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Monthly EM&A Report
August 2022

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/0684

Prepared by: Andy K. H. Choi

Reviewed by: Cyrus C. Y. Lai

Certified by: 

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Projects and Development Branch
Consultants Management Division
42/F, Revenue Tower,
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Wan Chai, Hong Kong

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

19 September 2022

By E-mail & Post

Dear Sir,

RE: CONTRACT NO. CM 13/2016
INDEPENDENT ENVIRONMENTAL CHECKER FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT WORKS (SHWSTW)
MONTHLY ENVIRONMENTAL MONITORING AND AUDIT (EM&A) REPORT (AUGUST 2022)

Reference is made to the submission of Monthly Environmental Monitoring and Audit (EM&A) Report for August 2022 (Report No.: 0041/17/ED/0684) from the Environmental Team (ET), Fugro Technical Services Ltd., received on 13 September 2022 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 Mr. Timmy WONG at 2815 7028.

Yours faithfully,

For and on behalf of
Allied Environmental Consultants Ltd.

Grace M. H. KWOK
Independent Environmental Checker

GK/jn/tw

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

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APPENDICES

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EXECUTIVE SUMMARY

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

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

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

This is the Sixty-first Monthly EM&A Report for the Project which summarizes findings of the EM&A works during the reporting period from 1 August 2022 to 31 August 2022 (the "reporting period").

Breaches of Action and Limit Levels

Odour patrol monitoring was resumed from January 2020 and carried out on 2, 8, 19, 26 and 31 August 2022. 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 17 August 2022. 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.

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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

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1.4 Works Undertaken during the Reporting Period

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

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

2. AIR QUALITY MONITORING

2.1 Methodology of H_2S Concentration Monitoring

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

Table 2.1 Equipment used for H_2S Concentration Monitoring

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

2.2 Methodology of 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

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		[4,5]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.
5) As instruction from the company of Discovery Bay Tunnel, odour patrol monitoring at OD5 (Spur Road near Discovery Bay Tunnel Outlet) was conducted on monthly basis.

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. Due to raining on 25 August 2022, the odour patrol monitoring was rescheduled to 26 August 2022. The odour patrol monitoring was carried out on 2, 8, 19, 26 and 31 August 2022. As instruction from the company of Discovery Bay Tunnel, odour patrol monitoring at OD5 (Spur Road near Discovery Bay Tunnel Outlet) was conducted on monthly basis.

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)
2 August 2022	OD1	33.0	62	E	0.3
	OD2			-	0.0
	OD3			SE	0.2
	OD4			-	0.0
	OD6			SE	0.4
	OD7			E	0.2
	OD8			NE	1.0
	OD9			NE	0.6
8 August 2022	OD1	27.0	98	-	0.0
	OD2			-	0.0
	OD3			NE	0.8
	OD4			-	0.0
	OD6			E	0.5
	OD7			E	0.2
	OD8			-	0.0
	OD9			-	0.0
19 August 2022	OD1	28.0	82	E	0.5
	OD2			-	0.0
	OD3			E	0.9
	OD4			-	0.0
	OD6			NE	1.4
	OD7			NE	0.3

	OD8			NE	0.2
	OD9			NE	0.7
26 August 2022	OD1	30.2	85	E	0.6
	OD2			-	0.0
	OD3			E	0.8
	OD4			SE	1.1
	OD5			NE	0.4
	OD6			E	0.2
	OD7			E	0.3
	OD8			NE	0.2
	OD9			E	0.8
31 August 2022	OD1	33.4	73	W	1.4
	OD2			W	0.7
	OD3			W	1.0
	OD4			-	0.0
	OD6			-	0.0
	OD7			-	0.0
	OD8			W	0.5
	OD9			W	1.0

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
OD5	0 – 1
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

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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 With reference to EPD's letter (Ref: Ax(7) to EP 2/No/F/50 Pt.7) dated 8 February 2022, Change of Laboratory on Water Quality Monitoring, Sediment Quality Monitoring and Benthic Survey (0041_17_ED_0632A) is approved. Fugro Technical Services Limited (HOKLAS Reg. No. 015), 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 23rd edition 5210B	1 mg/L
Total Suspended Solid	APHA 23rd edition 2540D	0.5 mg/L
Ammonia as N	APHA 23rd edition 4500 - NH_3 H	0.005 mg/L
Nitrate as N	APHA 23rd edition 4500 - NO_3^- I	0.005 mg/L
Nitrite as N	APHA 23rd edition 4500 - NO_2^- A & NO_3^- I	0.005 mg/L
Total Inorganic Nitrogen	By Calculation	0.01 mg/L

Analysis Description	Method	Reporting limits
Total phosphorus (soluble and particulate)	APHA 17th edition 4500-PB5 (digestion) and In-house method E-T-056 (determination)	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 17 August 2022. 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	6.01	29.04	8.08	22.60	5.1	0.14	54.1
		S	1	6.02	29.05	8.07	22.40	5.2	0.17	52.7
		M	8.5	5.94	29.01	8.08	22.79	6.4	0.11	70.6
		M	8.5	5.96	29.02	8.07	22.78	6.6	0.18	70.4
		B	16	5.91	28.74	8.04	22.91	7.2	0.14	64.1
		B	16	5.90	28.77	8.03	22.94	7.7	0.12	64.4
B	14	S	1	5.72	27.12	8.04	22.77	4.2	0.21	264.8
		S	1	5.71	27.11	8.03	22.76	4.4	0.24	266.1
		M	7	5.54	28.04	8.04	22.94	6.0	0.24	257.4
		M	7	5.58	28.06	8.06	22.99	5.7	0.26	256.9
		B	13	5.32	28.14	8.07	23.12	6.4	0.25	249.1
		B	13	5.31	28.19	8.06	23.16	6.1	0.27	244.1
C	12	S	1	5.75	28.97	8.04	22.39	5.1	0.13	92.4
		S	1	5.76	29.00	8.05	22.34	5.0	0.14	90.7
		M	6	5.54	28.51	8.07	22.74	7.1	0.19	89.1
		M	6	5.53	28.52	8.06	22.76	7.2	0.17	89.4
		B	11	5.31	28.24	8.08	22.94	8.0	0.14	78.4
		B	11	5.32	28.26	8.07	22.96	8.1	0.16	78.6
D	13	S	1	6.24	29.51	8.09	22.17	4.8	0.23	244.1
		S	1	6.26	29.52	8.07	22.16	4.7	0.25	254.1
		M	6.5	6.01	29.34	8.04	22.24	4.9	0.23	256.7
		M	6.5	6.01	29.33	8.05	22.26	4.8	0.24	255.1
		B	12	5.80	29.00	8.04	22.39	5.4	0.24	207.1
		B	12	5.82	29.04	8.06	22.31	5.5	0.21	205.1
E	16	S	1	5.92	28.85	7.91	22.56	4.4	0.15	98.4
		S	1	5.90	28.84	7.92	22.54	4.6	0.18	99.1
		M	8	5.71	28.81	7.97	22.60	4.3	0.06	142.5
		M	8	5.70	28.94	7.96	22.64	4.9	0.08	144.6
		B	15	5.68	28.79	7.94	22.78	1.7	0.21	136.8
		B	15	5.69	28.77	7.95	22.79	1.6	0.24	133.7
F	23	S	1	5.87	28.85	8.63	22.58	3.6	0.24	104.5
		S	1	5.86	28.89	8.64	22.59	3.7	0.26	106.7
		M	11.5	5.81	28.81	7.98	22.59	3.5	0.17	114.5
		M	11.5	5.79	28.83	7.99	22.58	3.6	0.12	116.2
		B	22	5.53	28.91	7.95	22.64	4.6	0.14	97.8
		B	22	5.56	28.92	7.94	22.66	4.4	0.19	90.1

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
G	22	S	1	6.02	29.01	8.15	22.10	3.9	0.19	98.7
		S	1	6.04	29.04	8.14	22.12	3.7	0.21	99.1
		M	11	5.65	28.81	8.09	22.97	7.2	0.17	104.6
		M	11	5.64	28.82	8.04	22.96	7.7	0.19	105.1
		B	21	5.52	28.70	8.07	23.18	1.2	0.14	117.3
		B	21	5.54	28.90	8.06	23.17	1.3	0.16	116.2
H	19	S	1	5.14	28.46	8.02	23.36	7.2	0.72	246.1
		S	1	5.16	28.49	8.03	23.34	7.1	0.71	223.8
		M	9.5	5.38	28.74	8.04	23.21	1.7	0.17	261.9
		M	9.5	5.39	28.77	8.03	23.20	1.8	0.18	264.8
		B	18	5.45	28.72	8.06	23.37	1.3	0.13	257.2
		B	18	5.48	28.74	8.06	23.36	1.4	0.12	256.4

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	15	S	1	5.72	28.85	7.99	18.59	2.4	0.13	72.4
		S	1	5.74	28.89	7.94	18.56	2.2	0.19	70.1
		M	7.5	5.85	28.84	8.00	18.68	4.3	0.17	69.4
		M	7.5	5.89	28.89	8.00	18.64	4.4	0.16	68.1
		B	14	5.52	28.72	7.98	18.91	5.1	0.13	63.4
		B	14	5.51	28.74	7.99	18.94	5.2	0.15	63.3
B	14	S	1	5.83	28.83	8.00	18.44	2.9	0.16	143.1
		S	1	5.83	28.84	8.01	18.43	2.8	0.12	138.2
		M	7	5.77	28.83	8.00	18.71	3.4	0.02	77.6
		M	7	5.76	28.84	8.01	18.72	3.3	0.18	78.9
		B	13	5.46	28.69	7.99	18.80	6.3	0.22	104.5
		B	13	5.45	28.66	7.98	18.81	6.6	0.24	106.7
C	12	S	1	5.37	28.73	8.02	16.02	5.2	0.24	75.1
		S	1	5.38	28.74	8.03	16.04	5.1	0.27	70.6
		M	6	5.27	28.62	8.01	16.23	1.2	0.26	92.4
		M	6	5.26	28.69	8.02	16.24	1.3	0.21	92.6
		B	11	5.23	28.58	8.01	16.59	1.9	0.19	79.4
		B	11	5.24	28.59	8.02	16.58	2.0	0.16	79.9
D	14	S	1	5.57	28.54	8.00	14.11	6.4	0.18	314.1
		S	1	5.56	28.59	8.01	14.13	6.6	0.14	306.2
		M	7	5.44	28.52	8.00	14.87	1.6	0.16	284.1
		M	7	5.48	28.54	8.02	14.86	1.7	0.13	281.7
		B	13	5.21	28.57	8.01	15.26	1.5	0.17	294.6
		B	13	5.24	28.56	8.02	15.27	1.7	0.19	299.6
E	14	S	1	6.30	29.18	8.08	21.62	4.4	0.14	90.7
		S	1	6.27	29.19	8.00	21.66	4.5	0.12	90.9
		M	7	6.04	29.12	8.07	21.89	4.9	0.18	104.1
		M	7	6.05	29.11	8.06	21.88	4.8	0.16	102.3
		B	13	5.87	29.02	8.08	22.34	5.2	0.17	114.5
		B	13	5.86	20.03	8.07	22.39	5.3	0.14	115.1
F	18	S	1	6.02	29.23	8.08	21.66	4.8	0.23	206.4

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
		S	1	6.01	29.24	8.07	21.64	4.4	0.29	206.6
		M	9	6.09	29.14	8.08	21.87	5.1	0.23	241.1
		M	9	6.08	29.16	8.09	21.88	5.2	0.28	241.2
		B	17	5.72	28.99	8.05	22.38	6.9	0.26	223.7
		B	17	5.70	28.94	8.06	22.39	6.7	0.27	220.6
G	13	S	1	6.28	29.26	8.14	22.36	4.6	0.14	23.5
		S	1	6.29	29.28	8.12	22.34	4.7	0.19	23.8
		M	6.5	6.06	29.04	8.12	22.49	5.9	0.17	40.1
		M	6.5	6.07	29.05	8.11	22.48	5.8	0.13	14.2
		B	12	5.84	29.26	8.11	22.84	6.4	0.18	38.1
		B	12	5.87	29.24	8.18	22.87	6.6	0.16	37.4
H	19	S	1	6.04	29.04	8.04	22.94	1.3	0.07	91.5
		S	1	6.03	29.06	8.06	22.99	1.2	0.08	90.7
		M	9.5	5.63	28.71	8.01	23.17	1.8	0.09	78.2
		M	9.5	5.62	28.72	8.02	23.16	1.7	0.10	78.9
		B	18	5.54	28.64	8.02	23.37	1.7	0.14	86.4
		B	18	5.56	28.61	8.06	23.41	1.8	0.16	86.1

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	5	0.059	0.11	0.79	0.96	11	0.02	<1
		S	1	6	0.075	0.11	0.74	0.93	12	0.02	<1
		M	8.5	5	0.078	0.11	0.77	0.96	13	0.03	<1
		M	8.5	6	0.067	0.11	0.68	0.86	16	0.03	<1
		B	16	7	0.053	0.11	0.79	0.95	12	0.02	<1
		B	16	7	0.066	0.11	0.79	0.97	11	0.02	<1
B	14	S	1	4	0.063	0.11	0.88	1.1	13	0.02	<1
		S	1	4	0.067	0.11	0.93	1.1	12	0.02	<1
		M	7	6	0.067	0.11	1.0	1.2	16	0.03	<1
		M	7	6	0.069	0.11	0.99	1.2	14	0.03	<1
		B	13	5	0.068	0.11	0.85	1.0	16	0.03	<1
		B	13	6	0.067	0.11	0.87	1.0	11	0.03	<1
C	12	S	1	7	0.066	0.12	0.99	1.2	0	0.02	<1
		S	1	7	0.069	0.12	0.91	1.1	0	0.03	<1
		M	6	6	0.085	0.12	1.1	1.3	3	0.02	<1
		M	6	5	0.066	0.12	0.95	1.1	1	0.02	<1
		B	11	7	0.073	0.12	0.94	1.1	1	0.02	<1
		B	11	7	0.077	0.12	0.83	1.0	1	0.02	<1
D	13	S	1	7	0.065	0.12	0.90	1.1	0	0.02	<1
		S	1	6	0.068	0.12	1.09	1.3	0	0.02	<1
		M	6.5	6	0.066	0.12	0.87	1.1	1	0.02	<1
		M	6.5	6	0.068	0.12	0.99	1.2	0	0.02	<1
		B	12	7	0.072	0.12	0.93	1.1	0	0.03	<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)
		B	12	8	0.062	0.12	0.97	1.2	0	0.03	<1
E	16	S	1	6	0.089	0.12	0.97	1.2	57	0.02	<1
		S	1	6	0.089	0.12	0.95	1.2	48	0.02	<1
		M	8	6	0.081	0.12	0.95	1.1	39	0.02	<1
		M	8	6	0.081	0.12	0.83	1.0	30	0.02	<1
		B	15	6	0.079	0.12	0.93	1.1	38	0.02	<1
		B	15	6	0.078	0.12	0.92	1.1	45	0.02	<1
F	23	S	1	6	0.071	0.12	0.90	1.1	40	0.03	<1
		S	1	6	0.065	0.12	1.0	1.2	33	0.03	<1
		M	11.5	6	0.072	0.12	1.1	1.2	30	0.02	<1
		M	11.5	6	0.070	0.12	0.94	1.1	39	0.02	<1
		B	22	6	0.079	0.12	0.92	1.1	32	0.02	<1
		B	22	6	0.078	0.12	0.97	1.2	38	0.02	<1
G	22	S	1	6	0.15	0.12	0.79	1.1	34	0.02	1.3
		S	1	6	0.13	0.12	0.77	1.0	40	0.02	1.0
		M	11	5	0.067	0.12	0.64	0.83	80	0.02	1.3
		M	11	6	0.069	0.12	0.54	0.72	110	0.02	1.3
		B	21	5	0.11	0.12	0.88	1.1	70	0.02	<1
		B	21	5	0.12	0.12	0.88	1.1	82	0.02	<1
H	19	S	1	6	0.078	0.12	0.90	1.1	70	0.02	<1
		S	1	5	0.079	0.12	0.84	1.0	69	0.02	1.2
		M	9.5	5	0.13	0.12	0.91	1.2	63	0.01	<1
		M	9.5	5	0.12	0.12	0.94	1.2	56	0.01	<1
		B	18	5	0.11	0.12	1.0	1.2	66	0.01	1.2
		B	18	6	0.11	0.12	1.1	1.3	50	0.02	<1

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	0.066	0.11	1.0	1.2	12	0.02	<1
		S	1	6	0.071	0.11	0.92	1.1	15	0.02	<1
		M	7.5	6	0.062	0.11	0.87	1.0	17	0.02	<1
		M	7.5	6	0.061	0.11	0.83	1.0	14	0.02	1.4
		B	14	6	0.062	0.11	0.76	1.0	13	0.03	<1
		B	14	6	0.063	0.11	0.85	1.0	18	0.03	<1
B	14	S	1	6	0.061	0.11	0.85	1.0	14	0.02	<1
		S	1	5	0.062	0.11	0.84	1.0	16	0.02	<1
		M	7	6	0.062	0.11	0.86	1.0	16	0.02	<1
		M	7	7	0.059	0.11	0.99	1.2	13	0.02	<1
		B	13	5	0.060	0.11	0.96	1.1	16	0.03	<1
		B	13	5	0.057	0.11	1.1	1.3	15	0.02	<1
C	12	S	1	6	0.060	0.12	0.88	1.1	1	0.02	<1
		S	1	6	0.056	0.12	0.79	1.0	1	0.02	<1
		M	6	6	0.063	0.12	0.82	1.0	0	0.02	<1
		M	6	5	0.062	0.12	0.76	0.9	1	0.02	<1
		B	11	4	0.061	0.12	0.79	1.0	1	0.02	<1
		B	11	5	0.060	0.12	0.71	0.9	1	0.02	<1
D	14	S	1	6	0.058	0.12	0.96	1.1	0	0.02	<1
		S	1	6	0.067	0.12	0.80	0.99	0	0.02	<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)
		M	7	5	0.059	0.12	0.82	1.0	8	0.02	<1
		M	7	5	0.060	0.12	0.85	1.0	7	0.02	<1
		B	13	5	0.058	0.12	0.83	1.0	11	0.02	<1
		B	13	6	0.070	0.12	0.82	1.0	9	0.03	<1
E	14	S	1	6	0.063	0.11	0.83	1.0	36	0.02	<1
		S	1	5	0.061	0.11	0.80	0.98	35	0.02	<1
		M	7	5	0.067	0.12	0.85	1.0	41	0.02	<1
		M	7	6	0.066	0.11	0.77	0.95	55	0.02	<1
		B	13	7	0.086	0.11	0.86	1.1	46	0.02	<1
		B	13	6	0.063	0.11	0.89	1.1	50	0.02	<1
F	18	S	1	6	0.071	0.11	0.81	0.99	50	0.03	<1
		S	1	5	0.070	0.11	1.2	1.4	39	0.02	<1
		M	9	4	0.11	0.11	0.74	0.96	52	0.02	1.4
		M	9	4	0.11	0.11	0.71	0.93	62	0.02	1.2
		B	17	5	0.087	0.11	0.68	0.88	46	0.02	1.2
		B	17	5	0.780	0.11	0.63	0.83	38	0.02	1.2
G	13	S	1	6	0.15	0.12	0.60	0.87	46	0.02	1.4
		S	1	7	0.14	0.12	0.63	0.89	66	0.02	1.3
		M	6.5	6	0.13	0.12	0.65	0.89	52	0.02	1.4
		M	6.5	7	0.13	0.12	0.59	0.83	45	0.02	1.3
		B	12	7	0.13	0.12	0.57	0.82	53	0.02	1.1
		B	12	6	0.13	0.12	0.57	0.82	48	0.02	1.0
H	19	S	1	6	0.060	0.12	0.85	1.0	70	0.02	1.3
		S	1	6	0.061	0.12	0.92	1.1	62	0.02	<1
		M	9.5	6	0.060	0.12	0.91	1.1	59	0.01	1.5
		M	9.5	6	0.058	0.12	0.96	1.1	66	0.02	1.4
		B	18	5	0.11	0.12	0.79	1.0	50	0.02	1.3
		B	18	7	0.11	0.12	1.2	1.5	49	0.02	1.5

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)		
17 August 2022	32.3	28.2	26.2	86	29.8

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 With reference to EPD's letter (Ref: Ax(7) to EP 2/No/F/50 Pt.7) dated 8 February 2022, Change of Laboratory on Water Quality Monitoring, Sediment Quality Monitoring and Benthic Survey (0041_17_ED_0632A) is approved. Fugro Technical Services Limited (HOKLAS Reg. No. 015), 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 8.1, 8.5 and 8.7	1%
Total Organic Carbon	APHA 23rd edition 5310B	0.05%
pH value	APHA 23rd edition 4500-H^+B	0.1 pH unit
Ammonia as N	APHA 23rd edition 4500 NH3: B & C / In house method E-T-039	0.5 mg/kg
Total Nitrogen	APHA 23rd edition 4500 N_{org}: D (digestion), In-house method E-T-036, E-T-037 & APHA 23rd edition 4500 - NO_3^- I	10 mg/kg
Total Phosphorus	APHA 17th edition 4500 – PB.5 (digestion) & In house method E-T-056 (determination)	10 mg/kg
Cadmium	USEPA method 3050B (digestion) and 6020A (determination)	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 17 August 2022. 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	8.3	6.2	880	1200	<0.1	22	23	29	0.07	12	83	12	0.2
B	7.9	11	1300	940	<0.1	29	30	36	0.15	16	94	10	0.3
C	7.9	10	1200	950	0.1	29	30	37	0.11	17	94	11	0.3
D	8.1	7.4	1200	920	0.1	29	29	36	0.09	16	100	10.0	0.3
E	7.9	14	1500	1000	<0.1	32	33	40	0.17	18	100	10.0	0.4
F	7.9	18	1500	1200	<0.1	33	34	41	0.15	19	110	11.0	0.4
G	8.1	8.0	1100	1000	<0.1	29	39	36	0.10	17	110	10.0	0.3
H	7.9	12	1400	960	<0.1	21	27	25	<0.05	11	66	5.9	0.2

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	0.91	0	5	50	45	Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
B	0.73	0	19	37	44	Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
C	0.90	5	43	22	30	Moist, dark grey, slightly gravelly, sandy SILT/CLAY with shell fragments
D	0.81	1	11	40	48	Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
E	0.95	0	4	42	54	Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
F	0.90	0	1	43	56	Moist, dark grey, slightly sandy SILT/CLAY with shell fragments
G	0.66	3	13	37	47	Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
H	0.74	0	4	39	57	Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments

4.10.2 Rinsate blank was collected for chemical analysis. The laboratory data results are provided in **Appendix 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)		
17 August 2022	32.3	28.2	26.2	86	29.8

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 17 August 2022

Monitoring Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	62	20.01	9	1.09	0.49
B	84	12.20	8	0.92	0.44
C	53	0.39	7	1.06	0.54
D	68	4.46	6	1.40	0.78
E	49	1.41	8	1.33	0.64
F	45	0.62	6	1.35	0.75
G	50	3.28	7	1.11	0.57
H	26	0.15	5	1.10	0.68

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

i) Abundance

A total of 437 benthic organisms were recorded from the eight monitoring stations during August 2022 monitoring period. Current monitoring results showed lower total monthly abundance compared to both dry (March 2004) and wet (August 2004) seasons baseline data results. Similar with previous monitoring periods, total monthly abundance of benthic organisms exhibits significant seasonal variation (F-value = 4.56; F-crit =1.53; p-value = 7.64E-11; $\alpha = 0.05$).

In terms of spatial distribution, the lowest abundance of 26 ind. was recorded in the reference station, Station H, while the highest (84 ind.) was also noted in other reference station, Station B. Total macrobenthic abundances, similar with the previous monitoring periods, showed statistically significant spatial distribution (F-value = 3.55; F-crit = 2.05; P-value = 0.001; $\alpha = 0.05$).

ii) Biomass

The total wet biomass recorded in the eight monitoring stations was 42.51 g with the highest biomass recorded in the reference station, Station A (20.01 g) while the lowest biomass (0.15 g) was observed in the reference station, Station H. Relative to the June 2022 period, a general increase in biomass was observed during the current monitoring period. Most of the current increase was attributed to the biomass increase of Trypauchen and Styela in the benthic community.

iii) Taxonomic Composition

A total of five phyla comprising of 18 families and about 22 genera were identified. During the current monitoring period, the annelids (88.56%) dominated the macrobenthic assemblage, followed by the molluscs (8.47%). Relative to June 2022 community assemblage, current results showed that annelids still maintained to dominate the community.

The dominance of annelids in the community assemblage was still noted as it is still wet season during the current survey.

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iv) Diversity

Benthic diversity index (H') in the impact stations ranged from 1.06 to 1.40. In the reference stations, H' values ranged from 0.92 to 1.35. Currently, reference station, Station D had the highest diversity value among the different monitoring stations, while the lowest was the reference station, Station B. In terms of evenness index (J) values, impact Station D was noted with relatively high value as compared to other monitoring stations. Moreover, current monitoring results indicated an overall increase in both 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 7 July 2022, "*Monitoring of Marine Mammals in Hong Kong Waters (2021-22)*", in terms of the distribution and abundance of CWDs, was reviewed. The discharge point of Siu Ho Wan outfall is situated at a location about 1km off Northeast Lantau (NEL), as such our scope shall solely focus on CWDs findings within this area. The increased amount of sewage discharged from Siu Ho Wan Sewage Treatment Works has been identified as a potential issue of concern for CWDs. Referring to the latest AFCD's report, "Monitoring of Marine Mammals in Hong Kong Waters (2021-22)", 165 line-transact vessel surveys with a total survey effort of 6.566.1km was conducted amongst 10 survey areas in Hong Kong from April 2021 to March 2022; the survey areas included NEL, Northwest Lantau (NWL), West Lantau (WL), Southwest Lantau (SWL), Southeast Lantau (SEL), Deep Bay (DB), Lamma (LM), Po Toi (PT), Ninepins (NP), and Sai Kung (SK). Additionally, under the Hong Kong-Zhuhai-Macao Bridge related EM&A, supplementary surveys with a survey effort of 3,325.2km were conducted at NEL and NWL, bringing the total survey effort to 4,592.8km in North Lantau waters.

5.1.3 During the 12-month monitoring period – from the AFCD monitoring surveys, 158 groups of 554 CWDs were sighted from April 2021 to March 2022. Additionally, the complementary sighting contributed from HZMB-related EM&A surveys, a total of 170 groups of 582 dolphin were sighted altogether during the 12-month monitoring period. Among them, 160 groups of 552 dolphins were sighted during the on-effort line-transect vessel surveys while the remaining numbers were sighted during the off-effort search.

5.1.4 During the 2021-2022 monitoring period, dolphin sightings were only made in the WL (124 sightings), SWL (31), and NWL (15) survey areas. Despite a significant amount of effort has been made, no sighting occurred in DB, NEL, SEL, or EL survey areas. As in previous monitoring periods, no dolphin was sighted in LM, PT or NP survey areas where porpoises primarily occur on a regular basis.

5.1.5 The associated impact of increased effluent discharged from Siu Ho Wan outfall on the CWDs is not mentioned in this report. Despite the combined effort of the AFCD and HZMB-related surveys, only a handful of dolphin sightings were made at the western end of the NWL area. However, there were no dolphins sighted at the central and eastern portions of North Lantau waters, including most of the peripheral of the Three Runway System (3RS) project work zone and the footprints of the HZMB at the juncture of NWL and NEL survey areas.

5.1.6 Regarding the habit use pattern of dolphins in the North Lantau region, an alarming decline has been well documented within the Brothers Marine Park and the Sha Chau and Lung Kwu Chau Marine Park in recent years, with the occurrence has noticeably diminished since 2013. Such a trend continued, and there is a complete absence of dolphins in NEL waters as no dolphin sighting was reported in recent AFCD surveys in consecutive years (2015-2021). Moreover, the continuous absence of dolphins in the central and eastern parts of the region

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since 2015 is of great concern, as no apparent signs of recovery in habitat use have been observed even after the completion of marine work associated with the HZMB construction in 2016, and the major reclamation works associated with the 3RS expansion in 2020. Continuous acoustic monitoring is critical to detect any signs of dolphin despite the recovery remains at very low levels.

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 M**.

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 M**.

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8. SUMMARY OF EXCEEDANCE OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS

8.1.1 Odour patrol monitoring was resumed and carried out on 10, 16, 22 and 28 June 2022. 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 17 August 2022. 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 L**.

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 2, 8, 19, 26 and 31 August 2022. 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 17 August 2022 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 7 July 2022, "*Monitoring of Marine Mammals in Hong Kong Waters (2021-22)*" in terms of the distribution and abundance of CWDs was reviewed. According to the advice from AFCD, the data of distribution and abundance of CWDs would only be available in the annual reports for Monitoring of Marine Mammals In Hong Kong Waters which cover monitoring data from 1 April to 31 March (next year). The updated status of the distribution and abundance of CWDs will be provided once the annual report (2022-23) is uploaded to AFCD"s webpage.

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

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

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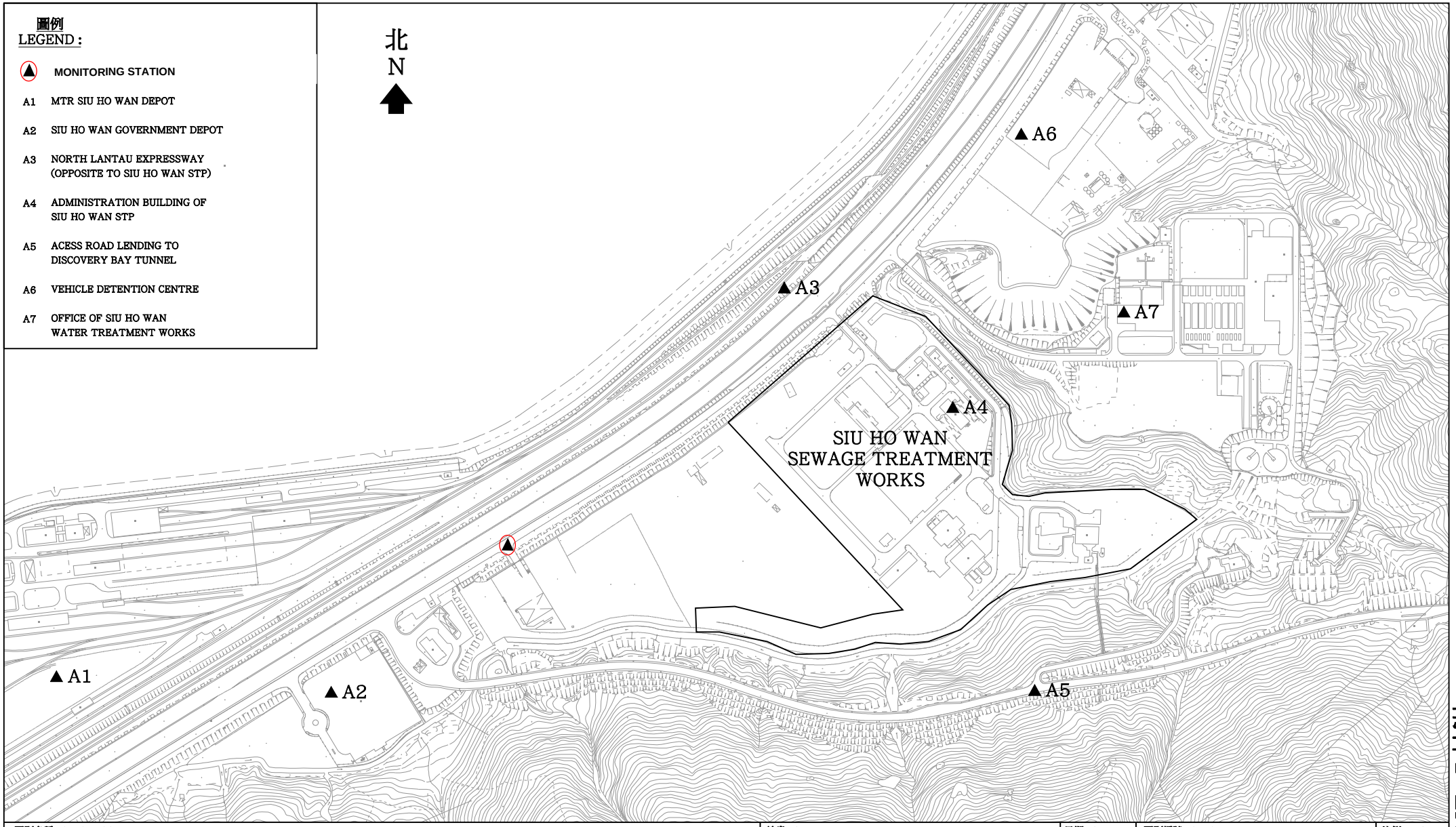
Figure 1

Monitoring Stations of Air Sensitive Receivers



圖則名稱 drawing title

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

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

圖則編號 drawing no. DCM/2006/063

比例 scale N.T.S.

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

附件1 ENCLOSURE 1

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Figure 2

Odour Patrol Points of Modified Odour Patrol

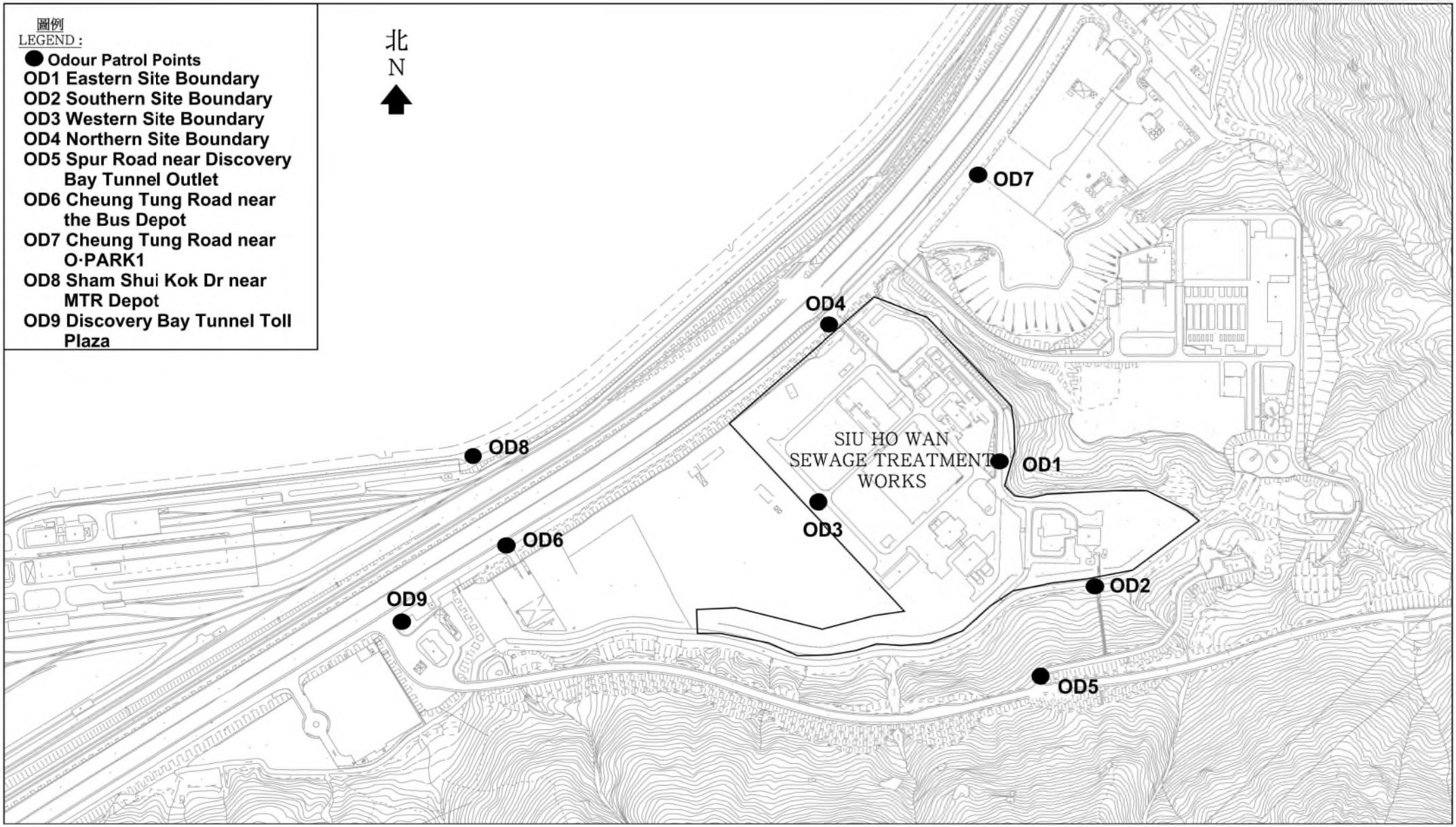
圖例
LEGEND :
Odour Patrol Points
OD1 Eastern Site Boundary
OD2 Southern Site Boundary
OD3 Western Site Boundary
OD4 Northern Site Boundary
OD5 Spur Road near Discovery Bay Tunnel Outlet
OD6 Cheung Tung Road near the Bus Depot
OD7 Cheung Tung Road near O·PARK1
OD8 Sham Shui Kok Dr near MTR Depot
OD9 Discovery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

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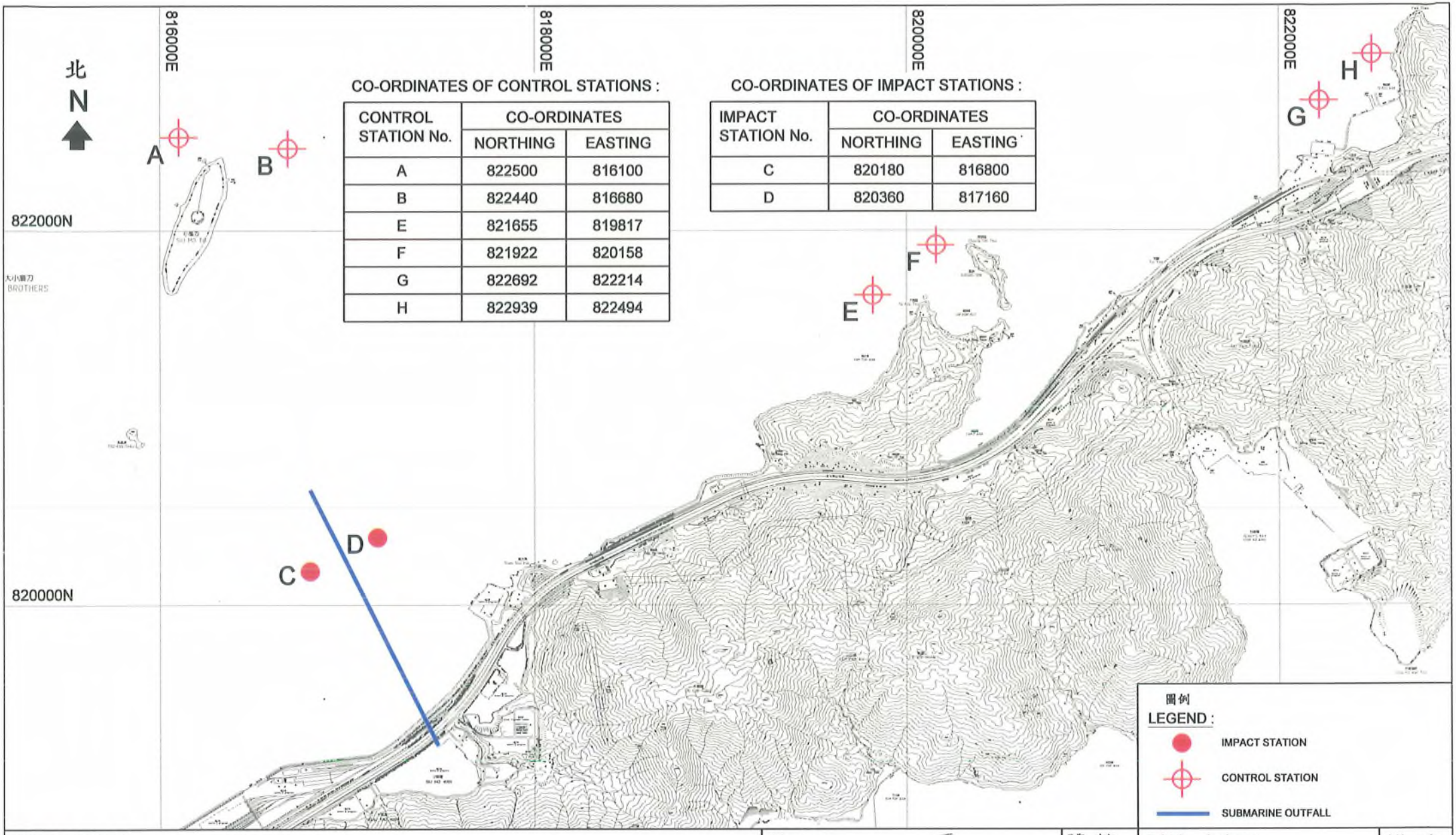
Figure 3

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

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Figure 4

Location of the Tide Gauge

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Location of the Tide Gauge

Source: Google Maps

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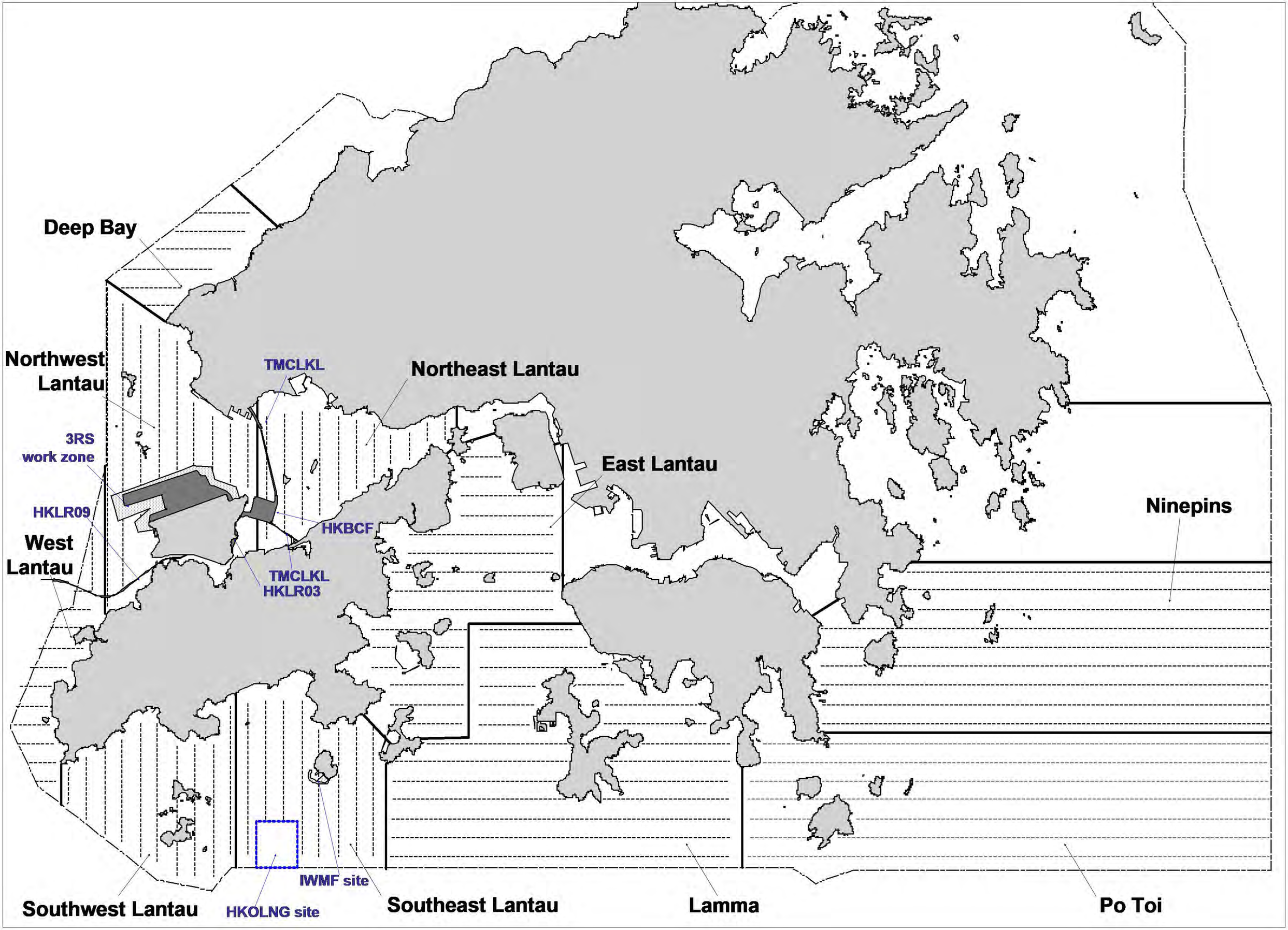
Figure 5

Location of Survey Areas of Chinese White Dolphins



Ten Line-Transect Survey Areas within the Study Area chosen for the 2021-22 AFCD Monitoring Study

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Appendix A

Project Organization Chart

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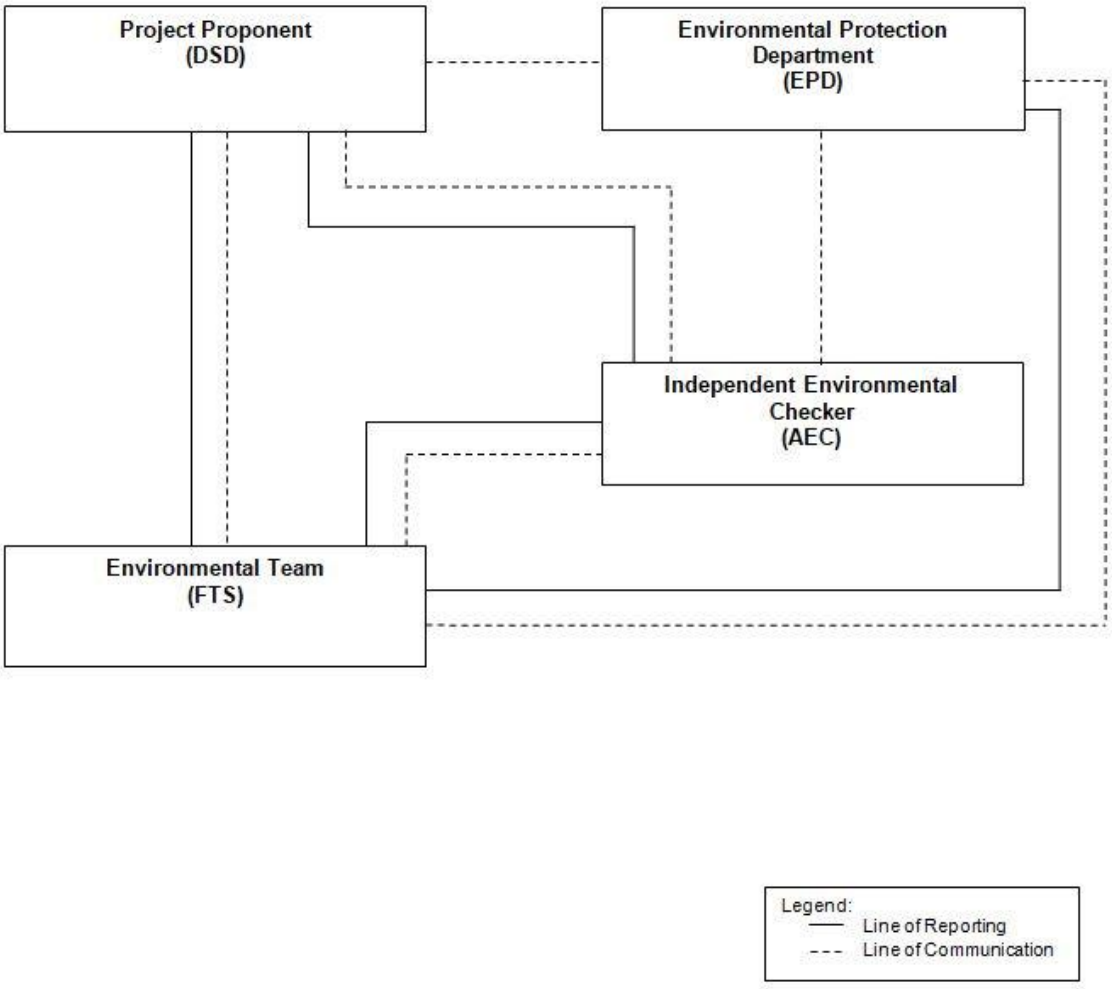

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Appendix B

Monitoring Schedule for Present and Next Reporting Period

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Website : www.fugro.com

Report No.: 0041/17/ED/0684

Monitoring Schedule for the Present Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
	1 August	2 Odour Patrol	3	4	5	6
7	8 Odour Patrol	9	10	11	12	13
14	15	16	17 Water Quality Monitoring and Sediment Quality Monitoring and Benthic Survey Mid-Flood (09:51) Mid-Ebb (16:01)	18	19 Odour Patrol	20
21	22	23	24	25 Odour Patrol	26	27
28	29	30	31 Odour Patrol			

Remarks

1. Due to raining on 25 August 2022, the odour patrol monitoring was rescheduled to 26 August 2022.

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Monitoring Schedule for the Next Reporting Period

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

Remarks

2. 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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Appendix D

Results and Graphical Presentation of Air Quality Monitoring

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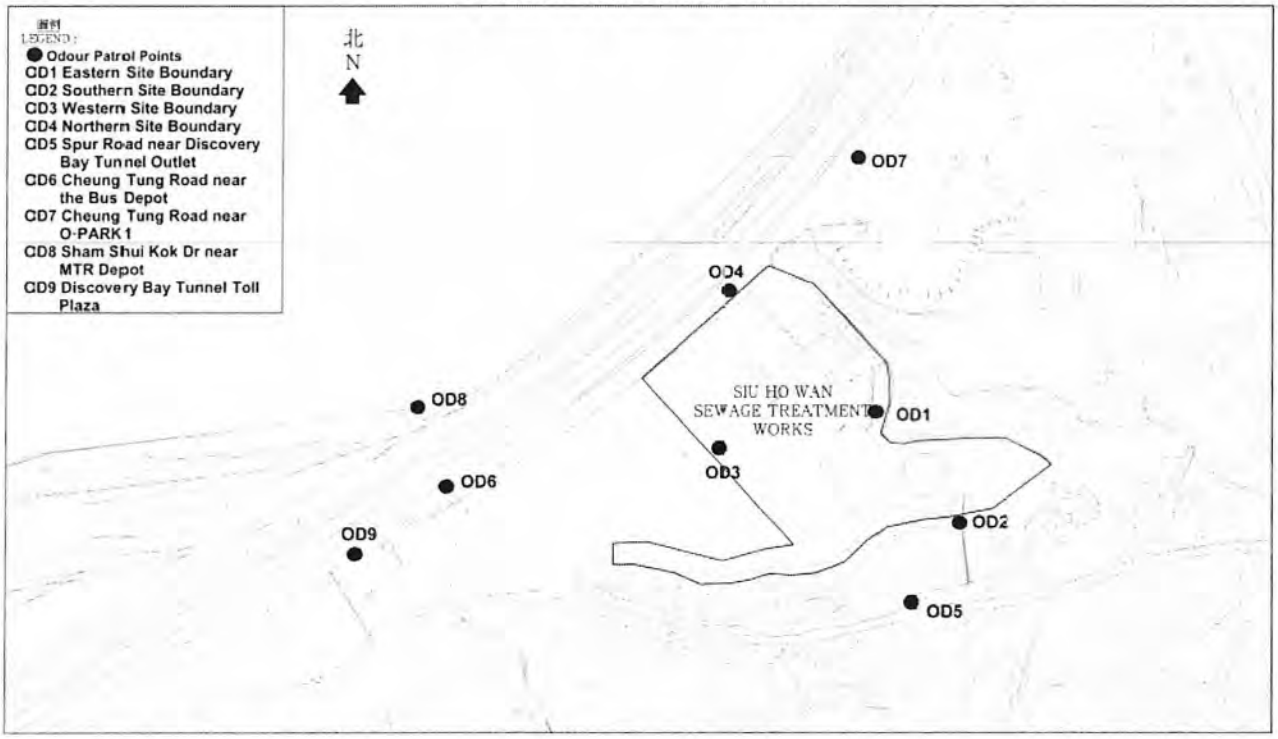
Email : mcl@fugro.com.hk

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	2/8/2022	Weather	Fine	Temperature	33°C	Humidity	62%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	1149	E	0.3	0	/
OD2	Southern Site Boundary	1151	/	0	0	/
OD3	Western Site Boundary	1147	SE	0.2	0	/
OD4	Northern Site Boundary	1145	/	0	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	1127	SE	0.4	0	/
OD7	Cheung Tung Road near O·PARK1	1130	E	0.2	0	/
OD8	Sham Shui Kok Dr near MTR Depot	1119	NE	1.0	0	/
OD9	Discovery Bay Tunnel Toll Plaza	1125	NE	0.6	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: Ip
Name: Ip Tsz Hin
Date: 2/8/2022

Checked by: Choi
Name: CHOI KAM HO
Date: 2 August 2022

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Email : mcl@fugro.com.hk

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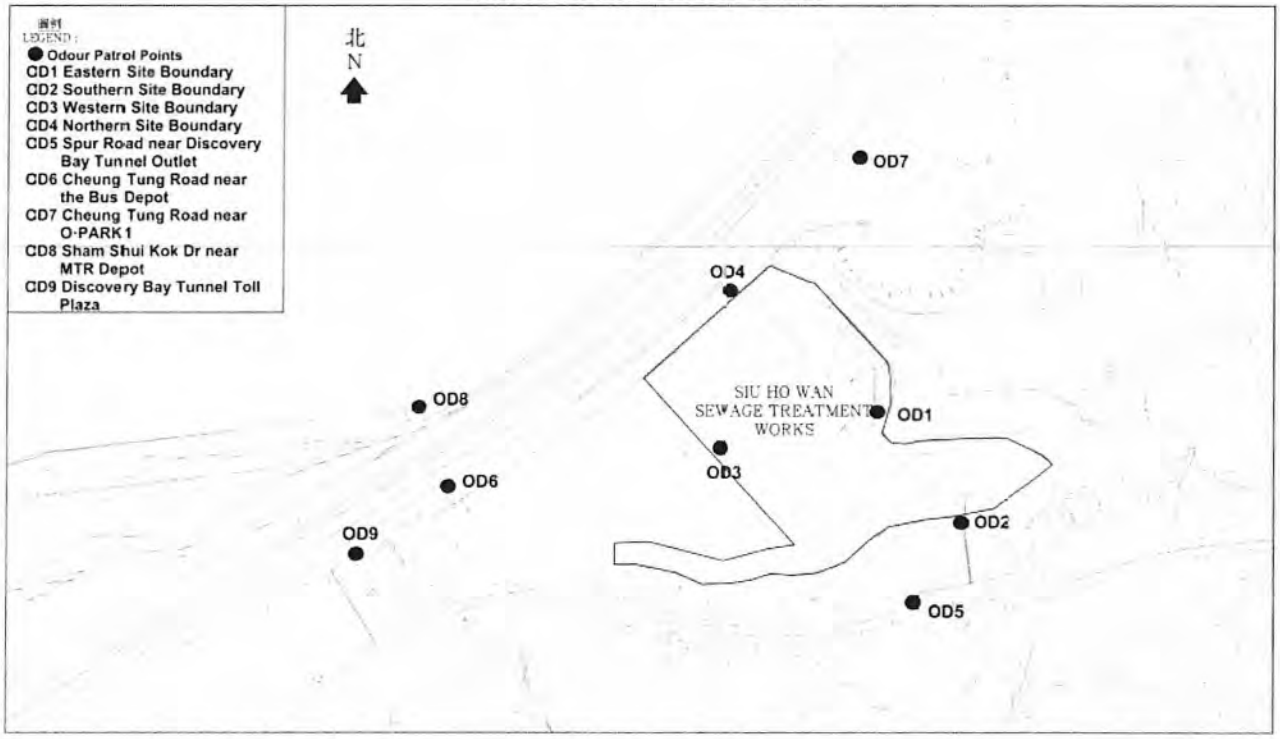
Odour Patrol Record Sheet



Date	2/8/2022	Weather	Fine	Temperature	33°C	Humidity	62%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	11:49	E	0.3	0	/
OD2	Southern Site Boundary	11:51	/	0	0	/
OD3	Western Site Boundary	11:47	SE	0.2	0	/
OD4	Northern Site Boundary	11:45	/	0	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	11:27	SE	0.4	0	/
OD7	Cheung Tung Road near O·PARK1	11:30	E	0.2	0	/
OD8	Sham Shui Kok Dr near MTR Depot	11:19	NE	1.0	0	/
OD9	Discovery Bay Tunnel Toll Plaza	11:25	NE	0.6	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: W. L.
Name: Wong Wa Yan
Date: 2/8/2022

Checked by: AY
Name: CHOI KAM HO
Date: 2 August 2022

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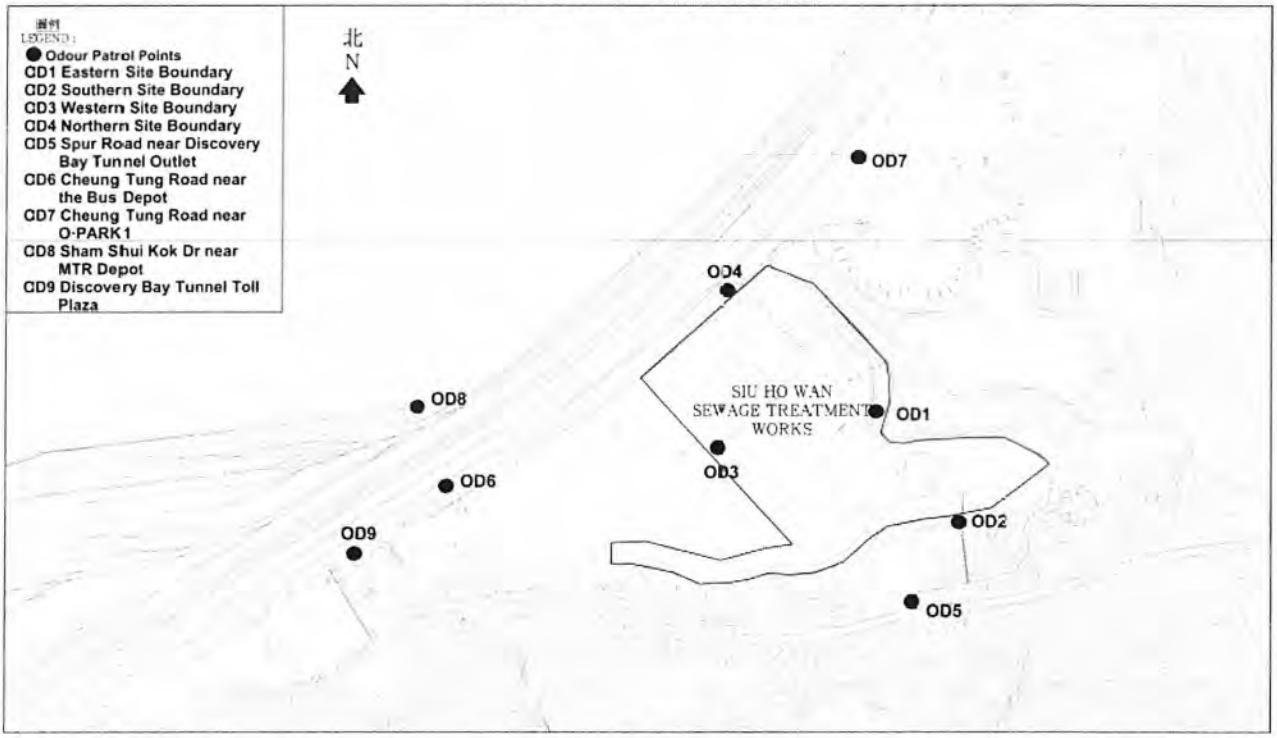

Date	8/8/2022	Weather	Cloudy	Temperature	27°C	Humidity	98%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	1118	—	0	0	—
OD2	Southern Site Boundary	1121	—	0	0	—
OD3	Western Site Boundary	1116	NE	0.3	0	—
OD4	Northern Site Boundary	1112	—	0	0	—
OD5	Spur Road near Discovery Bay Tunnel Outlet	—	—	—	—	—
OD6	Cheung Tung Road near the Bus Depot	1100	E	0.5	0	—
OD7	Cheung Tung Road near O·PARK1	1052	E	0.2	0	—
OD8	Sham Shui Kok Dr near MTR Depot	1041	—	0	0	—
OD9	Discovery Bay Tunnel Toll Plaza	1105	—	0	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 Lun
Date: 8/8/2022

Checked by: _____
Name: CHOI KAM HO
Date: 9 August 2022

FUGRO TECHNICAL SERVICES LIMITED
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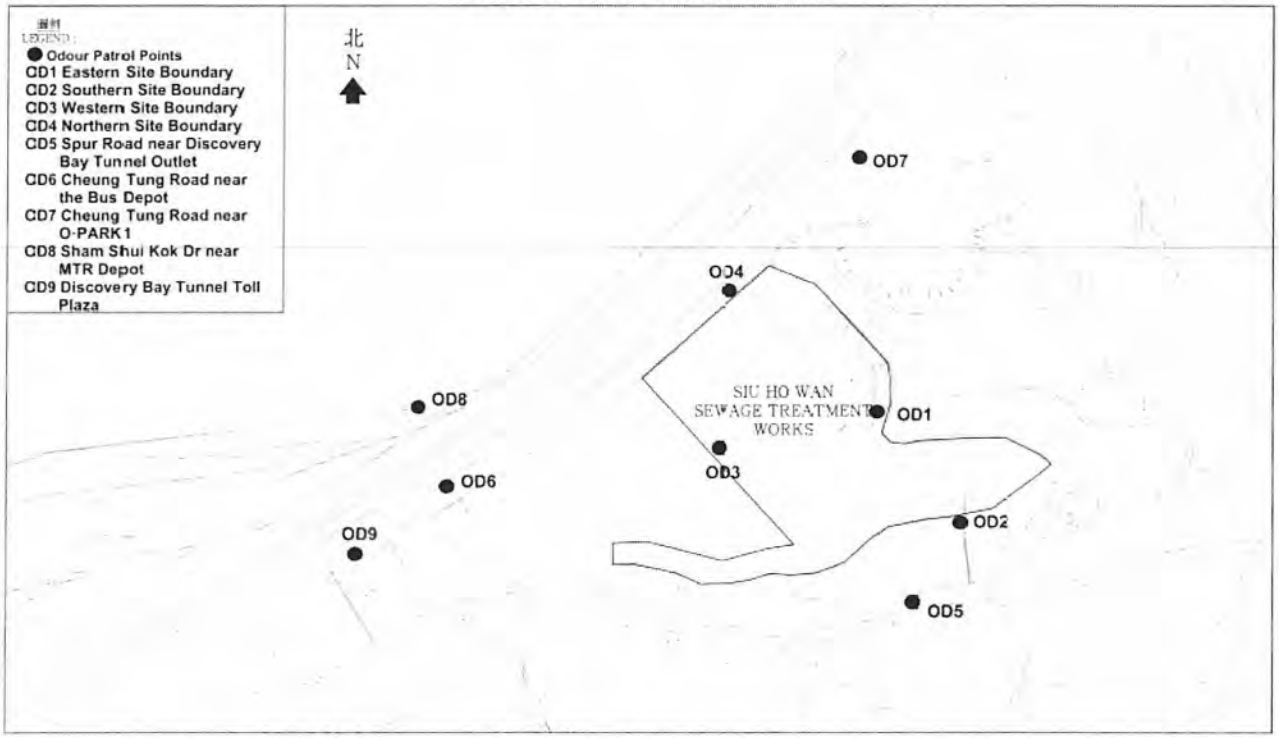

Date	8/8/2022	Weather	Cloudy	Temperature	27°C	Humidity	98%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	1114	/	0	0	/
OD2	Southern Site Boundary	1121	/	0	0	/
OD3	Western Site Boundary	1116	NE	0.8	0	/
OD4	Northern Site Boundary	1112	/	0	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	1100	E	0.5	0	/
OD7	Cheung Tung Road near O·PARK1	1052	E	0.2	0	/
OD8	Sham Shui Kok Dr near MTR Depot	1049	/	0	0	/
OD9	Discovery Bay Tunnel Toll Plaza	1105	/	0	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: Ip Tsz Him
Date: 8/8/2022

Checked by: _____
Name: CHOI Kam Ho
Date: 8 August 2022

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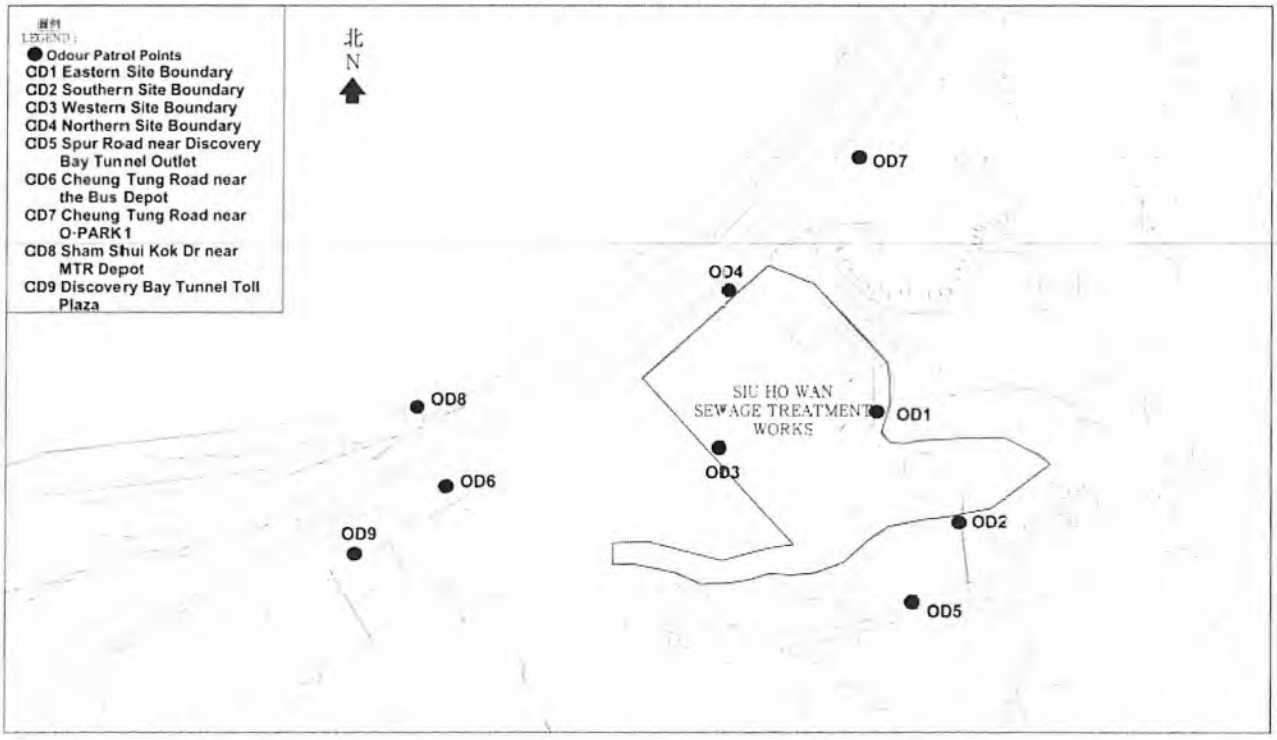

Date	19/8/2022	Weather	Fine	Temperature	28°C	Humidity	82%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	1114	E	0.5	0	/
OD2	Southern Site Boundary	1116	/	0	0	/
OD3	Western Site Boundary	1111	E	0.9	0	/
OD4	Northern Site Boundary	1109	/	0	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	1055	NE	1.4	0	/
OD7	Cheung Tung Road near O·PARK1	1049	NE	0.3	0	/
OD8	Sham Shui Kok Dr near MTR Depot	1037	NE	0.2	0	/
OD9	Discovery Bay Tunnel Toll Plaza	1059	NE	0.7	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: Wong Wa Yan
Date: 19/8/2022

Checked by: _____
Name: CHOI KAM HO
Date: 19 August 2022

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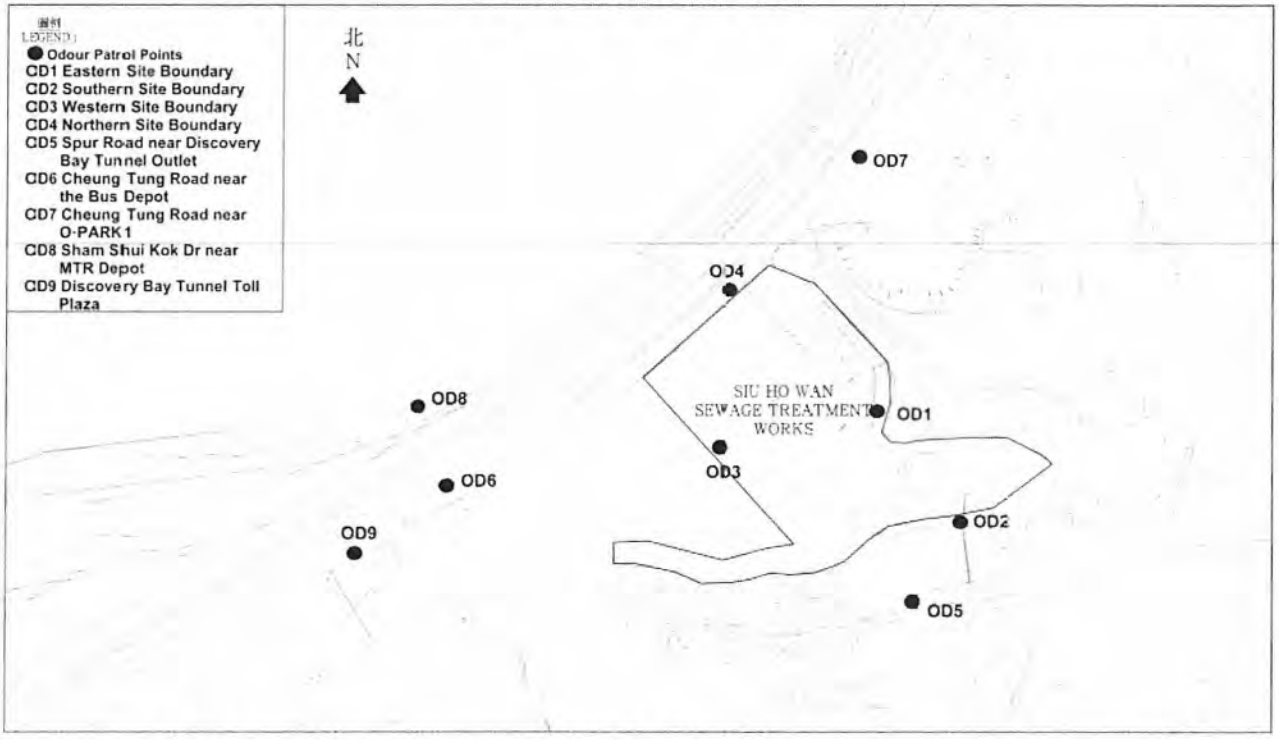

Date	19/8/2022	Weather	Fine	Temperature	29.0°C	Humidity	82%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	11:14	E	0.5	0	/
OD2	Southern Site Boundary	11:16	/	0	0	/
OD3	Western Site Boundary	11:11	E	0.9	0	/
OD4	Northern Site Boundary	11:08	/	0	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	10:55	NE	1.4	0	/
OD7	Cheung Tung Road near O·PARK1	10:49	NE	0.3	0	/
OD8	Sham Shui Kok Dr near MTR Depot	10:38	NE	0.2	0	/
OD9	Discovery Bay Tunnel Toll Plaza	10:59	NE	0.7	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: Ip Tsz Him
Name: Ip Tsz Him
Date: 19/8/2022

Checked by: CHUI KAM HO
Name: CHUI KAM HO
Date: 19 August 2022

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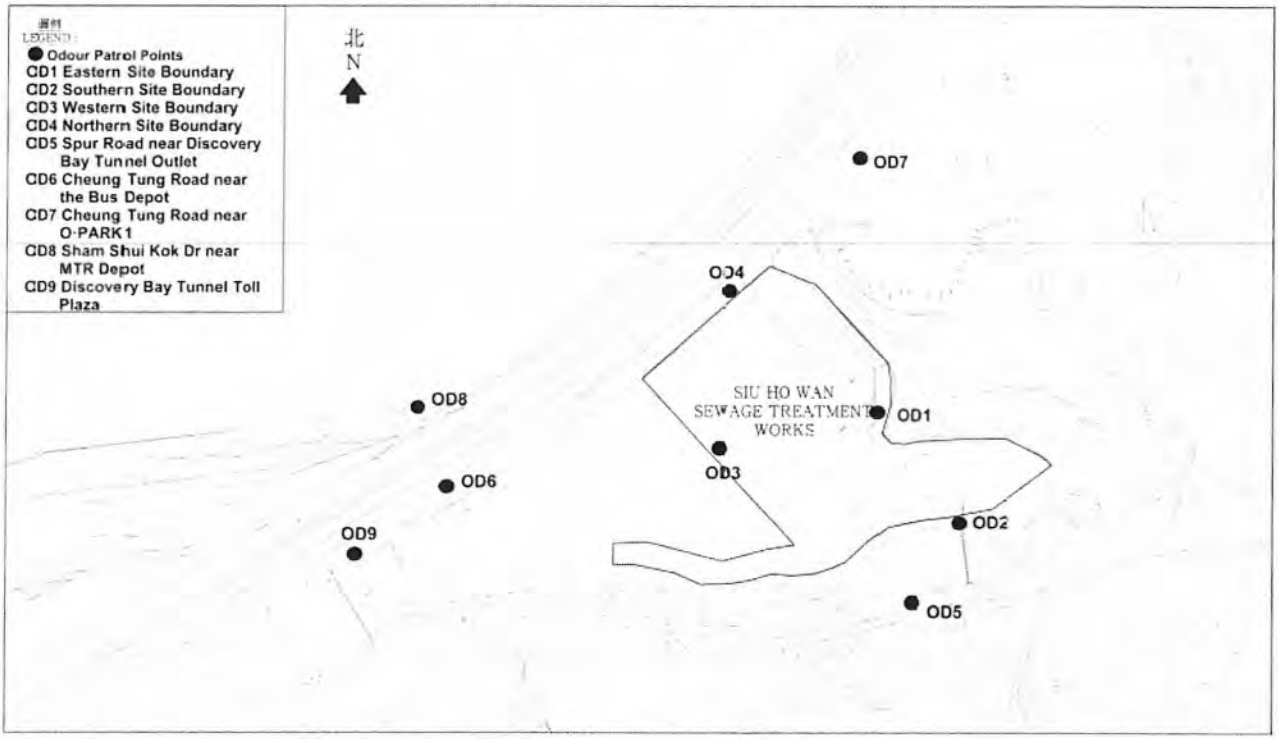


Date	2022/8/26	Weather	Fine	Temperature	30.2°C	Humidity	85%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	15:34	E	0.6	0	/
OD2	Southern Site Boundary	15:36	/	/	1	Effluent
OD3	Western Site Boundary	15:55	E	0.8	0	/
OD4	Northern Site Boundary	15:31	SE	1.1	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	15:23	NE	0.4	1	Effluent
OD6	Cheung Tung Road near the Bus Depot	15:03	E	0.2	0	/
OD7	Cheung Tung Road near O·PARK1	15:07	E	0.3	0	/
OD8	Sham Shui Kok Dr near MTR Depot	14:37	NE	0.2	0	/
OD9	Discovery Bay Tunnel Toll Plaza	15:06	E	0.8	0	/

***Classification Criteria:**

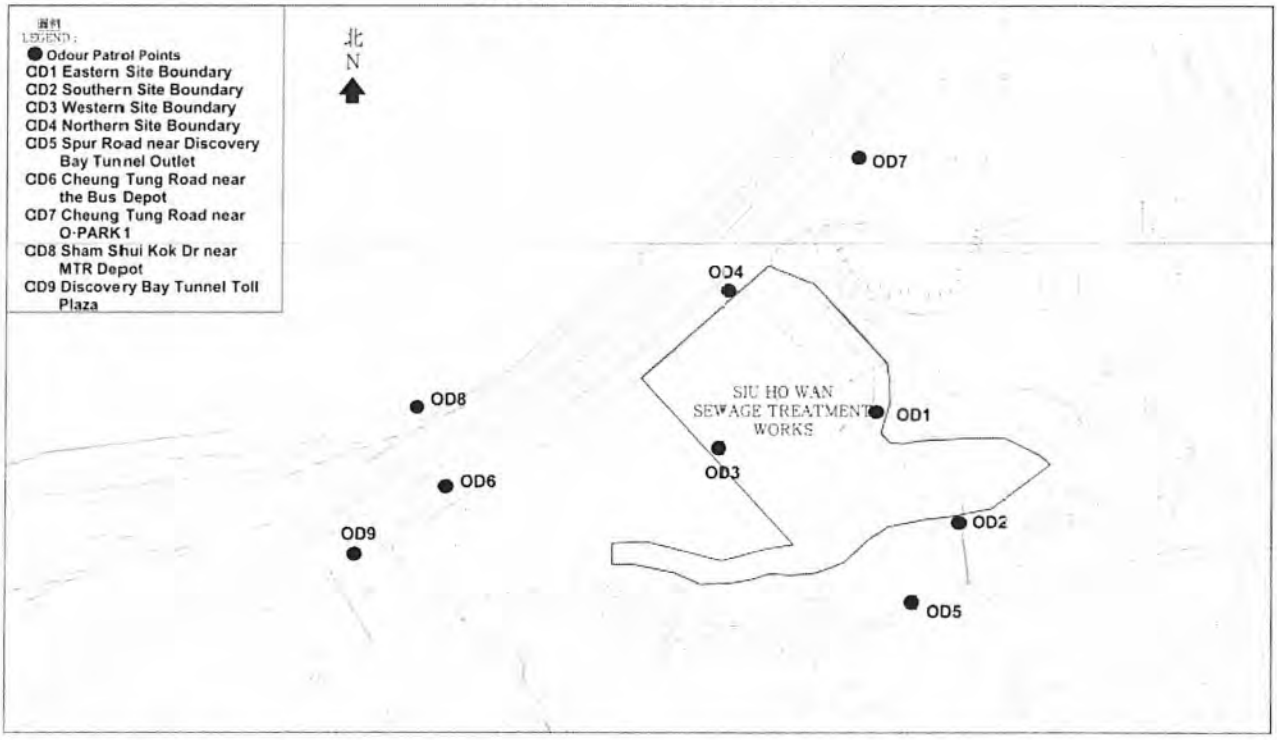
Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely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

Recorded by:
Name: Yeung Tak Sang
Date: 2022/8/26

Checked by:
Name: CHOI KAM HO
Date: 26 August 2022

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	26/8/2022	Weather	Fine	Temperature	30.2°C	Humidity	85%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	15:34	E	0.6	0	/
OD2	Southern Site Boundary	15:36	/	0	1	Effluent
OD3	Western Site Boundary	15:33	E	0.8	0	/
OD4	Northern Site Boundary	15:31	SE	1.1	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	15:23	NE	0.4	0	/
OD6	Cheung Tung Road near the Bus Depot	15:03	E	0.2	0	/
OD7	Cheung Tung Road near O·PARK1	15:01	E	0.3	0	/
OD8	Sham Shui Kok Dr near MTR Depot	14:37	NE	0.2	0	/
OD9	Discovery Bay Tunnel Toll Plaza	15:06	E	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: Tsz Him
Name: Ip Tsz Him
Date: 26/8/2022

Checked by: CHOI KAM HO
Name: CHOI KAM HO
Date: 26 August 2022

FUGRO TECHNICAL SERVICES LIMITED
Room 723 - 726, 7/F, Block B,
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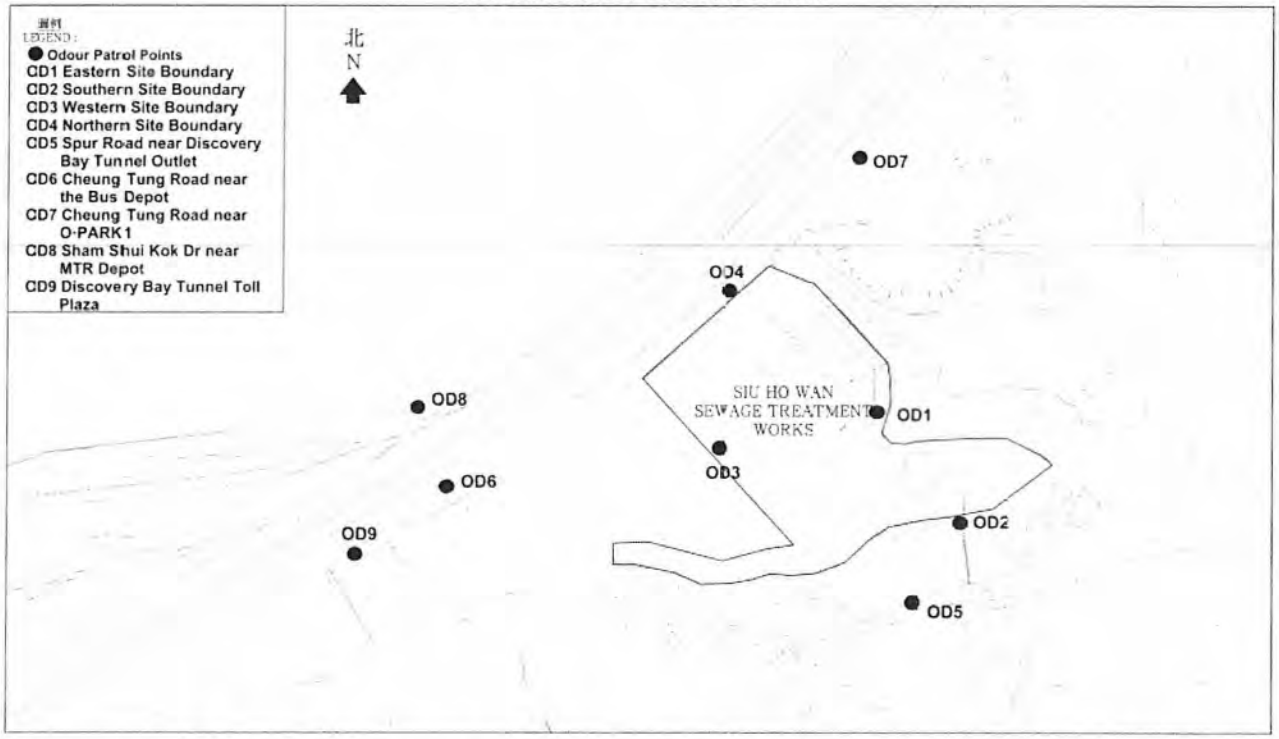

Date	31/8/2022	Weather	Fine	Temperature	33.4°C	Humidity	73%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	11:13	W	1.4	0	/
OD2	Southern Site Boundary	11:15	W	0.7	0	/
OD3	Western Site Boundary	11:11	W	1	0	/
OD4	Northern Site Boundary	11:09	/	0	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	10:39	/	0	0	/
OD7	Cheung Tung Road near O-PARK1	10:43	/	0	0	/
OD8	Sham Shui Kok Dr near MTR Depot	1033	W	0.5	0	/
OD9	Discovery Bay Tunnel Toll Plaza	10:37	W	1	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: W. L
Name: Wong Wa Yan
Date: 31/8/2022

Checked by: [signature]
Name: CHOI KAM HO
Date: 31 August 2022

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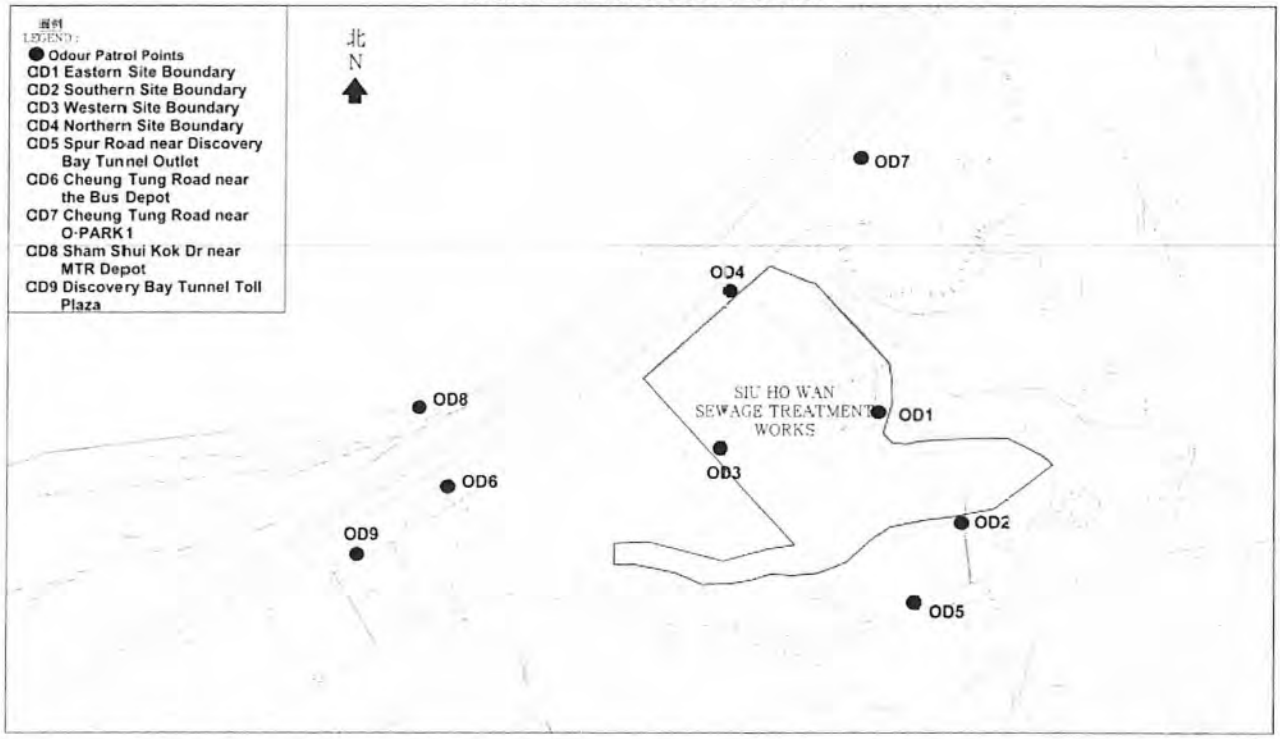
Contract No. CM 14/2016
Environmental Team for Operational Environmental Monitoring and Audit for Siu Ho Wan Sewage Treatment Works
Odour Patrol Record Sheet



Date	31/8/2022	Weather	Fine	Temperature	33.4°C	Humidity	73%

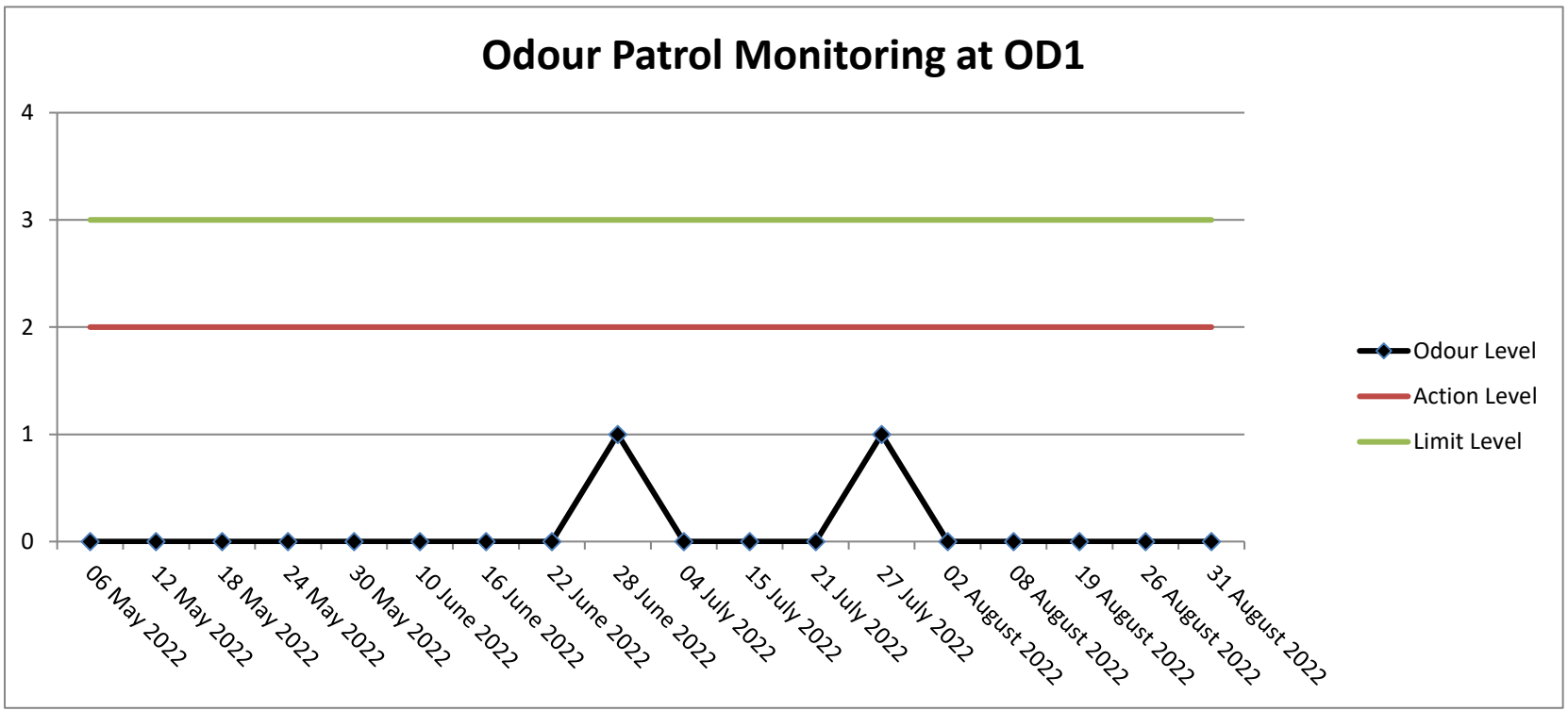
ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	1113	W	1.4	0	/
OD2	Southern Site Boundary	1115	W	0.7	1	Effluent
OD3	Western Site Boundary	1111	W	1	0	/
OD4	Northern Site Boundary	1108	/	0	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	1039	/	0	0	/
OD7	Cheung Tung Road near O·PARK1	1043	/	0	0	/
OD8	Sham Shui Kok Dr near MTR Depot	1033	W	0.5	0	/
OD9	Discovery Bay Tunnel Toll Plaza	1037	W	1	0	/

*Classification Criteria:

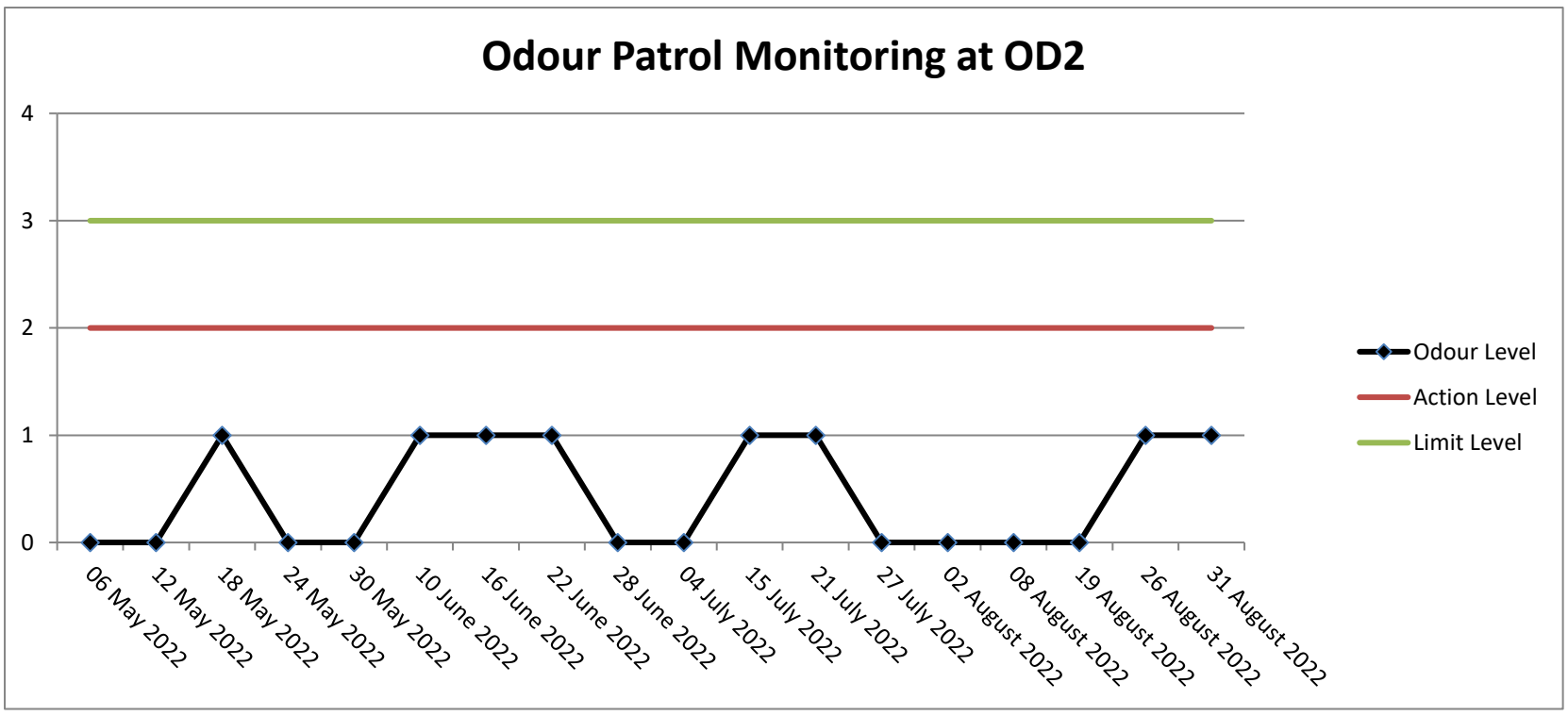
Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely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

Recorded by: Tm
Name: Tp Tsz Hm
Date: 31/8/2022

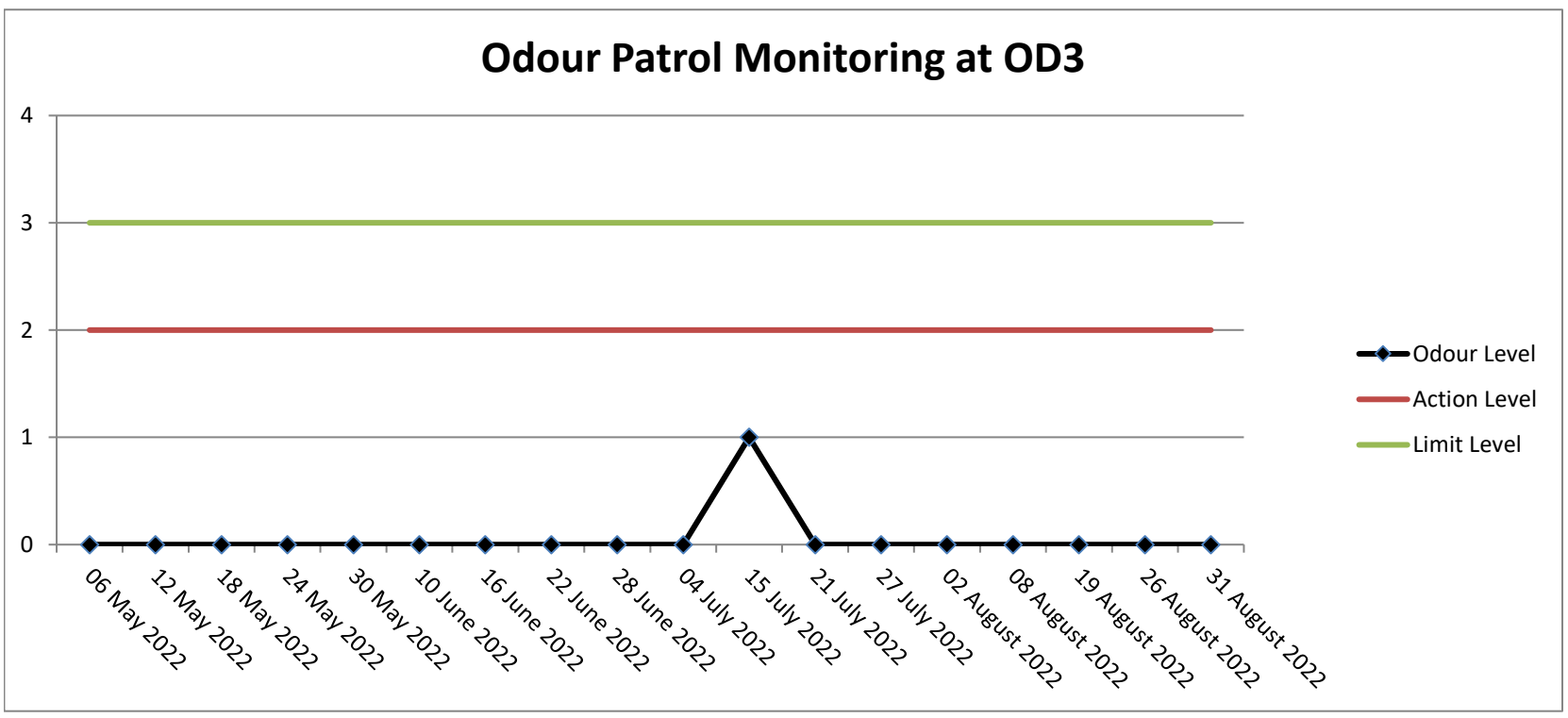
Checked by: AY
Name: CHOI Kim Ho
Date: 31 August 2022



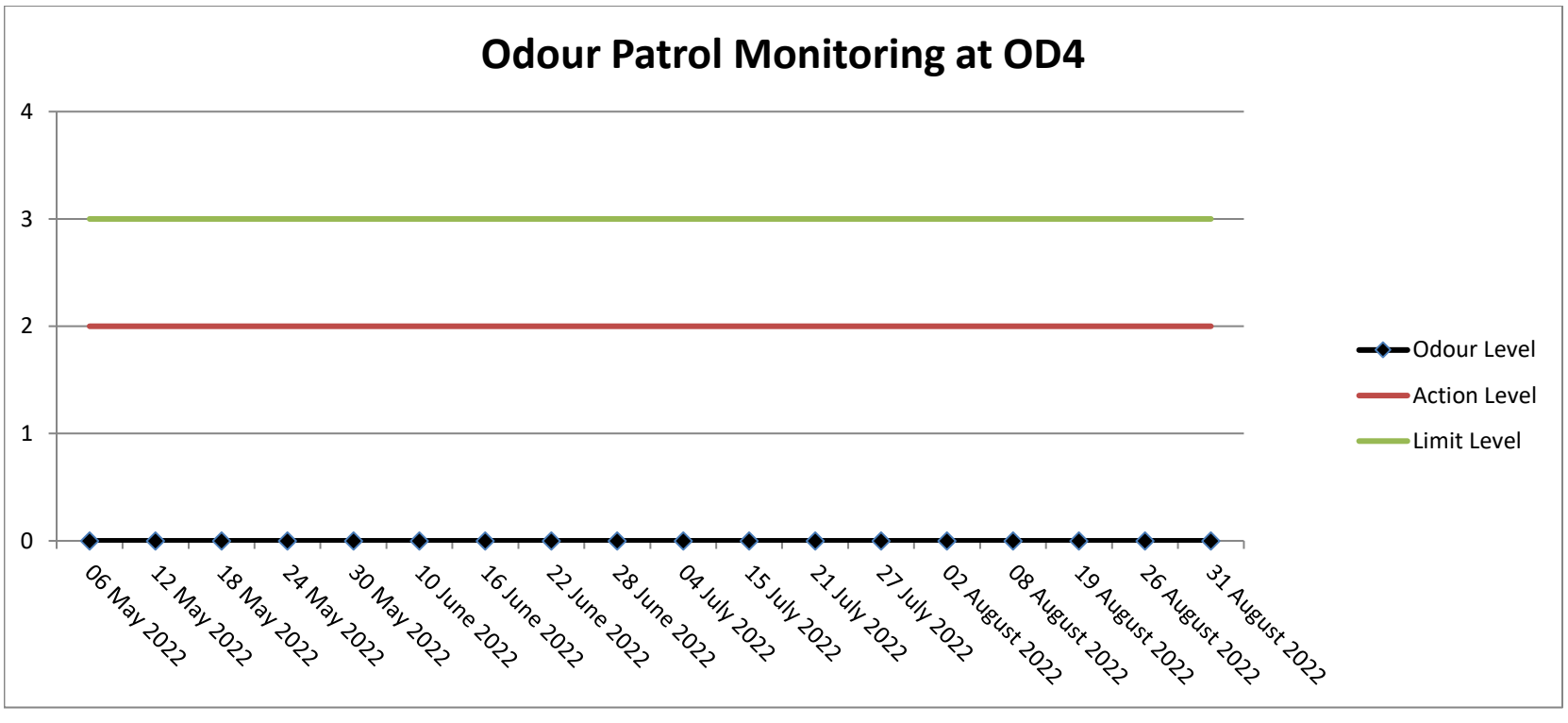
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



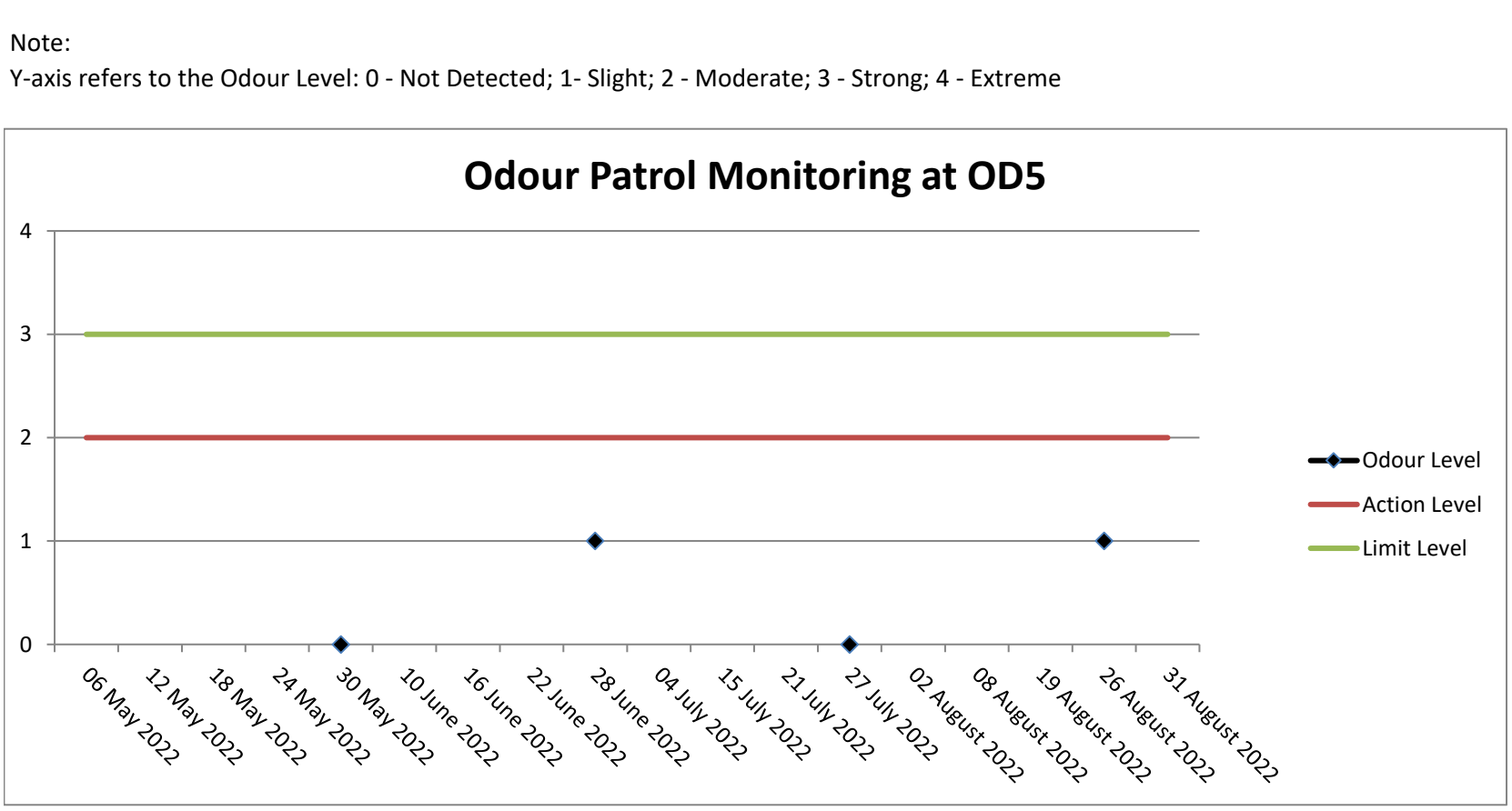
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



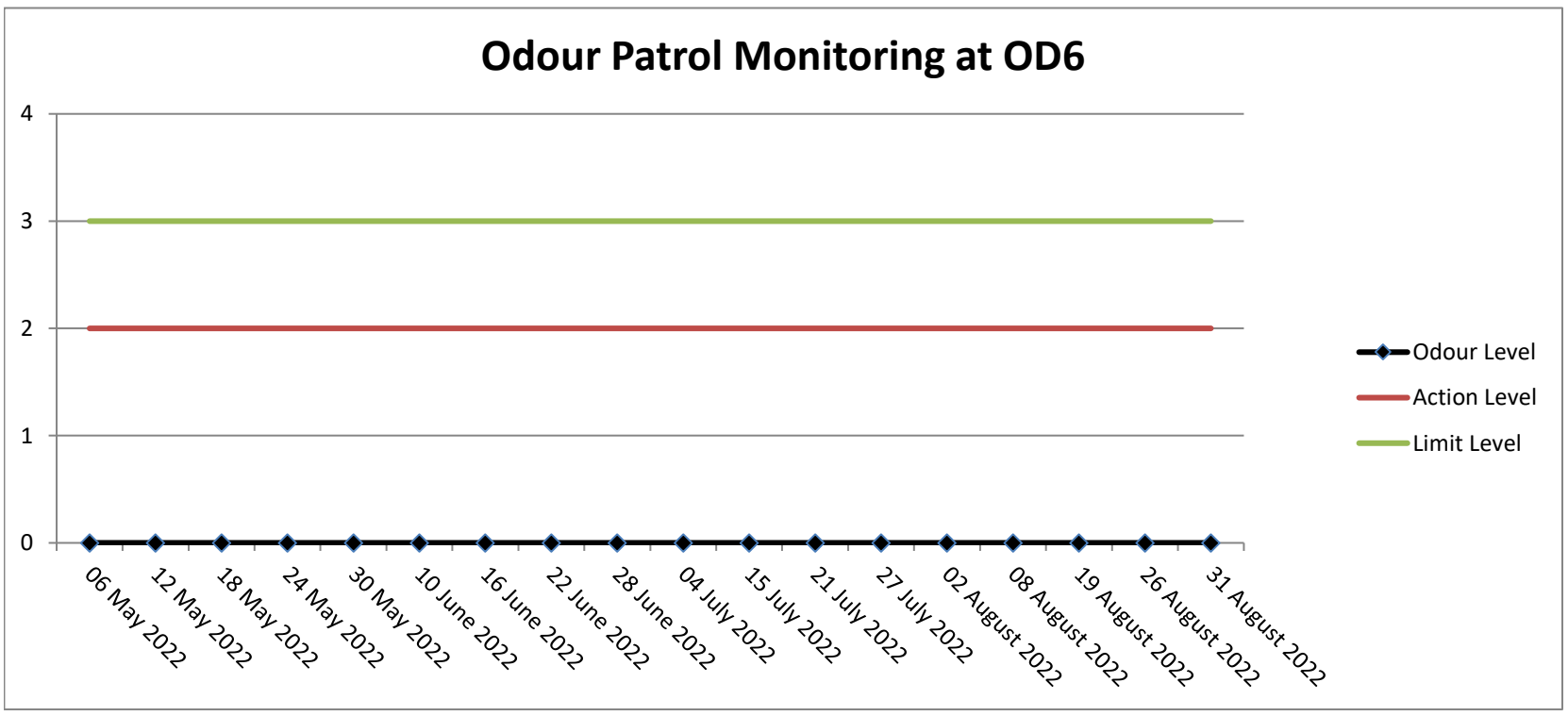
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



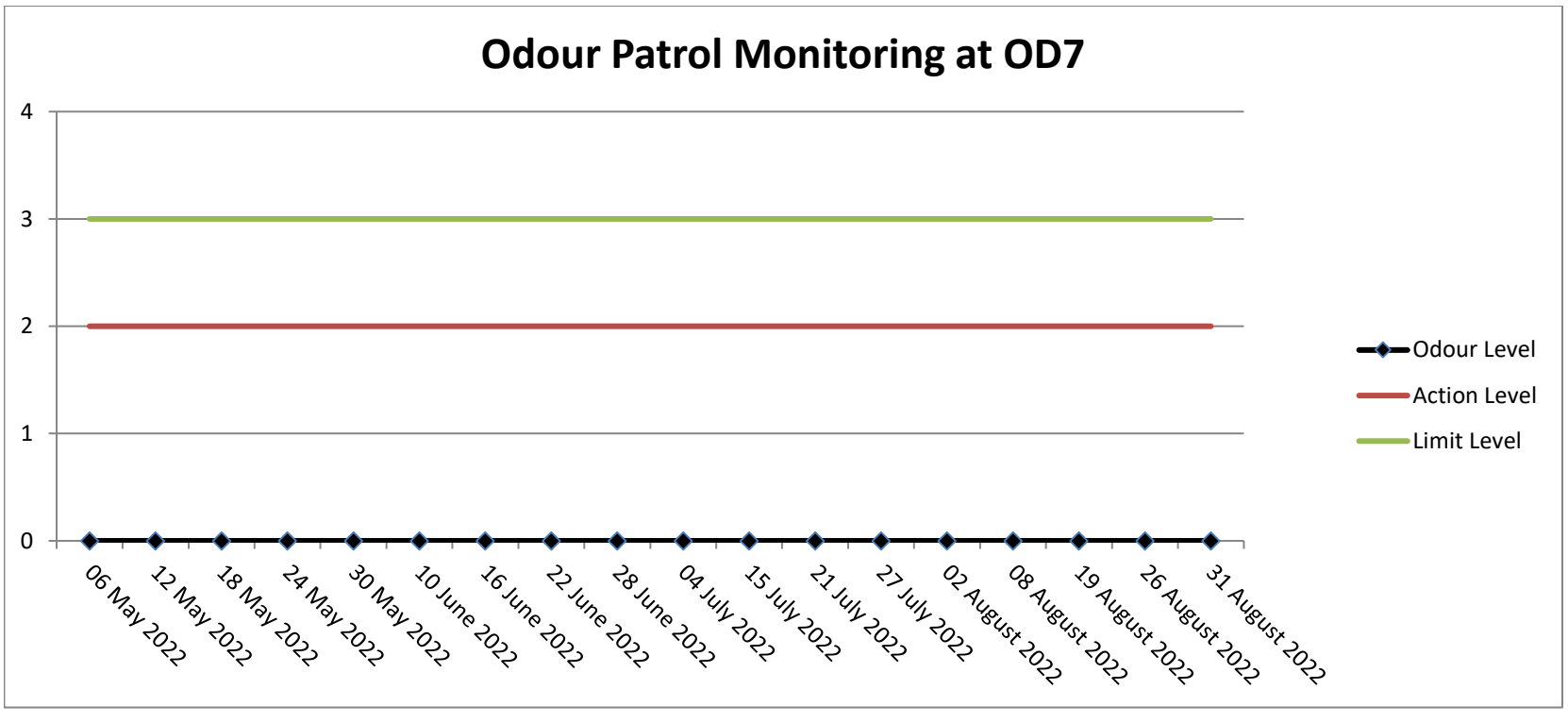
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



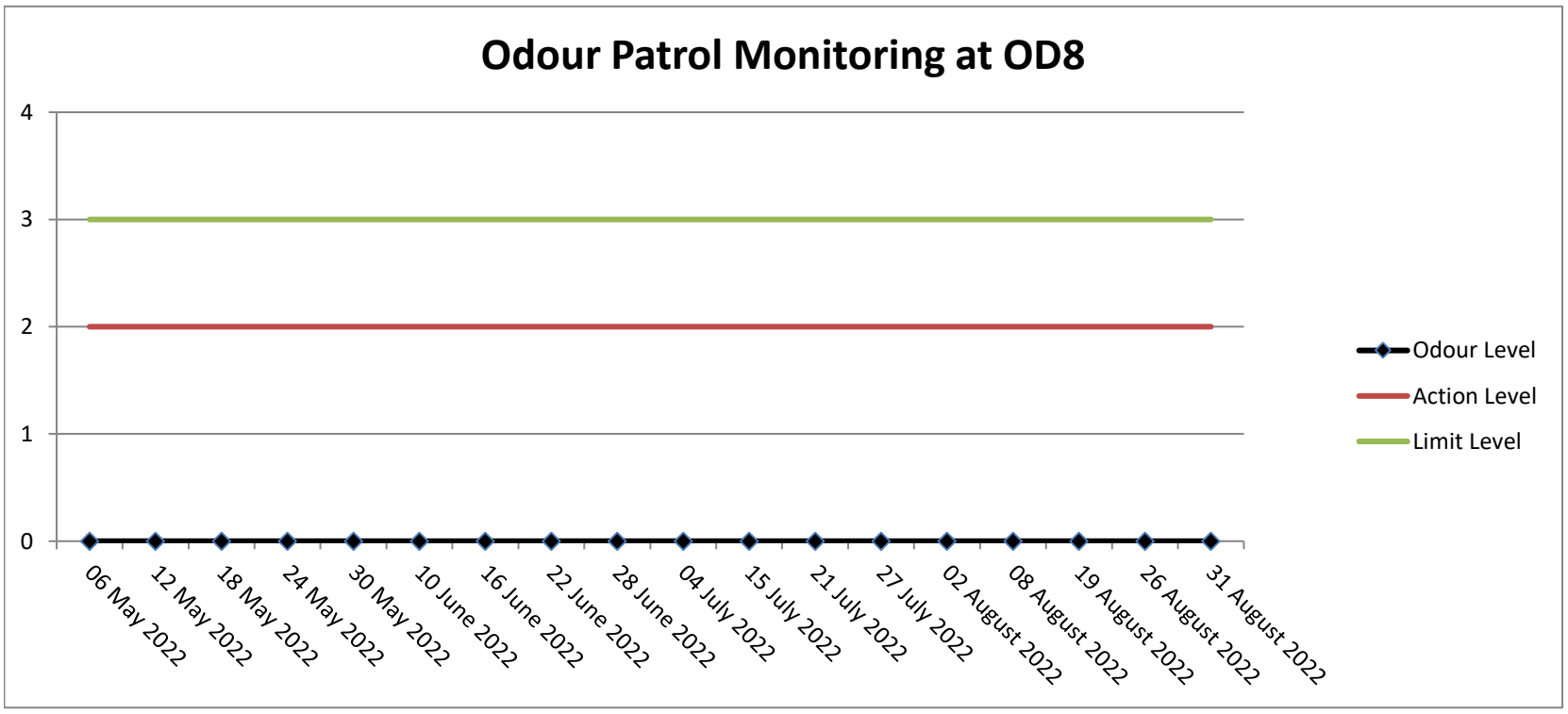
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



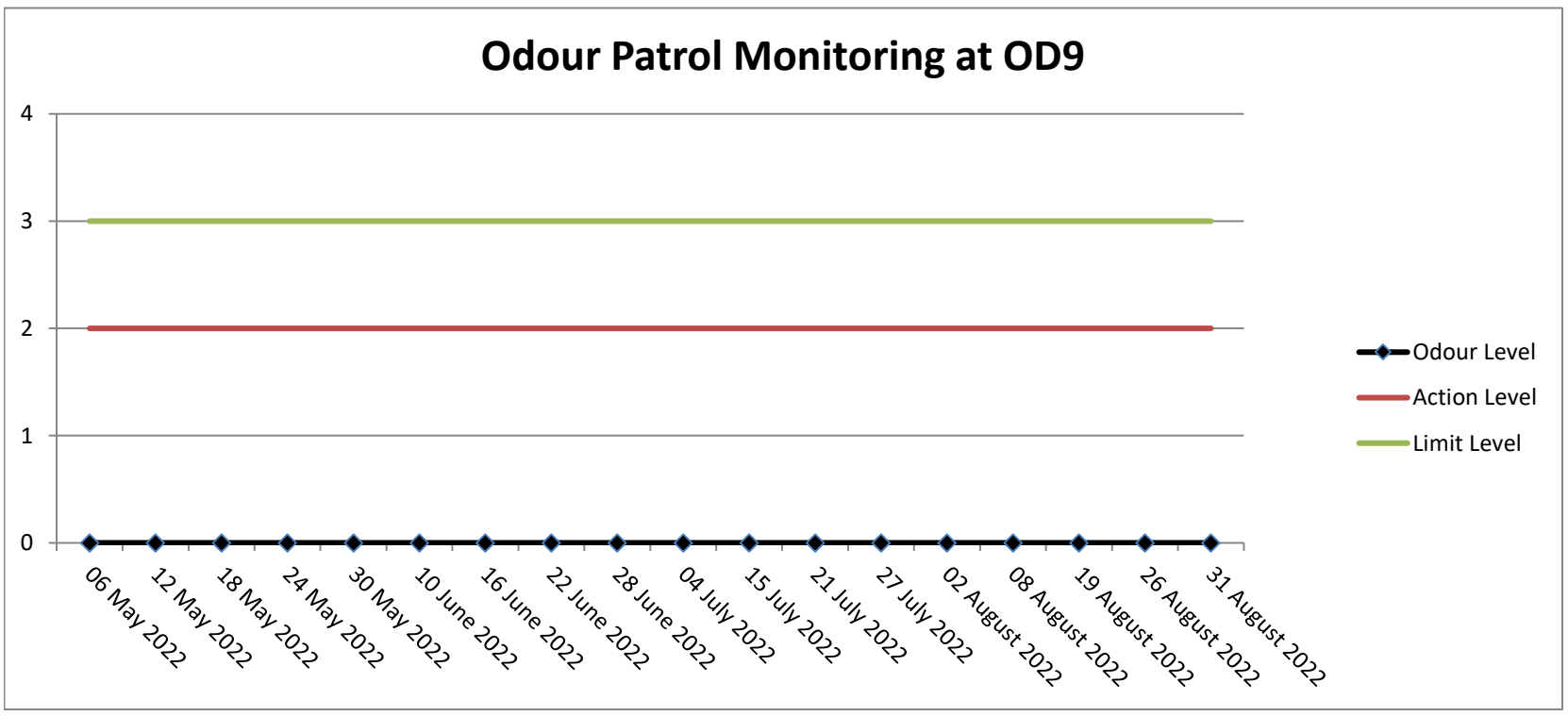
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



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



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

FUGRO TECHNICAL SERVICES LIMITED

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Tuen Mun, N.T.,
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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. : 142626WA221669

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	:	13/F, Fugro House – KCC2, No. 1 Kwai On Road, Kwai Chung, N.T., H.K.
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	:	WA221669/1
Date of calibration	:	08/08/2022
Next calibration date	:	07/11/2022
Test method used	:	In-house comparison method

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 142626WA221669

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	9.17	-0.01
6.86	6.87	+0.01

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.03	+0.03	± 0.5
20	20.09	+0.09	± 1.0
30	30.21	+0.21	± 1.5
40	40.58	+0.58	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	7.53	7.52
2	7.52	7.53
3	7.52	7.53
Average	7.52	7.53

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 : 22/8/2012

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 142626WA221669

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
25.05	25.01

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.10	+0.10	± 0.6
8	8.10	+0.10	± 0.8
40	40.54	+0.54	± 3.0
80	80.83	+0.83	± 4.0

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

Date : 21/8/2022

** End of Report **

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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.

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

Appendix F

Results and Graphical Presentation of Water Quality Monitoring

Water Quality Monitoring Data

Monitoring Location	Date	Tide Mode	Weather	Sea Condition	Time	Water Depth (m)	Monitoring Level	Monitoring Level (m)	Replicate	In-situ Measurement								Laboratory Analysis							
										pH	Salinity (ppt)	Temperature (degree C)	DO Saturation (%)	DO (mg/L)	Turbidity (NTU)	Current Speed (m/s)	Current Direction (degree magnetic)	Total Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Nitrate Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (solube and particulate) (mg/L)	BOD_5 (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	17/8/2022	Mid-Ebb	Fine	Moderate	14:49	17	S	1	1	8.08	22.60	29.04	88.7	6.01	5.1	0.14	54.1	5	0.059	0.11	0.79	0.96	11	0.02	<1
A	17/8/2022	Mid-Ebb	Fine	Moderate	14:49	17	S	1	2	8.07	22.40	29.05	88.6	6.02	5.2	0.17	52.7	6	0.075	0.11	0.74	0.93	12	0.02	<1
A	17/8/2022	Mid-Ebb	Fine	Moderate	14:49	17	M	8.5	1	8.08	22.79	29.01	87.6	5.94	6.4	0.11	70.6	5	0.078	0.11	0.77	0.96	13	0.03	<1
A	17/8/2022	Mid-Ebb	Fine	Moderate	14:49	17	M	8.5	2	8.07	22.78	29.02	87.4	5.96	6.6	0.18	70.4	6	0.067	0.11	0.68	0.86	16	0.03	<1
A	17/8/2022	Mid-Ebb	Fine	Moderate	14:49	17	B	16	1	8.04	22.91	28.74	85.8	5.91	7.2	0.14	64.1	7	0.053	0.11	0.79	0.95	12	0.02	<1
A	17/8/2022	Mid-Ebb	Fine	Moderate	14:49	17	B	16	2	8.03	22.94	28.77	85.7	5.90	7.7	0.12	64.4	7	0.066	0.11	0.79	0.97	11	0.02	<1
B	17/8/2022	Mid-Ebb	Fine	Moderate	15:06	14	S	1	1	8.04	22.77	27.12	74.8	5.72	4.2	0.21	264.8	4	0.063	0.11	0.88	1.1	13	0.02	<1
B	17/8/2022	Mid-Ebb	Fine	Moderate	15:06	14	S	1	2	8.03	22.76	27.11	74.7	5.71	4.4	0.24	266.1	4	0.067	0.11	0.93	1.1	12	0.02	<1
B	17/8/2022	Mid-Ebb	Fine	Moderate	15:06	14	M	7	1	8.04	22.94	28.04	72.1	5.54	6.0	0.24	257.4	6	0.067	0.11	1.0	1.2	16	0.03	<1
B	17/8/2022	Mid-Ebb	Fine	Moderate	15:06	14	M	7	2	8.06	22.99	28.06	72.3	5.58	5.7	0.26	256.9	6	0.069	0.11	0.99	1.2	14	0.03	<1
B	17/8/2022	Mid-Ebb	Fine	Moderate	15:06	14	B	13	1	8.07	23.12	28.14	70.4	5.32	6.4	0.25	249.1	5	0.068	0.11	0.85	1.0	16	0.03	<1
B	17/8/2022	Mid-Ebb	Fine	Moderate	15:06	14	B	13	2	8.06	23.16	28.19	70.5	5.31	6.1	0.27	244.1	6	0.067	0.11	0.87	1.0	11	0.03	<1
C	17/8/2022	Mid-Ebb	Fine	Moderate	15:27	12	S	1	1	8.04	22.39	28.97	84.6	5.75	5.1	0.13	92.4	7	0.066	0.12	0.99	1.2	0	0.02	<1
C	17/8/2022	Mid-Ebb	Fine	Moderate	15:27	12	S	1	2	8.05	22.34	29.00	84.7	5.76	5.0	0.14	90.7	7	0.069	0.12	0.91	1.1	0	0.03	<1
C	17/8/2022	Mid-Ebb	Fine	Moderate	15:27	12	M	6	1	8.07	22.74	28.51	81.7	5.54	7.1	0.19	89.1	6	0.085	0.12	1.1	1.3	3	0.02	<1
C	17/8/2022	Mid-Ebb	Fine	Moderate	15:27	12	M	6	2	8.06	22.76	28.52	85.6	5.53	7.2	0.17	89.4	5	0.066	0.12	0.95	1.1	1	0.02	<1
C	17/8/2022	Mid-Ebb	Fine	Moderate	15:27	12	B	11	1	8.08	22.94	28.24	78.6	5.31	8.0	0.14	78.4	7	0.073	0.12	0.94	1.1	1	0.02	<1
C	17/8/2022	Mid-Ebb	Fine	Moderate	15:27	12	B	11	2	8.07	22.96	28.26	78.4	5.32	8.1	0.16	78.6	7	0.077	0.12	0.83	1.0	1	0.02	<1
D	17/8/2022	Mid-Ebb	Fine	Moderate	15:43	13	S	1	1	8.09	22.17	29.51	90.2	6.24	4.8	0.23	244.1	7	0.065	0.12	0.90	1.1	0	0.02	<1
D	17/8/2022	Mid-Ebb	Fine	Moderate	15:43	13	S	1	2	8.07	22.16	29.52	90.4	6.26	4.7	0.25	254.1	6	0.068	0.12	1.09	1.3	0	0.02	<1
D	17/8/2022	Mid-Ebb	Fine	Moderate	15:43	13	M	6.5	1	8.04	22.24	29.34	86.7	6.01	4.9	0.23	256.7	6	0.066	0.12	0.87	1.1	1	0.02	<1
D	17/8/2022	Mid-Ebb	Fine	Moderate	15:43	13	M	6.5	2	8.05	22.26	29.33	86.6	6.01	4.8	0.24	255.1	6	0.068	0.12	0.99	1.2	0	0.02	<1
D	17/8/2022	Mid-Ebb	Fine	Moderate	15:43	13	B	12	1	8.04	22.39	29.00	85.6	5.80	5.4	0.24	207.1	7	0.072	0.12	0.93	1.1	0	0.03	<1
D	17/8/2022	Mid-Ebb	Fine	Moderate	15:43	13	B	12	2	8.06	22.31	29.04	85.4	5.82	5.5	0.21	205.1	8	0.062	0.12	0.97	1.2	0	0.03	<1
E	17/8/2022	Mid-Ebb	Fine	Moderate	16:02	16	S	1	1	7.91	22.56	28.85	87.5	5.92	4.4	0.15	98.4	6	0.089	0.12	0.97	1.2	57	0.02	<1
E	17/8/2022	Mid-Ebb	Fine	Moderate	16:02	16	S	1	2	7.92	22.54	28.84	87.0	5.90	4.6	0.18	99.1	6	0.089	0.12	0.95	1.2	48	0.02	<1
E	17/8/2022	Mid-Ebb	Fine	Moderate	16:02	16	M	8	1	7.97	22.60	28.81	84.6	5.71	4.3	0.06	142.5	6	0.081	0.12	0.95	1.1	39	0.02	<1
E	17/8/2022	Mid-Ebb	Fine	Moderate	16:02	16	M	8	2	7.96	22.64	28.94	84.5	5.70	4.9	0.08	144.6	6	0.081	0.12	0.83	1.0	30	0.02	<1
E	17/8/2022	Mid-Ebb	Fine	Moderate	16:02	16	B	15	1	7.94	22.78	28.79	84.6	5.68	1.7	0.21	136.8	6	0.079	0.12	0.93	1.1	38	0.02	<1
E	17/8/2022	Mid-Ebb	Fine	Moderate	16:02	16	B	15	2	7.95	22.79	28.77	84.3	5.69	1.6	0.24	133.7	6	0.078	0.12	0.92	1.1	45	0.02	<1
F	17/8/2022	Mid-Ebb	Fine	Moderate	16:17	23	S	1	1	8.63	22.58	28.85	86.2	5.87	3.6	0.24	104.5	6	0.071	0.12	0.90	1.1	40	0.03	<1
F	17/8/2022	Mid-Ebb	Fine	Moderate	16:17	23	S	1	2	8.64	22.59	28.89	86.4	5.86	3.7	0.26	106.7	6	0.065	0.12	1.0	1.2	33	0.03	<1
F	17/8/2022	Mid-Ebb	Fine	Moderate	16:17	23	M	11.5	1	7.98	22.59	28.81	84.9	5.81	3.5	0.17	114.5	6	0.072	0.12	1.1	1.2	30	0.02	<1
F	17/8/2022	Mid-Ebb	Fine	Moderate	16:17	23	M	11.5	2	7.99	22.58	28.83	84.6	5.79	3.6	0.12	116.2	6	0.070	0.12	0.94	1.1	39	0.02	<1
F	17/8/2022	Mid-Ebb	Fine	Moderate	16:17	23	B	22	1	7.95	22.64	28.91	81.1	5.53	4.6	0.14	97.8	6	0.079	0.12	0.92	1.1	32	0.02	<1
F	17/8/2022	Mid-Ebb	Fine	Moderate	16:17	23	B	22	2	7.94	22.66	28.92	81.4	5.56	4.4	0.19	90.1	6	0.078	0.12	0.97	1.2	38	0.02	<1
G	17/8/2022	Mid-Ebb	Fine	Moderate	16:36	22	S	1	1	8.15	22.10	29.01	89.1	6.02	3.9	0.19	98.7	6	0.15	0.12	0.79	1.1	34	0.02	1.3
G	17/8/2022	Mid-Ebb	Fine	Moderate	16:36	22	S	1	2	8.14	22.12	29.04	89.4	6.04	3.7	0.21	99.1	6	0.13	0.12	0.77	1.0	40	0.02	1.0
G	17/8/2022	Mid-Ebb	Fine	Moderate	16:36	22	M	11	1	8.09	22.97	28.81	85.0	5.65	7.2	0.17	104.6	5	0.067	0.12	0.64	0.83	80	0.02	1.3
G	17/8/2022	Mid-Ebb	Fine	Moderate	16:36	22	M	11	2	8.04	22.96	28.82	84.8	5.64	7.7	0.19	105.1	6	0.069	0.12	0.54	0.72	110	0.02	1.3
G	17/8/2022	Mid-Ebb	Fine	Moderate	16:36	22	B	21	1	8.07	23.18	28.70	81.2	5.52	1.2	0.14	117.3	5	0.11	0.12	0.88	1.1	70	0.02	<1
G	17/8/2022	Mid-Ebb	Fine	Moderate	16:36	22	B	21	2	8.06	23.17	28.90	81.4	5.54	1.3	0.16	116.2	5	0.12	0.12	0.88	1.1	82	0.02	<1
H	17/8/2022	Mid-Ebb	Fine	Moderate	16:53	19	S	1	1	8.02	23.36	28.46	79.1	5.14	7.2	0.72	246.1	6	0.078	0.12	0.90	1.1	70	0.02	<1
H	17/8/2022	Mid-Ebb	Fine	Moderate	16:53	19	S	1	2	8.03	23.34	28.49	79.2	5.16	7.1	0.71	223.8	5	0.079	0.12	0.84	1.0	69	0.02	1.2
H	17/8/2022	Mid-Ebb	Fine	Moderate	16:53	19	M	9.5	1	8.04	23.21	28.74	79.5	5.38	1.7	0.17	261.9	5	0.13	0.12	0.91	1.2	63	0.01	<1
H	17/8/2022	Mid-Ebb	Fine	Moderate	16:53	19	M	9.5	2	8.03	23.20	28.77	79.4	5.39	1.8	0.18	264.8	5	0.12	0.12	0.94	1.2	56	0.01	<1
H	17/8/2022	Mid-Ebb	Fine	Moderate	16:53	19	B	18	1	8.06	23.37	28.72	80.2	5.45	1.3	0.13	257.2	5	0.11	0.12	1.0	1.2	66	0.01	1.2
H	17/8/2022	Mid-Ebb	Fine	Moderate	16:53	19	B	18	2	8.06	23.36	28.74	80.4	5.48	1.4	0.12	256.4	6	0.11	0.12	1.1	1.3	50	0.02	<1

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	17/8/2022	Mid-Flood	Fine	Moderate	10:21	15	S	1	1	7.99	18.59	28.85	86.1	5.72	2.4	0.13	72.4	5	0.066	0.11	1.0	1.2	12	0.02	<1
A	17/8/2022	Mid-Flood	Fine	Moderate	10:21	15	S	1	2	7.94	18.56	28.89	85.9	5.74	2.2	0.19	70.1	6	0.071	0.11	0.92	1.1	15	0.02	<1
A	17/8/2022	Mid-Flood	Fine	Moderate	10:21	15	M	7.5	1	8.00	18.68	28.84	86.0	5.85	4.3	0.17	69.4	6	0.062	0.11	0.87	1.0	17	0.02	<1
A	17/8/2022	Mid-Flood	Fine	Moderate	10:21	15	M	7.5	2	8.00	18.64	28.89	86.1	5.89	4.4	0.16	68.1	6	0.061	0.11	0.83	1.0	14	0.02	1.4
A	17/8/2022	Mid-Flood	Fine	Moderate	10:21	15	B	14	1	7.98	18.91	28.72	81.3	5.52	5.1	0.13	63.4	6	0.062	0.11	0.76	1.0	13	0.03	<1
A	17/8/2022	Mid-Flood	Fine	Moderate	10:21	15	B	14	2	7.99	18.94	28.74	81.2	5.51	5.2	0.15	63.3	6	0.063	0.11	0.85	1.0	18	0.03	<1
B	17/8/2022	Mid-Flood	Fine	Moderate	10:13	14	S	1	1	8.00	18.44	28.83	85.6	5.83	2.9	0.16	143.1	6	0.061	0.11	0.85	1.0	14	0.02	<1
B	17/8/2022	Mid-Flood	Fine	Moderate	10:13	14	S	1	2	8.01	18.43	28.84	85.4	5.83	2.8	0.12	138.2	5	0.062	0.11	0.84	1.0	16	0.02	<1
B	17/8/2022	Mid-Flood	Fine	Moderate	10:13	14	M	7	1	8.00	18.71	28.83	83.2	5.77	3.4	0.02	77.6	6	0.062	0.11	0.86	1.0	16	0.02	<1
B	17/8/2022	Mid-Flood	Fine	Moderate	10:13	14	M	7	2	8.01	18.72	28.84	83.1	5.76	3.3	0.18	78.9	7	0.059	0.11	0.99	1.2	13	0.02	<1
B	17/8/2022	Mid-Flood	Fine	Moderate	10:13	14	B	13	1	7.99	18.80	28.69	79.9	5.46	6.3	0.22	104.5	5	0.060	0.11	0.96	1.1	16	0.03	<1
B	17/8/2022	Mid-Flood	Fine	Moderate	10:13	14	B	13	2	7.98	18.81	28.66	79.8	5.45	6.6	0.24	106.7	5	0.057	0.11	1.1	1.3	15	0.02	<1
C	17/8/2022	Mid-Flood	Fine	Moderate	09:52	12	S	1	1	8.02	16.02	28.73	79.1	5.37	5.2	0.24	75.1	6	0.060	0.12	0.88	1.1	1	0.02	<1
C	17/8/2022	Mid-Flood	Fine	Moderate	09:52	12	S	1	2	8.03	16.04	28.74	79.3	5.38	5.1	0.27	70.6	6	0.056	0.12	0.79	1.0	1	0.02	<1
C	17/8/2022	Mid-Flood	Fine	Moderate	09:52	12	M	6	1	8.01	16.23	28.62	78.1	5.27	1.2	0.26	92.4	6	0.063	0.12	0.82	1.0	0	0.02	<1
C	17/8/2022	Mid-Flood	Fine	Moderate	09:52	12	M	6	2	8.02	16.24	28.69	78.2	5.26	1.3	0.21	92.6	5	0.062	0.12	0.76	0.9	1	0.02	<1
C	17/8/2022	Mid-Flood	Fine	Moderate	09:52	12	B	11	1	8.01	16.59	28.58	77.0	5.23	1.9	0.19	79.4	4	0.061	0.12	0.79	1.0	1	0.02	<1
C	17/8/2022	Mid-Flood	Fine	Moderate	09:52	12	B	11	2	8.02	16.58	28.59	77.1	5.24	2.0	0.16	79.9	5	0.060	0.12	0.71	0.9	1	0.02	<1
D	17/8/2022	Mid-Flood	Fine	Moderate	09:35	14	S	1	1	8.00	14.11	28.54	81.3	5.57	6.4	0.18	314.1	6	0.058	0.12	0.96	1.1	0	0.02	<1
D	17/8/2022	Mid-Flood	Fine	Moderate	09:35	14	S	1	2	8.01	14.13	28.59	81.4	5.56	6.6	0.14	306.2	6	0.067	0.12	0.80	0.99	0	0.02	<1
D	17/8/2022	Mid-Flood	Fine	Moderate	09:35	14	M	7	1	8.00	14.87	28.52	80.2	5.44	1.6	0.16	284.1	5	0.059	0.12	0.82	1.0	8	0.02	<1
D	17/8/2022	Mid-Flood	Fine	Moderate	09:35	14	M	7	2	8.02	14.86	28.54	80.3	5.48	1.7	0.13	281.7	5	0.060	0.12	0.85	1.0	7	0.02	<1
D	17/8/2022	Mid-Flood	Fine	Moderate	09:35	14	B	13	1	8.01	15.26	28.57	76.7	5.21	1.5	0.17	294.6	5	0.058	0.12	0.83	1.0	11	0.02	<1
D	17/8/2022	Mid-Flood	Fine	Moderate	09:35	14	B	13	2	8.02	15.27	28.56	76.4	5.24	1.7	0.19	299.6	6	0.070	0.12	0.82	1.0	9	0.03	<1
E	17/8/2022	Mid-Flood	Fine	Moderate	09:14	14	S	1	1	8.08	21.62	29.18	93.9	6.30	4.4	0.14	90.7	6	0.063	0.11	0.83	1.0	36	0.02	<1
E	17/8/2022	Mid-Flood	Fine	Moderate	09:14	14	S	1	2	8.00	21.66	29.19	93.7	6.27	4.5	0.12	90.9	5	0.061	0.11	0.80	0.98	35	0.02	<1
E	17/8/2022	Mid-Flood	Fine	Moderate	09:14	14	M	7	1	8.07	21.89	29.12	89.8	6.04	4.9	0.18	104.1	5	0.067	0.12	0.85	1.0	41	0.02	<1
E	17/8/2022	Mid-Flood	Fine	Moderate	09:14	14	M	7	2	8.06	21.88	29.11	89.4	6.05	4.8	0.16	102.3	6	0.066	0.11	0.77	0.95	55	0.02	<1
E	17/8/2022	Mid-Flood	Fine	Moderate	09:14	14	B	13	1	8.08	22.34	29.02	87.7	5.87	5.2	0.17	114.5	7	0.086	0.11	0.86	1.1	46	0.02	<1
E	17/8/2022	Mid-Flood	Fine	Moderate	09:14	14	B	13	2	8.07	22.39	20.03	87.4	5.86	5.3	0.14	115.1	6	0.063	0.11	0.89	1.1	50	0.02	<1
F	17/8/2022	Mid-Flood	Fine	Moderate	08:58	18	S	1	1	8.08	21.66	29.23	88.5	6.02	4.8	0.23	206.4	6	0.071	0.11	0.81	0.99	50	0.03	<1
F	17/8/2022	Mid-Flood	Fine	Moderate	08:58	18	S	1	2	8.07	21.64	29.24	88.4	6.01	4.4	0.29	206.6	5	0.070	0.11	1.2	1.4	39	0.02	<1
F	17/8/2022	Mid-Flood	Fine	Moderate	08:58	18	M	9	1	8.08	21.87	29.14	89.3	6.09	5.1	0.23	241.1	4	0.11	0.11	0.74	0.96	52	0.02	1.4
F	17/8/2022	Mid-Flood	Fine	Moderate	08:58	18	M	9	2	8.09	21.88	29.16	89.4	6.08	5.2	0.28	241.2	4	0.11	0.11	0.71	0.93	62	0.02	1.2
F	17/8/2022	Mid-Flood	Fine	Moderate	08:58	18	B	17	1	8.05	22.38	28.99	84.0	5.72	6.9	0.26	223.7	5	0.087	0.11	0.68	0.88	46	0.02	1.2
F	17/8/2022	Mid-Flood	Fine	Moderate	08:58	18	B	17	2	8.06	22.39	28.94	83.8	5.70	6.7	0.27	220.6	5	0.780	0.11	0.63	0.83	38	0.02	1.2
G	17/8/2022	Mid-Flood	Fine	Moderate	08:39	13	S	1	1	8.14	22.36	29.26	92.2	6.28	4.6	0.14	23.5	6	0.15	0.12	0.60	0.87	46	0.02	1.4
G	17/8/2022	Mid-Flood	Fine	Moderate	08:39	13	S	1	2	8.12	22.34	29.28	92.4	6.29	4.7	0.19	23.8	7	0.14	0.12	0.63	0.89	66	0.02	1.3
G	17/8/2022	Mid-Flood	Fine	Moderate	08:39	13	M	6.5	1	8.12	22.49	29.04	90.1	6.06	5.9	0.17	40.1	6	0.13	0.12	0.65	0.89	52	0.02	1.4
G	17/8/2022	Mid-Flood	Fine	Moderate	08:39	13	M	6.5	2	8.11	22.48	29.05	90.2	6.07	5.8	0.13	14.2	7	0.13	0.12	0.59	0.83	45	0.02	1.3
G	17/8/2022	Mid-Flood	Fine	Moderate	08:39	13	B	12	1	8.11	22.84	29.26	88.1	5.84	6.4	0.18	38.1	7	0.13	0.12	0.57	0.82	53	0.02	1.1
G	17/8/2022	Mid-Flood	Fine	Moderate	08:39	13	B	12	2	8.18	22.87	29.24	88.3	5.87	6.6	0.16	37.4	6	0.13	0.12	0.57	0.82	48	0.02	1.0
H	17/8/2022	Mid-Flood	Fine	Moderate	08:23	19	S	1	1	8.04	22.94	29.04	90.3	6.04	1.3	0.07	91.5	6	0.060	0.12	0.85	1.0	70	0.02	1.3
H	17/8/2022	Mid-Flood	Fine	Moderate	08:23	19	S	1	2	8.06	22.99	29.06	90.2	6.03	1.2	0.08	90.7	6	0.061	0.12	0.92	1.1	62	0.02	<1
H	17/8/2022	Mid-Flood	Fine	Moderate	08:23	19	M	9.5	1	8.01	23.17	28.71	86.4	5.63	1.8	0.09	78.2	6	0.060	0.12	0.91	1.1	59	0.01	1.5
H	17/8/2022	Mid-Flood	Fine	Moderate	08:23	19	M	9.5	2	8.02	23.16	28.72	86.1	5.62	1.7	0.10	78.9	6	0.058	0.12	0.96	1.1	66	0.02	1.4
H	17/8/2022	Mid-Flood	Fine	Moderate	08:23	19	B	18	1	8.02	23.37	28.64	85.7	5.54	1.7	0.14	86.4	5	0.11	0.12	0.79	1.0	50	0.02	1.3
H	17/8/2022	Mid-Flood	Fine	Moderate	08:23	19	B	18	2	8.06	23.41	28.61	85.6	5.56	1.8	0.16	86.1	7	0.11	0.12	1.2	1.5	49	0.02	1.5

Note: 1. ND: Not Detected

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

Report No. : 181172WA221589

Test Report on Analysis of Water

Information Supplied by Client

Client : Fugro Technical Services Limited

Client's address : 13/F, Fugro House – KCC2, No. 1 Kwai On Road, Kwai Chung, N.T., H.K

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

Sample description : Ninety-six samples of water taken by the staff of FTS on 17/08/2022

Client sample ID : Refer to pages 3 to 18

Tests required :
1. Biochemical oxygen demand
2. Total suspended solids dried at 103°C – 105°C
3. Ammoniacal Nitrogen content
4. Nitrate-Nitrogen content
5. Nitrite-Nitrogen content
6. Total Inorganic Nitrogen content
7. Total phosphorus content
8. Total phosphorus content (Filtered)
9. E. coli count

Laboratory Information

Lab. sample ID :

Chemical tests	Microbiological tests
WA221589/1-96	WA221589/1B-96B

	Chemical tests	Microbiological tests
Container	Ninety-six 250 mL and 3 L plastic bottles	Ninety-six sterilized 250 mL plastic bottles with thiosulphate added
Appearance	Colourless	
Temperature	Cooled	

Date of receipt of sample : 17/08/2022

Date test commenced : 17/08/2022

Date test completed : 24/08/2022

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172WA221589

Test methods used :

Biochemical oxygen demand
APHA 23ed. 5210B

Total suspended solids dried at 103°C – 105°C
APHA 23ed. 2540D

Ammoniacal Nitrogen content
APHA 23ed. 4500-NH_3 H

Nitrate-Nitrogen content
APHA 23ed. 4500-NO_3^- I

Nitrite-Nitrogen content
APHA 23ed. 4500-NO_2^- A & NO_3^- I

Total Inorganic Nitrogen content
In-house method E-T-112 (By Calculation)

Total phosphorus content
APHA 17ed. 4500-PB.5 (Digestion) &
In-house method E-T-056 (Determination)

Total phosphorus content (Filtered)
APHA 17ed. 4500-PB.5 (Digestion) &
In-house method E-T-056 (Determination)

E. coli count
The Bacteriological Examination of Drinking Water Supplies 1982, DoE (1983) Membrane Filtration Procedure: Sections 7.8, 7.9.4.2 Bacterial Confirmation: Section 7.9.4.4 & in-situ urease test

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	A/S/E	A/S/E/Dup	A/M/E	A/M/E/Dup	A/B/E	A/B/E/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	5	6	5	6	7	7
3. Ammoniacal nitrogen content, mg/L	0.059	0.075	0.078	0.067	0.053	0.066
4. Nitrate-Nitrogen content, mg/L	0.79	0.74	0.77	0.68	0.79	0.79
5. Nitrite-Nitrogen content, mg/L	0.11	0.11	0.11	0.11	0.11	0.11
6. Total Inorganic Nitrogen content, mg/L	0.96	0.93	0.96	0.86	0.95	0.97
7. Total phosphorus content, mg/L	0.06	0.05	0.05	0.06	0.05	0.05
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.03	0.03	0.02	0.02
9. E. coli count, cfu/100ml	1.1 x 10	1.2 x 10	1.3 x 10	1.6 x 10	1.2 x 10	1.1 x 10

Remarks: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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

Date : 5/9/2022

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	B/S/E	B/S/E/Dup	B/M/E	B/M/E/Dup	B/B/E	B/B/E/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	4	4	6	6	5	6
3. Ammoniacal nitrogen content, mg/L	0.063	0.067	0.067	0.069	0.068	0.067
4. Nitrate-Nitrogen content, mg/L	0.88	0.93	1.0	0.99	0.85	0.87
5. Nitrite-Nitrogen content, mg/L	0.11	0.11	0.11	0.11	0.11	0.11
6. Total Inorganic Nitrogen content, mg/L	1.1	1.1	1.2	1.2	1.0	1.0
7. Total phosphorus content, mg/L	0.05	0.05	0.06	0.05	0.04	0.05
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.03	0.03	0.03	0.03
9. E. coli count, cfu/100ml	1.3 x 10	1.2 x 10	1.6 x 10	1.4 x 10	1.6 x 10	1.1 x 10

Remarks: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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

Date : 5/9/2022

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	C/S/E	C/S/E/Dup	C/M/E	C/M/E/Dup	C/B/E	C/B/E/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	7	7	6	5	7	7
3. Ammoniacal nitrogen content, mg/L	0.066	0.069	0.085	0.066	0.073	0.077
4. Nitrate-Nitrogen content, mg/L	0.99	0.91	1.1	0.95	0.94	0.83
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	1.2	1.1	1.3	1.1	1.1	1.0
7. Total phosphorus content, mg/L	0.04	0.04	0.05	0.04	0.04	0.05
8. Total phosphorus content (Filtered), mg/L	0.02	0.03	0.02	0.02	0.02	0.02
9. E. coli count, cfu/100ml	0	0	3*	1*	1*	1*

Remarks: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)
2.* Estimated for E. coli count means the colonies counted was not in the range of 10 to 100 cfu/100ml.

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Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	D/S/E	D/S/E/Dup	D/M/E	D/M/E/Dup	D/B/E	D/B/E/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	7	6	6	6	7	8
3. Ammoniacal nitrogen content, mg/L	0.065	0.068	0.066	0.068	0.072	0.062
4. Nitrate-Nitrogen content, mg/L	0.90	1.09	0.87	0.99	0.93	0.97
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	1.1	1.3	1.1	1.2	1.1	1.2
7. Total phosphorus content, mg/L	0.04	0.04	0.05	0.05	0.06	0.05
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.03	0.03
9. E. coli count, cfu/100ml	0	0	1*	0	0	0

Remarks: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)
2.* Estimated for E. coli count means the colonies counted was not in the range of 10 to 100 cfu/100ml.

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Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	E/S/E	E/S/E/Dup	E/M/E	E/M/E/Dup	E/B/E	E/B/E/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	6	6	6	6	6
3. Ammoniacal nitrogen content, mg/L	0.089	0.089	0.081	0.081	0.079	0.078
4. Nitrate-Nitrogen content, mg/L	0.97	0.95	0.95	0.83	0.93	0.92
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	1.2	1.2	1.1	1.0	1.1	1.1
7. Total phosphorus content, mg/L	0.05	0.05	0.05	0.05	0.05	0.05
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.02	0.02
9. E. coli count, cfu/100ml	5.7 x 10	4.8 x 10	3.9 x 10	3.0 x 10	3.8 x 10	4.5 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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FUGRO TECHNICAL SERVICES LIMITED
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Tuen Mun, NT
Hong Kong

Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	F/S/E	F/S/E/Dup	F/M/E	F/M/E/Dup	F/B/E	F/B/E/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	6	6	6	6	6
3. Ammoniacal nitrogen content, mg/L	0.071	0.065	0.072	0.070	0.079	0.078
4. Nitrate-Nitrogen content, mg/L	0.90	1.0	1.1	0.94	0.92	0.97
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	1.1	1.2	1.2	1.1	1.1	1.2
7. Total phosphorus content, mg/L	0.06	0.05	0.06	0.05	0.04	0.05
8. Total phosphorus content (Filtered), mg/L	0.03	0.03	0.02	0.02	0.02	0.02
9. E. coli count, cfu/100ml	4.0 x 10	3.3 x 10	3.0 x 10	3.9 x 10	3.2 x 10	3.8 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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Date : 5/9/2011

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Hong Kong

Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	G/S/E	G/S/E/Dup	G/M/E	G/M/E/Dup	G/B/E	G/B/E/Dup
1. Biochemical oxygen demand, mg/L	1.3	1.0	1.3	1.3	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	6	5	6	5	5
3. Ammoniacal nitrogen content, mg/L	0.15	0.13	0.067	0.069	0.11	0.12
4. Nitrate-Nitrogen content, mg/L	0.79	0.77	0.64	0.54	0.88	0.88
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	1.1	1.0	0.83	0.72	1.1	1.1
7. Total phosphorus content, mg/L	0.04	0.04	0.04	0.05	0.04	0.04
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.02	0.02
9. E. coli count, cfu/100ml	3.4 x 10	4.0 x 10	8.0 x 10	1.1×10^2	7.0 x 10	8.2 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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Hong Kong

Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	H/S/E	H/S/E/Dup	H/M/E	H/M/E/Dup	H/B/E	H/B/E/Dup
1. Biochemical oxygen demand, mg/L	<1	1.2	<1	<1	1.2	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	5	5	5	5	6
3. Ammoniacal nitrogen content, mg/L	0.078	0.079	0.13	0.12	0.11	0.11
4. Nitrate-Nitrogen content, mg/L	0.90	0.84	0.91	0.94	1.0	1.1
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	1.1	1.0	1.2	1.2	1.2	1.3
7. Total phosphorus content, mg/L	0.05	0.03	0.04	0.03	0.05	0.05
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.01	0.01	0.01	0.02
9. E. coli count, cfu/100ml	7.0 x 10	6.9 x 10	6.3 x 10	5.6 x 10	6.6 x 10	5.0 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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Hong Kong

Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	A/S/F	A/S/F/Dup	A/M/F	A/M/F/Dup	A/B/F	A/B/F/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	1.4	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	6	6	6	6	6
3. Ammoniacal nitrogen content, mg/L	0.066	0.071	0.062	0.061	0.062	0.063
4. Nitrate-Nitrogen content, mg/L	1.0	0.92	0.87	0.83	0.86	0.85
5. Nitrite-Nitrogen content, mg/L	0.11	0.11	0.11	0.11	0.11	0.11
6. Total Inorganic Nitrogen content, mg/L	1.2	1.1	1.0	1.0	1.0	1.0
7. Total phosphorus content, mg/L	0.05	0.04	0.04	0.04	0.04	0.04
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.03	0.03
9. E. coli count, cfu/100ml	1.2 x 10	1.5 x 10	1.7 x 10	1.4 x 10	1.3 x 10	1.8 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	B/S/F	B/S/F/Dup	B/M/F	B/M/F/Dup	B/B/F	B/B/F/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	5	6	7	5	5
3. Ammoniacal nitrogen content, mg/L	0.061	0.062	0.062	0.059	0.060	0.057
4. Nitrate-Nitrogen content, mg/L	0.85	0.84	0.86	0.99	0.96	1.1
5. Nitrite-Nitrogen content, mg/L	0.11	0.11	0.11	0.11	0.11	0.11
6. Total Inorganic Nitrogen content, mg/L	1.0	1.0	1.0	1.2	1.1	1.3
7. Total phosphorus content, mg/L	0.04	0.04	0.04	0.05	0.05	0.03
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.03	0.02
9. E. coli count, cfu/100ml	1.4 x 10	1.6 x 10	1.6 x 10	1.3 x 10	1.6 x 10	1.5 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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Date : 5/9/2022

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FUGRO TECHNICAL SERVICES LIMITED
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Tuen Mun, NT
Hong Kong

Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	C/S/F	C/S/F/Dup	C/M/F	C/M/F/Dup	C/B/F	C/B/F/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	6	6	5	4	5
3. Ammoniacal nitrogen content, mg/L	0.060	0.056	0.063	0.062	0.061	0.060
4. Nitrate-Nitrogen content, mg/L	0.88	0.79	0.82	0.76	0.79	0.71
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.13
6. Total Inorganic Nitrogen content, mg/L	1.1	0.97	1.0	0.94	0.98	0.89
7. Total phosphorus content, mg/L	0.04	0.04	0.04	0.05	0.04	0.04
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.02	0.02
9. E. coli count, cfu/100ml	1*	1*	0	1*	1*	1*

Remarks: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)
2.* Estimated for E. coli count means the colonies counted was not in the range of 10 to 100 cfu/100ml.

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Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	D/S/F	D/S/F/Dup	D/M/F	D/M/F/Dup	D/B/F	D/B/F/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	6	5	5	5	6
3. Ammoniacal nitrogen content, mg/L	0.058	0.067	0.059	0.060	0.058	0.070
4. Nitrate-Nitrogen content, mg/L	0.96	0.80	0.82	0.85	0.83	0.82
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	1.1	0.99	1.0	1.0	1.0	1.0
7. Total phosphorus content, mg/L	0.04	0.05	0.04	0.03	0.03	0.04
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.02	0.03
9. E. coli count, cfu/100ml	0	0	8*	7*	1.1 x 10	9*

Remarks: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)
2.* Estimated for E. coli count means the colonies counted was not in the range of 10 to 100 cfu/100ml.

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Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	E/S/F	E/S/F/Dup	E/M/F	E/M/F/Dup	E/B/F	E/B/F/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	<1	<1	<1	<1
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	5	5	6	7	6
3. Ammoniacal nitrogen content, mg/L	0.063	0.061	0.067	0.066	0.086	0.063
4. Nitrate-Nitrogen content, mg/L	0.83	0.80	0.85	0.77	0.86	0.89
5. Nitrite-Nitrogen content, mg/L	0.11	0.11	0.12	0.11	0.11	0.11
6. Total Inorganic Nitrogen content, mg/L	1.0	0.98	1.0	0.95	1.1	1.1
7. Total phosphorus content, mg/L	0.05	0.04	0.04	0.04	0.03	0.04
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.02	0.02
9. E. coli count, cfu/100ml	3.6 x 10	3.5 x 10	4.1 x 10	5.5 x 10	4.6 x 10	5.0 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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Results :

Test parameters	Sample identification					
	F/S/F	F/S/F/Dup	F/M/F	F/M/F/Dup	F/B/F	F/B/F/Dup
1. Biochemical oxygen demand, mg/L	<1	<1	1.4	1.2	1.2	1.2
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	5	4	4	5	5
3. Ammoniacal nitrogen content, mg/L	0.071	0.070	0.11	0.11	0.087	0.078
4. Nitrate-Nitrogen content, mg/L	0.81	1.2	0.74	0.71	0.68	0.63
5. Nitrite-Nitrogen content, mg/L	0.11	0.11	0.11	0.11	0.11	0.11
6. Total Inorganic Nitrogen content, mg/L	0.99	1.4	0.96	0.93	0.88	0.83
7. Total phosphorus content, mg/L	0.05	0.05	0.05	0.05	0.05	0.04
8. Total phosphorus content (Filtered), mg/L	0.03	0.02	0.02	0.02	0.02	0.02
9. E. coli count, cfu/100ml	5.0 x 10	3.9 x 10	5.2 x 10	6.2 x 10	4.6 x 10	3.8 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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Results :

Test parameters	Sample identification					
	G/S/F	G/S/F/Dup	G/M/F	G/M/F/Dup	G/B/F	G/B/F/Dup
1. Biochemical oxygen demand, mg/L	1.4	1.3	1.4	1.3	1.1	1.0
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	7	6	7	7	6
3. Ammoniacal nitrogen content, mg/L	0.15	0.14	0.13	0.13	0.13	0.13
4. Nitrate-Nitrogen content, mg/L	0.60	0.63	0.65	0.59	0.57	0.57
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	0.87	0.89	0.89	0.83	0.82	0.82
7. Total phosphorus content, mg/L	0.04	0.04	0.04	0.05	0.05	0.04
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.02	0.02	0.02	0.02
9. E. coli count, cfu/100ml	4.6 x 10	6.6 x 10	5.2 x 10	4.5 x 10	5.3 x 10	4.8 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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Report No. : 181172WA221589

Results :

Test parameters	Sample identification					
	H/S/F	H/S/F/Dup	H/M/F	H/M/F/Dup	H/B/F	H/B/F/Dup
1. Biochemical oxygen demand, mg/L	1.3	<1	1.5	1.4	1.3	1.5
2. Total suspended solids dried at 103°C - 105°C, mg/L	6	6	6	6	5	7
3. Ammoniacal nitrogen content, mg/L	0.060	0.061	0.060	0.058	0.11	0.11
4. Nitrate-Nitrogen content, mg/L	0.85	0.92	0.91	0.96	0.79	1.2
5. Nitrite-Nitrogen content, mg/L	0.12	0.12	0.12	0.12	0.12	0.12
6. Total Inorganic Nitrogen content, mg/L	1.0	1.1	1.1	1.1	1.0	1.5
7. Total phosphorus content, mg/L	0.04	0.04	0.05	0.04	0.04	0.04
8. Total phosphorus content (Filtered), mg/L	0.02	0.02	0.01	0.02	0.02	0.02
9. E. coli count, cfu/100ml	7.0 x 10	6.2 x 10	5.9 x 10	6.6 x 10	5.0 x 10	4.9 x 10

Remark: 1.Total Inorganic Nitrogen (in mg/L) = Total Oxidised Nitrogen Content (in mg/L) + Ammoniacal Nitrogen Content (in mg/L)

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

Date : 5/9/2022

** End of Report **

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Note

Laboratory Duplicate, Quality Assurance/Quality Control Report

Biochemical oxygen demand, mg/L					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
1	<1	-	0.87	0.88	1.14
			1.84	1.79	2.75
			0.81	0.85	4.82
			0.96	0.98	2.06
			0.95	0.94	1.06

Nitrate-Nitrogen content, mg/L					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.005	-	-	-	-	-

Total suspended solids dried at 103°C – 105°C, mg/L					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
1	<1	93.38	6.35	5.90	7.35
		101.00	6.40	6.33	1.05
		100.27	5.25	5.10	2.90
		96.05	5.25	5.17	1.60
		101.25	6.93	6.37	8.52

Nitrite-Nitrogen content, mg/L					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.005	<0.005	107.50	0.123	0.123	0.00
	<0.005	108.75	0.117	0.118	0.85
	<0.005	110.25	0.112	0.113	0.89
	<0.005	108.25	0.114	0.115	0.87
	<0.005	110.25	0.119	0.118	0.84

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

Date : 5/9/2011

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Tuen Mun, NT
Hong Kong

Note

Laboratory Duplicate, Quality Assurance/Quality Control Report

Ammoniacal Nitrogen content, mg/L					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.005	<0.005	111.17	0.068	0.068	0.00
	<0.005	112.33	0.069	0.067	2.94
	<0.005	107.33	0.057	0.059	3.54
	<0.005	110.92	0.070	0.069	1.44
	<0.005	101.42	0.109	0.118	7.93

Total Inorganic Nitrogen content, mg/L					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.005	-	-	-	-	-

Total phosphorus content, mg/L					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.01	<0.01	99.6	0.042	0.040	4.88
	<0.01	98.2	0.049	0.051	4.00
	<0.01	99.7	0.032	0.035	8.96
	<0.01	100.1	0.052	0.051	1.94
	<0.01	98.8	0.042	0.044	4.65

Total phosphorus content (Filtered) , mg/L					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.01	<0.01	99.5	0.023	0.024	4.26
	<0.01	99.6	0.019	0.021	10.00
	<0.01	99.1	0.022	0.021	4.65
	<0.01	99.5	0.024	0.023	4.26
	<0.01	100.3	0.017	0.018	5.71

E. coli count, cfu/100ml					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	Precision
1	0	-	0	0	-
			1.1×10^2	1.0×10^2	0.0414
			1.2×10^2	1.7×10^2	0.1513
			3.2×10^2	4.5×10^2	0.1481
			5.5×10^2	4.2×10^2	0.1171

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

Date : 5/9/2022

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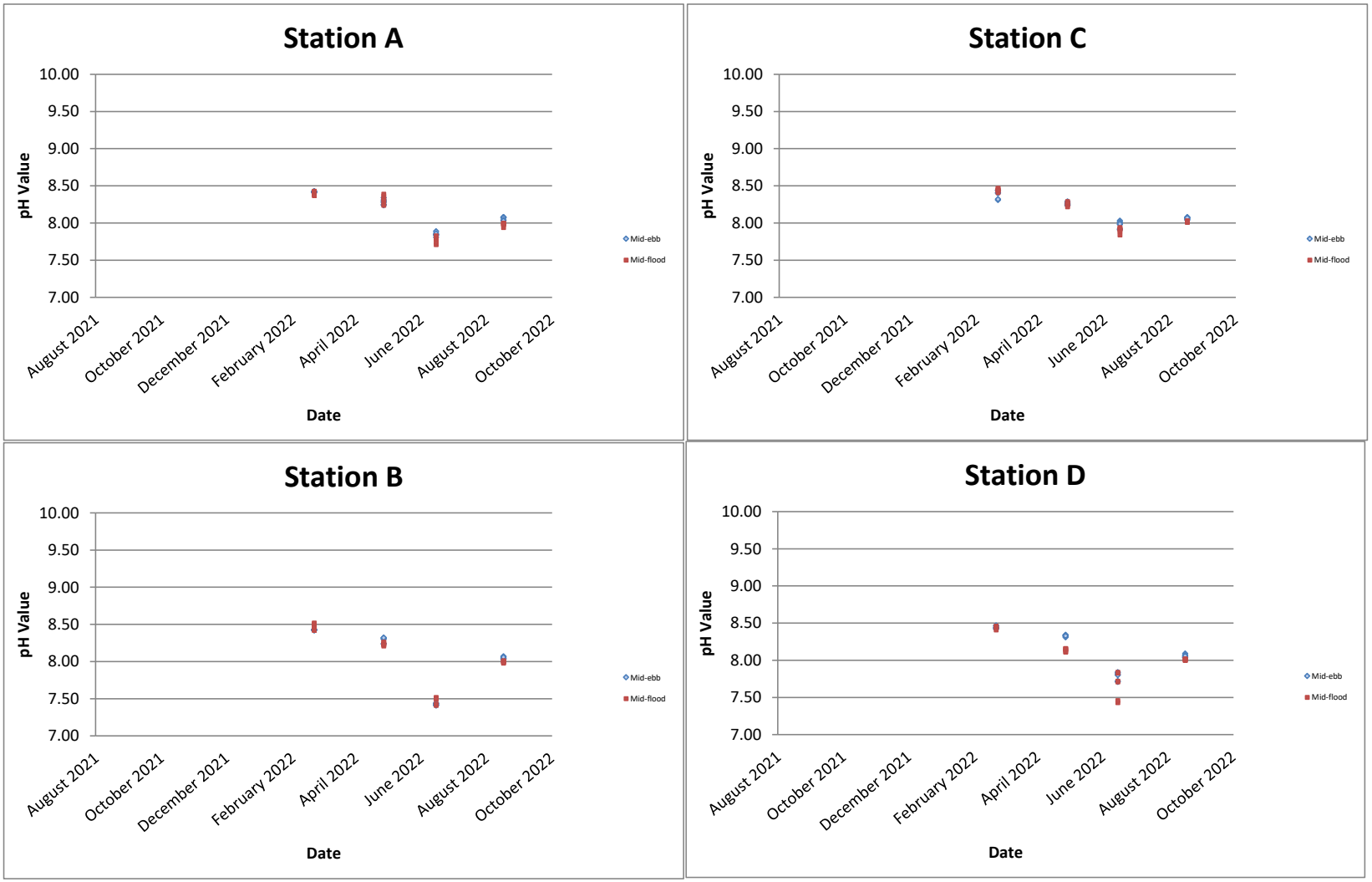
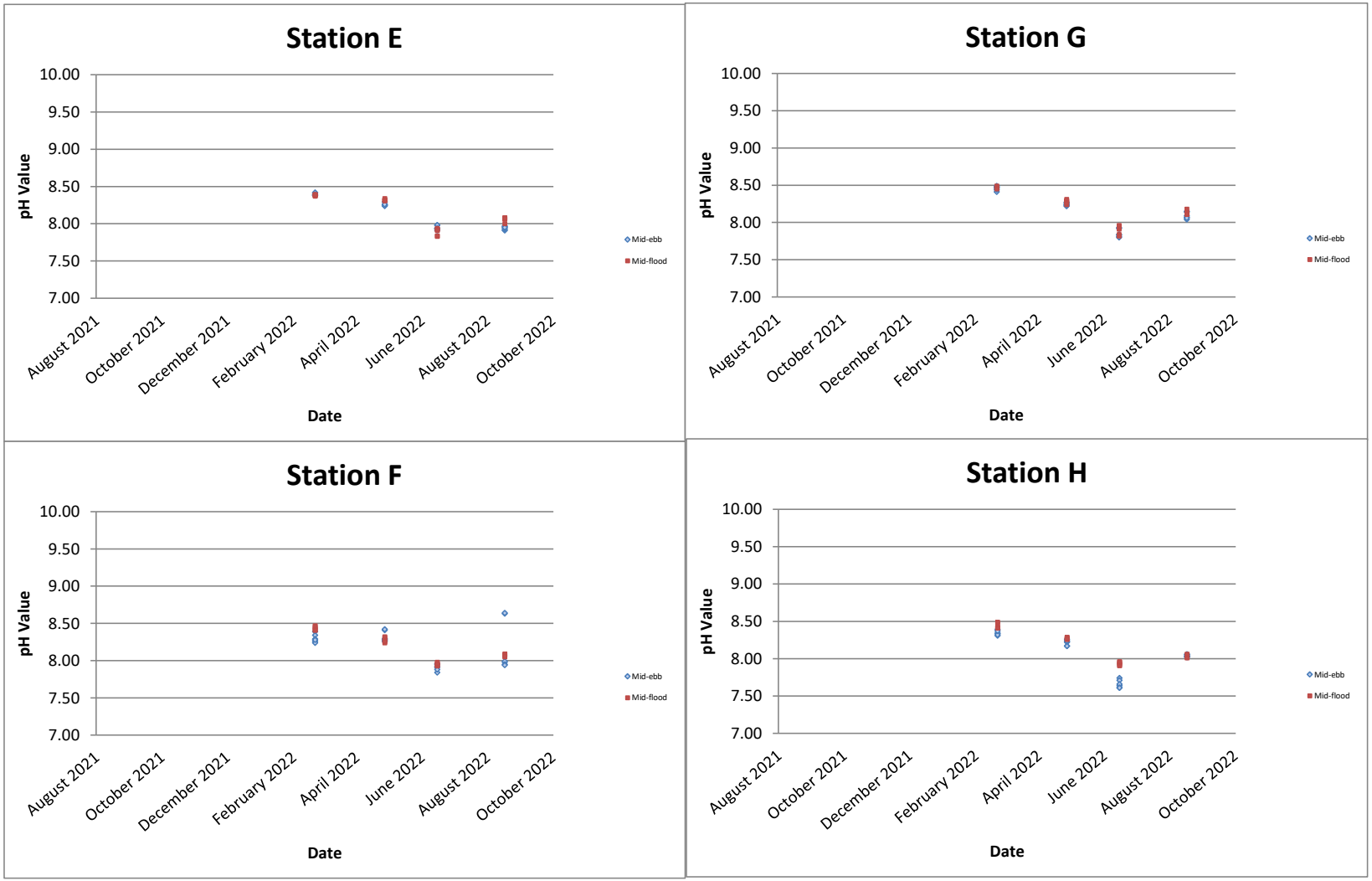
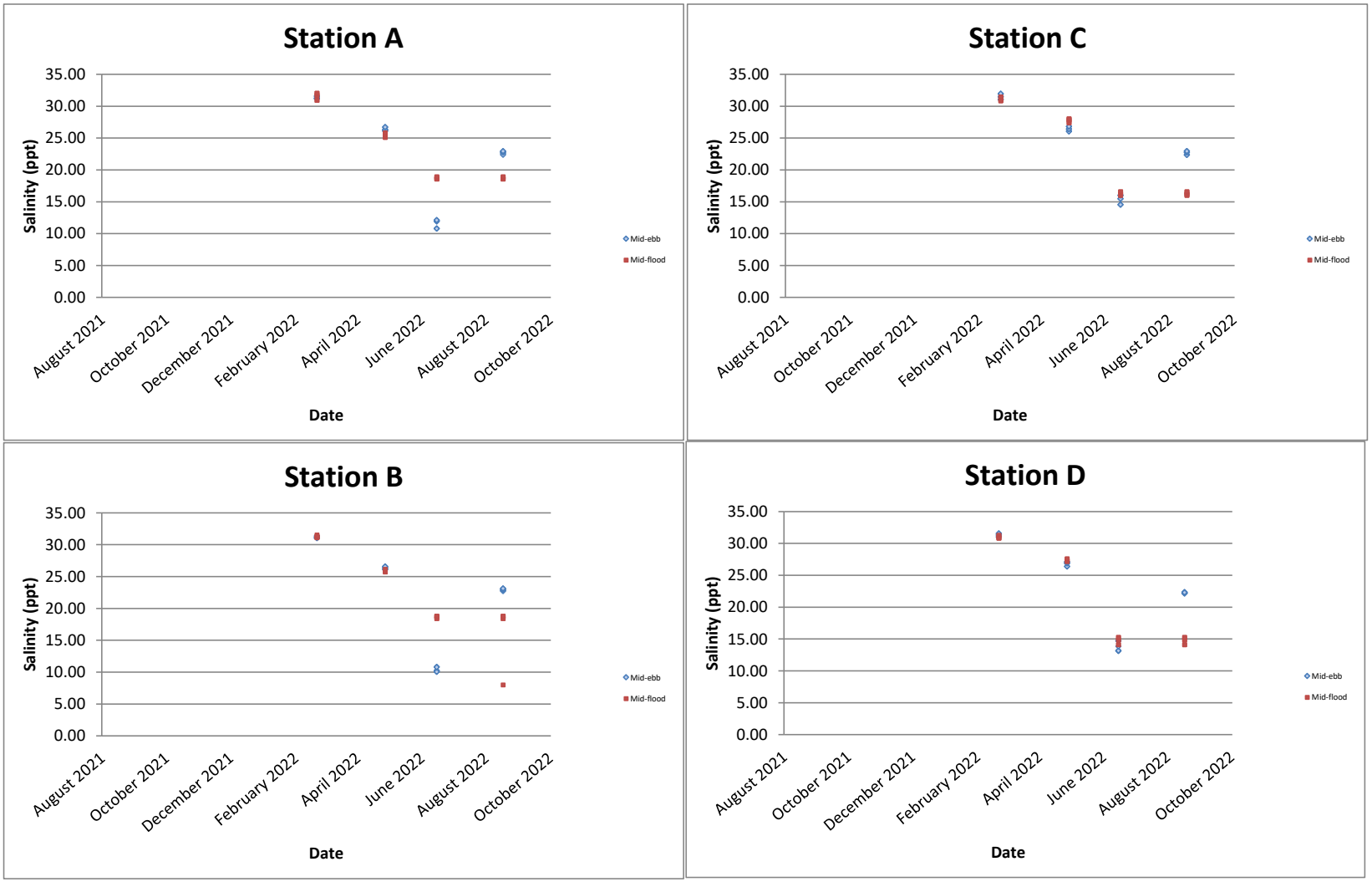
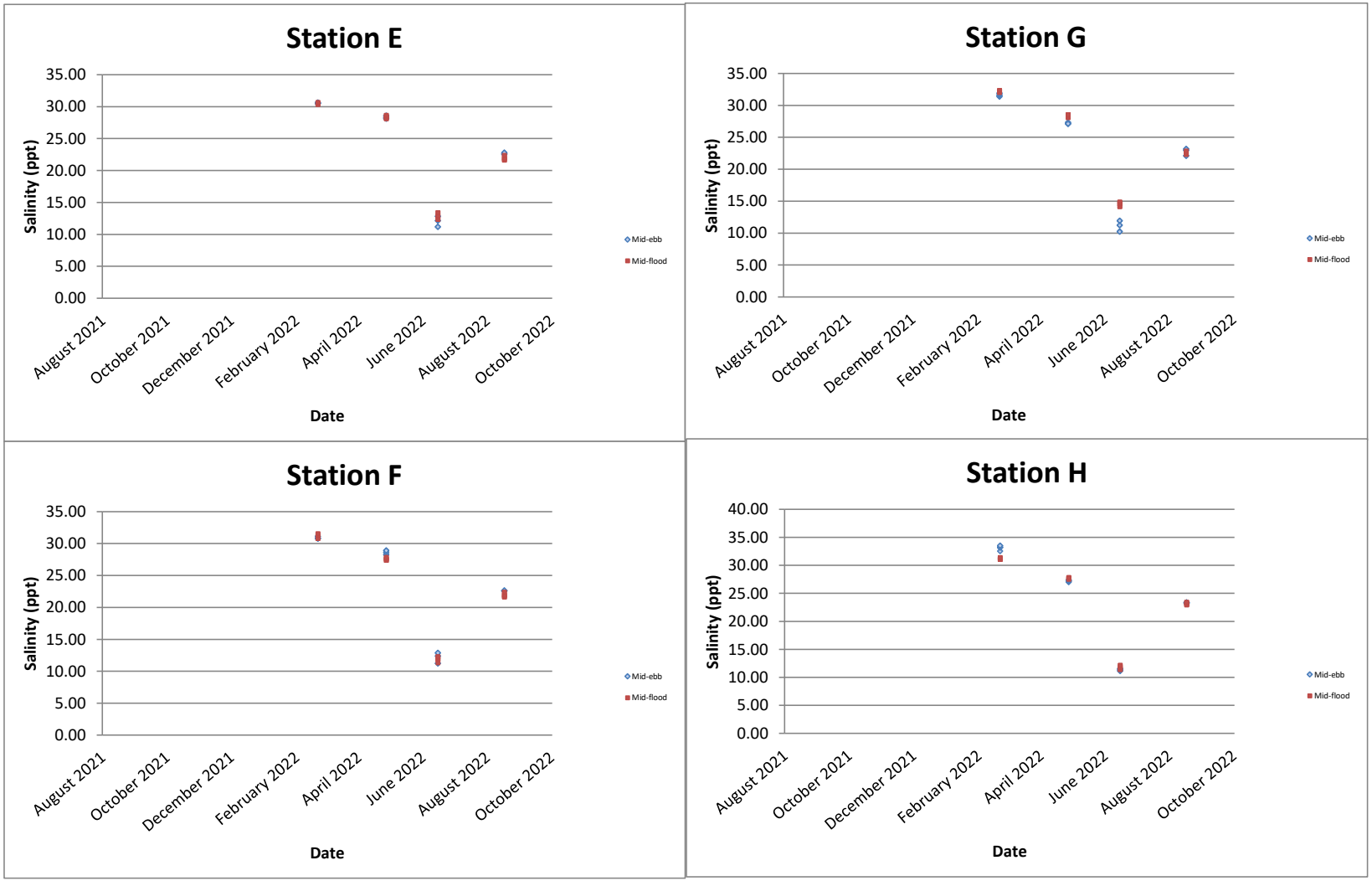
pH value

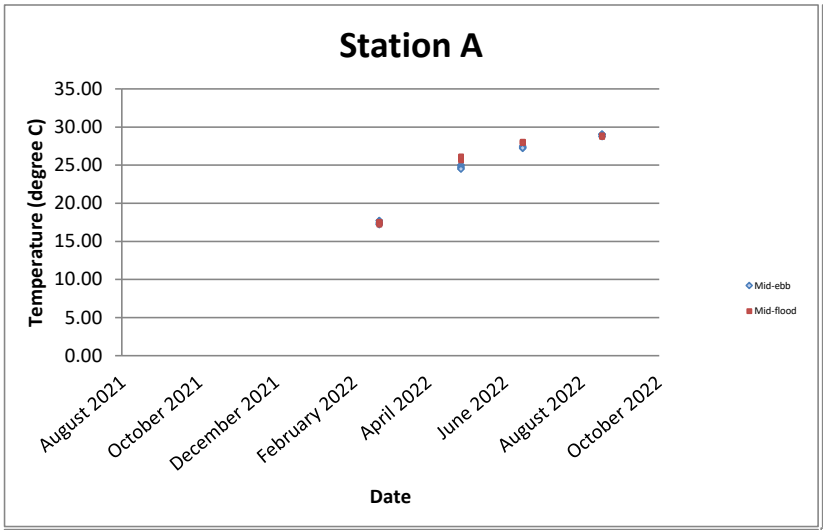

Station A
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station C
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station B
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station D
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

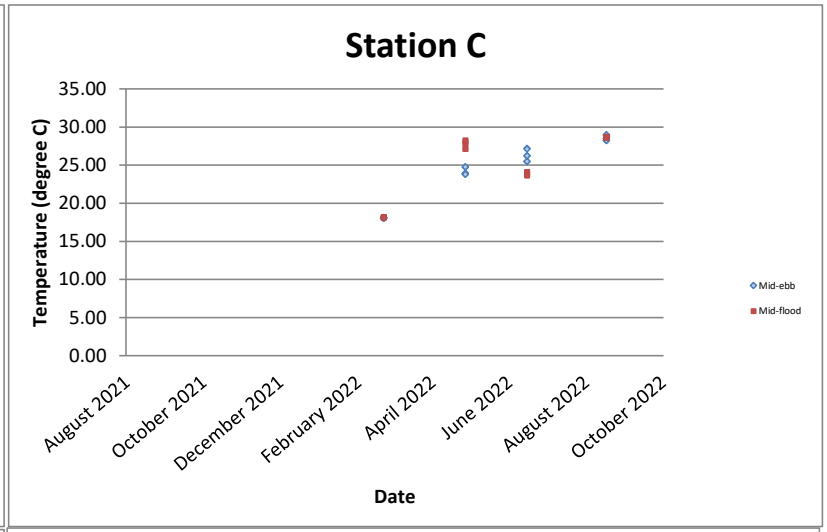

Station E
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station G
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station F
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station H
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

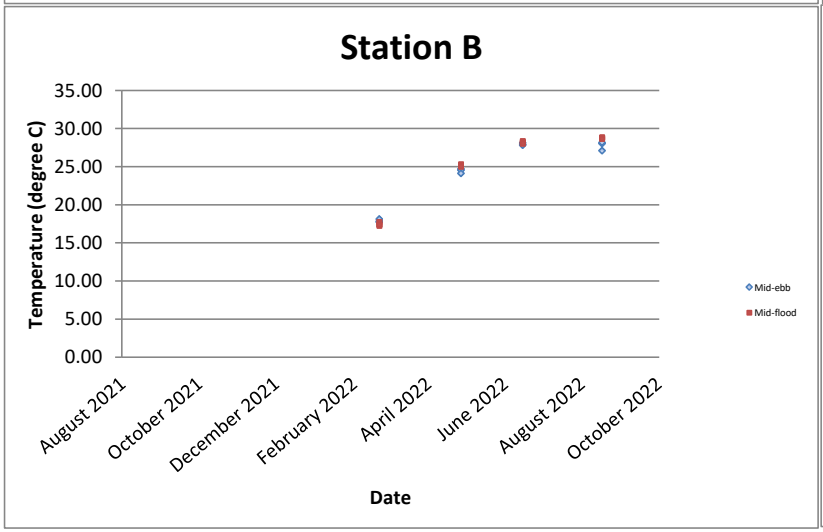
Salinity (ppt)

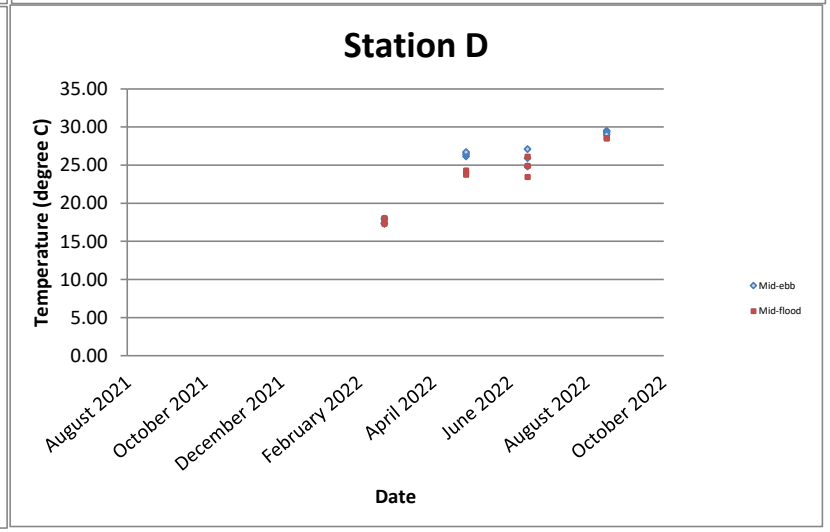



Station E
Salinity (ppt)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station G
Salinity (ppt)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station F
Salinity (ppt)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
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
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

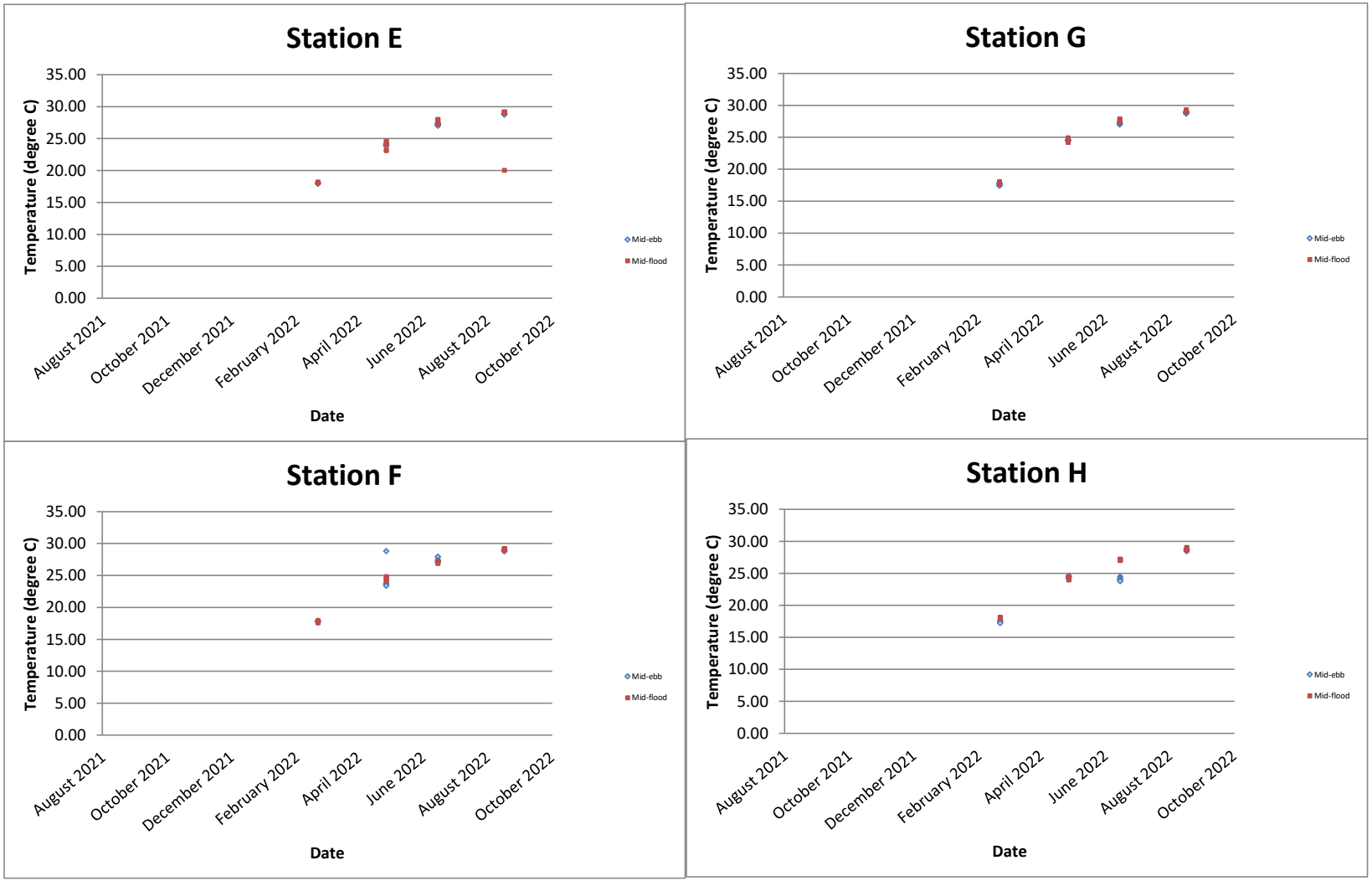

Station A
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

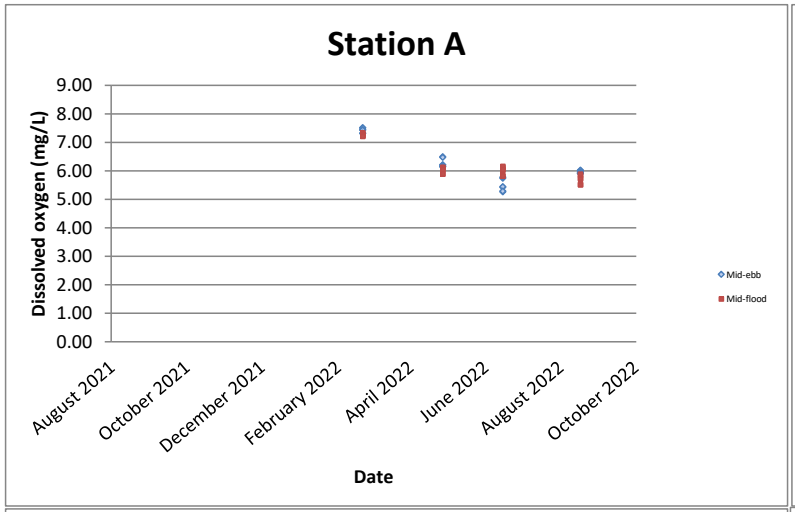

Station C
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

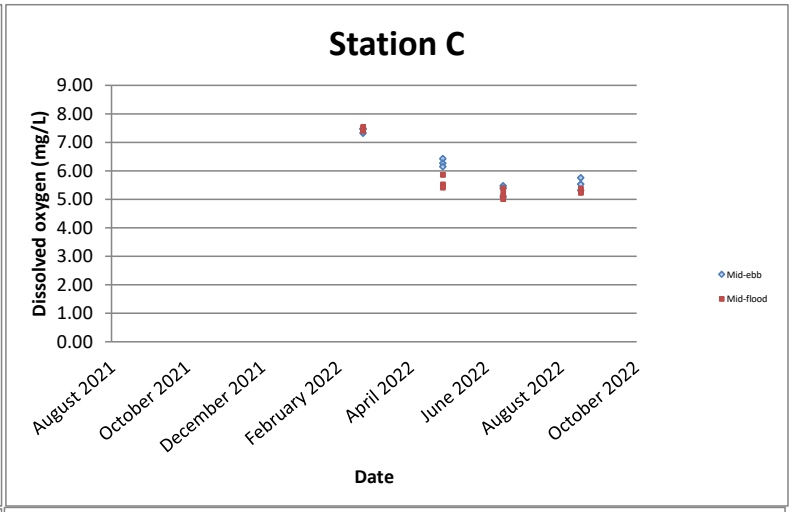

Station B
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

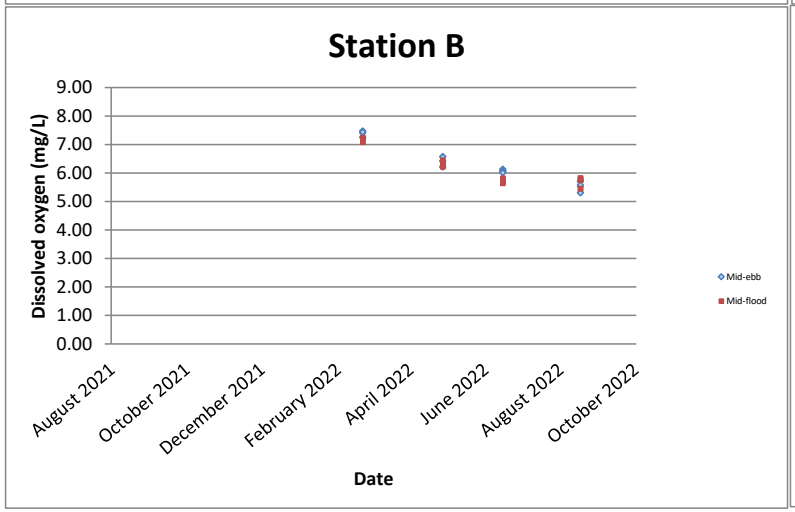

Station D
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

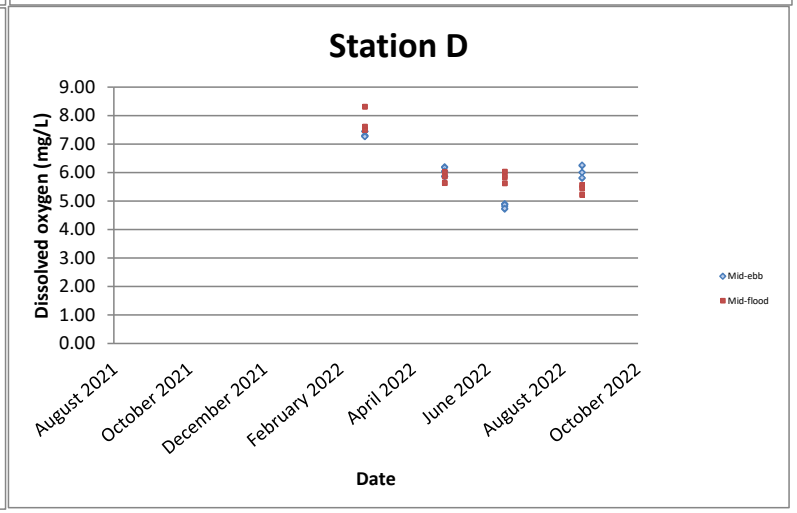
Temperature (degree C)

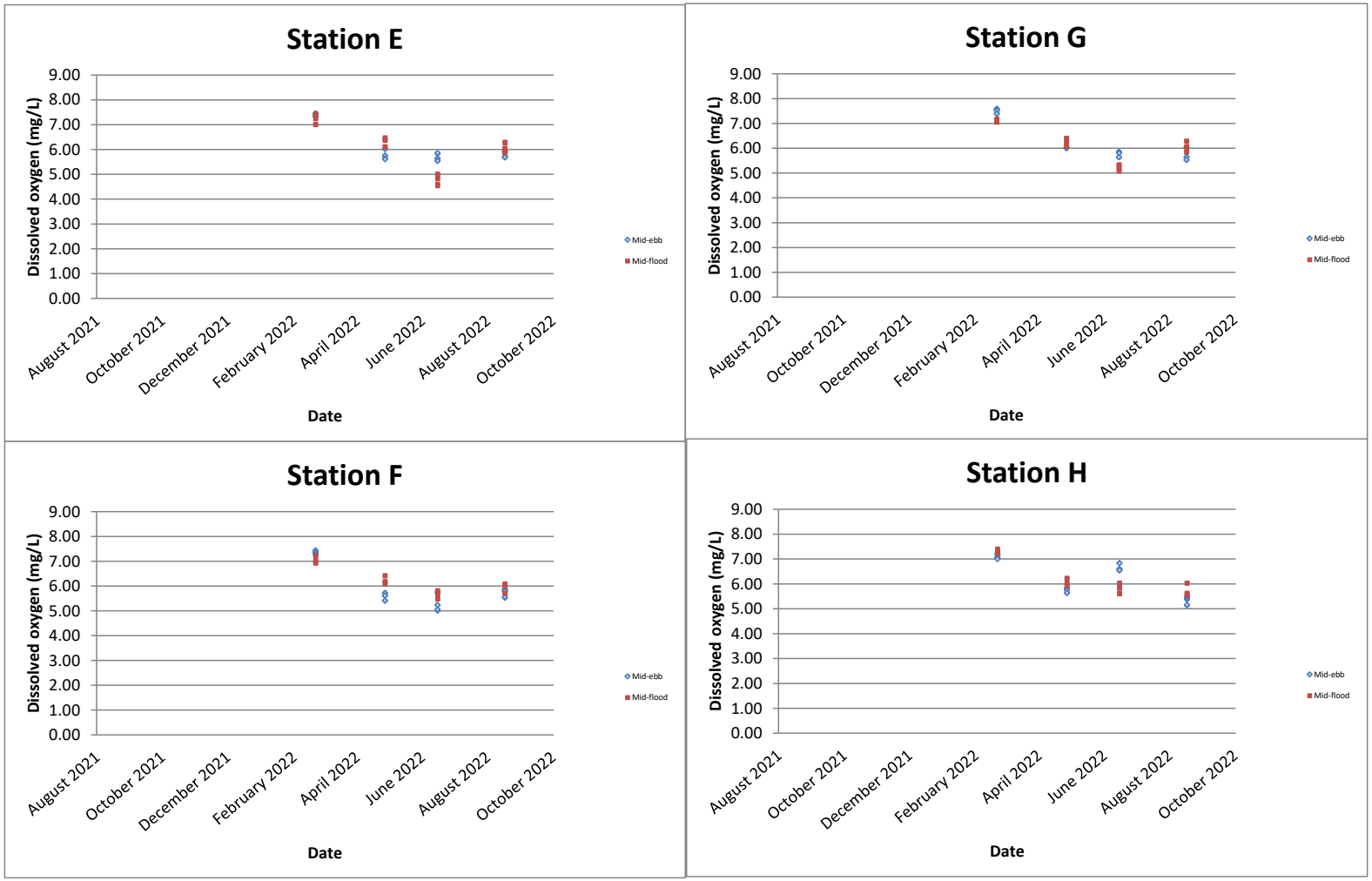



Station A
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

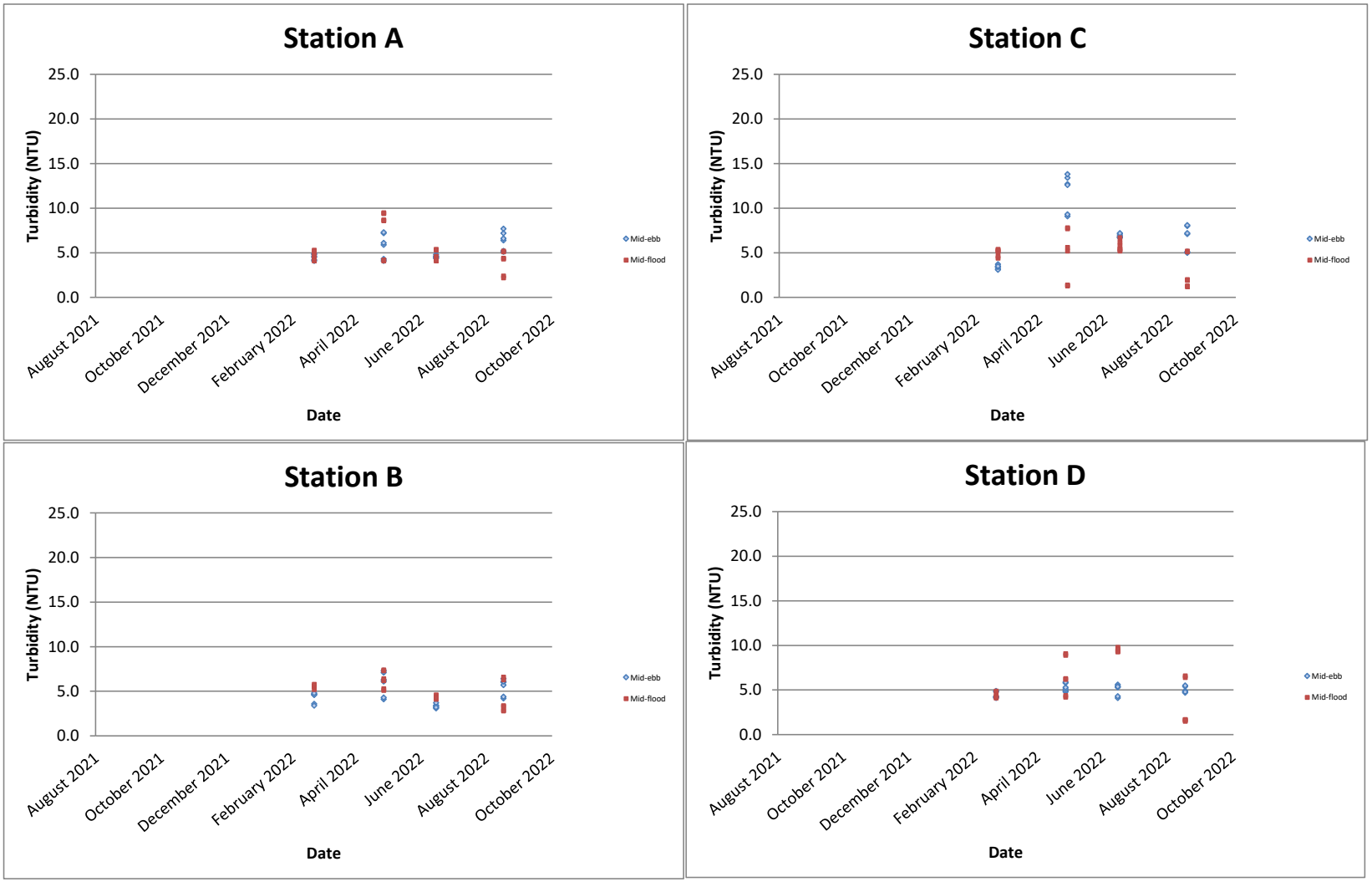

Station C
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

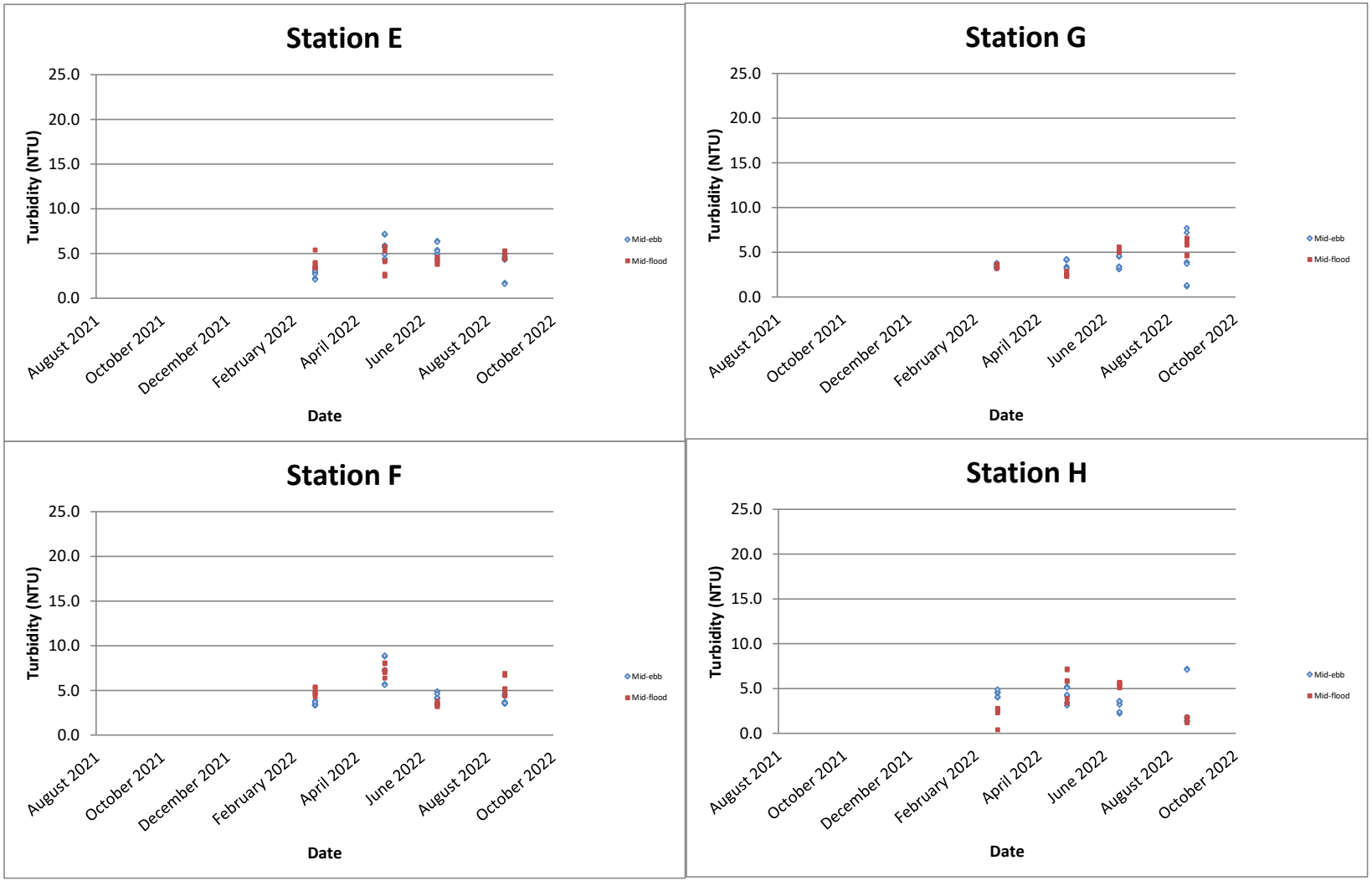

Station B
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood


Station D
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

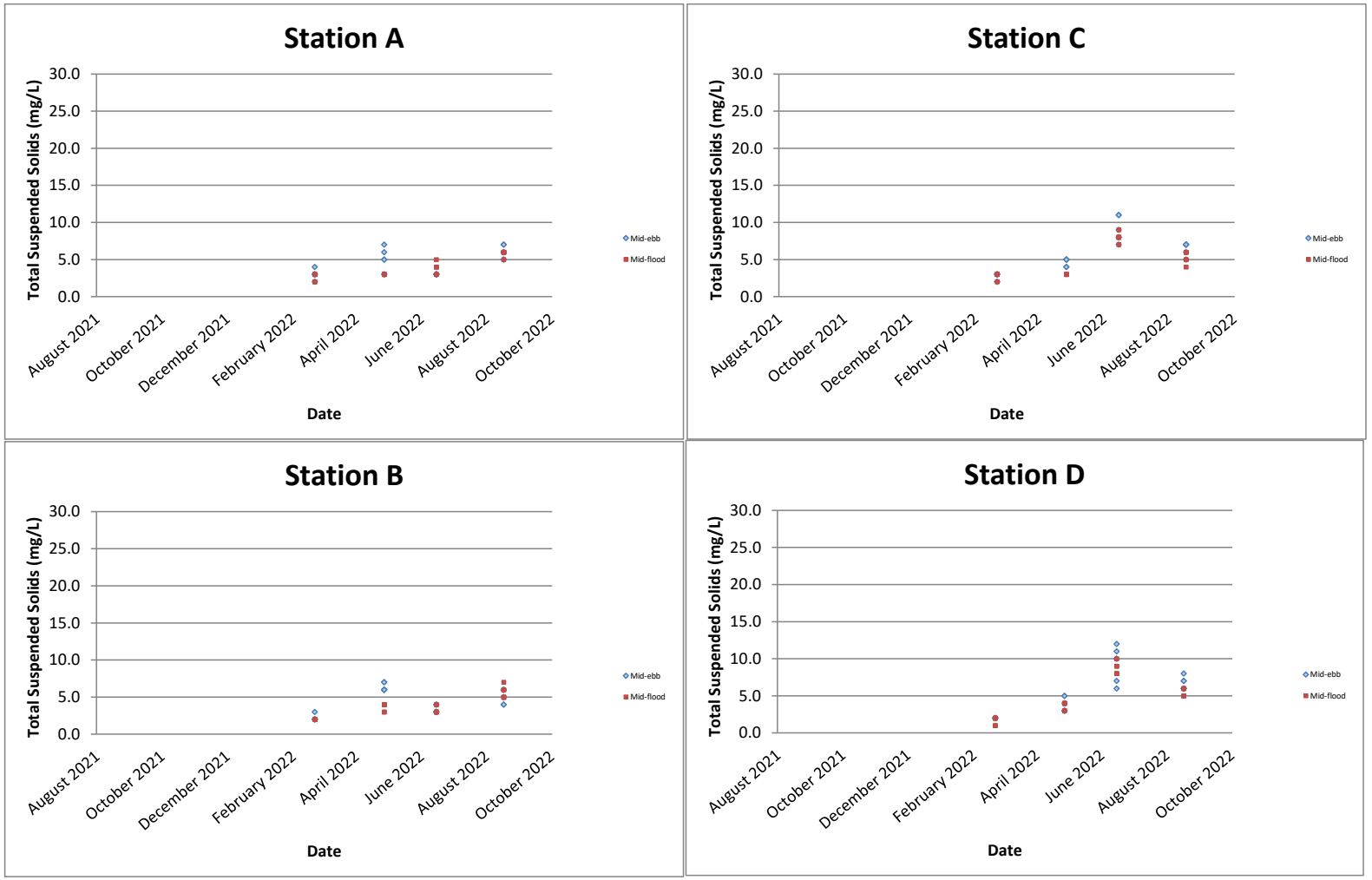

Station E
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood
Station G
Dissolved oxygen (mg/L)
Date
Mid-ebb
Mid-flood
Station F
Dissolved oxygen (mg/L)
Date
Mid-ebb
Mid-flood
Station H
Dissolved oxygen (mg/L)
Date
Mid-ebb
Mid-flood

Turbidity (NTU)

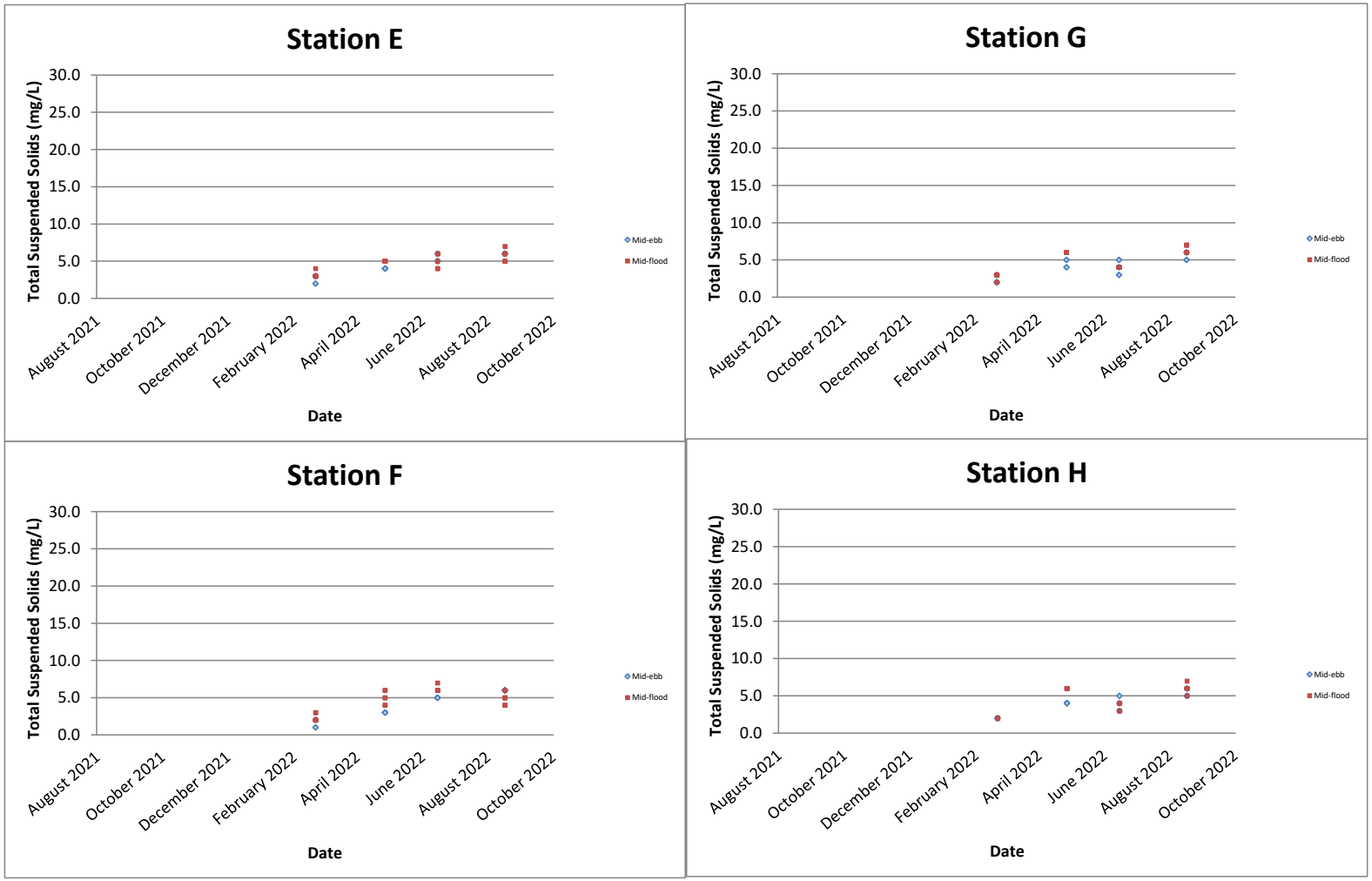



Station E
Station G
Station F
Station H
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Mid-ebb
Mid-flood

Total Suspended Solids (mg/L)

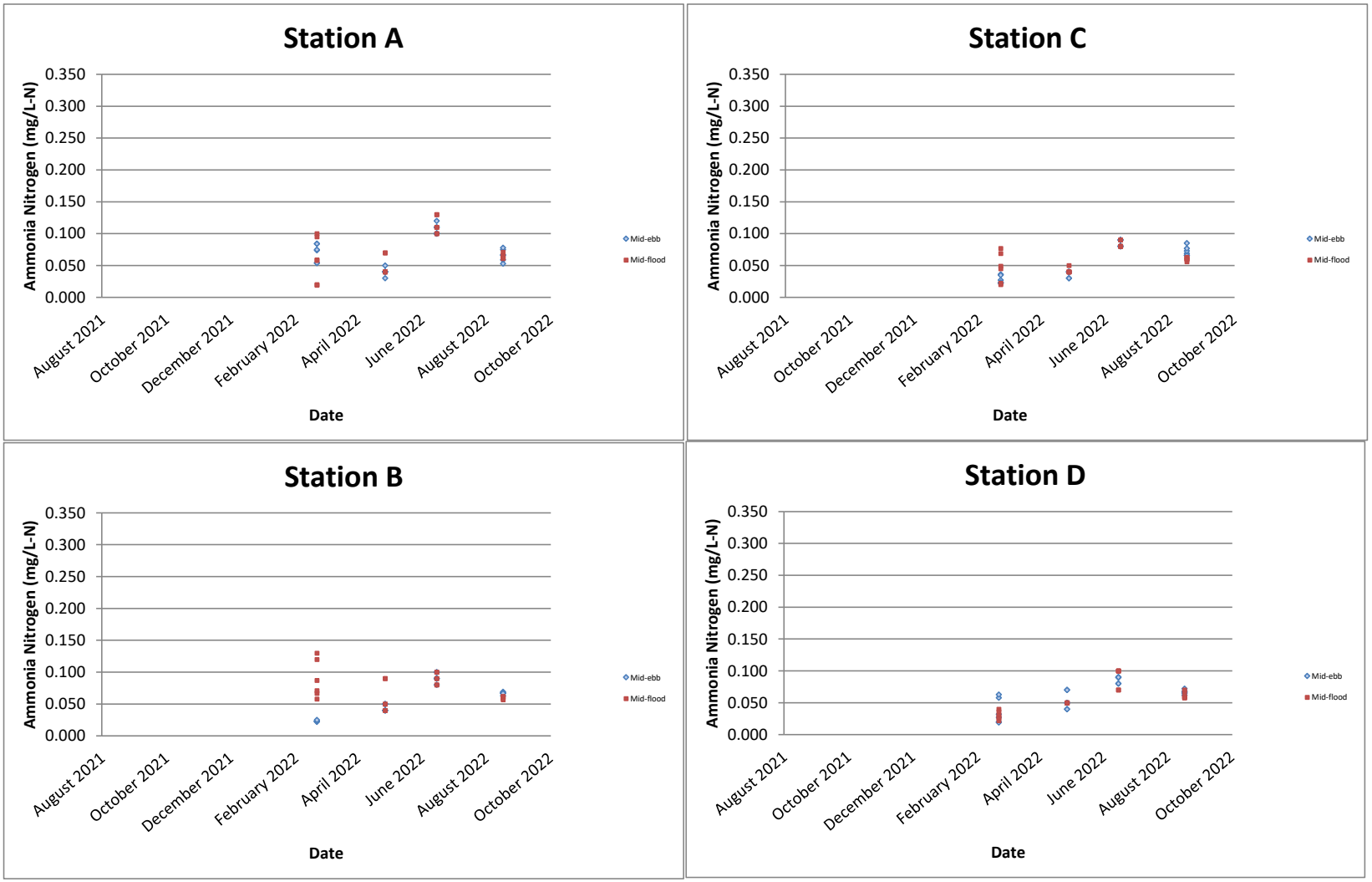


Remark: All below the Limit of Report sample results (<0.5 mg/L) for Total Suspended Solids is regarded as 0.5 mg/L in graphical presentation.

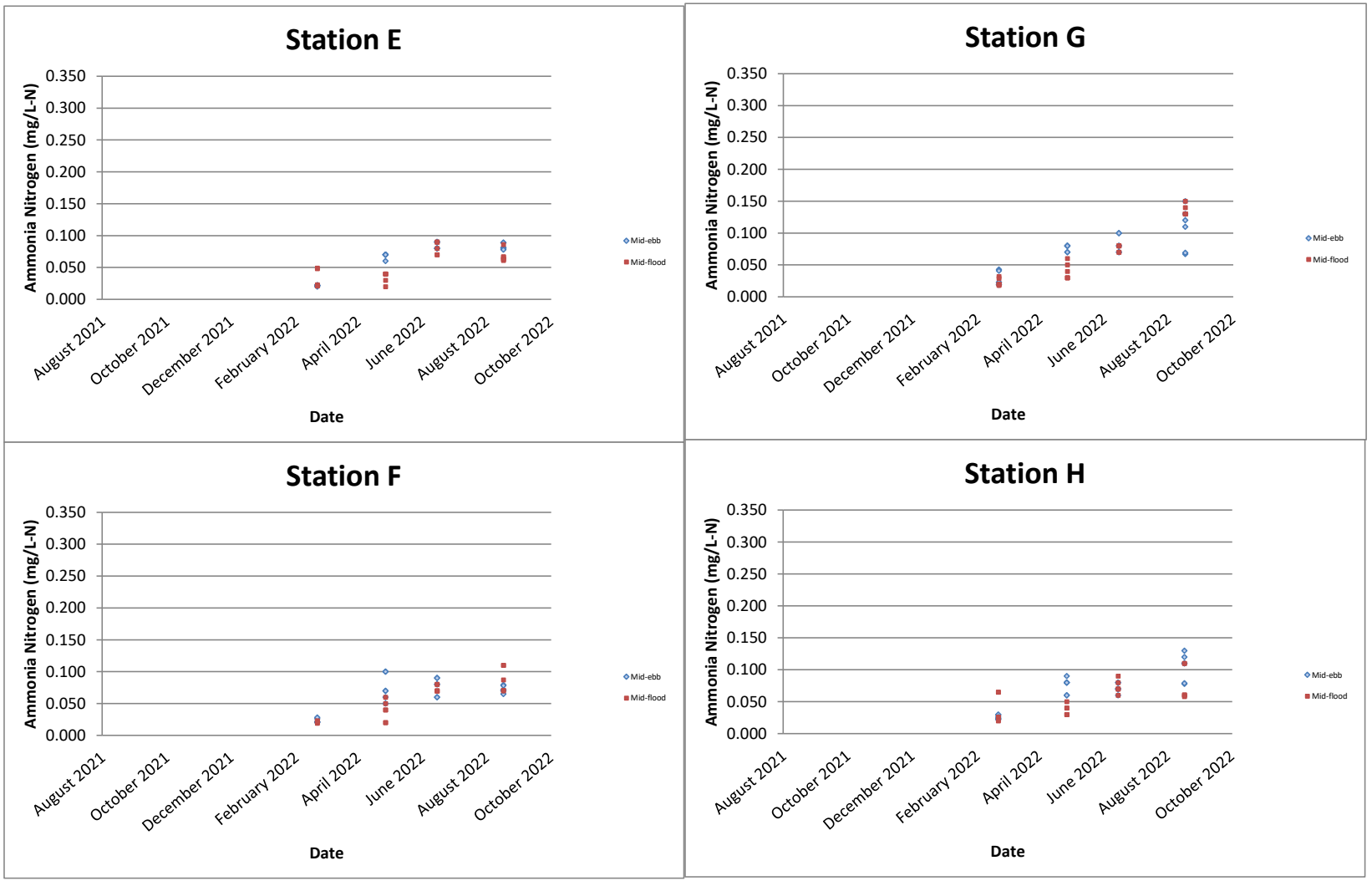


Remark: All below the Limit of Report sample results (<0.5 mg/L) for Total Suspended Solids is regarded as 0.5 mg/L in graphical presentation.

Ammonia Nitrogen (mg/L-N)

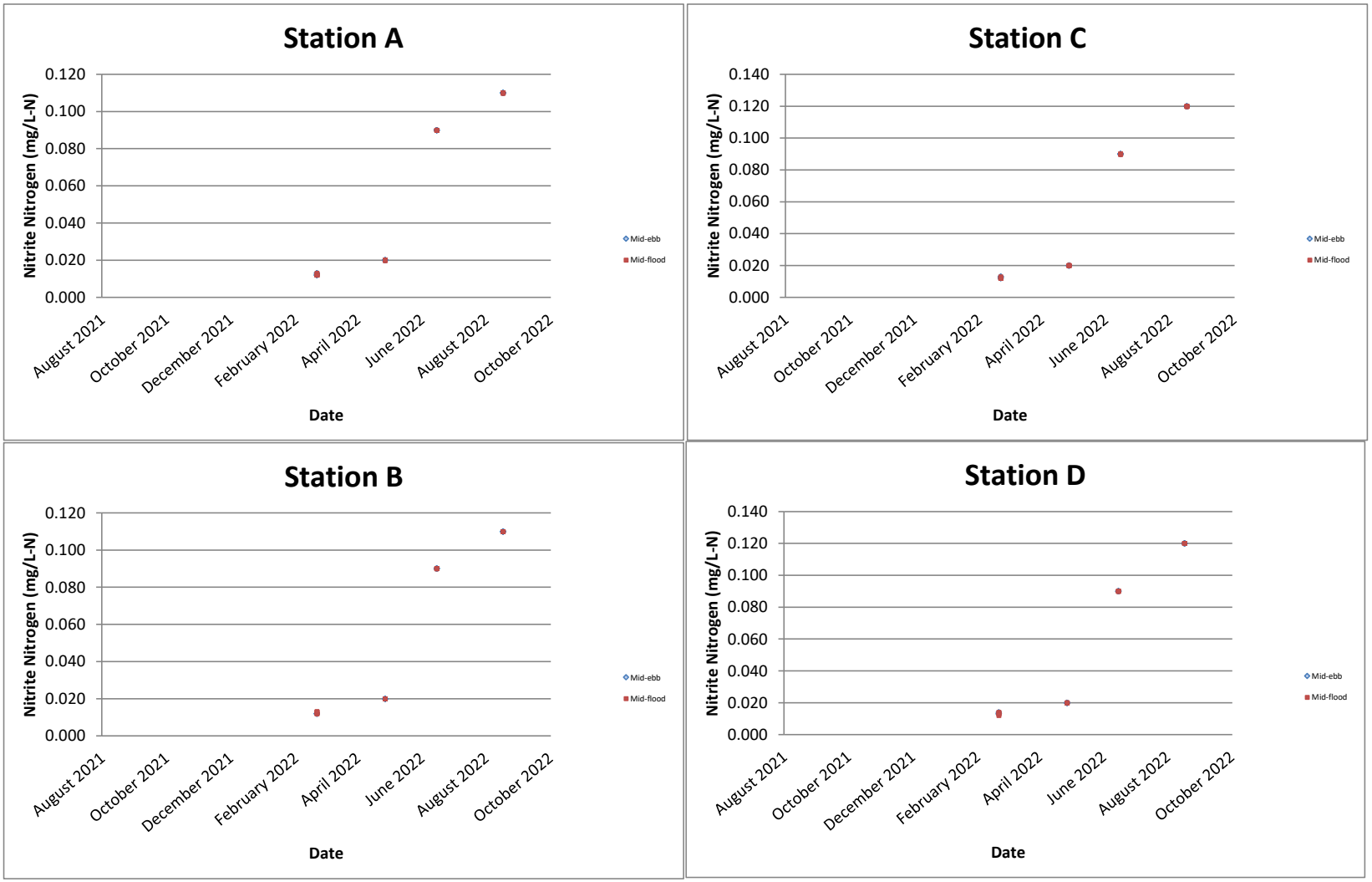


Remark: All below the Limit of Report sample results (<0.005 mg/L) for Ammonia Nitrogen is regarded as 0.005 mg/L in graphical presentation.

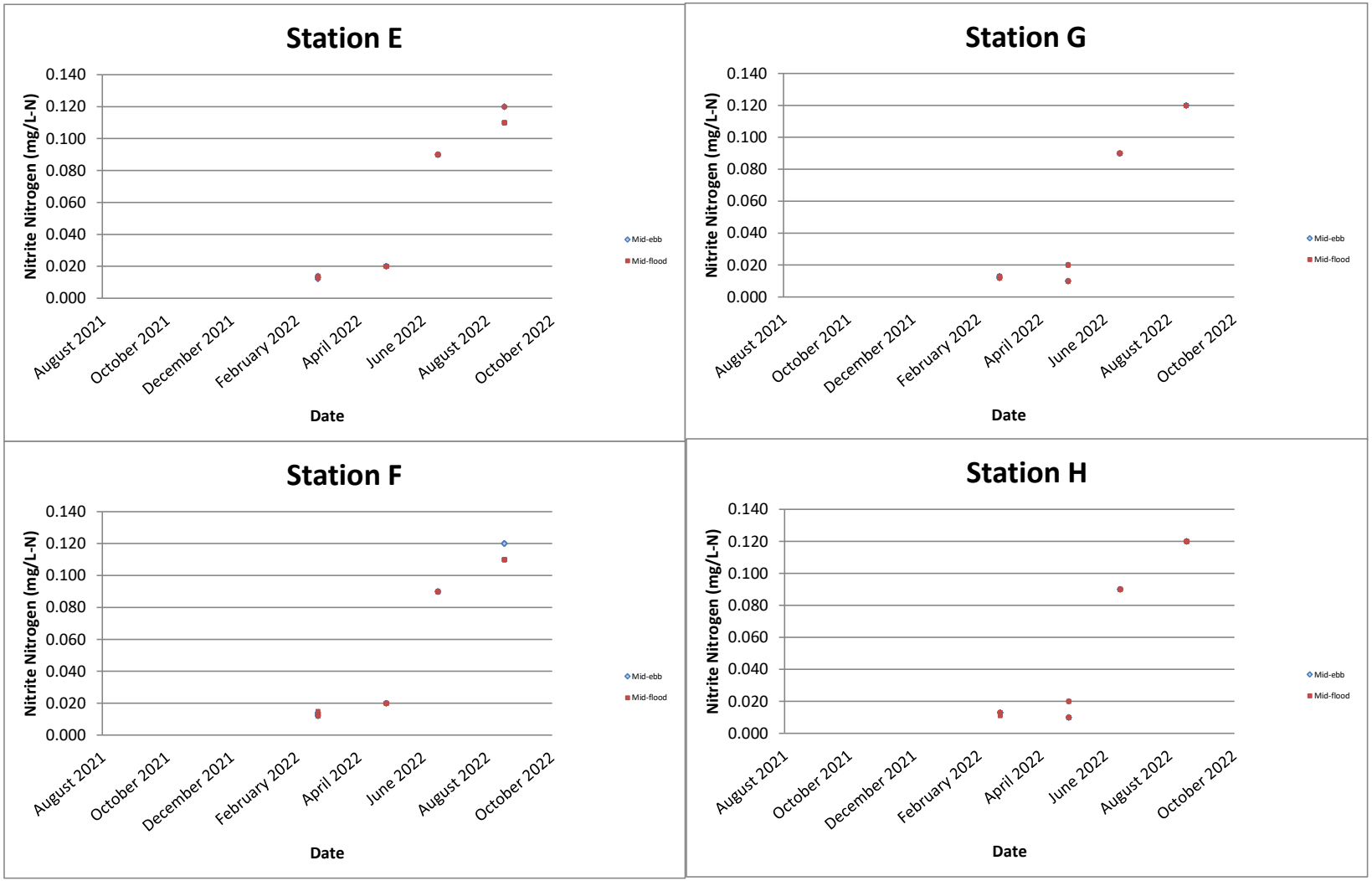


Remark: All below the Limit of Report sample results (<0.005 mg/L) for Ammonia Nitrogen is regarded as 0.005 mg/L in graphical presentation.

Nitrite Nitrogen (mg/L-N)

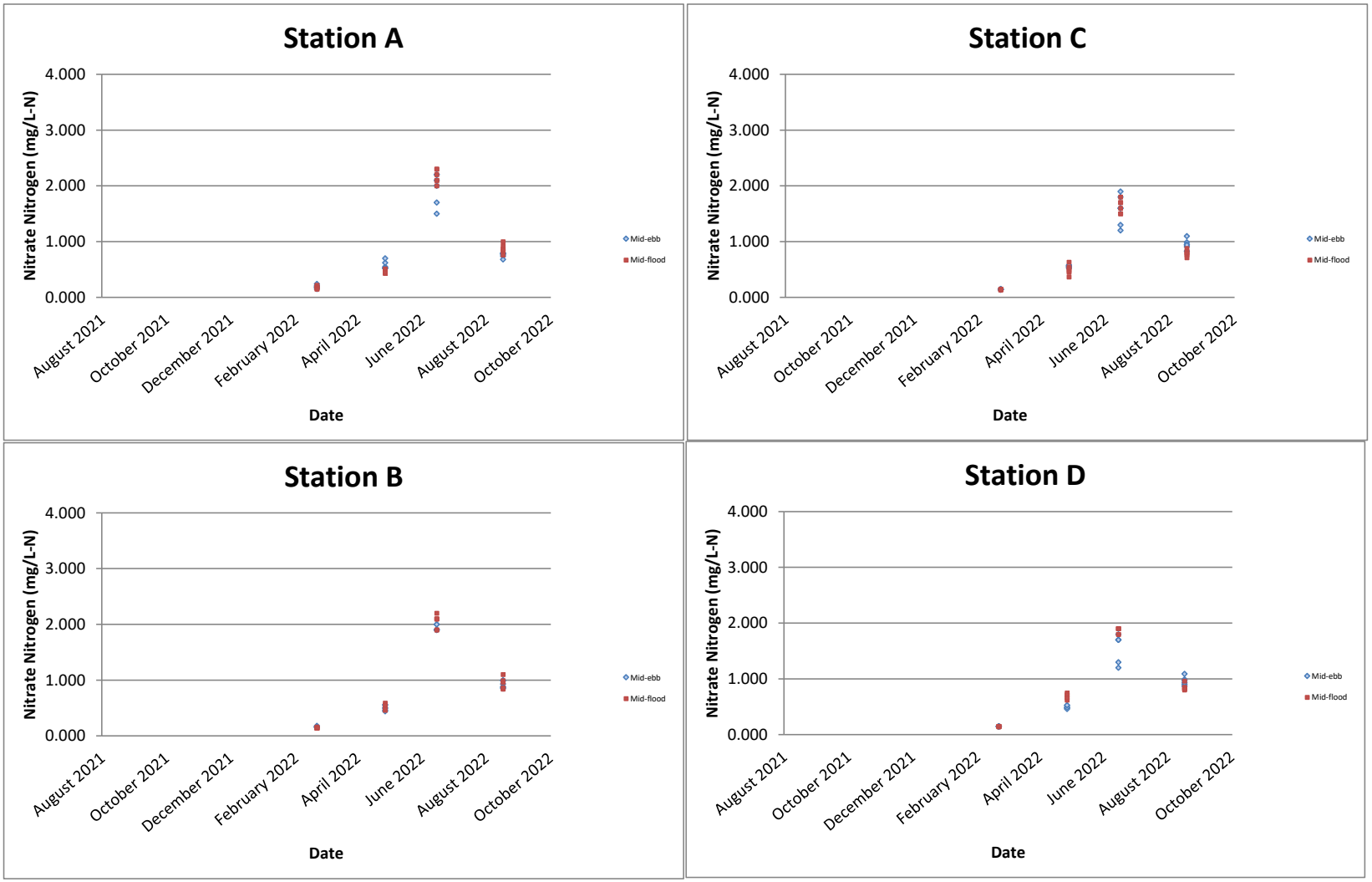


Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrite Nitrogen is regarded as 0.005 mg/L in graphical presentation.

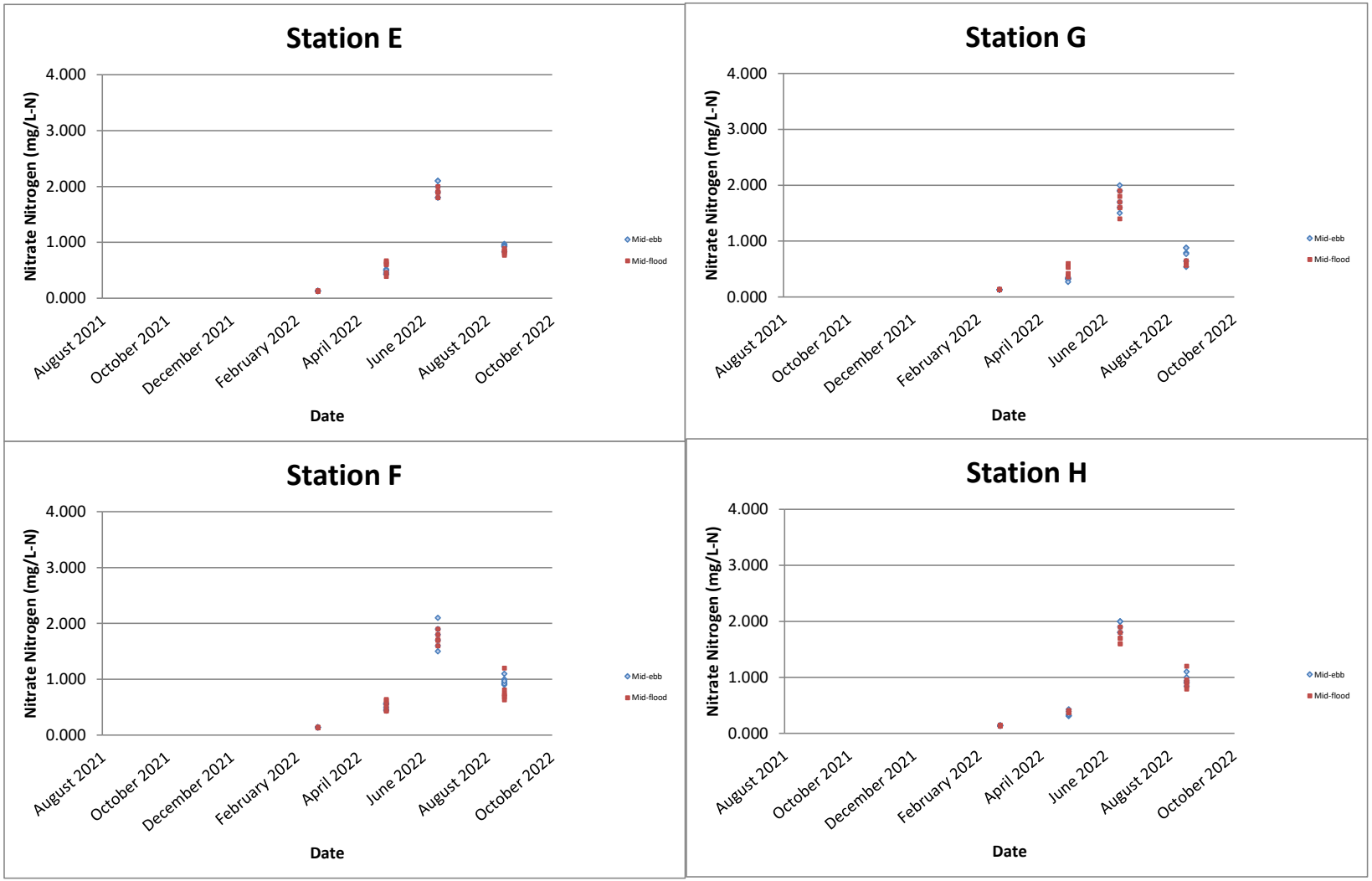


Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrite Nitrogen is regarded as 0.005 mg/L in graphical presentation.

Nitrate Nitrogen (mg/L-N)

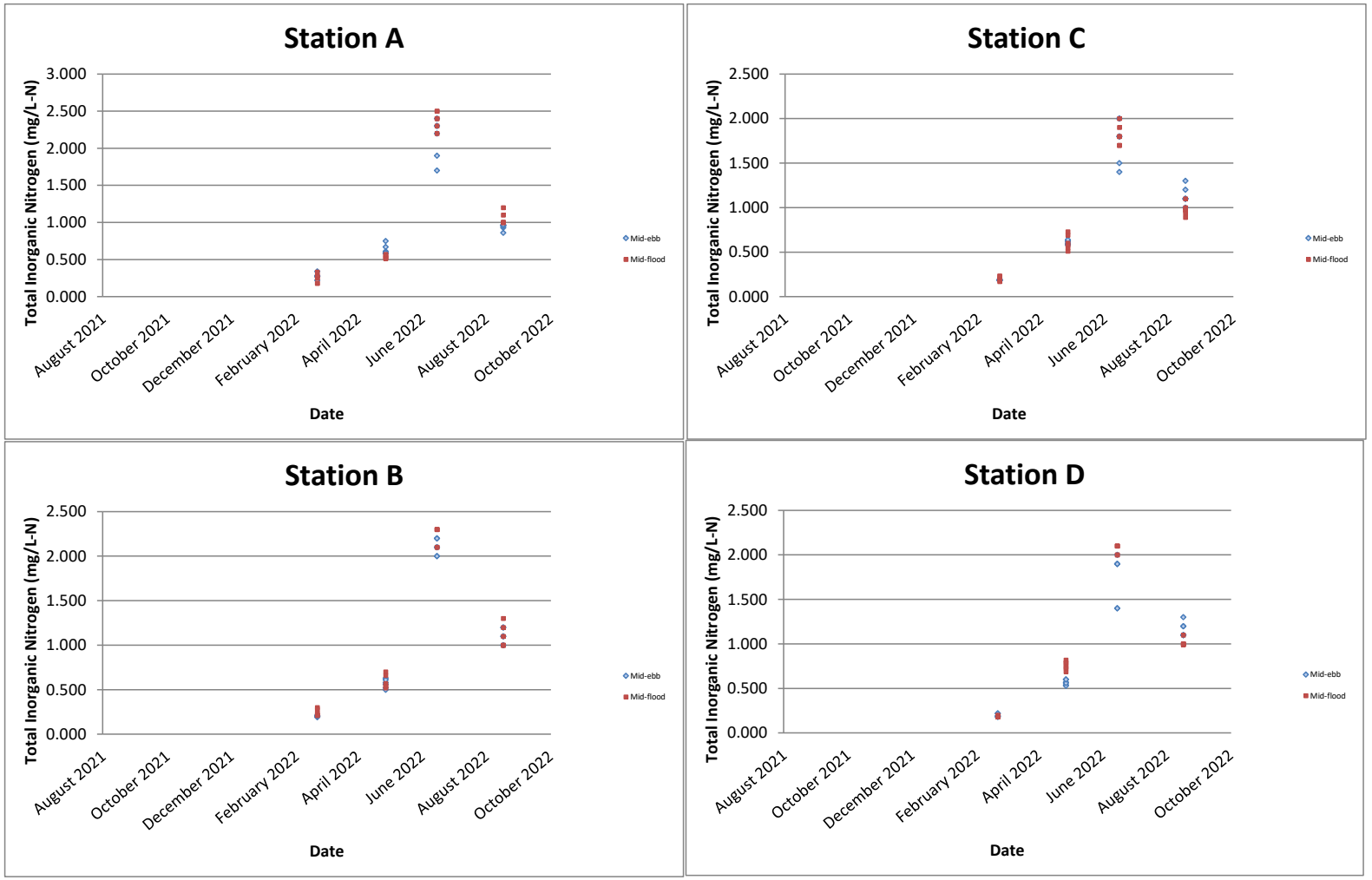


Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrate Nitrogen is regarded as 0.005 mg/L in graphical presentation.

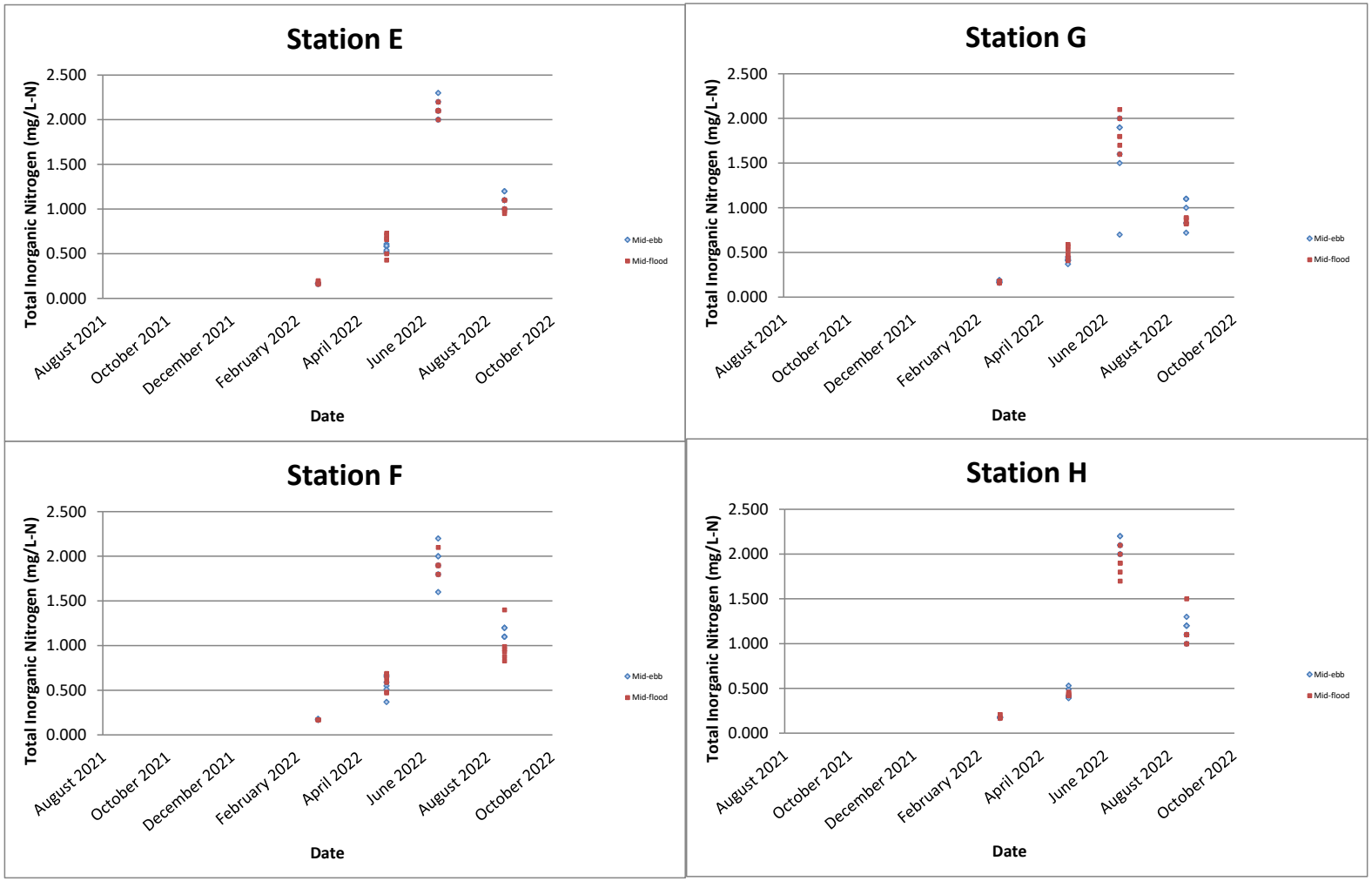


Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrate Nitrogen is regarded as 0.005 mg/L in graphical presentation.

Total Inorganic Nitrogen (mg/L-N)

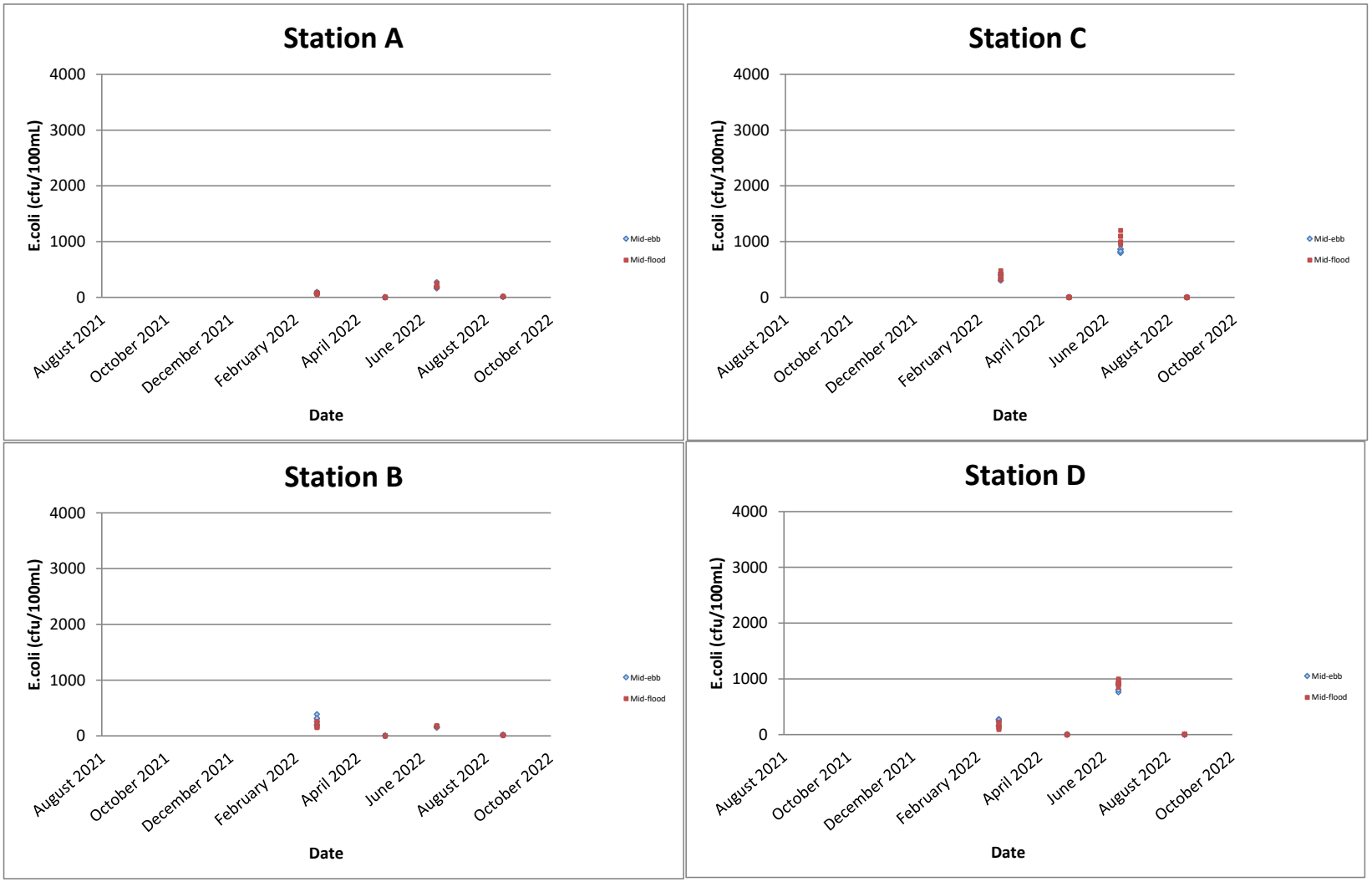


Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

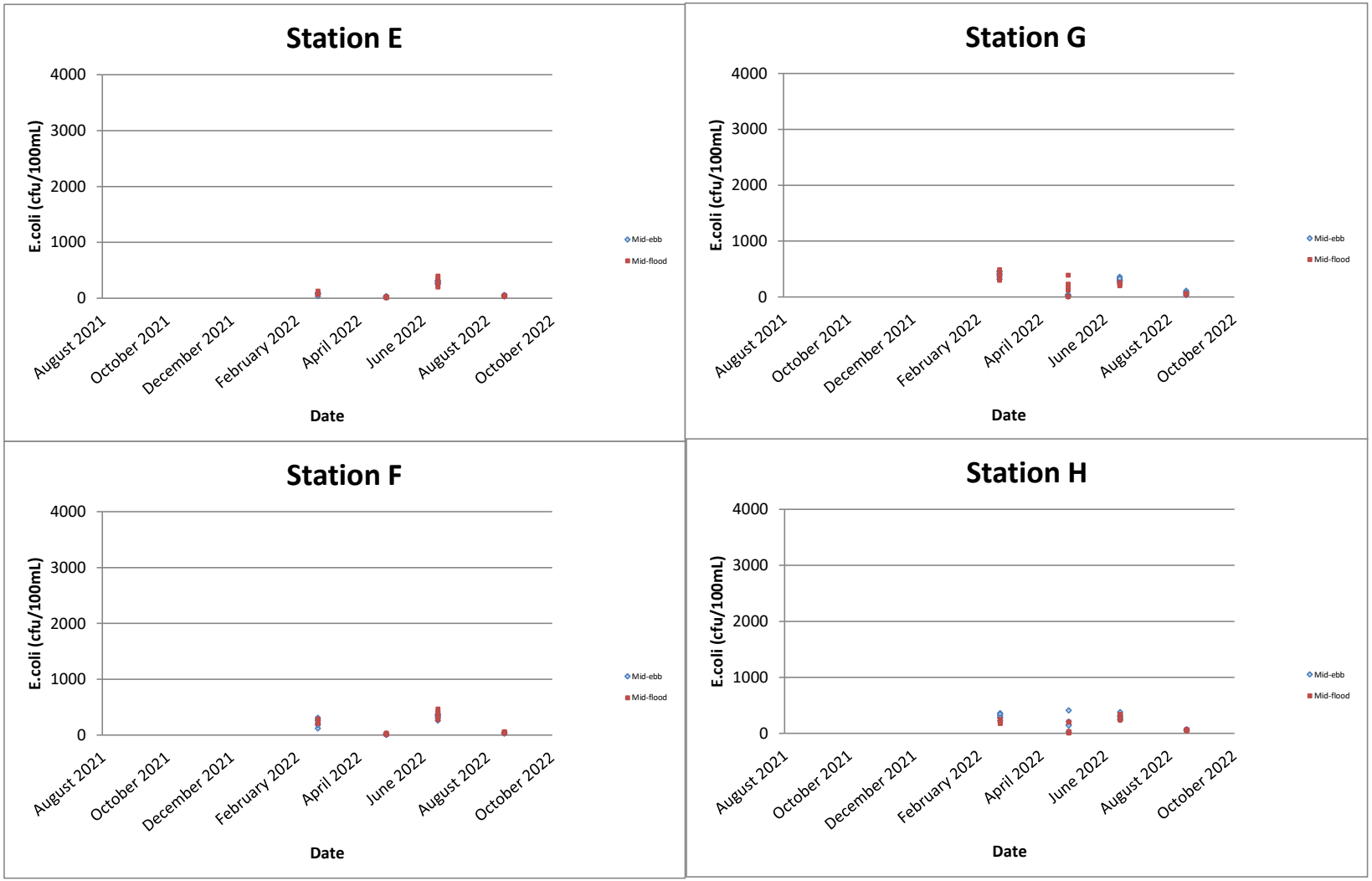


Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

E.coli (cfu/100mL)

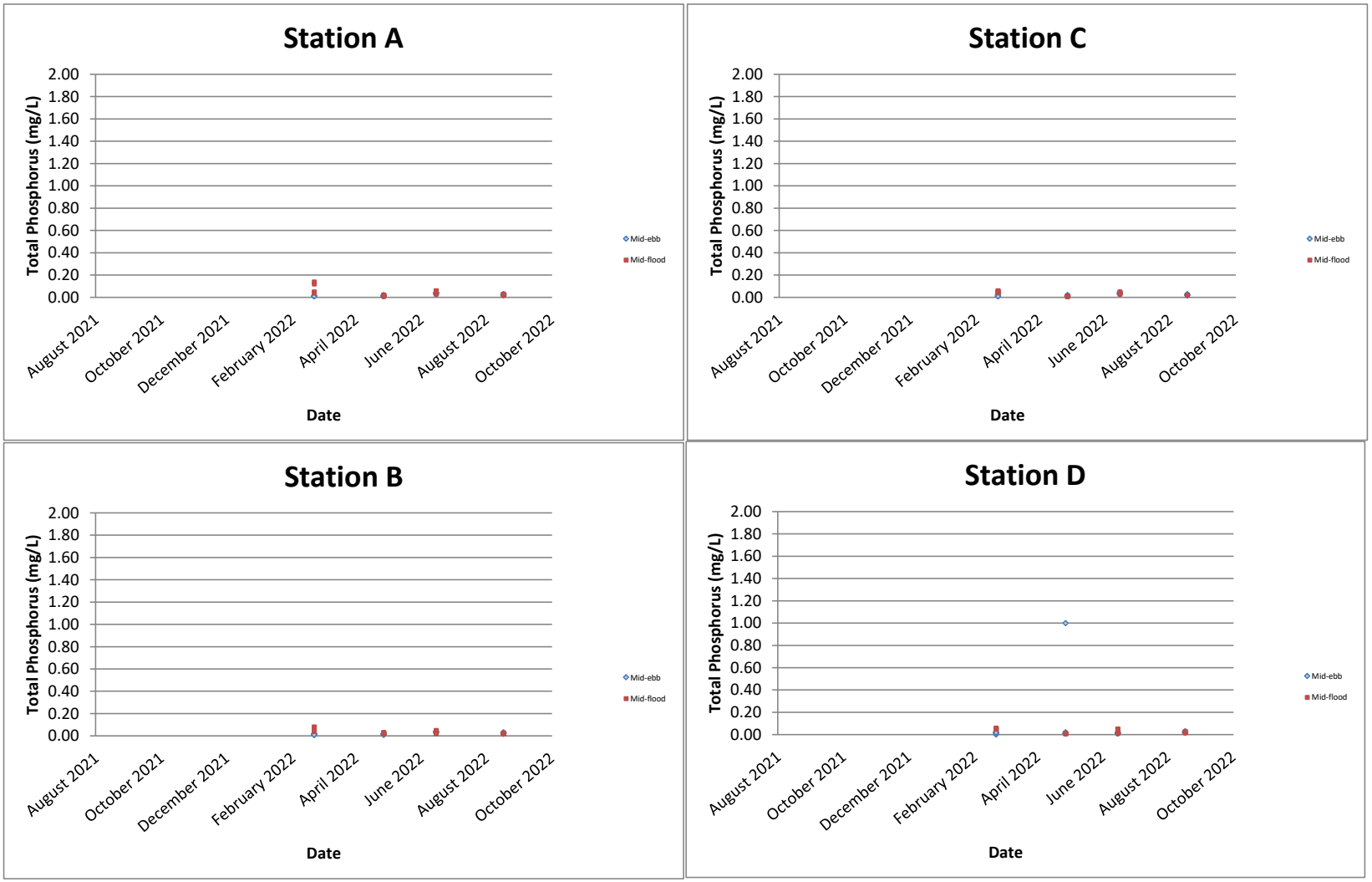


Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 1 CFU/100mL in graphical presentation.

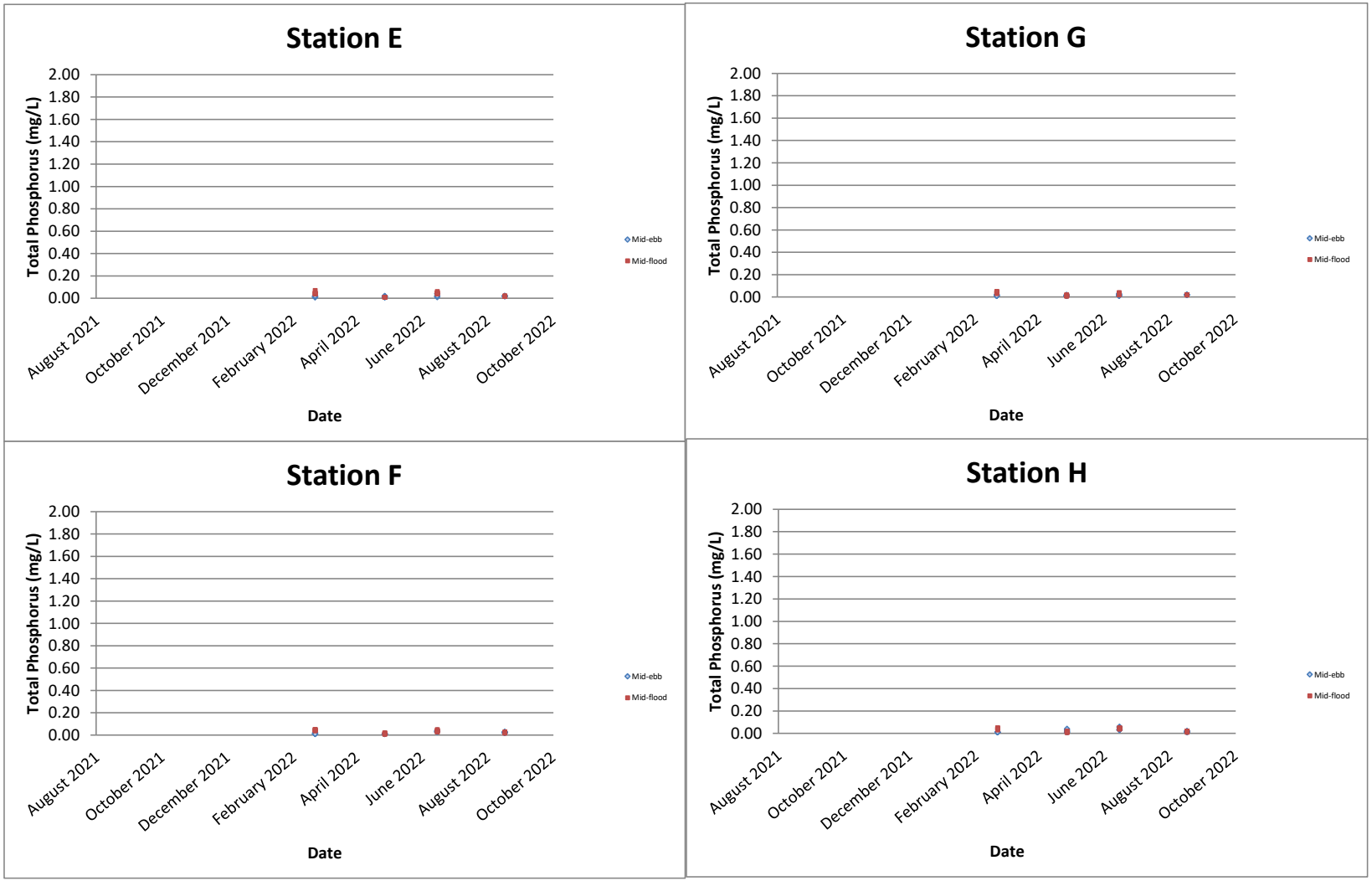


Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 1 CFU/100mL in graphical presentation.

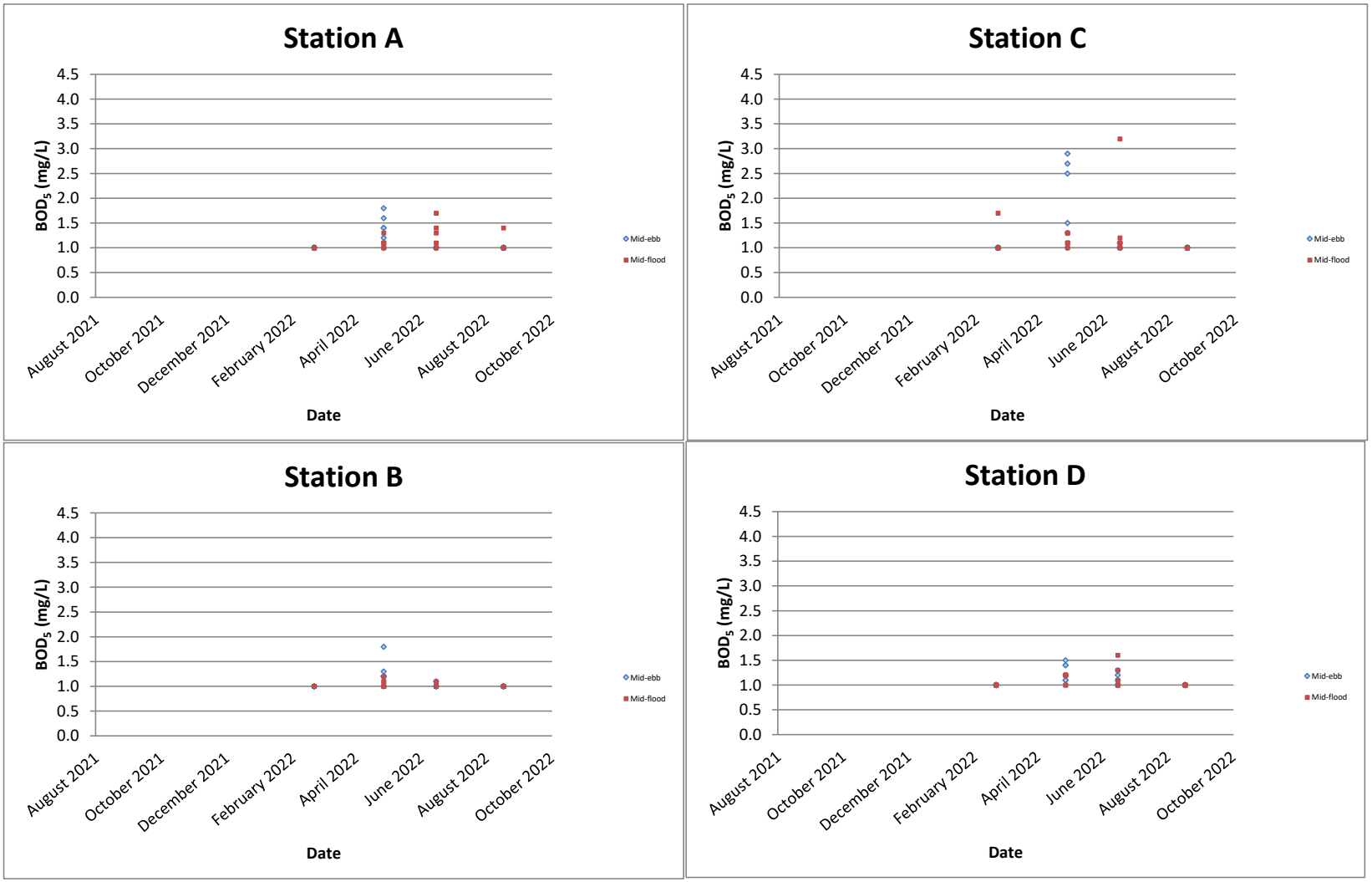
Total Phosphorus (soluble and particulate) (mg/L)



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.

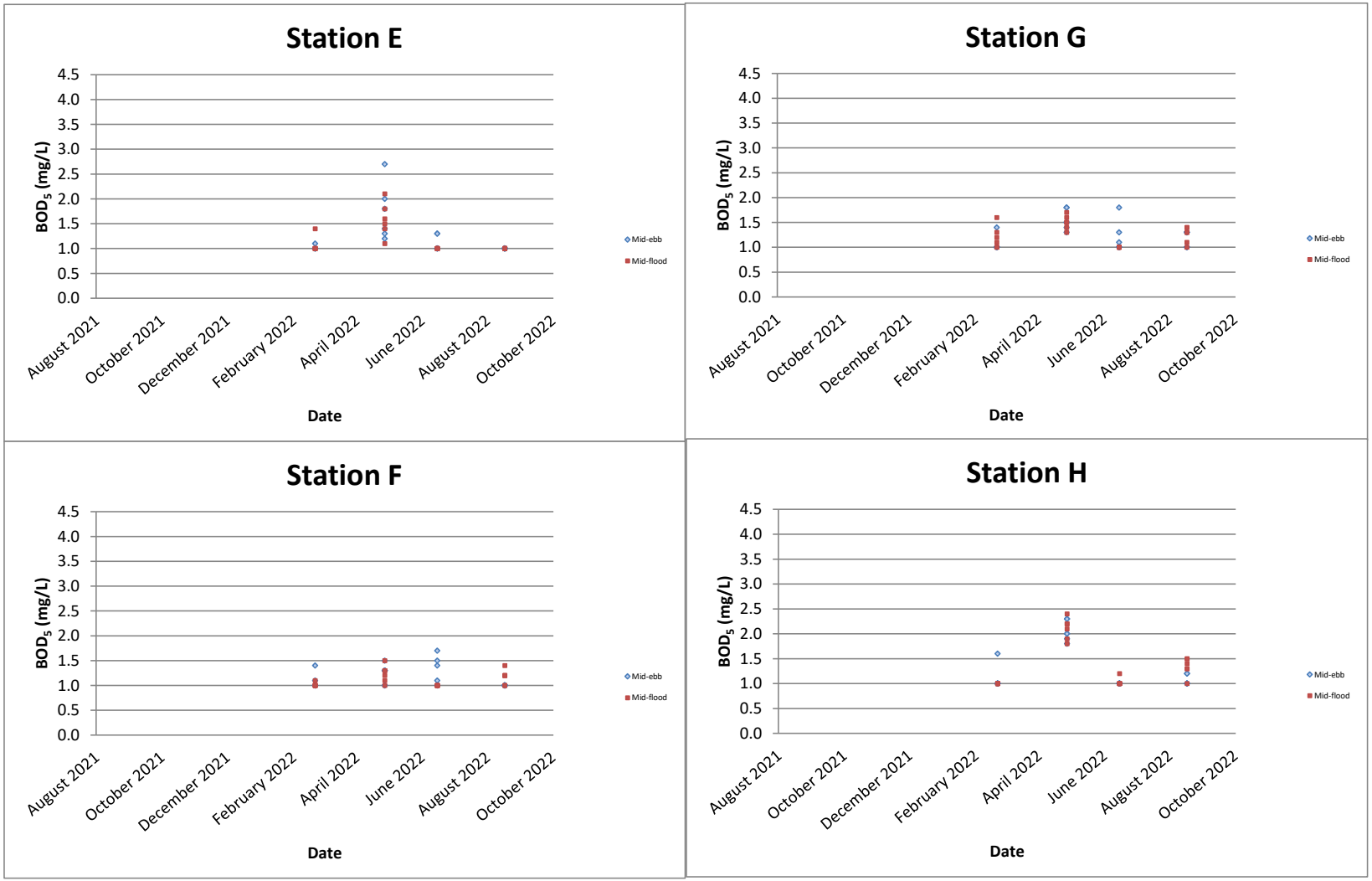


Remark: All below the Limit of Report sample results (<0.01 mg/L) for Total Phosphorus is regarded as 0.01 mg/L in graphical presentation.



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

FUGRO TECHNICAL SERVICES LIMITED

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Appendix G

Tidal Data obtained from Ma Wan Marine Traffic Station

FUGRO TECHNICAL SERVICES LIMITED

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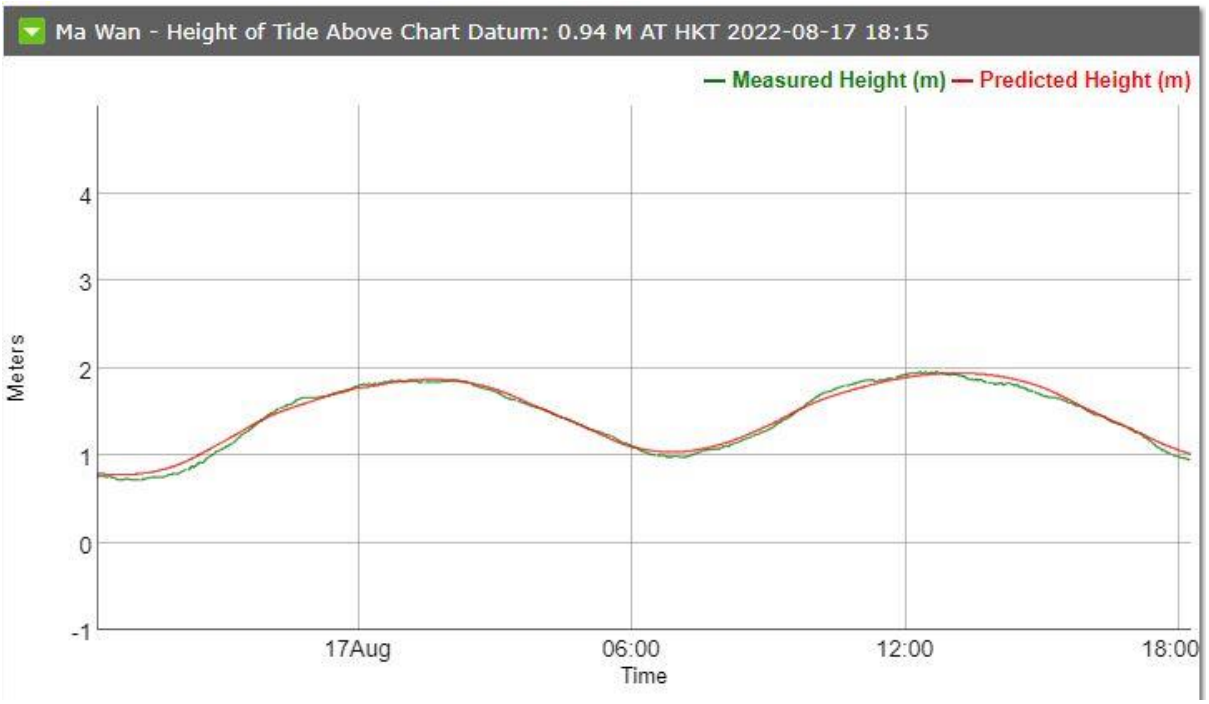
Report No.: 0041/17/ED/0684



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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	17/8/2022	Fine	Moderate	13:13	8.3	6.2	880	1200	<0.1	22	23	29	0.07	12	83	12	0.2
B	17/8/2022	Fine	Moderate	12:59	7.9	11	1300	940	<0.1	29	30	36	0.15	16	94	10	0.3
C	17/8/2022	Fine	Moderate	12:36	7.9	10	1200	950	0.1	29	30	37	0.11	17	94	11	0.3
D	17/8/2022	Fine	Moderate	12:21	8.1	7.4	1200	920	0.1	29	29	36	0.09	16	100	10.0	0.3
E	17/8/2022	Fine	Moderate	12:10	7.9	14	1500	1000	<0.1	32	33	40	0.17	18	100	10.0	0.4
F	17/8/2022	Fine	Moderate	11:54	7.9	18	1500	1200	<0.1	33	34	41	0.15	19	110	11.0	0.4
G	17/8/2022	Fine	Moderate	11:34	8.1	8.0	1100	1000	<0.1	29	39	36	0.10	17	110	10.0	0.3
H	17/8/2022	Fine	Moderate	11:15	7.9	12	1400	960	<0.1	21	27	25	<0.05	11	66	5.9	0.2

Monitoring Location	Date	Weather	Sea Condition	Time	Benthic Survey				
					Total Organic Carbon (%)	Particle Size Distrbution			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)
A	17/8/2022	Fine	Moderate	13:13	0.91	0	5	50	45
B	17/8/2022	Fine	Moderate	12:59	0.73	0	19	37	44
C	17/8/2022	Fine	Moderate	12:36	0.90	5	43	22	30
D	17/8/2022	Fine	Moderate	12:21	0.81	1	11	40	48
E	17/8/2022	Fine	Moderate	12:10	0.95	0	4	42	54
F	17/8/2022	Fine	Moderate	11:54	0.90	0	1	43	56
G	17/8/2022	Fine	Moderate	11:34	0.66	3	13	37	47
H	17/8/2022	Fine	Moderate	11:15	0.74	0	4	39	57

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

Report No. : 181172WA221589(1)

Test Report on Analysis of Sediment

Information Supplied by Client

Client	:	Fugro Technical Services Limited
Client's address	:	13/F, Fugro House – KCC2, No. 1 Kwai On Road, Kwai Chung, N.T., H.K
Project	:	Contract No. CM 14/2016 Environmental Team for Operational Environmental Monitoring and Audit for Siu Ho Wan Sewage Treatment Works
Sample description	:	Eight samples of sediment taken by the staff of FTS on 17/08/2022
Client sample ID	:	Refer to page 3
Tests required	:	1. pH value 2. Moisture content 3. Ammoniacal nitrogen content 4. Total nitrogen content 5. Total phosphorus content 6. Cadmium content 7. Chromium content 8. Copper content 9. Lead content 10. Mercury content 11. Nickel content 12. Zinc content 13. Arsenic content 14. Silver content

Laboratory Information

Lab. sample ID	:	WA221589(1)/1-8
Date of receipt of sample	:	17/08/2022
Date test commenced	:	17/08/2022
Date test completed	:	24/08/2022

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172WA221589(1)

Test methods used :

pH value
APHA 23ed. 4500-H^+B

Moisture content
In house method E-T-186

Ammoniacal Nitrogen content
In house method E-T-095

Total nitrogen
In house method E-T-114 (By Calculation),
In house method E-T-036 & APHA 23ed.4500-NO_3^--I

Total phosphorus content
APHA 17ed. 4500-PB.5 (Digestion) &
In house method E-T-056 (Determination)

Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Arsenic, Silver content
USEPA method 3050B (Digestion) & 6020A (Determination)

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172WA221589(1)

Results :

Test parameters	Sample identification							
	A/Sediment	B/Sediment	C/Sediment	D/Sediment	E/Sediment	F/Sediment	G/Sediment	H/Sediment
1. pH value at 25°C	8.3	7.9	7.9	8.1	7.9	7.9	8.1	7.9
2. Moisture content, %	47.2	56.6	61.6	56.6	63.8	64.9	59.1	62.3
3. Ammoniacal nitrogen content, mg/kg	6.2	11	10	7.4	14	18	8.0	12
4. Total nitrogen, mg/kg	880	1300	1200	1200	1500	1500	1100	1400
5. Total phosphorus content, mg/kg	1200	940	950	920	1000	1200	1000	960
6. Cadmium content, mg/kg	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1
7. Chromium content, mg/kg	22	29	29	29	32	33	29	21
8. Copper content, mg/kg	23	30	30	29	33	34	39	27
9. Lead content, mg/kg	29	36	37	36	40	41	36	25
10. Mercury content, mg/kg	0.07	0.15	0.11	0.09	0.17	0.15	0.10	<0.05
11. Nickel content, mg/kg	12	16	17	16	18	19	17	11
12. Zinc content, mg/kg	83	94	94	100	100	110	110	66
13. Arsenic content, mg/kg	12	10	11	10	10	11	10	5.9
14. Silver content, mg/kg	0.2	0.3	0.3	0.3	0.4	0.4	0.3	0.2

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

Date : 5/9/2022

** End of Report **

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Note

Laboratory Duplicate, Quality Assurance/Quality Control Report

pH value					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.1	-	-	8.35	8.33	0.24

Moisture content, %					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.1	-	-	45.23	47.20	4.26

Ammoniacal nitrogen content, mg/kg					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
0.5	<0.5	-	-	-	-

Total nitrogen, mg/kg					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
50	-	-	1356.04	1398.15	3.06

Total phosphorus content, mg/kg					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%
10	<10	-	946.10	974.43	2.95

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

Date : 5/9/2022

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Note

Method Blank (MB), Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Heavy metals content, mg/kg									
Item	Method Blank (MB) Report		Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
	LOR	Result	Spike Concentration	Spike recovery (%)		Recovery limits (%)		RPD%	
				MS	MSD	Low	High	Value	Control Limited
Arsenic	0.5	< 0.5	10	77.9	-	75	125	-	-
Cadmium	0.1	< 0.1	2	102.9	-	75	125	-	-
Chromium	0.5	< 0.5	50	88.4	-	75	125	-	-
Copper	0.2	< 0.2	50	84.9	-	75	125	-	-
Lead	0.2	< 0.2	50	96.0	-	75	125	-	-
Mercury	0.05	< 0.05	1	100.6	-	75	125	-	-
Nickel	0.2	< 0.2	20	83.7	-	75	125	-	-
Silver	0.1	< 0.1	2	103.7	-	75	125	-	-
Zinc	0.5	< 0.5	200	88.2	-	75	125	-	-

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

Date : 5/9/2022

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre
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Hong Kong

Report No. : 181172WA221589(2)

Test Report on Analysis of Sediment

Information Supplied by Client

Client	:	Fugro Technical Services Limited
Client's address	:	13/F, Fugro House – KCC2, No. 1 Kwai On Road, Kwai Chung, N.T., H.K
Project	:	Contract No. CM 14/2016 Environmental Team for Operational Environmental Monitoring and Audit for Siu Ho Wan Sewage Treatment Works
Sample description	:	Eight samples of benthic survey sediment taken by the staff of FTS on 17/08/2022
Client sample ID	:	Refer to page 2
Tests required	:	1. Moisture content 2. Total organic carbon content

Laboratory Information

Lab. sample ID	:	WA221589(1)/9-16
Date of receipt of sample	:	17/08/2022
Date test commenced	:	17/08/2022
Date test completed	:	29/08/2022
Test methods used	:	1. In-house method E-T-186 2. APHA 23ed. 5310B

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172WA221589(2)

Results :

Test parameters	Sample identification							
	A/Benthic Survey	B/Benthic Survey	C/Benthic Survey	D/Benthic Survey	E/Benthic Survey	F/Benthic Survey	G/Benthic Survey	H/Benthic Survey
1. Moisture content, %	47.7	56.0	60.4	55.6	64.3	65.4	58.4	65.6
2. Total organic carbon content, %	0.91	0.73	0.90	0.81	0.95	0.90	0.66	0.74

Certified by

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

Date 5/9/2022

** End of Report **

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Note

Laboratory Duplicate, Quality Assurance/Quality Control Report

Moisture content, %						Total organic carbon content, %					
Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate			Reporting Limit	Blank	Spike recovery (%)	Laboratory Duplicate		
			Original result	Duplicate result	RPD%				Original result	Duplicate result	RPD%
0.1	-	-	45.23	47.20	4.26	0.05	-	-	7423	7432	0.12

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

Date : 5/9/2022

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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FUGRO TECHNICAL SERVICES LIMITED
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Hong Kong

Report No. : 181172EN221757

Test Report on Analysis of Water and Wastewater

Information Supplied by Client

Client	:	Fugro Technical Services Limited
Client's address	:	Rm 723-726, 7/F, Profit Industrial Building, No.1-15, Kwai Fung Crescent, Kwai Chung, N.T.
Project	:	Contract No. CM 14/2016 Environmental Team for Operational Environmental Monitoring and Audit for Siu Ho Wan Sewage Treatment Works
Sampling date	:	17/08/2022
Sampling location	:	-
Sample description	:	Eight sample(s) of Rinsate Blank
Sample identification	:	1. A/Rinsate Blank 2. B/Rinsate Blank 3. C/Rinsate Blank 4. D/Rinsate Blank 5. E/Rinsate Blank 6. F/Rinsate Blank 7. G/Rinsate Blank 8. H/Rinsate Blank
Test required	:	Total recoverable metals: 1. Arsenic content 2. Cadmium content 3. Chromium content 4. Copper content 5. Lead content 6. Mercury content 7. Nickel content 8. Silver content 9. Zinc content

Laboratory Information

Lab sample ID	:	EN221757/1-8
Date of receipt of sample	:	17/08/2022
Date test completed	:	29/08/2022
Test method used	:	In-house method E-T-189 & E-T-190 (ICP-MS)

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172EN221757

Results :

		Client sample ID	A/Rinsate Blank	B/Rinsate Blank	C/Rinsate Blank	D/Rinsate Blank
Item	LOR	Unit				
In-house method E-T-189 & E-T-190 (ICP-MS)						
Arsenic	1	µg/L	<1	<1	<1	<1
Cadmium	0.2	µg/L	<0.2	<0.2	<0.2	<0.2
Chromium	1	µg/L	2	<1	2	1
Copper	1	µg/L	<1	4	<1	<1
Lead	1	µg/L	<1	<1	<1	<1
Mercury	0.5	µg/L	<0.5	<0.5	<0.5	<0.5
Nickel	1	µg/L	1	2	<1	1
Silver	1	µg/L	<1	<1	<1	<1
Zinc	10	µg/L	10	40	10	10

		Client sample ID	E/Rinsate Blank	F/Rinsate Blank	G/Rinsate Blank	H/Rinsate Blank
Item	LOR	Unit				
In-house method E-T-189 & E-T-190 (ICP-MS)						
Arsenic	1	µg/L	<1	<1	<1	<1
Cadmium	0.2	µg/L	<0.2	<0.2	<0.2	<0.2
Chromium	1	µg/L	1	<1	2	1
Copper	1	µg/L	<1	2	<1	2
Lead	1	µg/L	<1	<1	<1	1
Mercury	0.5	µg/L	<0.5	<0.5	<0.5	<0.5
Nickel	1	µg/L	<1	1	1	1
Silver	1	µg/L	<1	<1	<1	<1
Zinc	10	µg/L	<10	20	20	20

Remark: 1. The sampling procedure for the sample received in this report is outside the scope of accreditation.
2. µg/L - microgram per litre

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

Date : 5/9/2022

** End of Report **

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Report No. : 181172EN221757

Note

Method Blank (MB), Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Heavy metals content, µg/L

Item	Method Blank (MB) Report		Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
	LOR	Result	Spike Concentration	Spike recovery (%)		Recovery limits (%)		RPD%	
				MS	MSD	Low	High	Value	Control Limited
Arsenic	1	< 0.5	10	100.6%	-	75.0%	125.0%	-	-
Cadmium	0.2	< 0.1	10	98.2%	-	75.0%	125.0%	-	-
Chromium	1	< 0.5	10	103.4%	-	75.0%	125.0%	-	-
Copper	1	< 0.5	10	99.5%	-	75.0%	125.0%	-	-
Lead	1	< 0.5	10	90.8%	-	75.0%	125.0%	-	-
Mercury	0.5	< 0.25	0.5	76.4%	-	75.0%	125.0%	-	-
Nickel	1	< 0.5	10	100.0%	-	75.0%	125.0%	-	-
Silver	1	< 0.5	10	95.4%	-	75.0%	125.0%	-	-
Zinc	10	< 5	100	97.7%	-	75.0%	125.0%	-	-

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

Date : 5/9/2018

Note : This report refers only to the sample(s) tested and the result(s) applied to the sample(s) as received.

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

Test Report No. : M160554SL220312 Page 1 of 1

TEST REPORT ON PARTICLE SIZE DISTRIBUTION OF SOIL

HOKLAS 015 TEST

Information supplied by Client

Client : Fugro Technical Services Limited
Client's Address : -

Client sample No. : A

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

Borehole No. : -
Depth (m) From : -
To : -
Sample origin : -
Description : Benthic Survey

Service/Works Order No. : -

Laboratory Information

Date sample received : 17-08-2022
Date test commenced : 26-08-2022
Date test completed : 31-08-2022
Test method used : Geospec 3 (November 2001) Test Method 8.1 & 8.5 & 8.7
Method of preparation : Method B
Visual description : Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments.

Laboratory sample I.D. : SL220312/1
Specimen reference : A
Sample type : D
Location and Orientation within original sample (m)
From : Full Mix
To : -

Test Result (Sieve Analysis)

Initial dry mass (m_1) g : 124.095

		Sieve size mm	Mass retained (g)	Percent passing (%)
		100	0.000	100
		75	0.000	100
		63	0.000	100
		50	0.000	100
		37.5	0.000	100
		28	0.000	100
		20	0.000	100
Passing	(m_2)	20	124.095	
Riffled passing	(m_3)	20	124.095	
Wash passing	(m_4)	20	6.488	
		14	0.000	100
		10	0.000	100
		6.3	0.000	100
Passing	(m_5)	6.3	6.488	
Riffled passing	(m_6)	6.3	6.488	
		5.0	0.000	100
		3.35	0.000	100
		2.00	0.140	100
		1.18	0.162	100
		0.600	0.252	100
		0.425	0.184	99
		0.300	0.174	99
		0.212	0.170	99
		0.150	0.230	99
		0.063	4.936	95
Pan	(m_7)		0.240	

Test Result (Sedimentation Analysis)

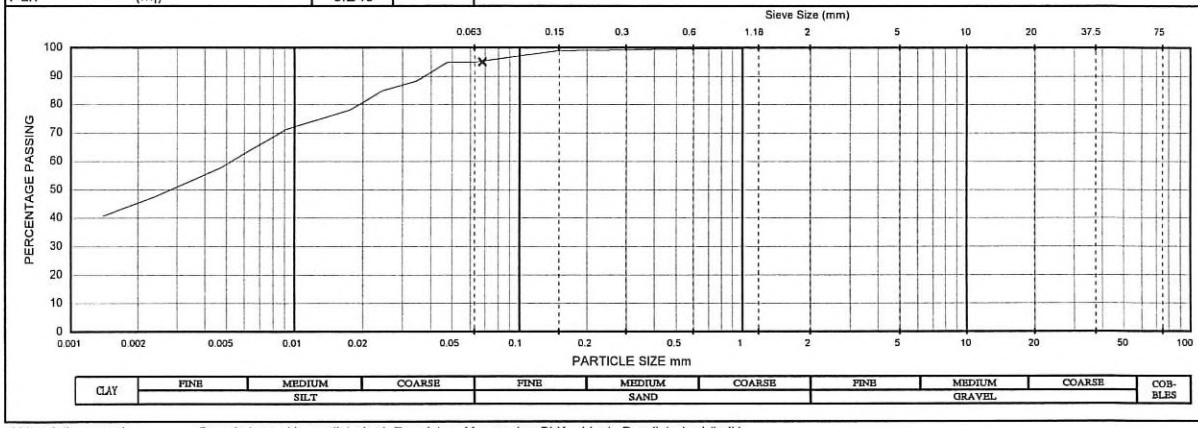
Hydrometer Serial No. : 8295797
Particle density (Assumed) : 2.65
Initial dry mass* g : 21.133
Mass retained on 63µm g : 0.977

Date	Time Started	Period min	Temp. °C	Hydro. Rdg	Hydro. Rdg #	Particle dia. mm	K %	K* %
30-08-2022	9:50	0.5	25.00	14.5	0.5	0.068	106	95
		1	25.00	14.5	0.5	0.048	106	95
		2	25.00	13.5	0.5	0.034	99	88
		4	25.00	13.0	0.5	0.024	95	85
		8	25.00	12.0	0.5	0.017	87	78
		30	25.00	11.0	0.5	0.0092	80	71
		120	25.00	9.0	0.5	0.0047	65	58
		480	25.00	7.5	0.5	0.0024	53	47
		1440	25.00	6.5	0.5	0.0014	46	41

Hydrometer reading in solution only (R_0')
K* modified according to Geospec 3 (November 2001) Test Method 8.7

SUMMATION :

GRAVEL	%	:	0
SAND	%	:	5
SILT	%	:	50
CLAY	%	:	45



Abbreviations used : Sample type : U = undisturbed, P = piston, M = mazier, BLK = block, D = disturbed (bulk)
Remarks : Point x(s) on graph indicate(s) initial modified hydrometer reading(s) being ignored.
Coefficient of Uniformity is undefined.

Initial dry mass* : The initial dry mass of the test specimen in the Sedimentation Analysis was not enough according to the requirement of GEOSPEC 3 (2001)

Approved Signatory : Au Yeung Wai Kit - Laboratory Manager Date : 08 SEP 2022

End of Report

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

Test Report No. : M160554SL220312(1) Page 1 of 1

TEST REPORT ON PARTICLE SIZE DISTRIBUTION OF SOIL

Information supplied by Client

Client : Fugro Technical Services Limited
Client's Address : -

Client sample No. : B

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

Borehole No. : -
Depth (m) From : -
To : -
Sample origin : -
Description : Benthic Survey

Service/Works Order No. : -

Laboratory Information

Date sample received : 17-08-2022
Date test commenced : 26-08-2022
Date test completed : 31-08-2022
Test method used : Geospec 3 (November 2001) Test Method 8.1 & 8.5 & 8.7
Method of preparation : Method B
Visual description : Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments.

Laboratory sample I.D. : SL220312/2
Specimen reference : A
Sample type : D
Location and Orientation within original sample (m)
From : Full Mix
To : -

Test Result (Sieve Analysis)

Initial dry mass (m_1) g : 143.928

		Sieve size mm	Mass retained (g)	Percent passing (%)
		100	0.000	100
		75	0.000	100
		63	0.000	100
		50	0.000	100
		37.5	0.000	100
		28	0.000	100
		20	0.000	100
Passing	(m_2)	20	143.928	
Riffled passing	(m_3)	20	143.928	
Wash passing	(m_4)	20	27.202	
		14	0.000	100
		10	0.000	100
		6.3	0.000	100
Passing	(m_5)	6.3	27.202	
Riffled passing	(m_6)	6.3	27.202	
		5.0	0.000	100
		3.35	0.000	100
		2.00	0.520	100
		1.18	0.382	99
		0.600	0.340	99
		0.425	0.198	99
		0.300	0.287	99
		0.212	0.650	98
		0.150	2.450	97
		0.063	21.885	81
Pan	(m_f)		0.490	

Test Result (Sedimentation Analysis)

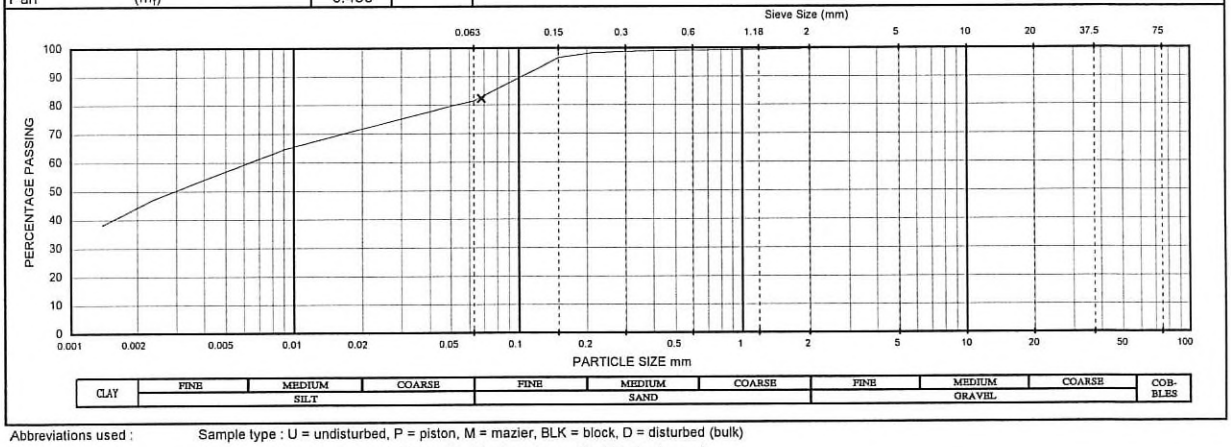
Hydrometer Serial No. : 8295797
Particle density (Assumed) : 2.65
Initial dry mass* g : 24.508
Mass retained on 63µm g : 4.599

Date	Time Started	Period min	Temp. °C	Hydro. Rdg	Hydro. Rdg #	Particle dia. mm	K %	K* %
30-08-2022	9:45	0.5	25.00	14.5	0.5	0.068	92	82
		1	25.00	14.0	0.5	0.048	88	79
		2	25.00	13.5	0.5	0.034	85	76
		4	25.00	13.0	0.5	0.024	82	73
		8	25.00	12.5	0.5	0.017	79	70
		30	25.00	11.5	0.5	0.0091	72	65
		120	25.00	10.0	0.5	0.0046	62	56
		480	25.00	8.5	0.5	0.0024	52	47
		1440	25.00	7.0	0.5	0.0014	43	38

Hydrometer reading in solution only (R_0')
K* modified according to Geospec 3 (November 2001) Test Method 8.7

SUMMATION :

GRAVEL	% :	0
SAND	% :	19
SILT	% :	37
CLAY	% :	44



Abbreviations used : Sample type : U = undisturbed, P = piston, M = mazier, BLK = block, D = disturbed (bulk)
Remarks : Point x(s) on graph indicate(s) initial modified hydrometer reading(s) being ignored.
Coefficient of Uniformity is undefined.

Initial dry mass* : The initial dry mass of the test specimen in the Sedimentation Analysis was not enough according to the requirement of GEOSPEC 3 (2001)

Approved Signatory : Au Yeung Wai Kit - Laboratory Manager Date : 08 SEP 2022

End of Report

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

Test Report No. : M160554SL220312(2) Page 1 of 1

TEST REPORT ON PARTICLE SIZE DISTRIBUTION OF SOIL

Information supplied by Client

Client : Fugro Technical Services Limited
Client's Address : -

Client sample No. : C

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

Borehole No. : -
Depth (m) From : -
To : -
Sample origin : -
Description : Benthic Survey

Service/Works Order No. : -

Laboratory Information

Date sample received : 17-08-2022
Date test commenced : 26-08-2022
Date test completed : 31-08-2022
Test method used : Geospec 3 (November 2001) Test Method 8.1 & 8.5 & 8.7
Method of preparation : Method B
Visual description : Moist, dark grey, slightly gravelly, sandy SILT/CLAY with shell fragments.

Laboratory sample I.D. : SL220312/3
Specimen reference : A
Sample type : D
Location and Orientation within original sample (m)
From : Full Mix
To : -

Test Result (Sieve Analysis)

Initial dry mass (m_1) g : 199.212

		Sieve size mm	Mass retained (g)	Percent passing (%)
		100	0.000	100
		75	0.000	100
		63	0.000	100
		50	0.000	100
		37.5	0.000	100
		28	0.000	100
		20	0.000	100
Passing	(m_2)	20	199.212	
Riffled passing	(m_3)	20	199.212	
Wash passing	(m_4)	20	96.968	
		14	0.000	100
		10	0.000	100
		6.3	1.740	99
Passing	(m_5)	6.3	95.228	
Riffled passing	(m_6)	6.3	95.228	
		5.0	1.350	98
		3.35	1.673	98
		2.00	4.870	95
		1.18	5.060	93
		0.600	6.792	89
		0.425	3.700	87
		0.300	5.634	85
		0.212	15.562	77
		0.150	26.190	64
		0.063	24.017	52
Pan	(m_f)		0.380	

Test Result (Sedimentation Analysis)

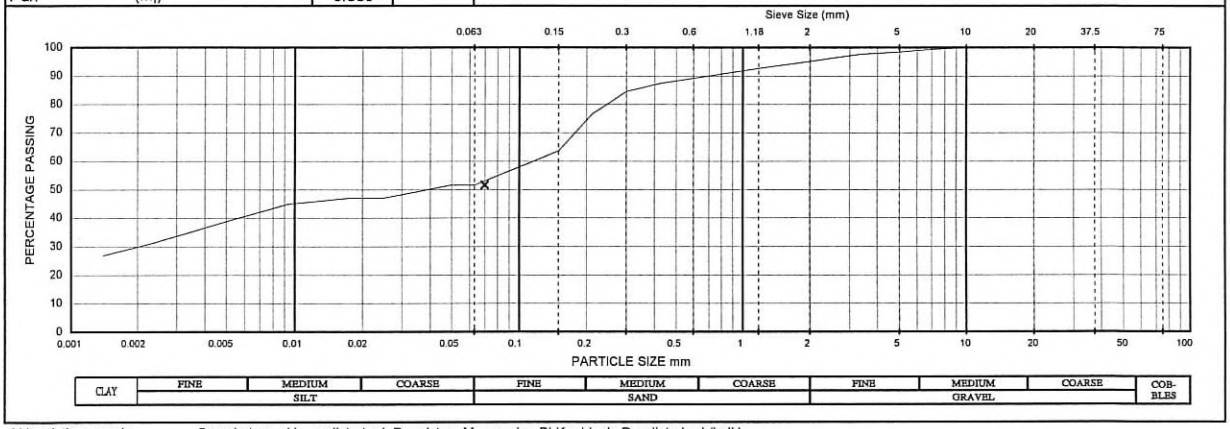
Hydrometer Serial No. : 8295797
Particle density (Assumed) : 2.65
Initial dry mass* g : 29.996
Mass retained on 63µm g : 14.028

Date	Time Started	Period min	Temp. °C	Hydro. Rdg	Hydro. Rdg #	Particle dia. mm	K %	K* %
30-08-2022	9:40	0.5	25.00	12.0	0.5	0.070	62	52
		1	25.00	12.0	0.5	0.049	62	52
		2	25.00	11.5	0.5	0.035	59	49
		4	25.00	11.0	0.5	0.025	56	47
		8	25.00	11.0	0.5	0.018	56	47
		30	25.00	10.5	0.5	0.0092	54	45
		120	25.00	9.0	0.5	0.0047	46	38
		480	25.00	7.5	0.5	0.0024	37	31
		1440	25.00	6.5	0.5	0.0014	32	27

Hydrometer reading in solution only (R_0')
K* modified according to Geospec 3 (November 2001) Test Method 8.7

SUMMATION :

GRAVEL	%	:	5
SAND	%	:	43
SILT	%	:	22
CLAY	%	:	30



Abbreviations used : Sample type : U = undisturbed, P = piston, M = mazier, BLK = block, D = disturbed (bulk)
Remarks : Point x(s) on graph indicate(s) initial modified hydrometer reading(s) being ignored.
Coefficient of Uniformity is undefined.

Initial dry mass* : The initial dry mass of the test specimen in the Sedimentation Analysis was not enough according to the requirement of GEOSPEC 3 (2001)

Approved Signatory : Au Yeung Wai Kit - Laboratory Manager Date : 08 SEP 2022

End of Report

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

Test Report No. : M160554SL220312(3) Page 1 of 1

TEST REPORT ON PARTICLE SIZE DISTRIBUTION OF SOIL

Information supplied by Client

Client : Fugro Technical Services Limited
Client's Address : -

Client sample No. : D

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

Borehole No. : -
Depth (m) From : -
To : -
Sample origin : -

Service/Works Order No. : -

Description : Benthic Survey

Laboratory Information

Date sample received : 17-08-2022
Date test commenced : 26-08-2022
Date test completed : 31-08-2022
Test method used : Geospec 3 (November 2001) Test Method 8.1 & 8.5 & 8.7
Method of preparation : Method B
Visual description : Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments.

Laboratory sample I.D. : SL220312/4
Specimen reference : A
Sample type : D
Location and Orientation within original sample (m)
From : Full Mix
To : -

Test Result (Sieve Analysis)

Initial dry mass (m_1) g : 136.308

		Sieve size mm	Mass retained (g)	Percent passing (%)
		100	0.000	100
		75	0.000	100
		63	0.000	100
		50	0.000	100
		37.5	0.000	100
		28	0.000	100
		20	0.000	100
Passing	(m_2)	20	136.308	
Riffled passing	(m_3)	20	136.308	
Wash passing	(m_4)	20	17.136	
		14	0.000	100
		10	0.000	100
		6.3	0.790	99
Passing	(m_5)	6.3	16.346	
Riffled passing	(m_6)	6.3	16.346	
		5.0	0.000	99
		3.35	0.280	99
		2.00	0.254	99
		1.18	0.220	99
		0.600	0.320	99
		0.425	0.243	98
		0.300	0.324	98
		0.212	0.572	98
		0.150	1.450	97
		0.063	12.383	88
Pan	(m_f)		0.300	

Test Result (Sedimentation Analysis)

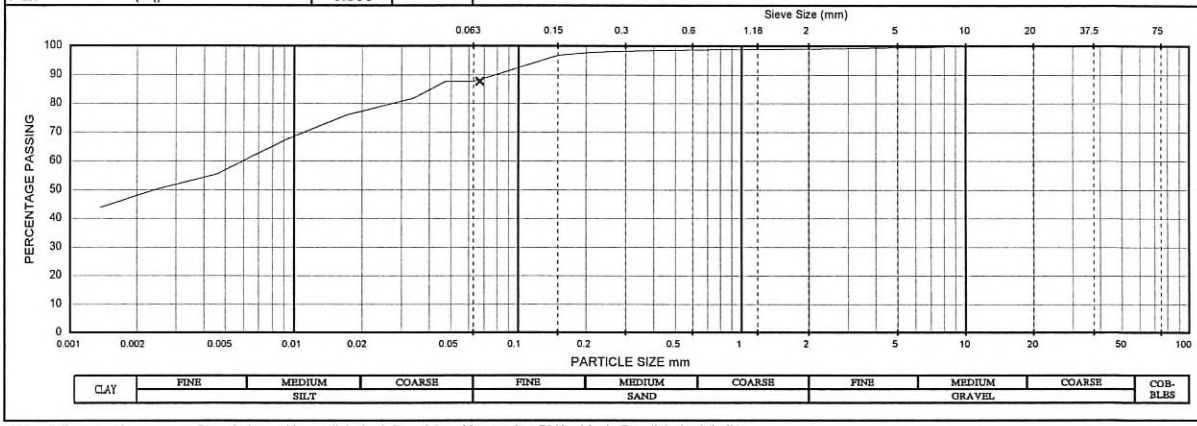
Hydrometer Serial No. : 8295797
Particle density (Assumed) : 2.65
Initial dry mass* g : 24.555
Mass retained on 63µm g : 2.846

Date	Time Started	Period min	Temp. °C	Hydro. Rdg	Hydro. Rdg #	Particle dia. mm	K %	K* %
30-08-2022	9:35	0.5	25.00	15.5	0.5	0.067	98	88
		1	25.00	15.5	0.5	0.047	98	88
		2	25.00	14.5	0.5	0.034	92	82
		4	25.00	14.0	0.5	0.024	88	79
		8	25.00	13.5	0.5	0.017	85	76
		30	25.00	12.0	0.5	0.0090	75	67
		120	25.00	10.0	0.5	0.0046	62	56
		480	25.00	9.0	0.5	0.0023	56	50
		1440	25.00	8.0	0.5	0.0014	49	44

Hydrometer reading in solution only (R_0')
K* modified according to Geospec 3 (November 2001) Test Method 8.7

SUMMATION :

GRAVEL	**%**	**:**	**1**
SAND	**%**	**:**	**11**
SILT	**%**	**:**	**40**
CLAY	**%**	**:**	**48**



Abbreviations used : Sample type : U = undisturbed, P = piston, M = mazier, BLK = block, D = disturbed (bulk)
Remarks : Point x(s) on graph indicate(s) initial modified hydrometer reading(s) being ignored.
Coefficient of Uniformity is undefined.

Initial dry mass* : The initial dry mass of the test specimen in the Sedimentation Analysis was not enough according to the requirement of GEOSPEC 3 (2001)

Approved Signatory : Au Yeung Wai Kit - Laboratory Manager Date : 08 SEP 2022

End of Report

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

Test Report No. : M160554SL220312(4) Page 1 of 1

TEST REPORT ON PARTICLE SIZE DISTRIBUTION OF SOIL

Information supplied by Client

Client : Fugro Technical Services Limited
Client's Address : -

Client sample No. : E

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

Borehole No. : -
Depth (m) From : -
To : -
Sample origin : -

Service/Works Order No. : -

Description : Benthic Survey

Laboratory Information

Date sample received : 17-08-2022
Date test commenced : 26-08-2022
Date test completed : 31-08-2022
Test method used : Geospec 3 (November 2001) Test Method 8.1 & 8.5 & 8.7
Method of preparation : Method B
Visual description : Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments.

Laboratory sample I.D. : SL220312/5
Specimen reference : A
Sample type : D
Location and Orientation within original sample (m)
From : Full Mix
To : -

Test Result (Sieve Analysis)

Initial dry mass (m_1) g : 133.798

Sieve size mm	Mass retained (g)	Percent passing (%)
100	0.000	100
75	0.000	100
63	0.000	100
50	0.000	100
37.5	0.000	100
28	0.000	100
20	0.000	100
Passing (m_2) 20	133.798	
Riffled passing (m_3) 20	133.798	
Wash passing (m_4) 20	5.658	
14	0.000	100
10	0.000	100
6.3	0.000	100
Passing (m_5) 6.3	5.658	
Riffled passing (m_6) 6.3	5.658	
5.0	0.040	100
3.35	0.032	100
2.00	0.063	100
1.18	0.050	100
0.600	0.113	100
0.425	0.085	100
0.300	0.095	100
0.212	0.124	100
0.150	0.260	99
0.063	4.676	96
Pan (m_f)	0.120	

Test Result (Sedimentation Analysis)

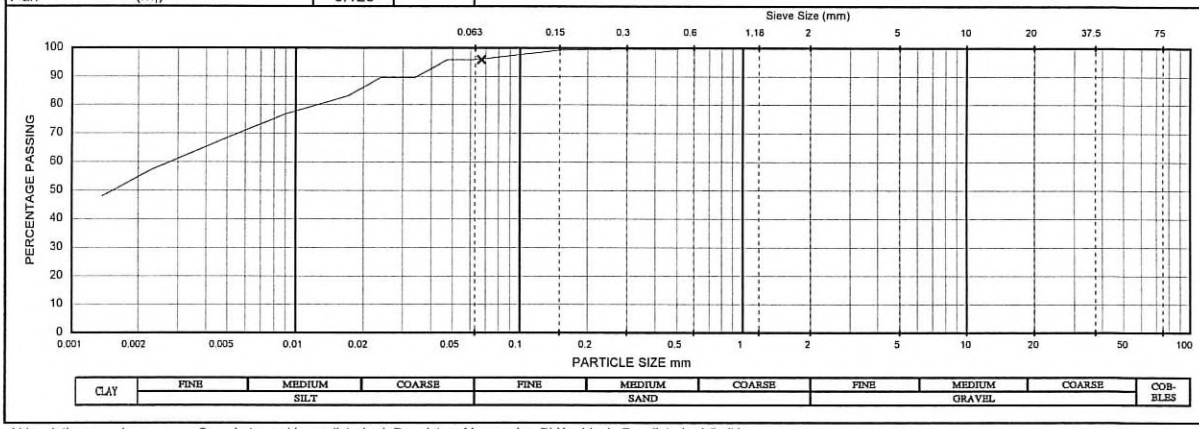
Hydrometer Serial No. : 8295797
Particle density (Assumed) : 2.65
Initial dry mass* g : 22.489
Mass retained on 63µm g : 0.588

Date	Time Started	Period min	Temp. °C	Hydro. Rdg	Hydro. Rdg #	Particle dia. mm	K %	K* %
30-08-2022	9:30	0.5	25.00	15.5	0.5	0.067	107	96
		1	25.00	15.5	0.5	0.047	107	96
		2	25.00	14.5	0.5	0.034	100	89
		4	25.00	14.5	0.5	0.024	100	89
		8	25.00	13.5	0.5	0.017	93	83
		30	25.00	12.5	0.5	0.0090	86	77
		120	25.00	11.0	0.5	0.0046	75	67
		480	25.00	9.5	0.5	0.0023	64	58
		1440	25.00	8.0	0.5	0.0014	54	48

Hydrometer reading in solution only (R_0')
K* modified according to Geospec 3 (November 2001) Test Method 8.7

SUMMATION :

GRAVEL	%	:	0
SAND	%	:	4
SILT	%	:	42
CLAY	%	:	54



Abbreviations used : Sample type : U = undisturbed, P = piston, M = mazier, BLK = block, D = disturbed (bulk)
Remarks : Point x(s) on graph indicate(s) initial modified hydrometer reading(s) being ignored.
Coefficient of Uniformity is undefined.

Initial dry mass* : The initial dry mass of the test specimen in the Sedimentation Analysis was not enough according to the requirement of GEOSPEC 3 (2001)

Approved Signatory : Au Yeung Wai Kit - Laboratory Manager Date : 08 SEP 2022

End of Report

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

Test Report No. : M160554SL220312(5) Page 1 of 1

TEST REPORT ON PARTICLE SIZE DISTRIBUTION OF SOIL

Information supplied by Client

Client : Fugro Technical Services Limited
Client's Address : -

Client sample No. : F

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

Borehole No. : -
Depth (m) From : -
To : -
Sample origin : -

Service/Works Order No. : -

Description : Benthic Survey

Laboratory Information

Date sample received : 17-08-2022
Date test commenced : 26-08-2022
Date test completed : 31-08-2022
Test method used : Geospec 3 (November 2001) Test Method 8.1 & 8.5 & 8.7
Method of preparation : Method B
Visual description : Moist, dark grey, slightly sandy SILT/CLAY with shell fragments.

Laboratory sample I.D. : SL220312/6
Specimen reference : A
Sample type : D
Location and Orientation within original sample (m)
From : Full Mix
To : -

Test Result (Sieve Analysis)

Initial dry mass (m_1) g : 118.645

		Sieve size mm	Mass retained (g)	Percent passing (%)
		100	0.000	100
		75	0.000	100
		63	0.000	100
		50	0.000	100
		37.5	0.000	100
		28	0.000	100
		20	0.000	100
Passing	(m_2)	20	118.645	
Riffled passing	(m_3)	20	118.645	
Wash passing	(m_4)	20	1.656	
		14	0.000	100
		10	0.000	100
		6.3	0.000	100
Passing	(m_5)	6.3	1.656	
Riffled passing	(m_6)	6.3	1.656	
		5.0	0.000	100
		3.35	0.000	100
		2.00	0.000	100
		1.18	0.040	100
		0.600	0.074	100
		0.425	0.072	100
		0.300	0.080	100
		0.212	0.081	100
		0.150	0.090	100
		0.063	1.129	99
Pan	(m_f)		0.090	

Test Result (Sedimentation Analysis)

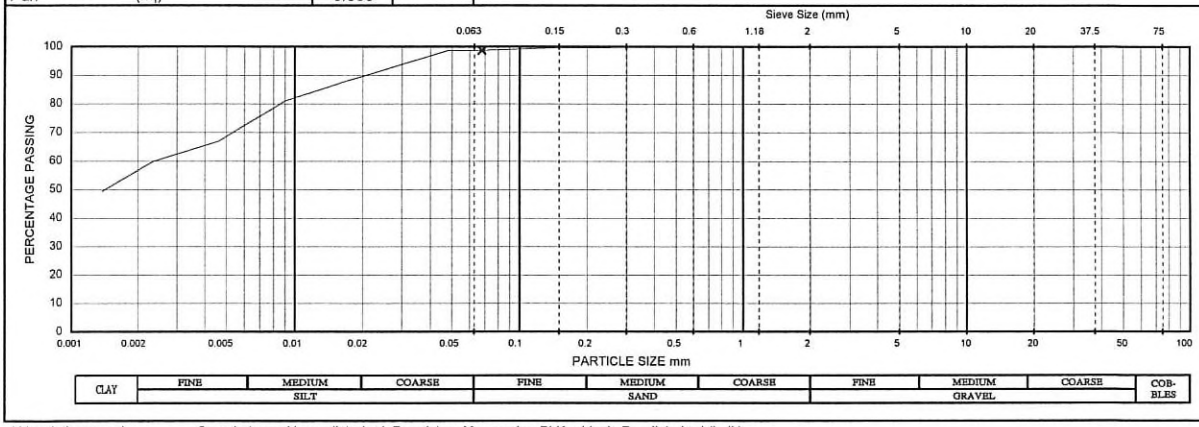
Hydrometer Serial No. : 8295797
Particle density (Assumed) : 2.65
Initial dry mass* g : 21.445
Mass retained on 63µm g : 0.375

Date	Time Started	Period min	Temp. °C	Hydro. Rdg	Hydro. Rdg #	Particle dia. mm	K %	K* %
30-08-2022	9:25	0.5	25.00	14.5	0.5	0.068	105	99
		1	25.00	14.5	0.5	0.048	105	99
		2	25.00	14.0	0.5	0.034	101	95
		4	25.00	13.5	0.5	0.024	97	92
		8	25.00	13.0	0.5	0.017	94	88
		30	25.00	12.0	0.5	0.0090	86	81
		120	25.00	10.0	0.5	0.0046	71	67
		480	25.00	9.0	0.5	0.0023	64	60
		1440	25.00	7.5	0.5	0.0014	52	49

Hydrometer reading in solution only (R_0')
K* modified according to Geospec 3 (November 2001) Test Method 8.7

SUMMATION :

GRAVEL	% :	0
SAND	% :	1
SILT	% :	43
CLAY	% :	56



Abbreviations used : Sample type : U = undisturbed, P = piston, M = mazier, BLK = block, D = disturbed (bulk)

Remarks : Point x(s) on graph indicate(s) initial modified hydrometer reading(s) being ignored.
Coefficient of Uniformity is undefined.

Initial dry mass* : The initial dry mass of the test specimen in the Sedimentation Analysis was not enough according to the requirement of GEOSPEC 3 (2001)

Approved Signatory : Au Yeung Wai Kit - Laboratory Manager Date : 08 SEP 2022

End of Report

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

Test Report No. : M160554SL220312(6) Page 1 of 1

TEST REPORT ON PARTICLE SIZE DISTRIBUTION OF SOIL

HOKLAS 015 TEST

Information supplied by Client

Client : Fugro Technical Services Limited
Client's Address : -

Client sample No. : G

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

Borehole No. : -
Depth (m) From : -
To : -
Sample origin : -

Service/Works Order No. : -

Description : Benthic Survey

Laboratory Information

Date sample received : 17-08-2022
Date test commenced : 26-08-2022
Date test completed : 31-08-2022
Test method used : Geospec 3 (November 2001) Test Method 8.1 & 8.5 & 8.7
Method of preparation : Method B
Visual description : Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments.

Laboratory sample I.D. : SL220312/7
Specimen reference : A
Sample type : D
Location and Orientation within original sample (m)
From : Full Mix
To : -

Test Result (Sieve Analysis)

Initial dry mass (m_1) g : 141.308

		Sieve size mm	Mass retained (g)	Percent passing (%)
		100	0.000	100
		75	0.000	100
		63	0.000	100
		50	0.000	100
		37.5	0.000	100
		28	0.000	100
		20	0.000	100
Passing	(m_2)	20	141.308	
Riffled passing	(m_3)	20	141.308	
Wash passing	(m_4)	20	23.261	
		14	0.000	100
		10	0.000	100
		6.3	0.000	100
Passing	(m_5)	6.3	23.261	
Riffled passing	(m_6)	6.3	23.261	
		5.0	1.230	99
		3.35	1.200	98
		2.00	1.153	97
		1.18	0.910	97
		0.600	1.472	96
		0.425	0.803	95
		0.300	1.020	94
		0.212	1.690	93
		0.150	2.850	91
		0.063	10.573	84
Pan	(m_7)		0.360	

Test Result (Sedimentation Analysis)

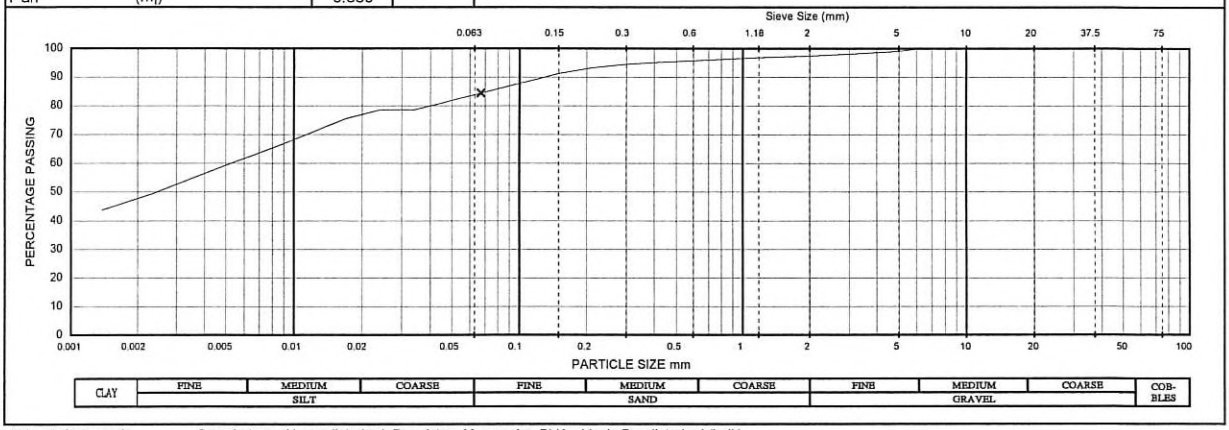
Hydrometer Serial No. : 8295797
Particle density (Assumed) : 2.65
Initial dry mass* g : 22.545
Mass retained on 63µm g : 2.997

Date	Time Started	Period min	Temp. °C	Hydro. Rdg	Hydro. Rdg #	Particle dia. mm	K %	K* %
30-08-2022	9:20	0.5	25.00	15.0	0.5	0.067	103	84
		1	25.00	14.5	0.5	0.048	100	81
		2	25.00	14.0	0.5	0.034	96	79
		4	25.00	14.0	0.5	0.024	96	79
		8	25.00	13.5	0.5	0.017	93	76
		30	25.00	12.0	0.5	0.0090	82	67
		120	25.00	10.5	0.5	0.0046	71	58
		480	25.00	9.0	0.5	0.0023	61	49
		1440	25.00	8.0	0.5	0.0014	53	44

Hydrometer reading in solution only (R_0')
K* modified according to Geospec 3 (November 2001) Test Method 8.7

SUMMATION :

GRAVEL	**%**	**:**	**3**
SAND	**%**	**:**	**13**
SILT	**%**	**:**	**37**
CLAY	**%**	**:**	**47**



Abbreviations used : Sample type : U = undisturbed, P = piston, M = mazier, BLK = block, D = disturbed (bulk)

Remarks : Point x(s) on graph indicate(s) initial modified hydrometer reading(s) being ignored.
Coefficient of Uniformity is undefined.

Initial dry mass* : The initial dry mass of the test specimen in the Sedimentation Analysis was not enough according to the requirement of GEOSPEC 3 (2001)

Approved Signatory : Au Yeung Wai Kit - Laboratory Manager Date : 08 SEP 2022

End of Report

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

Test Report No. : M160554SL220312(7) Page 1 of 1

TEST REPORT ON PARTICLE SIZE DISTRIBUTION OF SOIL

Information supplied by Client

Client : Fugro Technical Services Limited
Client's Address : -

Client sample No. : H

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

Borehole No. : -
Depth (m) From : -
To : -
Sample origin : -

Service/Works Order No. : -

Description : Benthic Survey

Laboratory Information

Date sample received : 17-08-2022
Date test commenced : 26-08-2022
Date test completed : 31-08-2022
Test method used : Geospec 3 (November 2001) Test Method 8.1 & 8.5 & 8.7
Method of preparation : Method B
Visual description : Moist, dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments.

Laboratory sample I.D. : SL220312/8
Specimen reference : A
Sample type : D
Location and Orientation within original sample (m)
From : Full Mix
To : -

Test Result (Sieve Analysis)

Initial dry mass (m_1) g : 118.259

		Sieve size mm	Mass retained (g)	Percent passing (%)
		100	0.000	100
		75	0.000	100
		63	0.000	100
		50	0.000	100
		37.5	0.000	100
		28	0.000	100
		20	0.000	100
Passing	(m_2)	20	118.259	
Riffled passing	(m_3)	20	118.259	
Wash passing	(m_4)	20	4.887	
		14	0.000	100
		10	0.000	100
		6.3	0.000	100
Passing	(m_5)	6.3	4.887	
Riffled passing	(m_6)	6.3	4.887	
		5.0	0.310	100
		3.35	0.043	100
		2.00	0.090	100
		1.18	0.200	99
		0.600	0.300	99
		0.425	0.210	99
		0.300	0.290	99
		0.212	0.496	98
		0.150	0.700	98
		0.063	2.138	96
Pan	(m_7)		0.110	

Test Result (Sedimentation Analysis)

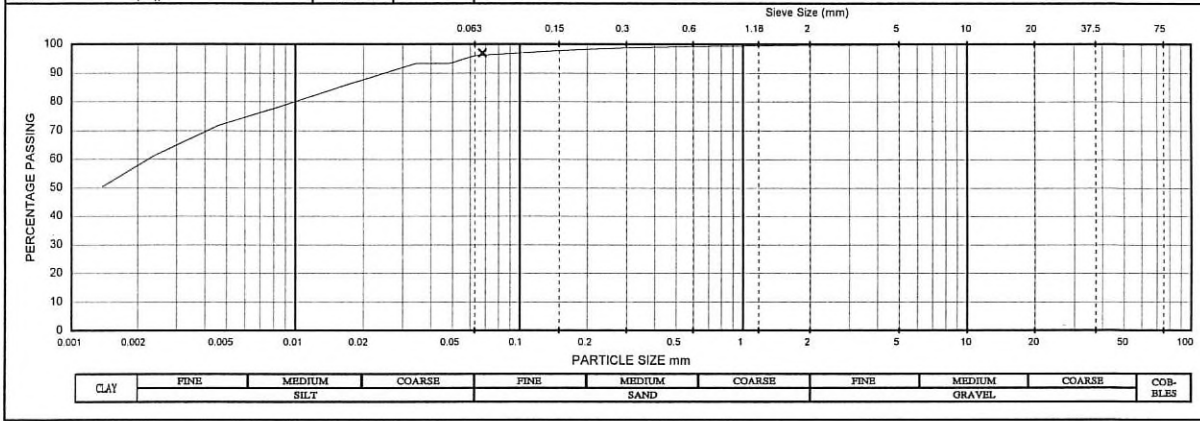
Hydrometer Serial No. : 8295797
Particle density (Assumed) : 2.65
Initial dry mass* g : 19.946
Mass retained on 63µm g : 0.555

Date	Time Started	Period min	Temp. °C	Hydro. Rdg	Hydro. Rdg #	Particle dia. mm	K %	K* %
30-08-2022	9:15	0.5	25.00	14.0	0.5	0.068	109	97
		1	25.00	13.5	0.5	0.049	105	93
		2	25.00	13.5	0.5	0.034	105	93
		4	25.00	13.0	0.5	0.024	101	90
		8	25.00	12.5	0.5	0.017	97	86
		30	25.00	11.5	0.5	0.0091	89	79
		120	25.00	10.5	0.5	0.0046	81	72
		480	25.00	9.0	0.5	0.0023	68	61
		1440	25.00	7.5	0.5	0.0014	56	50

Hydrometer reading in solution only (R_0')
K* modified according to Geospec 3 (November 2001) Test Method 8.7

SUMMATION :

GRAVEL	**%**	**:**	**0**
SAND	**%**	**:**	**4**
SILT	**%**	**:**	**39**
CLAY	**%**	**:**	**57**



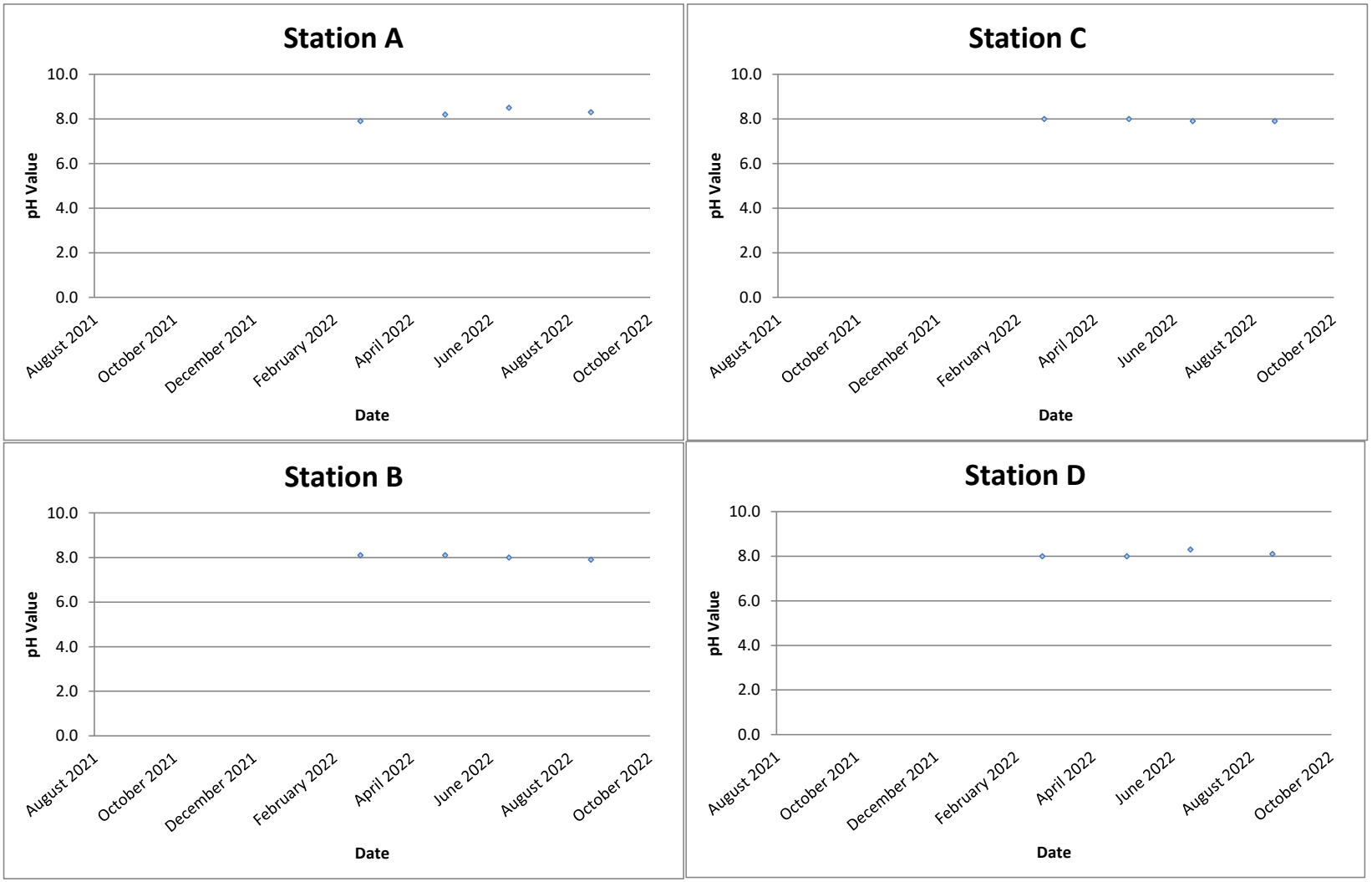
Abbreviations used : Sample type : U = undisturbed, P = piston, M = mazier, BLK = block, D = disturbed (bulk)

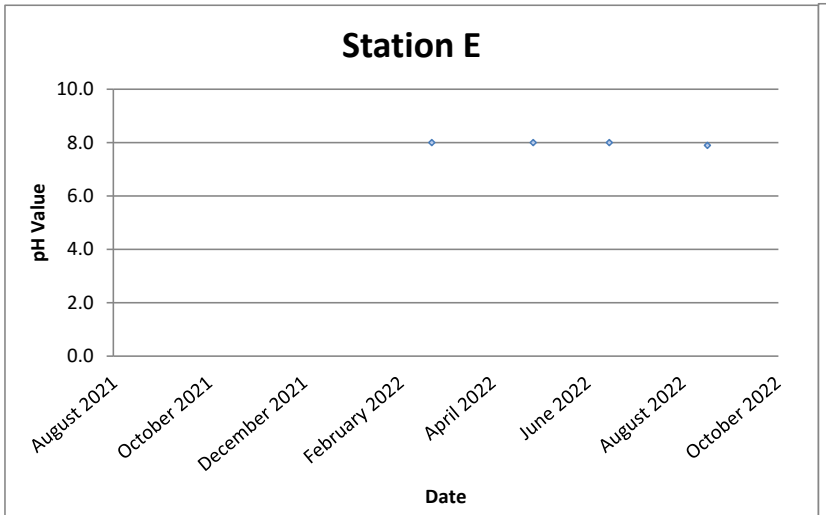
Remarks : Point x(s) on graph indicate(s) initial modified hydrometer reading(s) being ignored.
Coefficient of Uniformity is undefined.

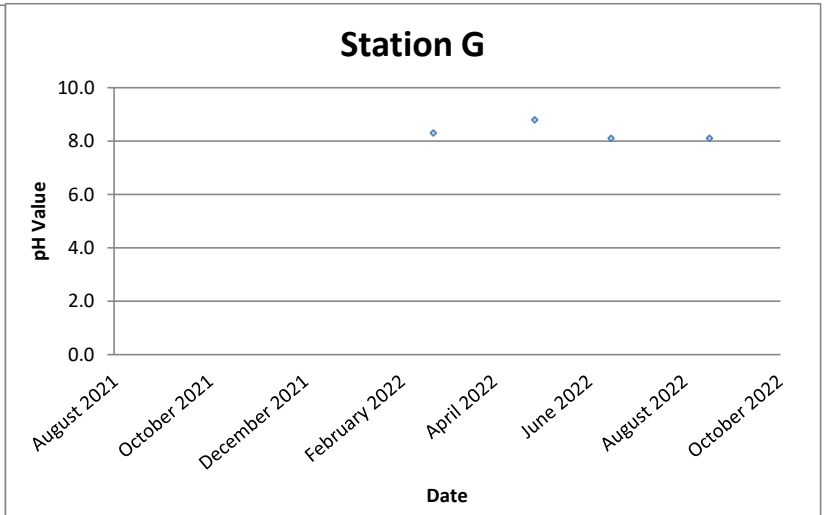
Initial dry mass* : The initial dry mass of the test specimen in the Sedimentation Analysis was not enough according to the requirement of GEOSPEC 3 (2001)

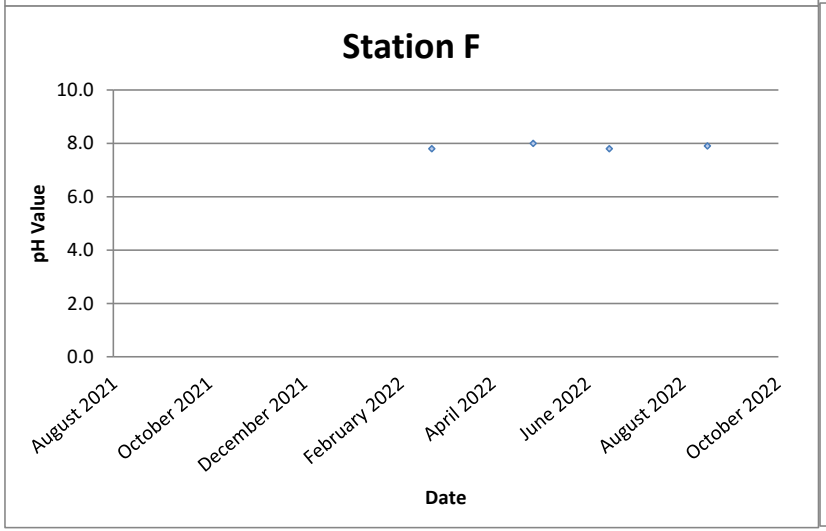
Approved Signatory : Au Yeung Wai Kit - Laboratory Manager Date : 08 SEP 2022

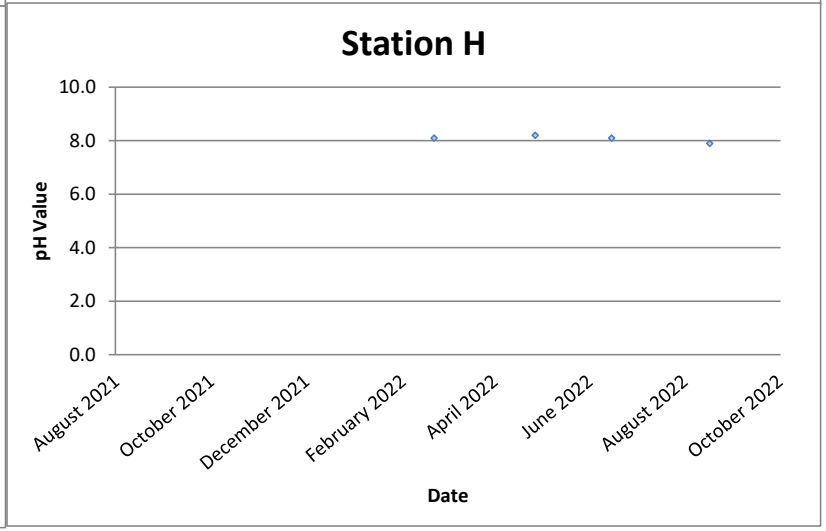
End of Report

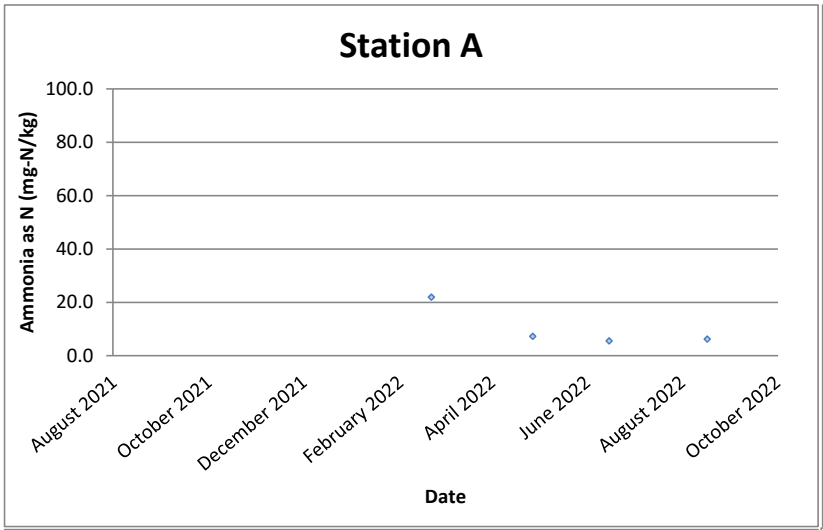

Station A
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station C
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station B
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station D
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

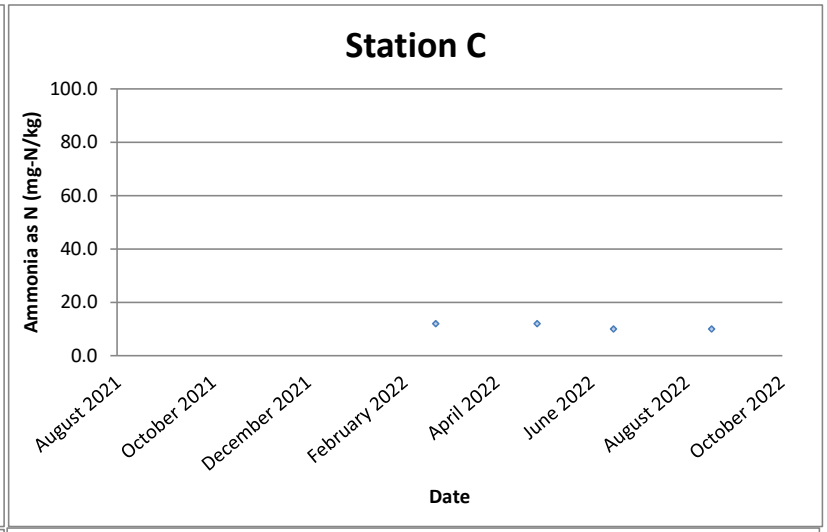

Station E
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

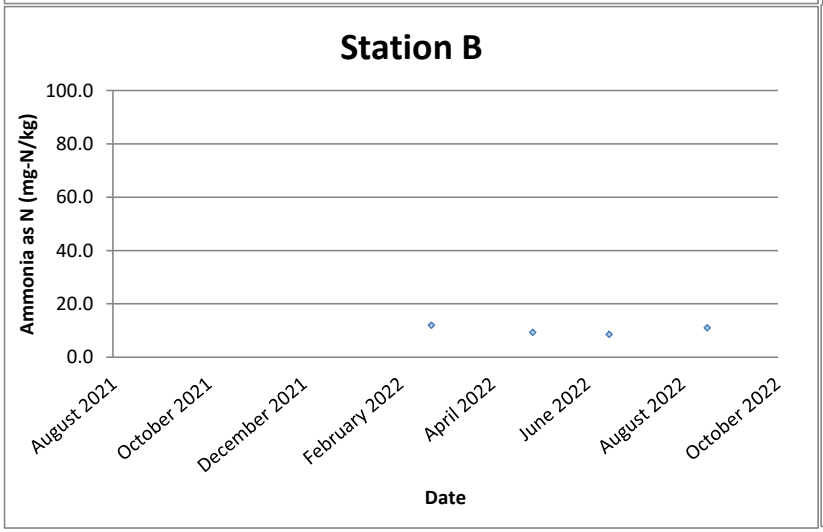

Station G
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

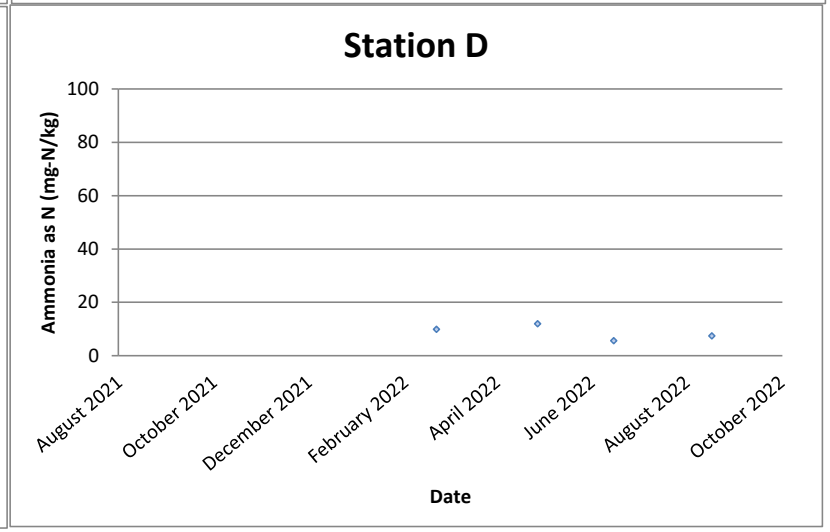

Station F
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

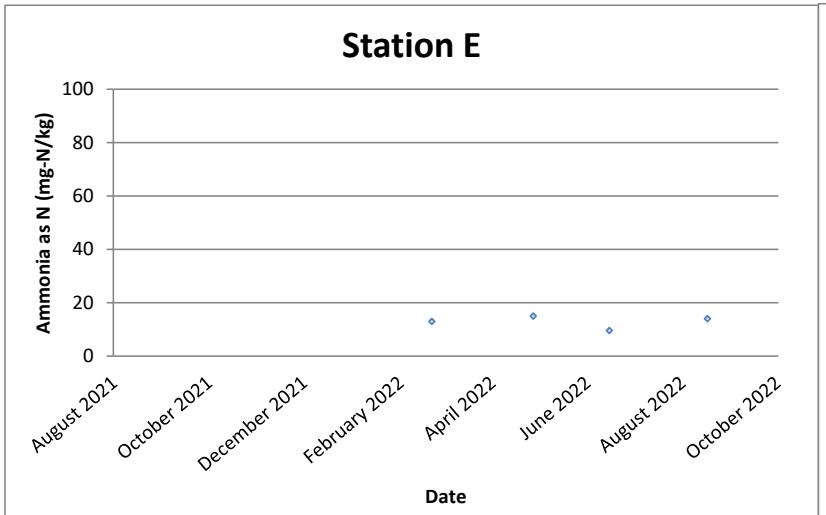

Station H
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

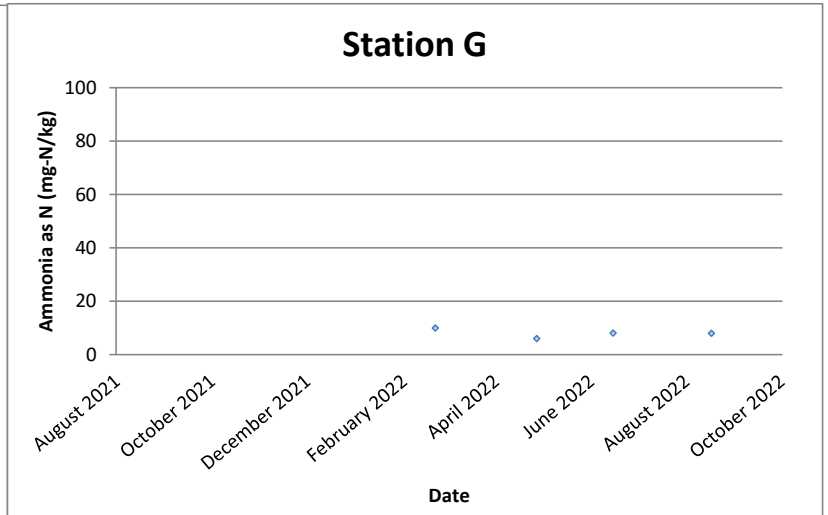

Station A
Ammonia as N (mg-N/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

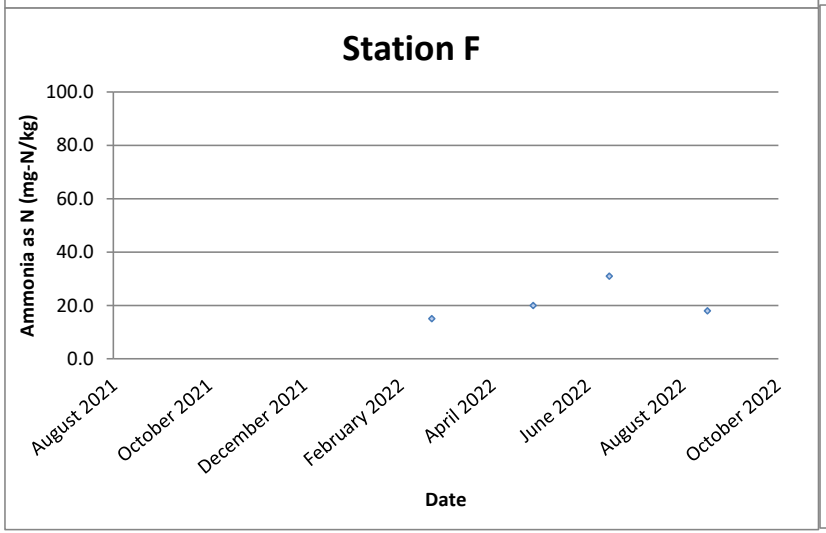

Station C
Ammonia as N (mg-N/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

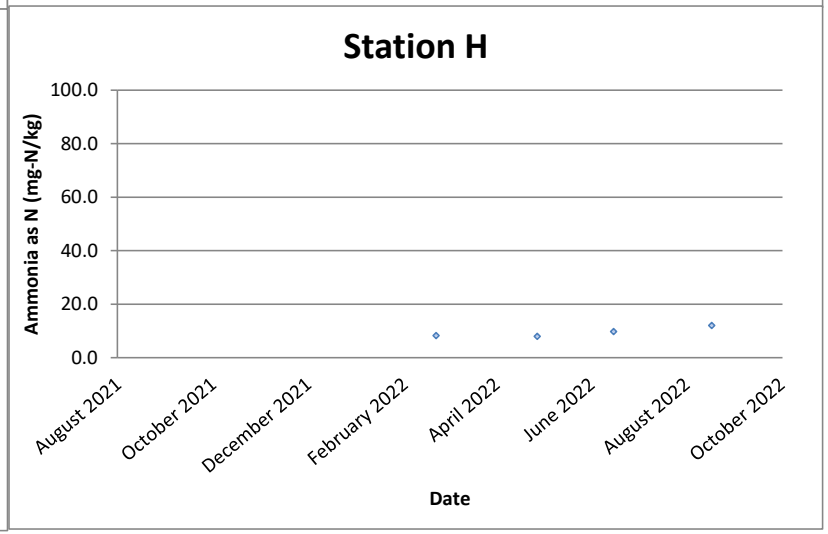

Station B
Ammonia as N (mg-N/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

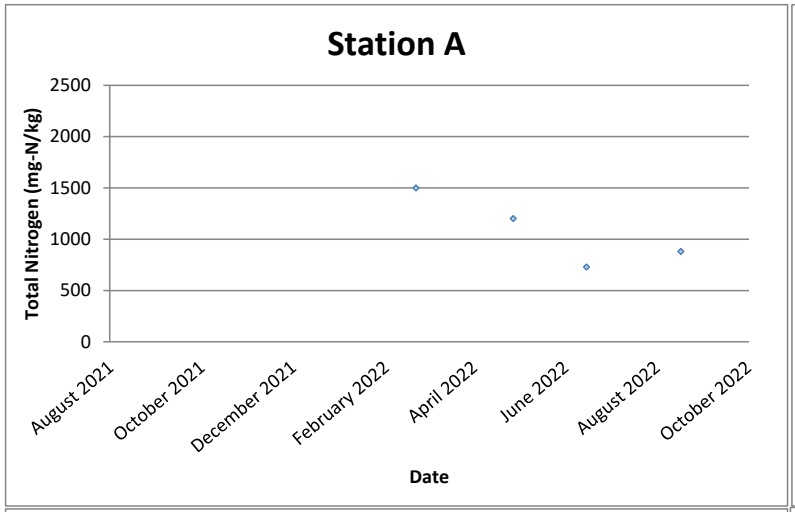

Station D
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

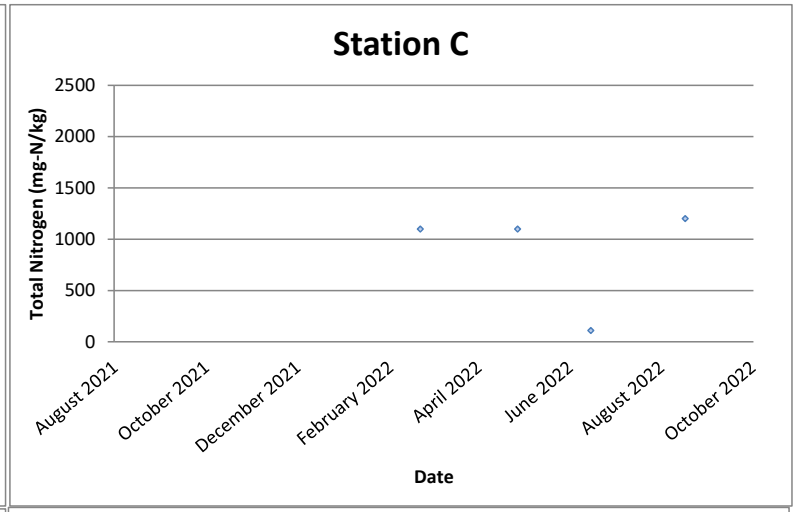

Station E
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

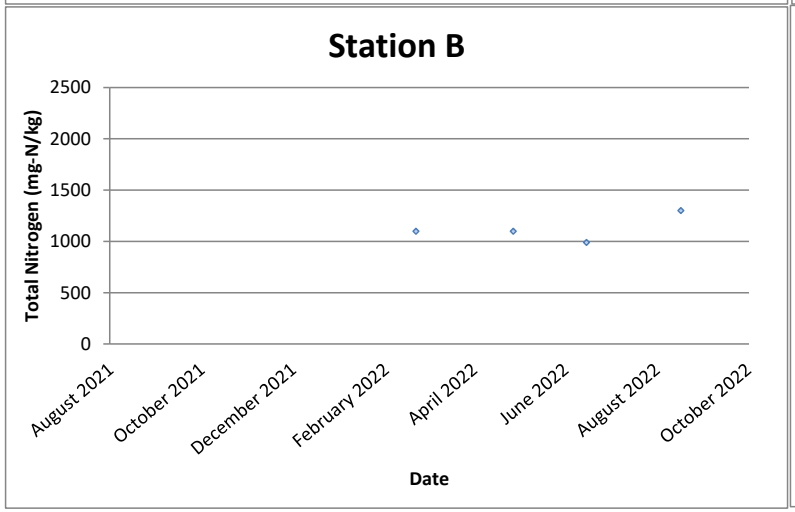

Station G
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

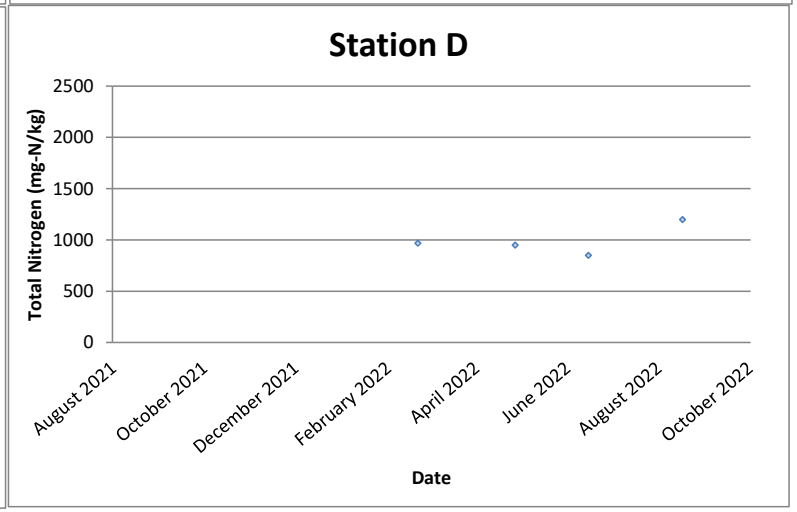

Station F
Ammonia as N (mg-N/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

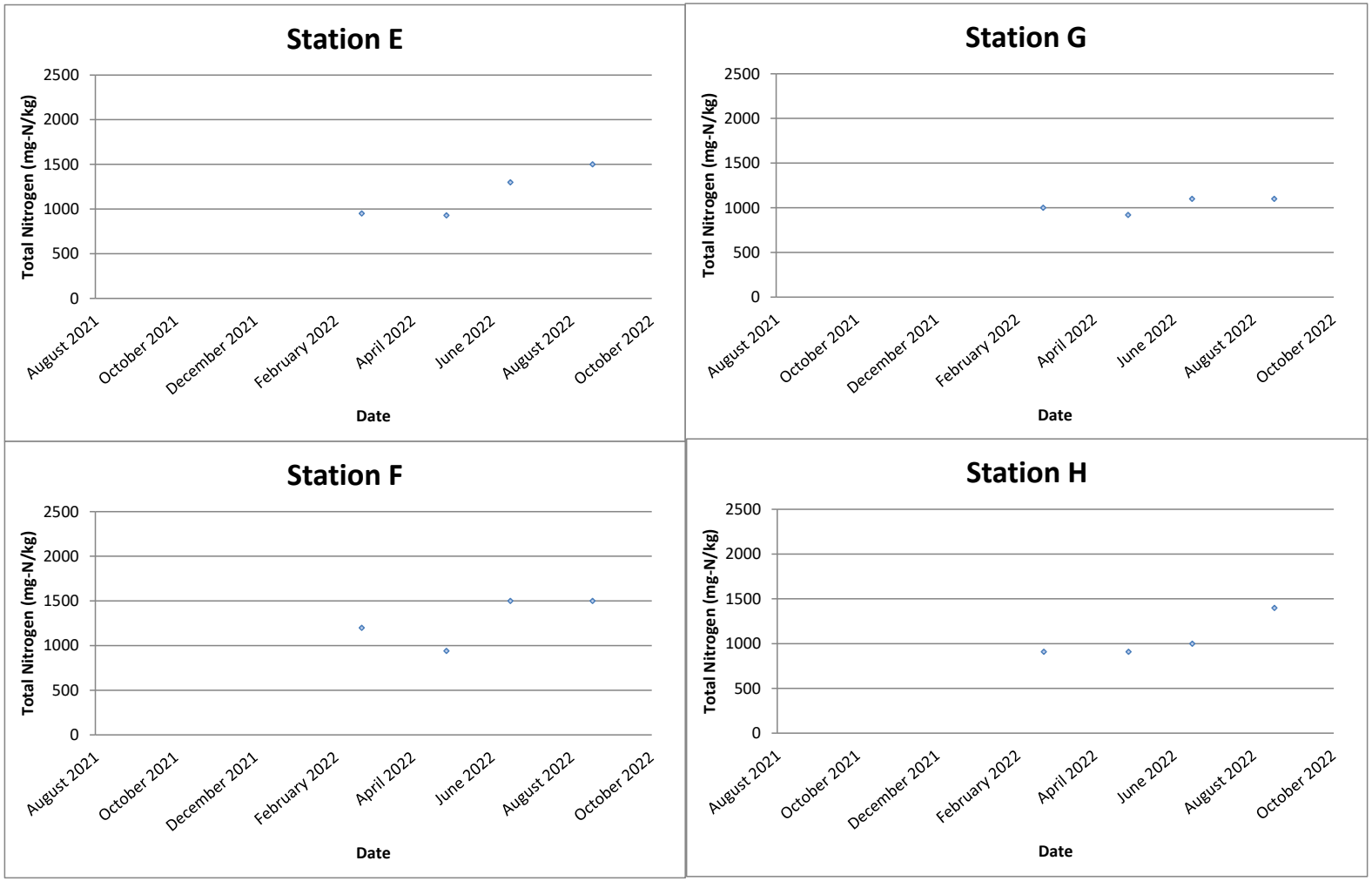

Station H
Ammonia as N (mg-N/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

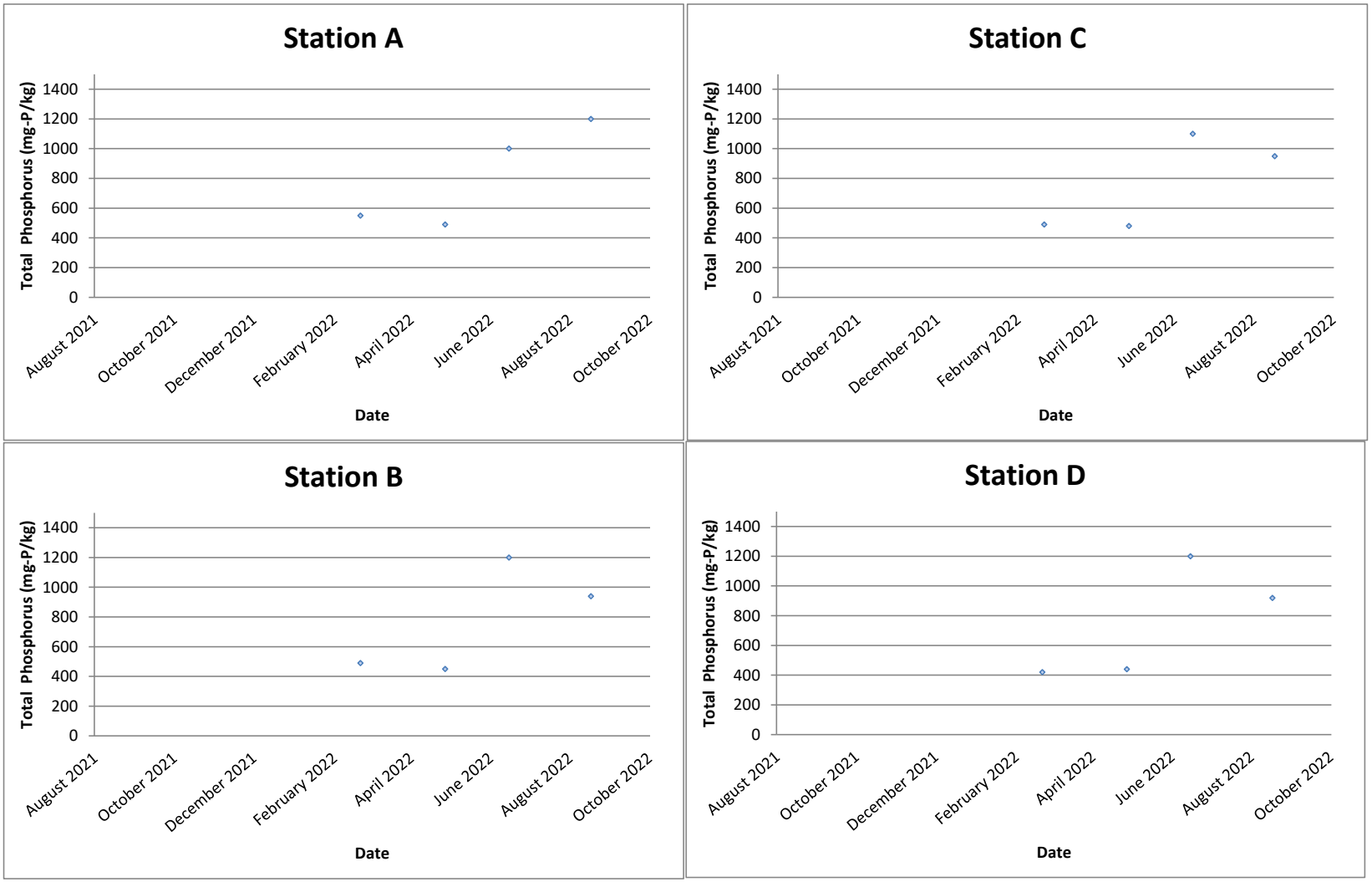

Station A
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

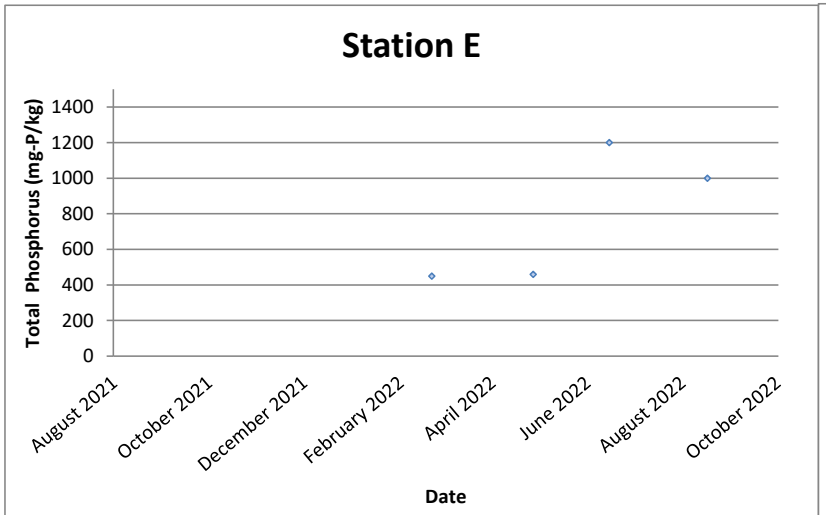

Station C
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

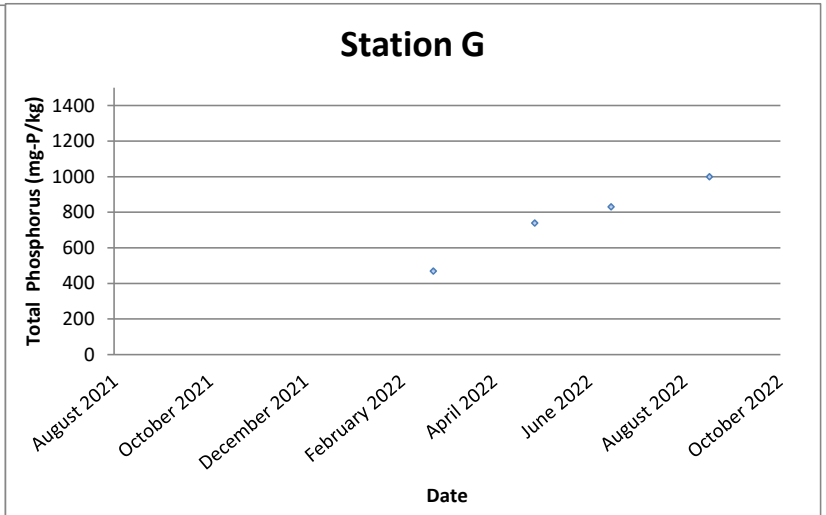

Station B
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

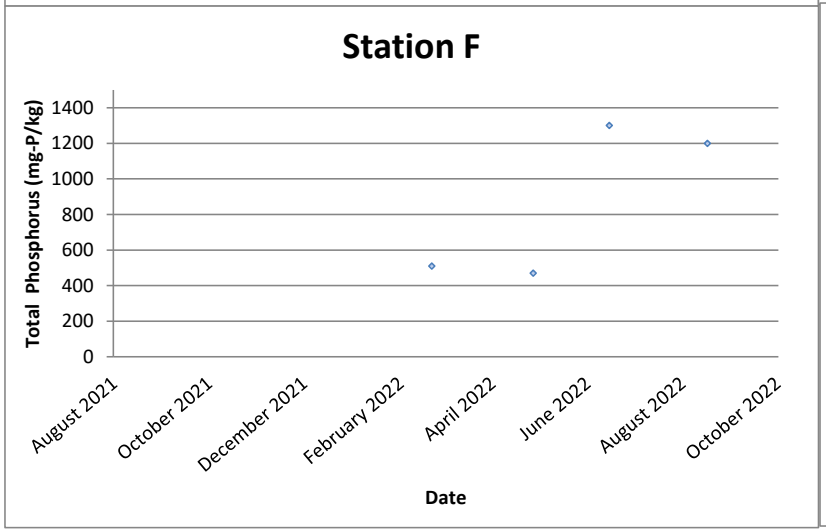

Station D
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

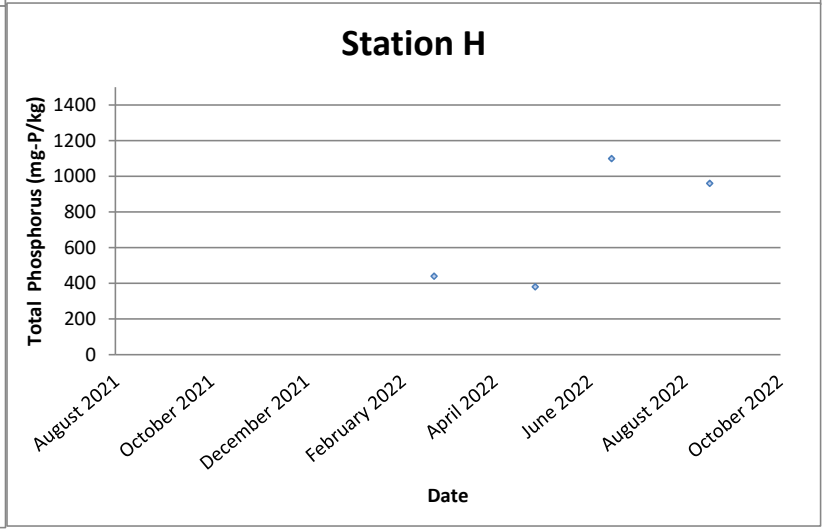

Station E
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station G
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station F
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station H
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station A
Total Phosphorus (mg-P/kg)
1400
1200
1000
800
600
400
200
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station C
Total Phosphorus (mg-P/kg)
1400
1200
1000
800
600
400
200
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station B
Total Phosphorus (mg-P/kg)
1400
1200
1000
800
600
400
200
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station D
Total Phosphorus (mg-P/kg)
1400
1200
1000
800
600
400
200
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

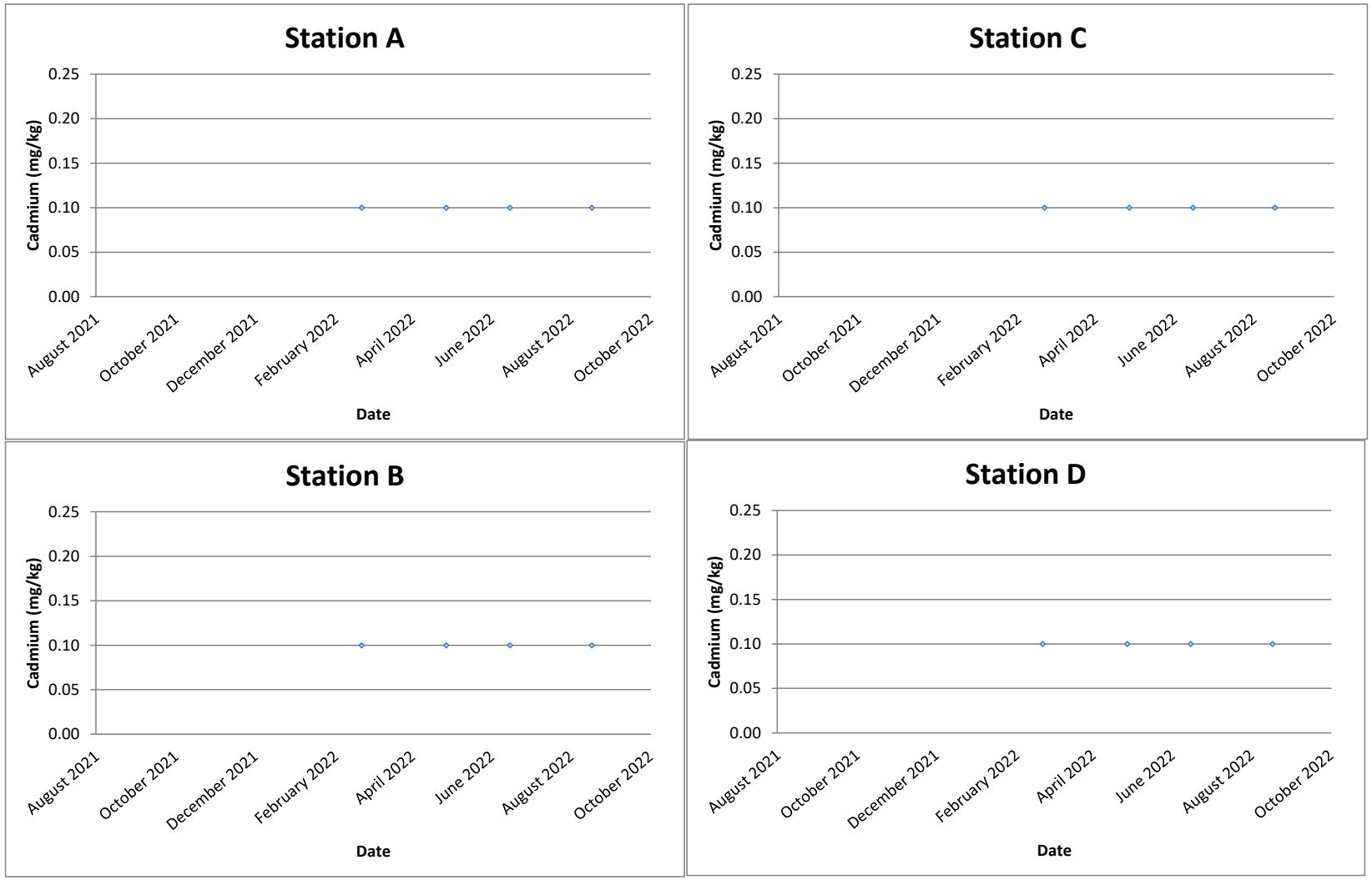

Station E
Total Phosphorus (mg-P/kg)
1400
1200
1000
800
600
400
200
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station G
Total Phosphorus (mg-P/kg)
1400
1200
1000
800
600
400
200
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

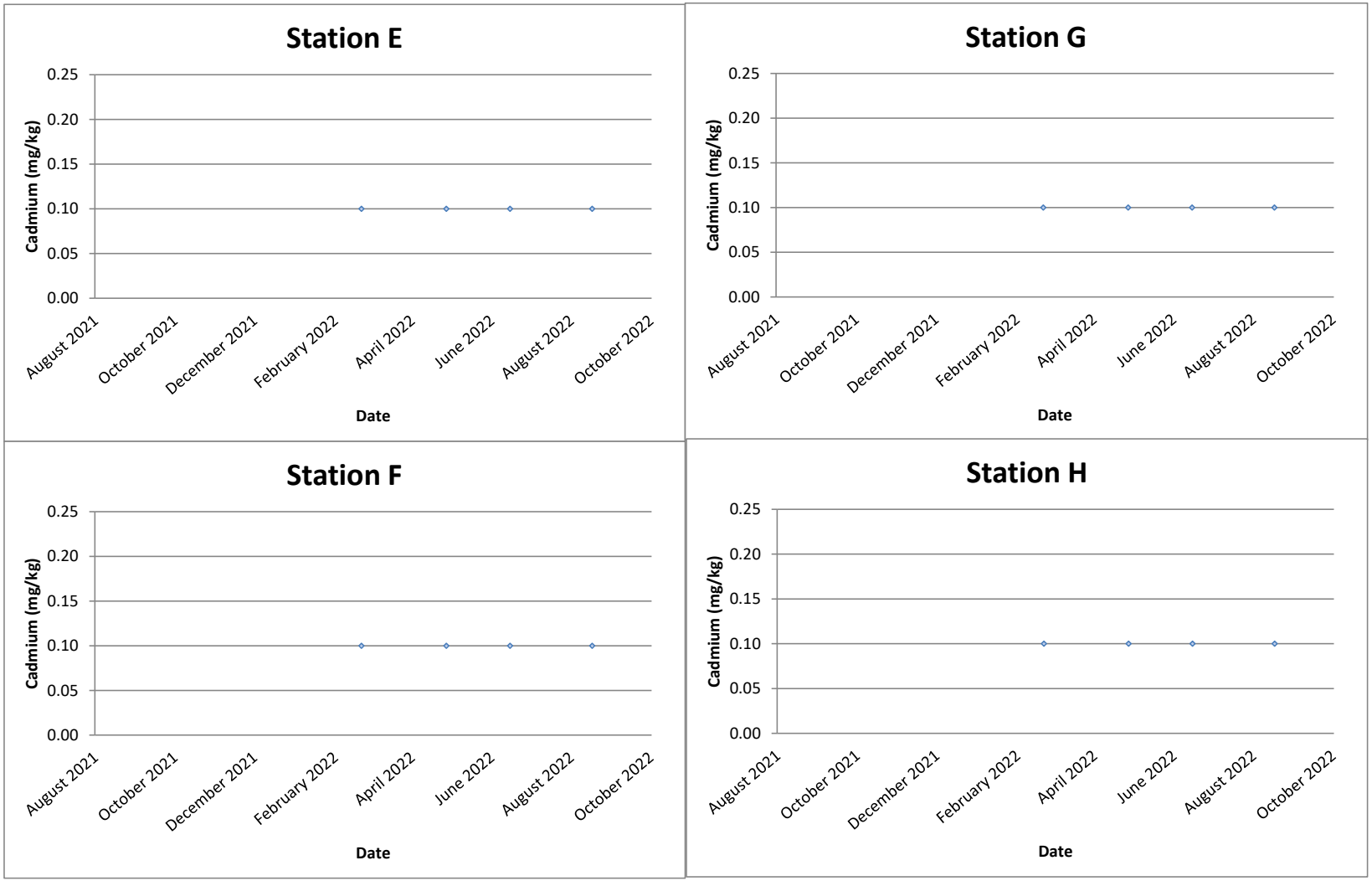

Station F
Total Phosphorus (mg-P/kg)
1400
1200
1000
800
600
400
200
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station H
Total Phosphorus (mg-P/kg)
1400
1200
1000
800
600
400
200
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

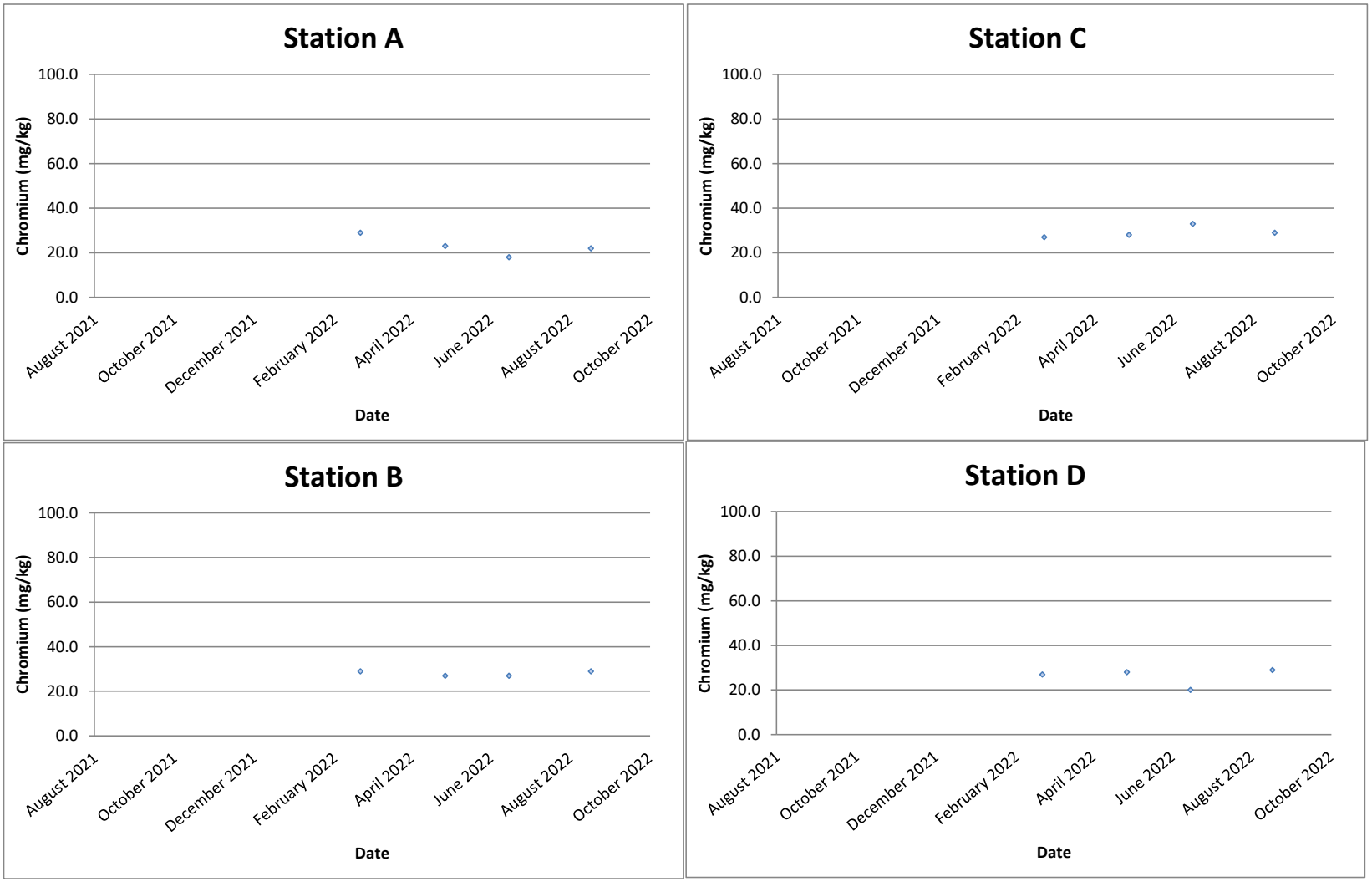
Cadmium (mg/kg)

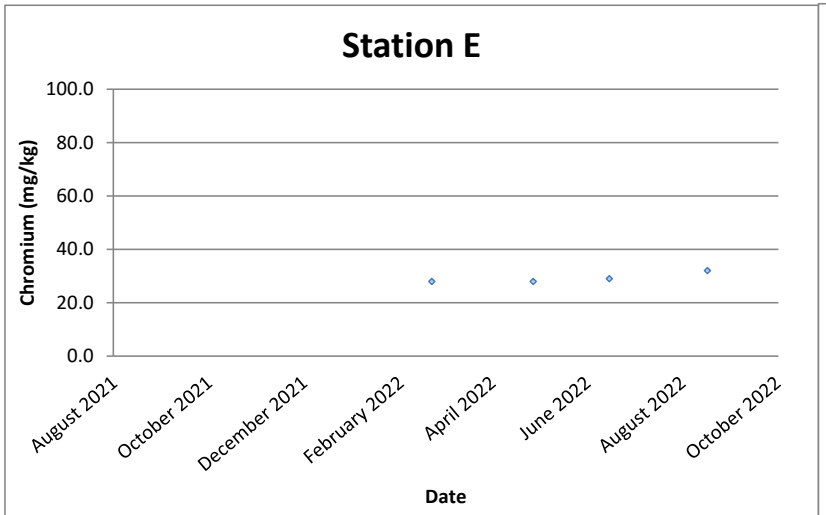


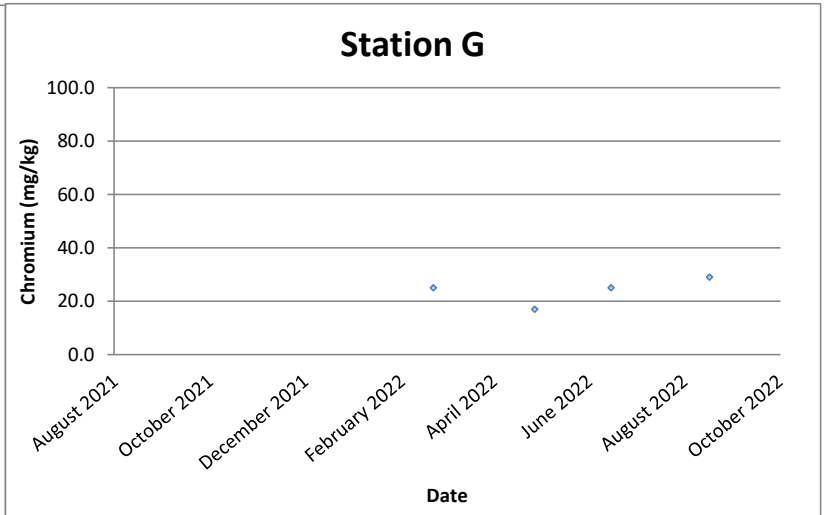
Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

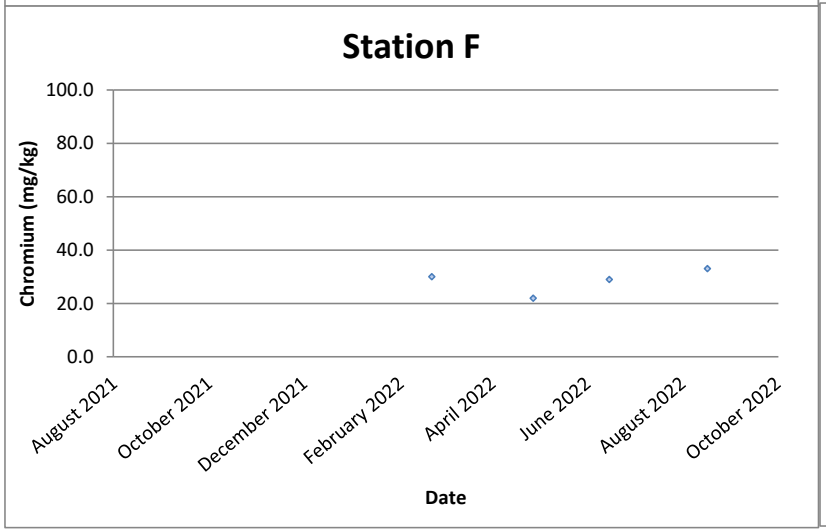


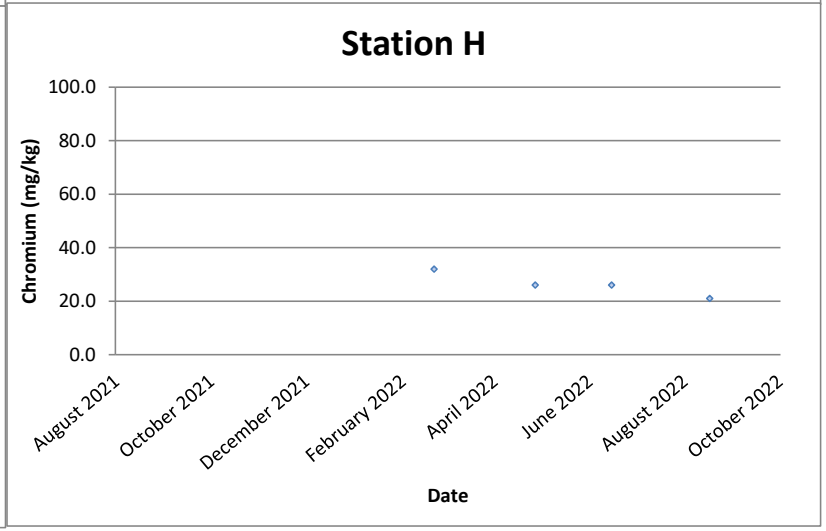
Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.


Station A
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station C
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station B
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station D
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

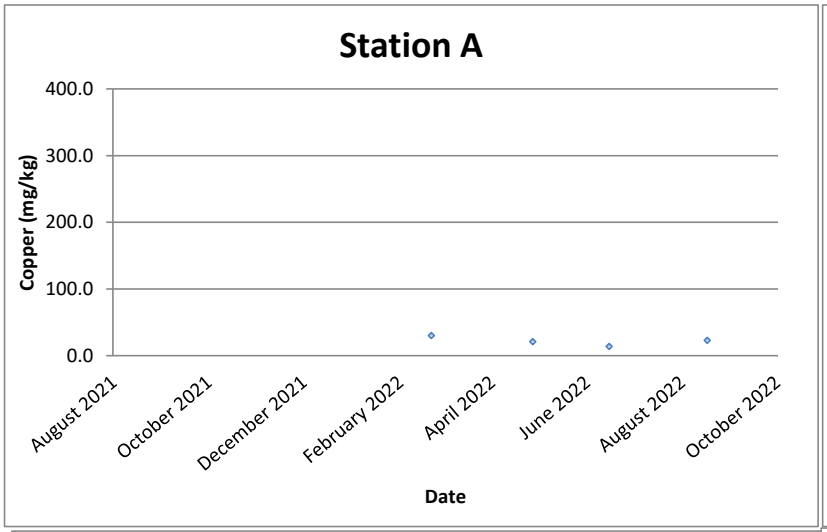

Station E
100.0
80.0
60.0
40.0
20.0
0.0
Chromium (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

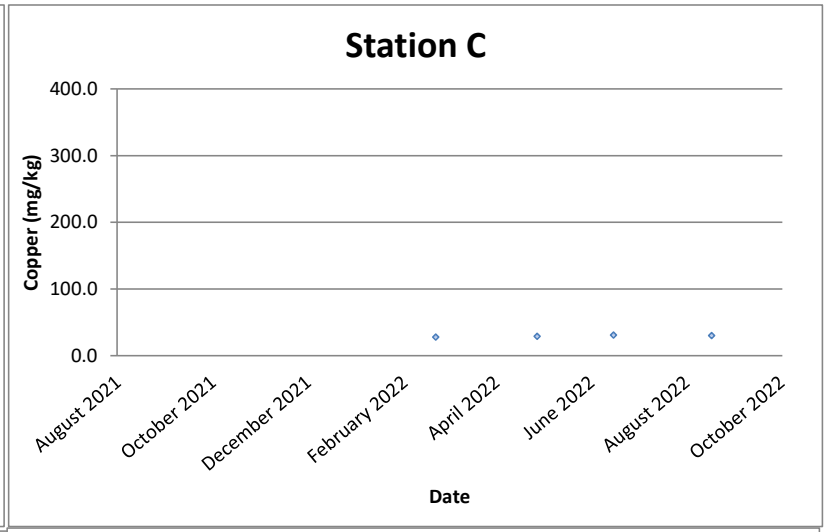

Station G
100.0
80.0
60.0
40.0
20.0
0.0
Chromium (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

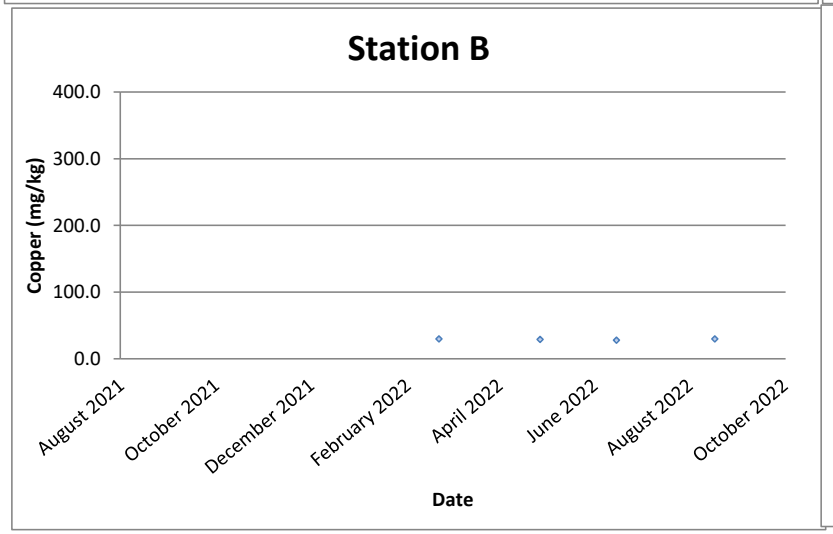

Station F
100.0
80.0
60.0
40.0
20.0
0.0
Chromium (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

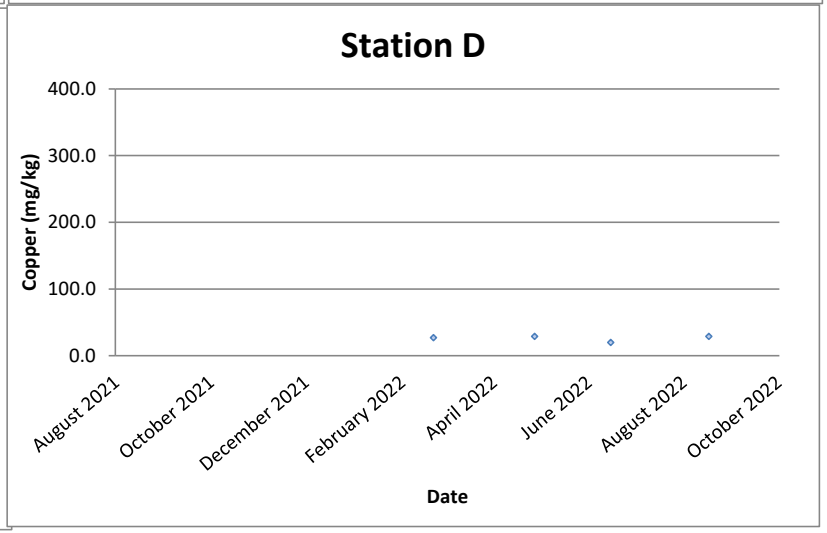

Station H
100.0
80.0
60.0
40.0
20.0
0.0
Chromium (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

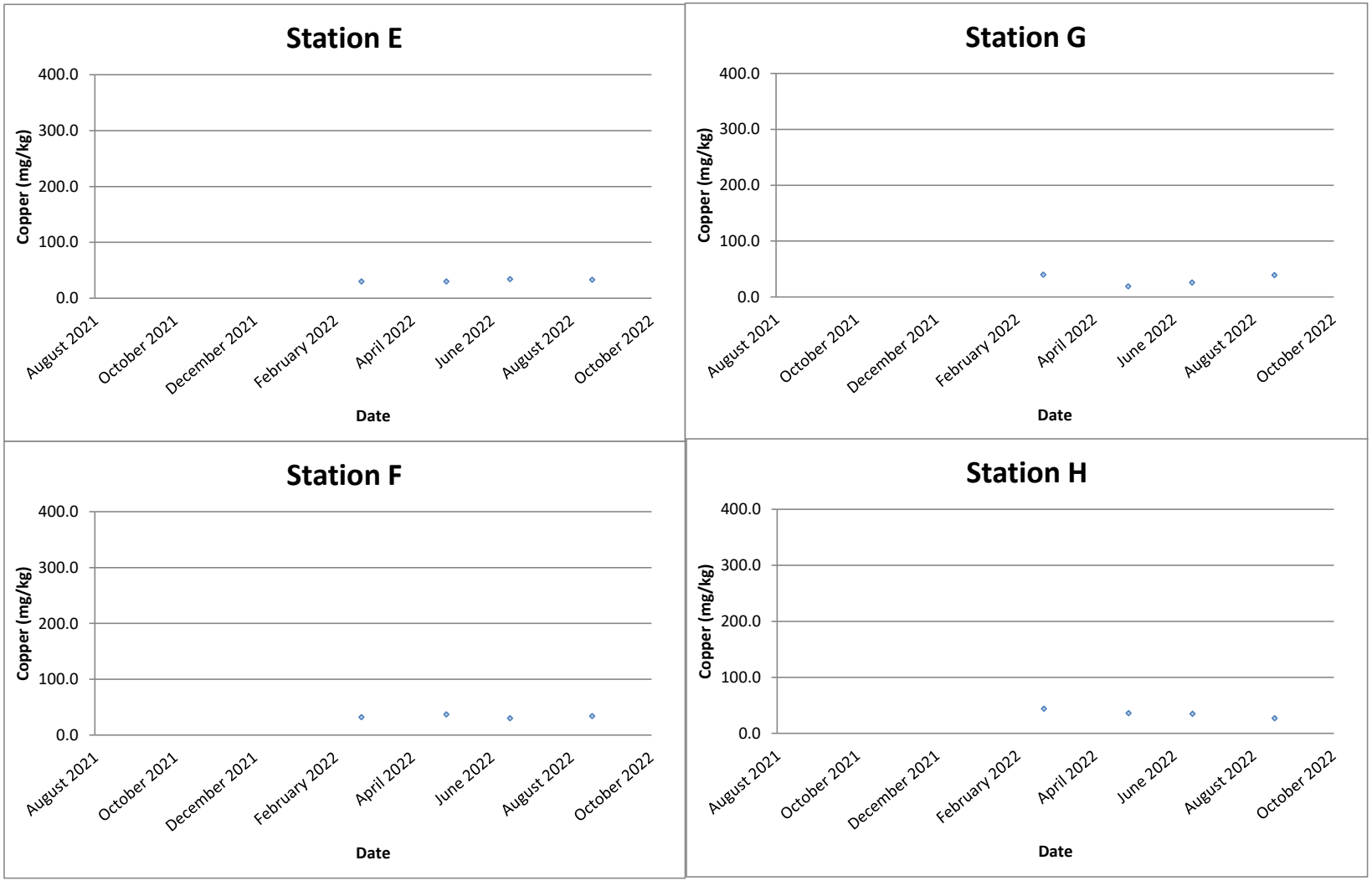
Copper (mg/kg)

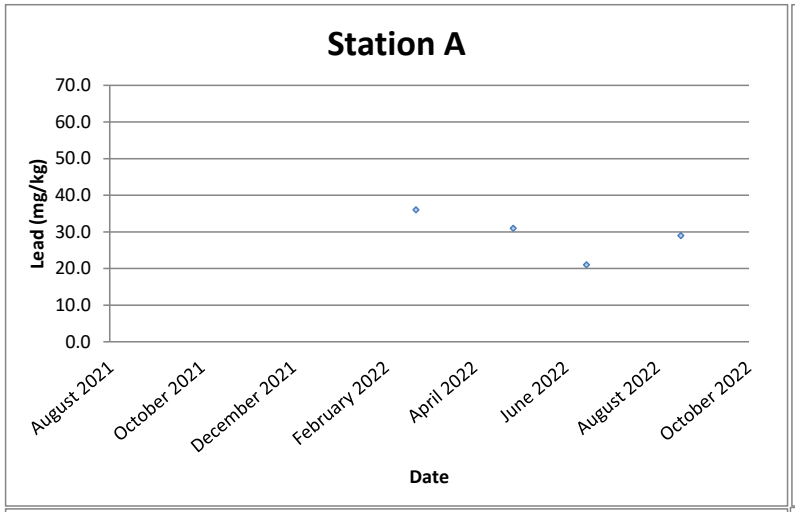

Station A
400.0
300.0
200.0
100.0
0.0
Copper (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

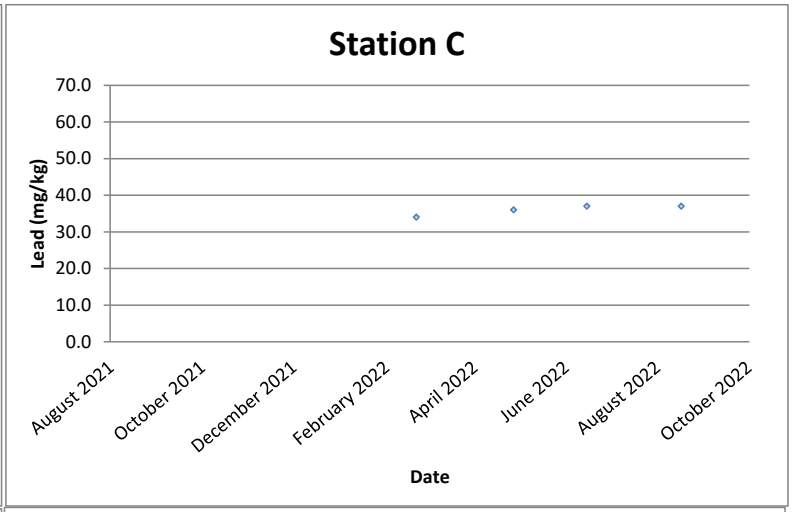

Station C
400.0
300.0
200.0
100.0
0.0
Copper (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

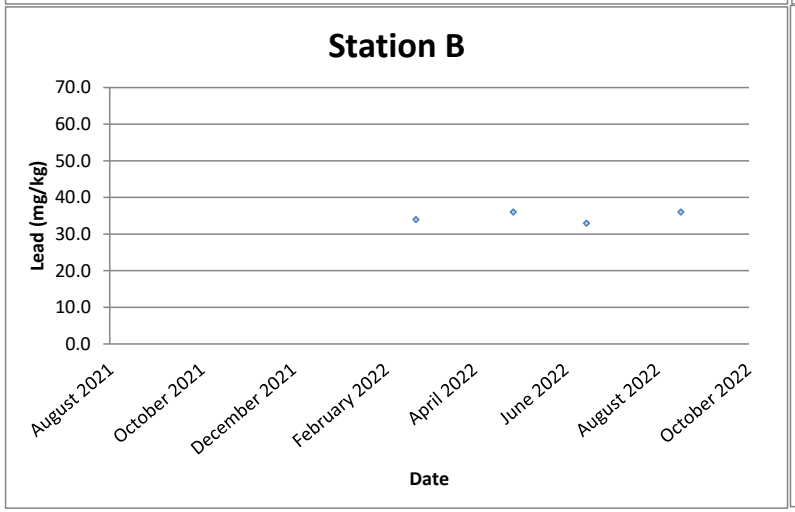

Station B
400.0
300.0
200.0
100.0
0.0
Copper (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

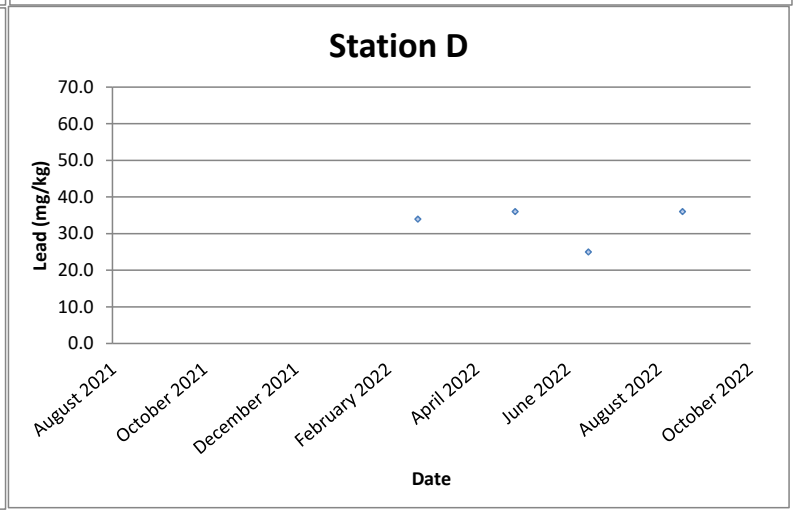

Station D
400.0
300.0
200.0
100.0
0.0
Copper (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

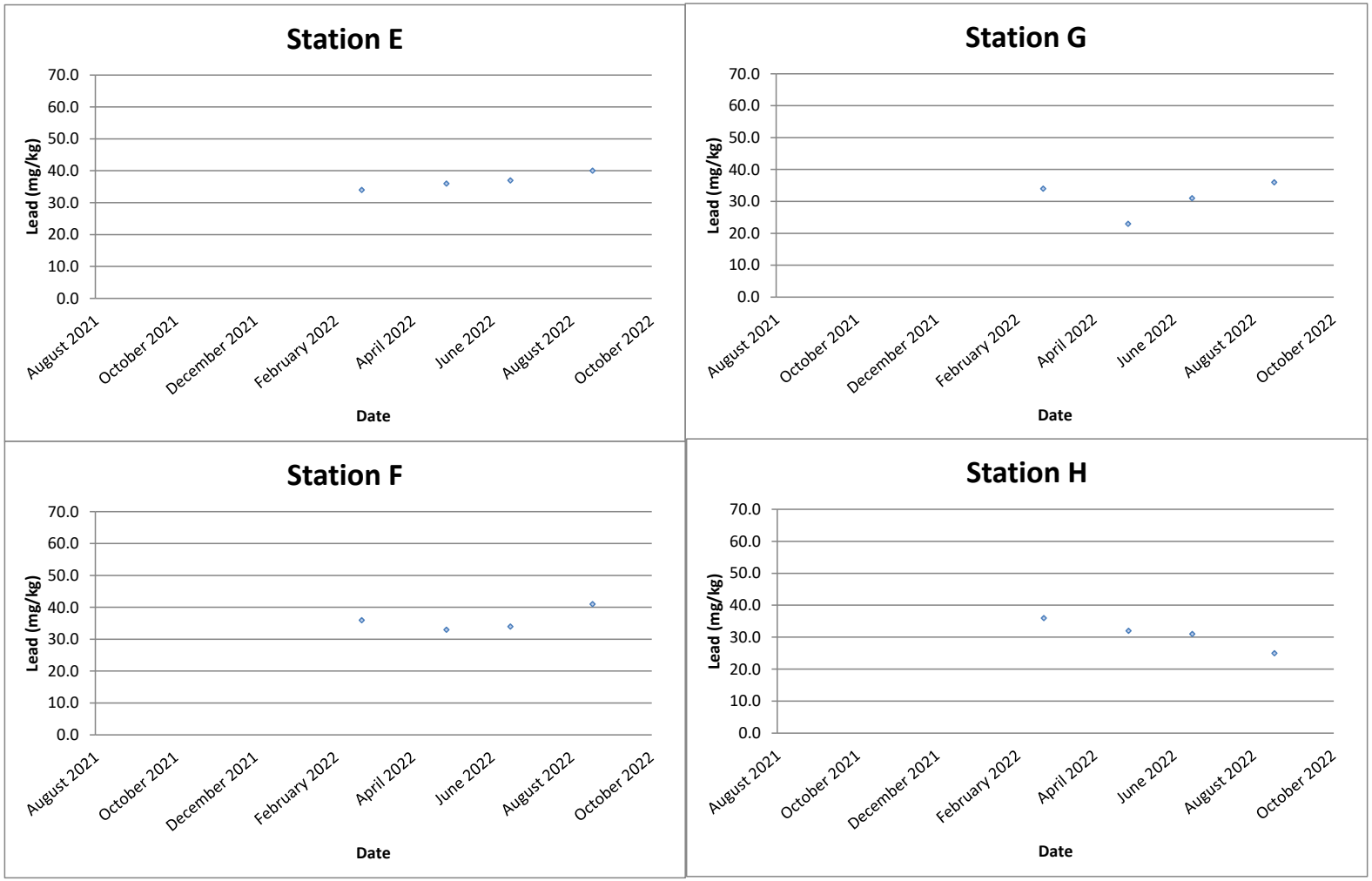

Station E
Station G
Station F
Station H
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station A
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

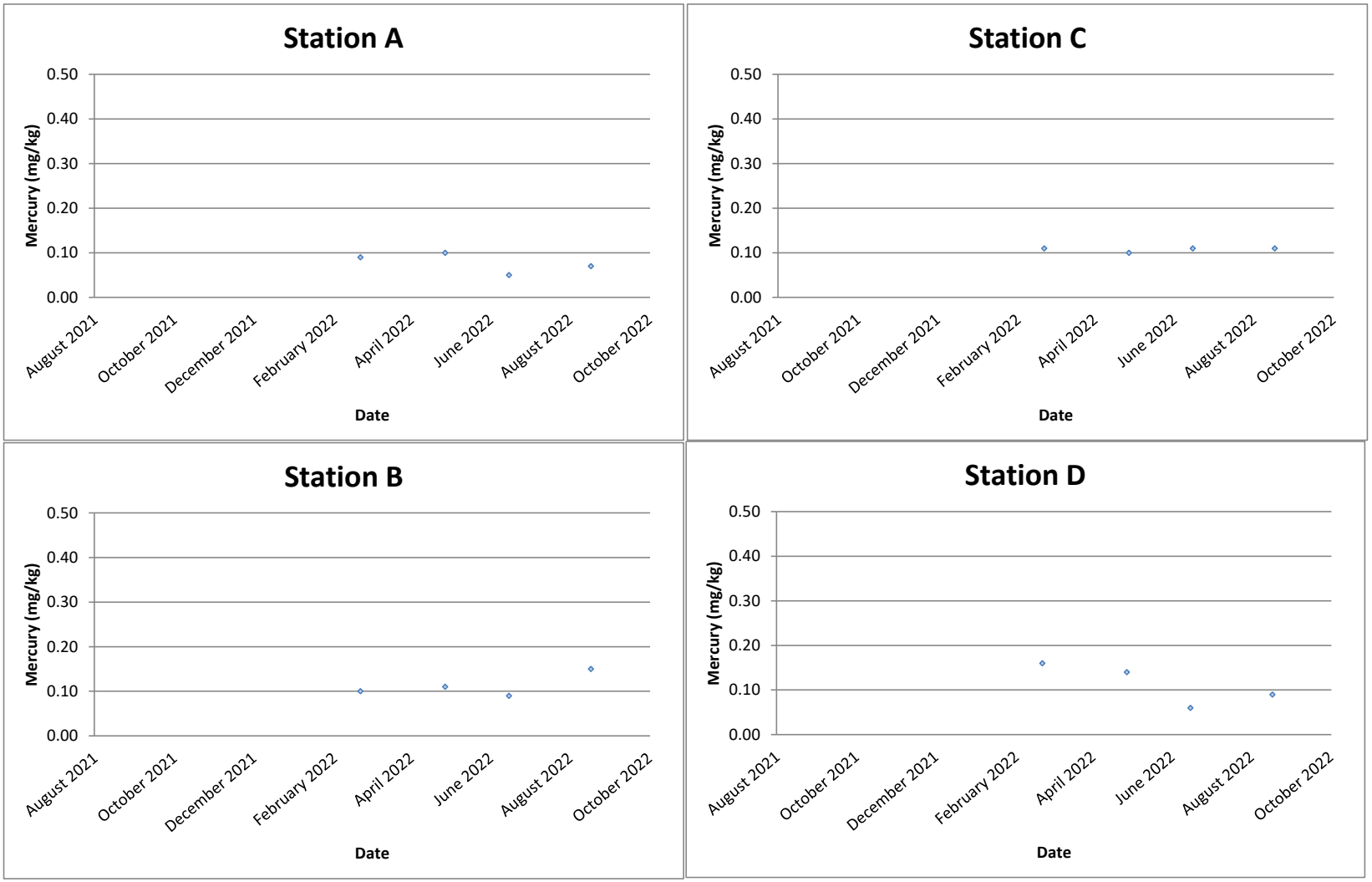

Station C
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

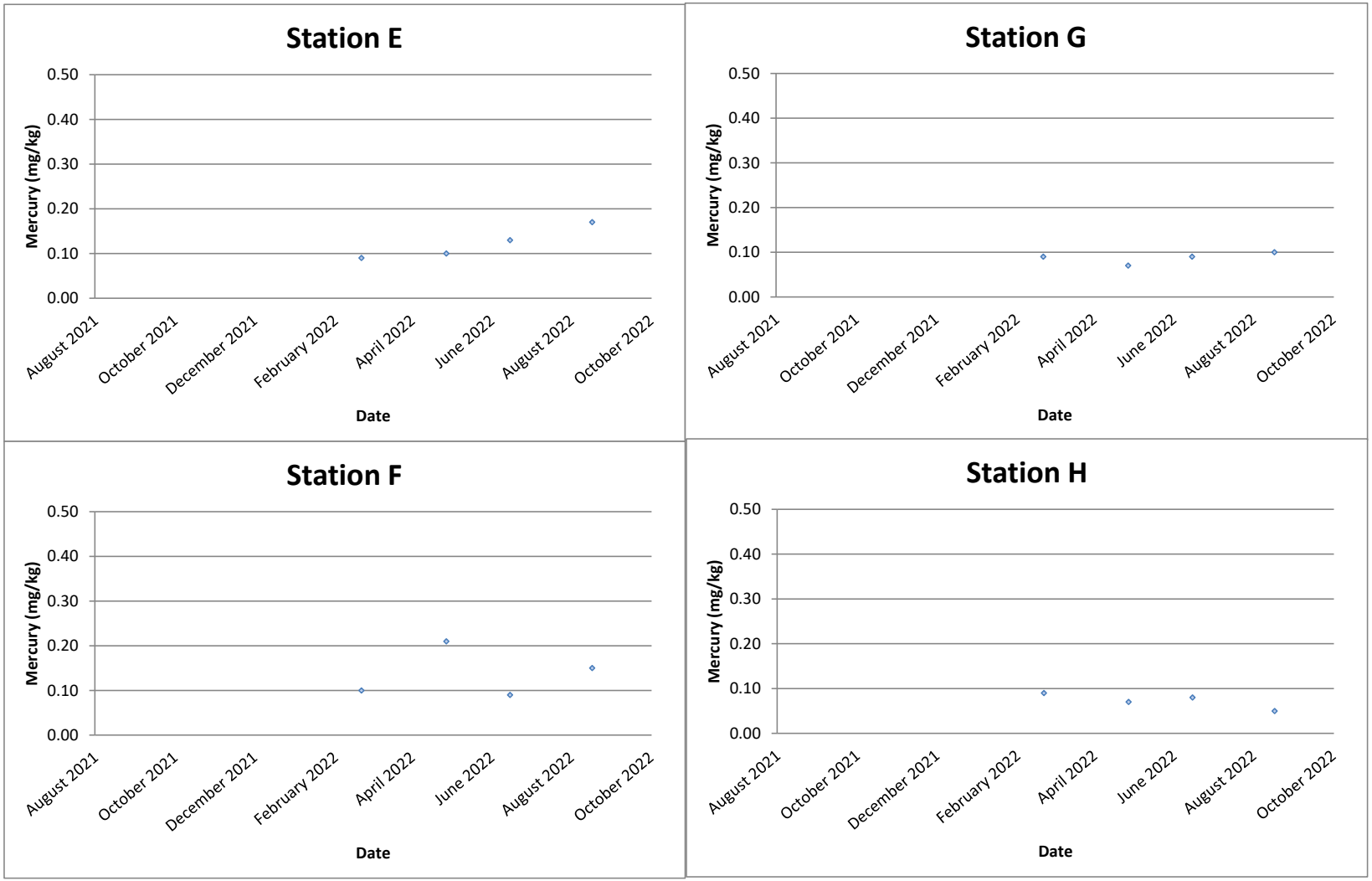

Station B
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station D
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

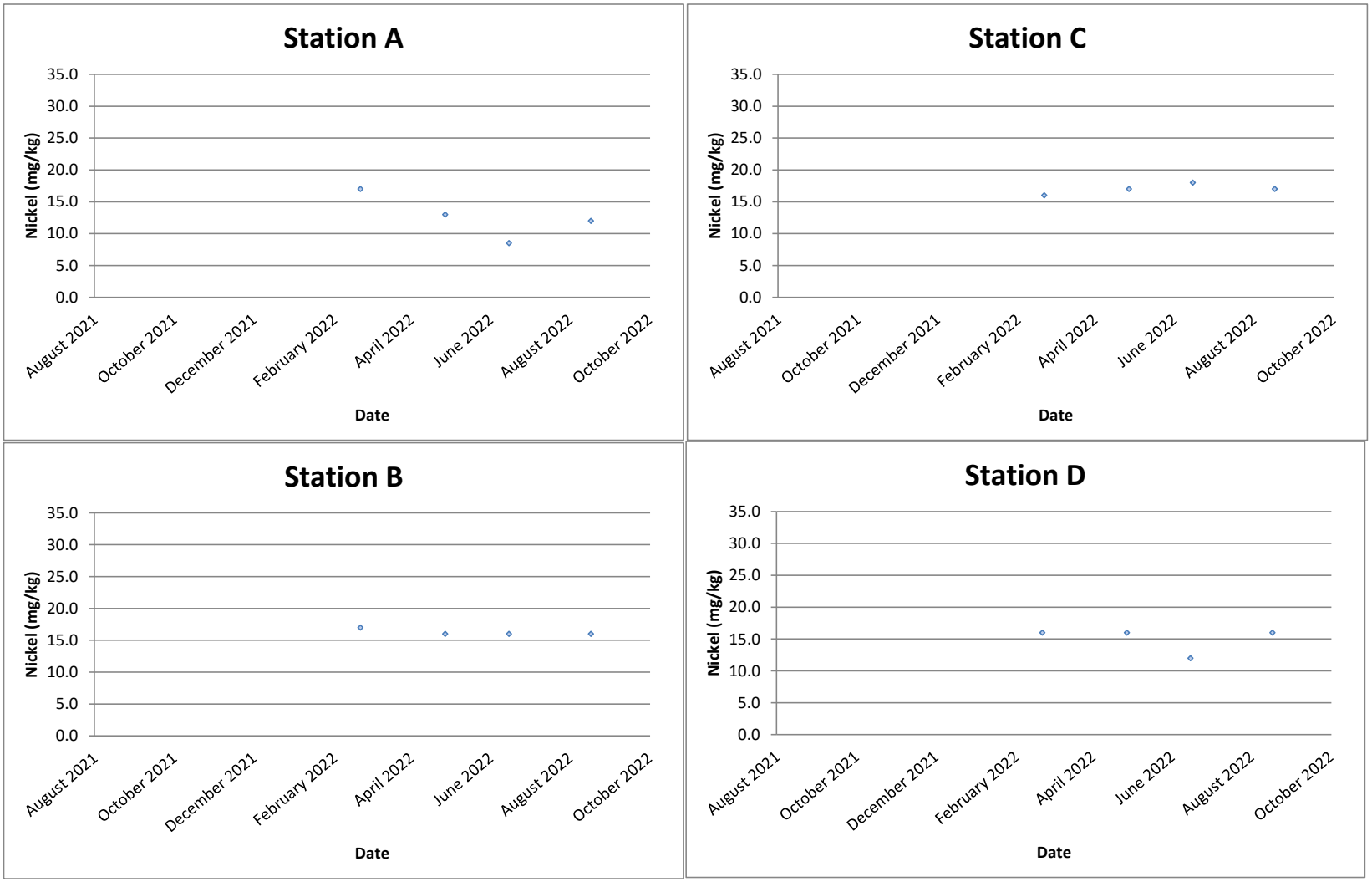

Station E
Lead (mg/kg)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station G
Lead (mg/kg)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station F
Lead (mg/kg)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station H
Lead (mg/kg)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

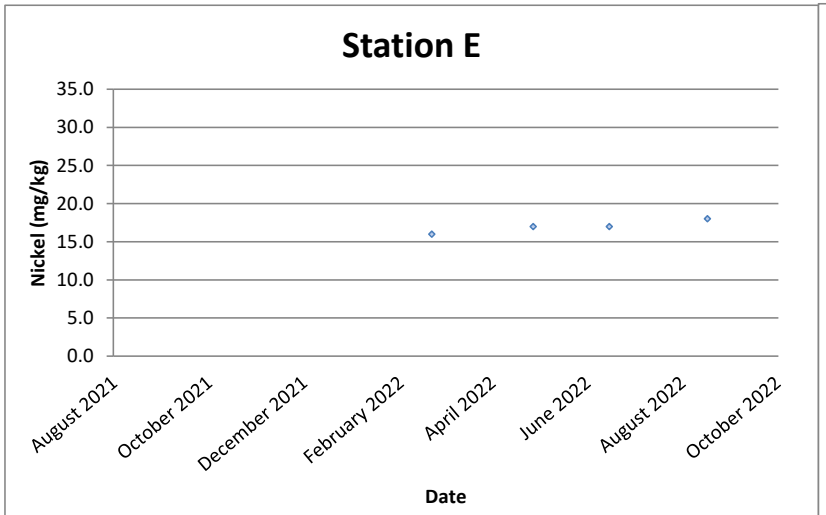
Mercury (mg/kg)

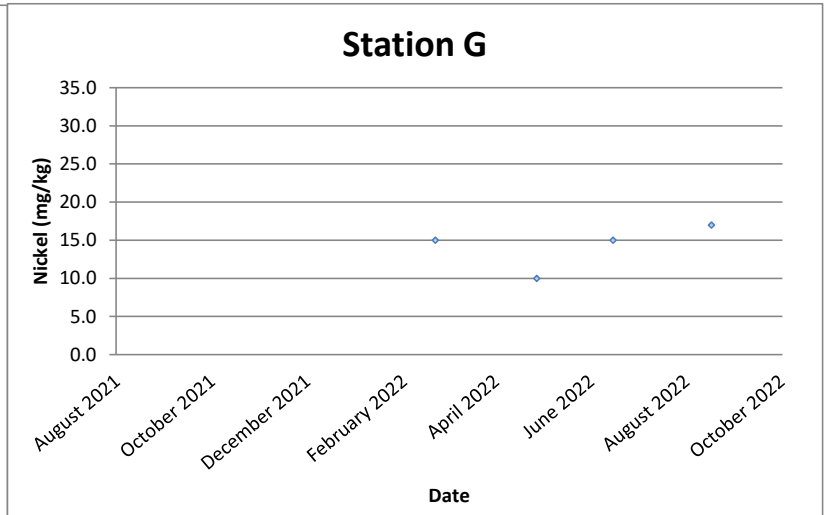


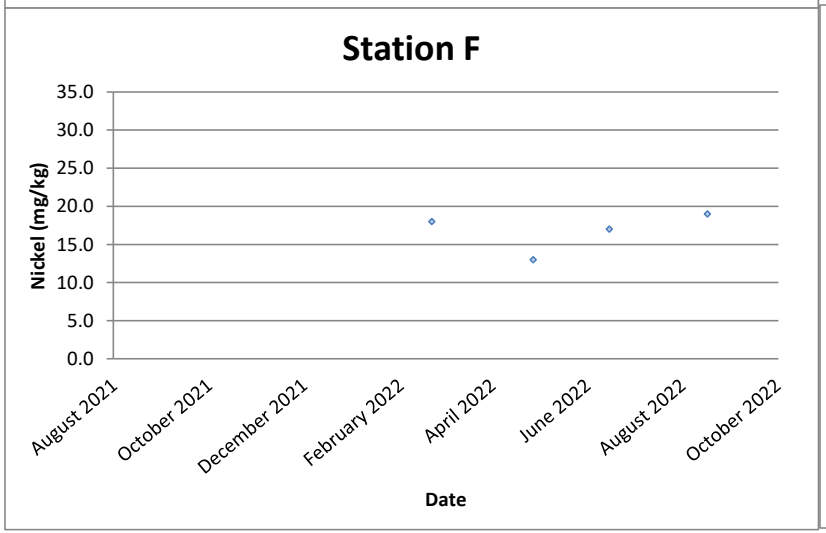

Station E
Mercury (mg/kg)
0.50
0.40
0.30
0.20
0.10
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station G
Mercury (mg/kg)
0.50
0.40
0.30
0.20
0.10
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station F
Mercury (mg/kg)
0.50
0.40
0.30
0.20
0.10
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station H
Mercury (mg/kg)
0.50
0.40
0.30
0.20
0.10
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

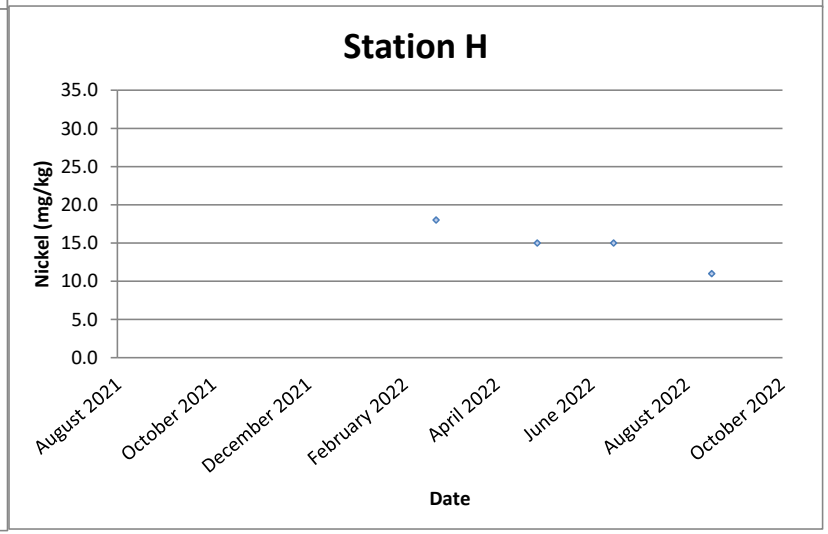
Nickel (mg/kg)

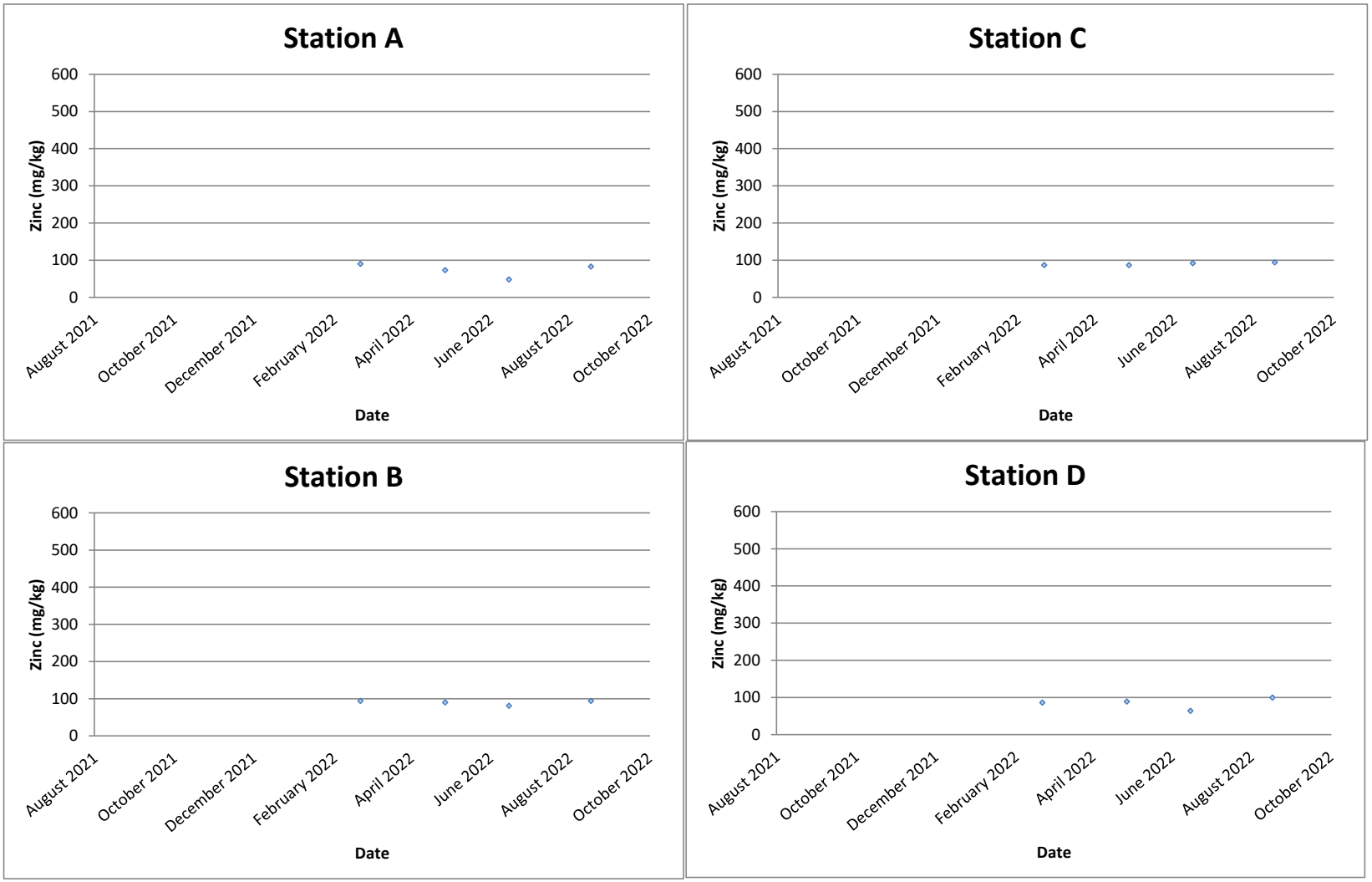

Station A
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station C
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station B
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station D
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

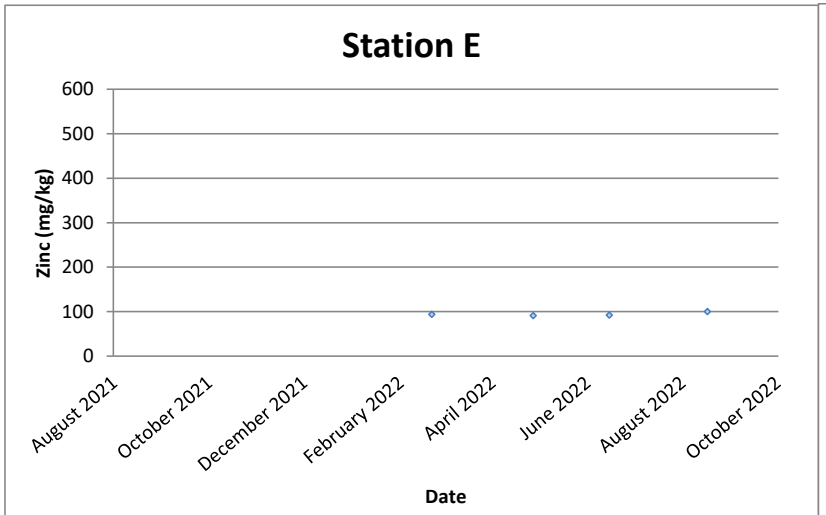

Station E
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Nickel (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

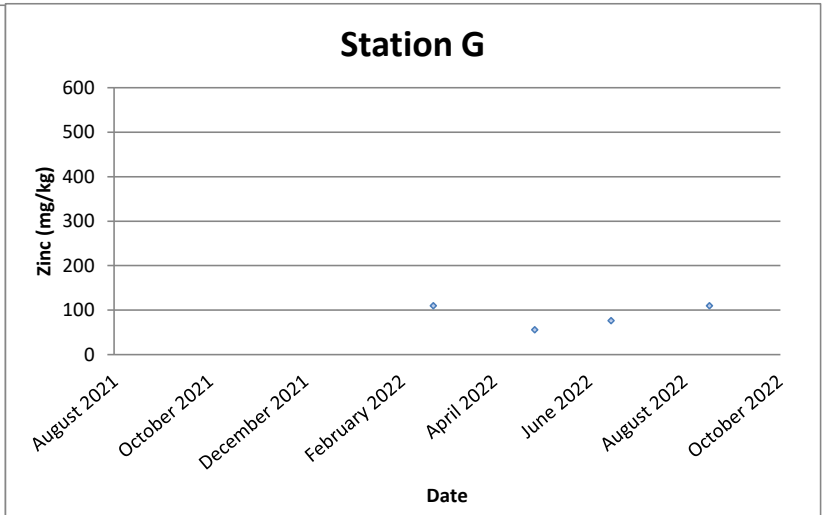

Station G
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Nickel (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

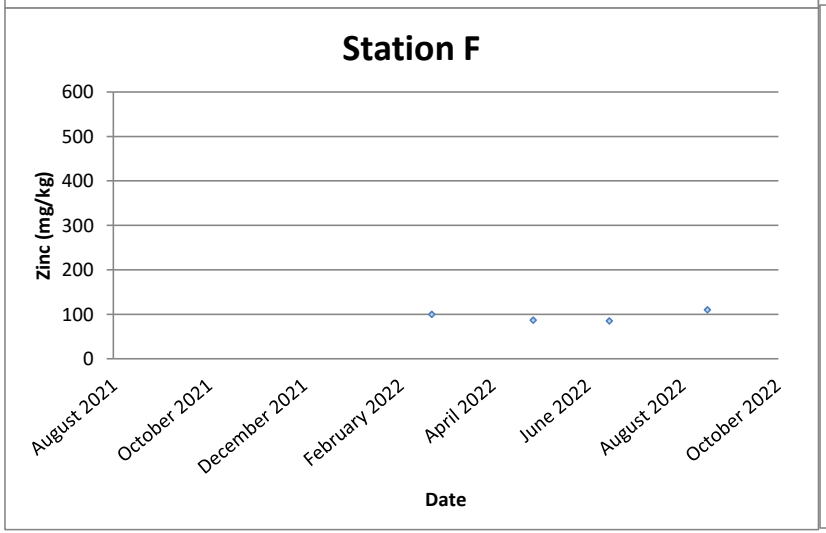

Station F
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Nickel (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

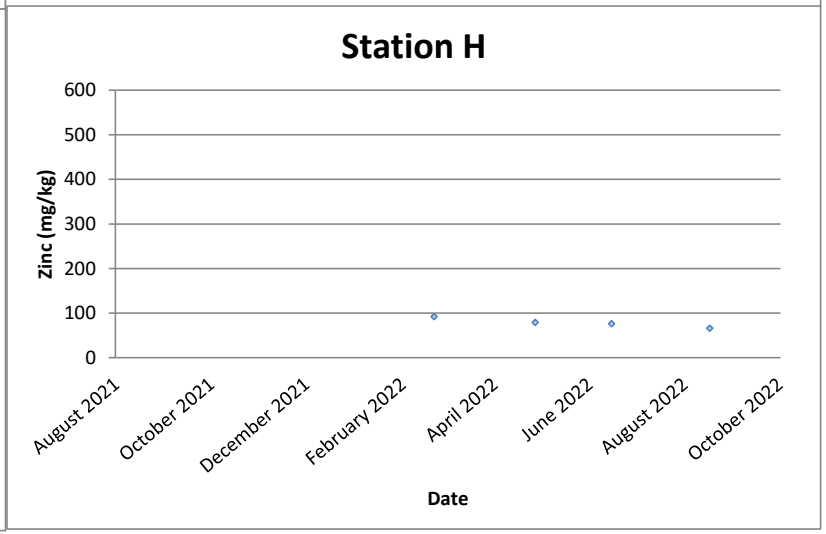

Station H
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Nickel (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station A
Zinc (mg/kg)
600
500
400
300
200
100
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station C
Zinc (mg/kg)
600
500
400
300
200
100
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station B
Zinc (mg/kg)
600
500
400
300
200
100
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station D
Zinc (mg/kg)
600
500
400
300
200
100
0
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

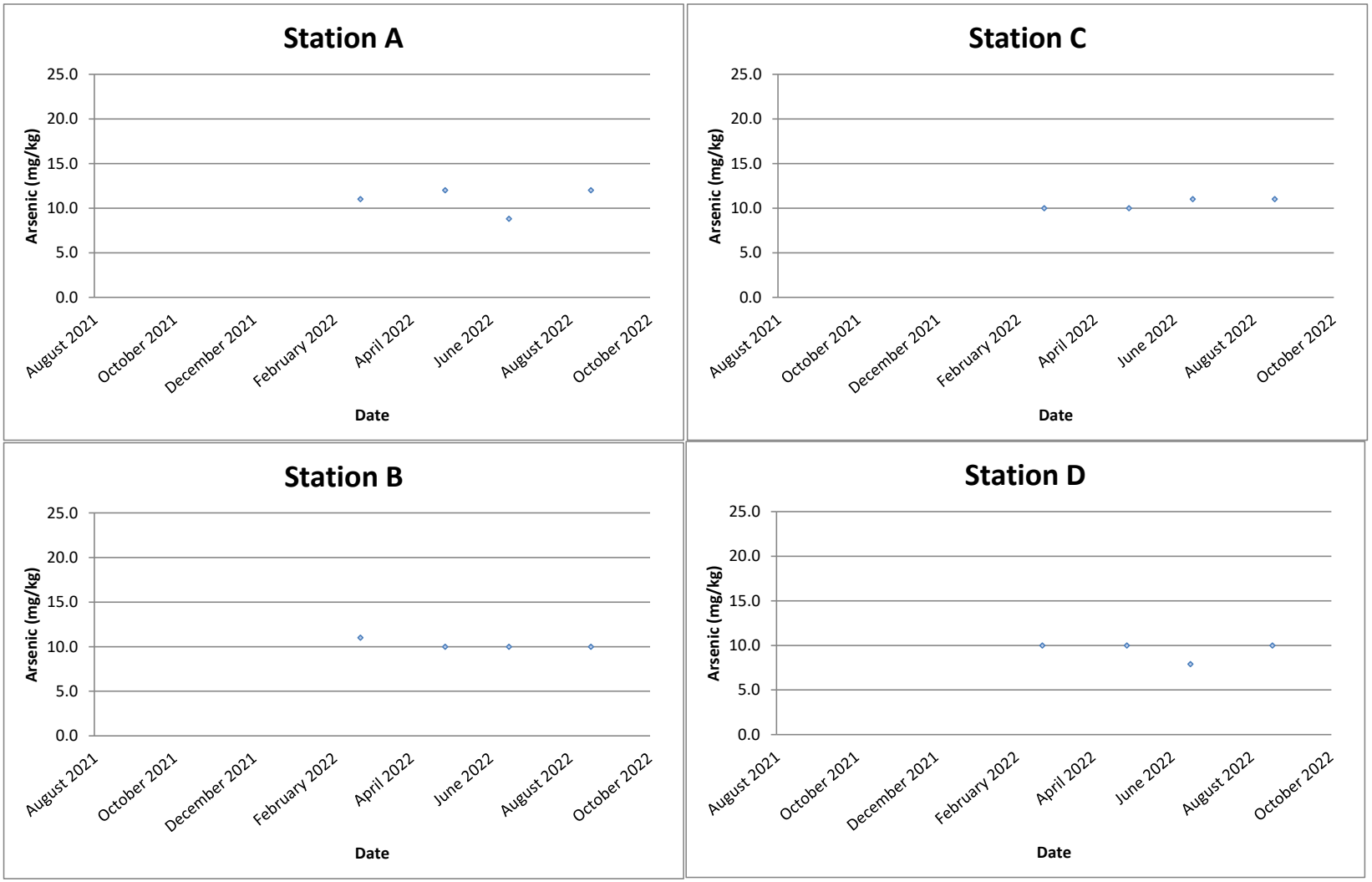

Station E
600
500
400
300
200
100
0
Zinc (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

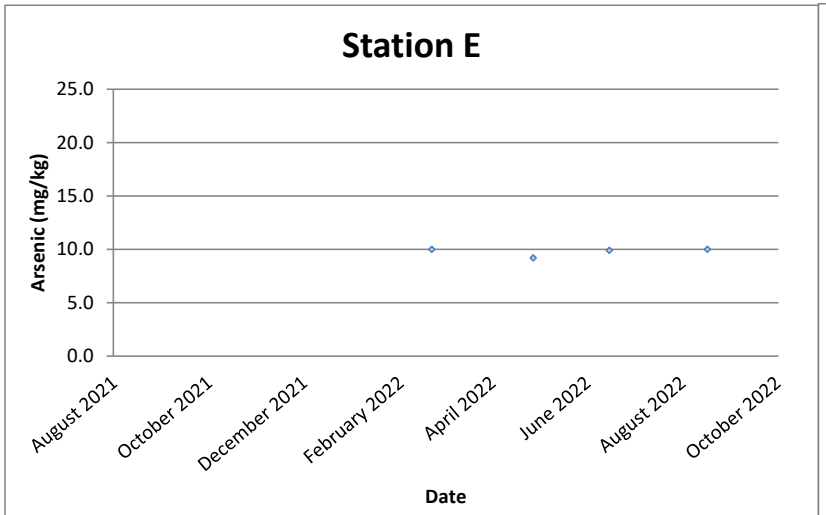

Station G
600
500
400
300
200
100
0
Zinc (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

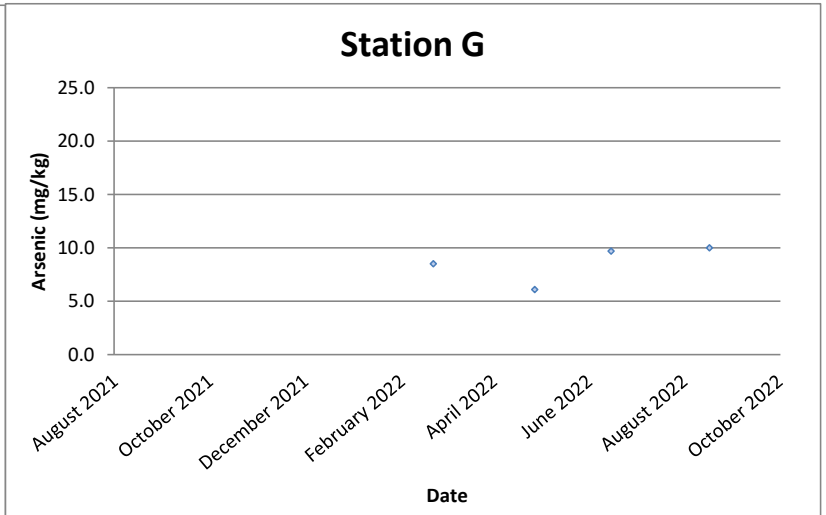

Station F
600
500
400
300
200
100
0
Zinc (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

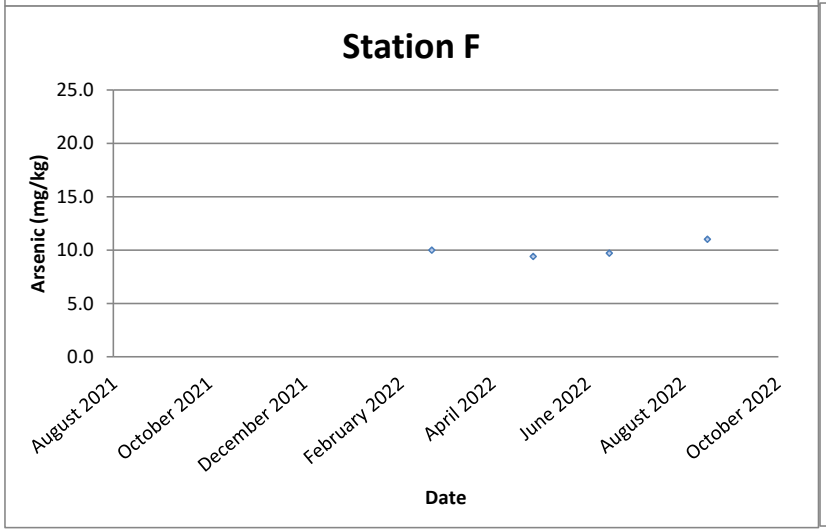

Station H
600
500
400
300
200
100
0
Zinc (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

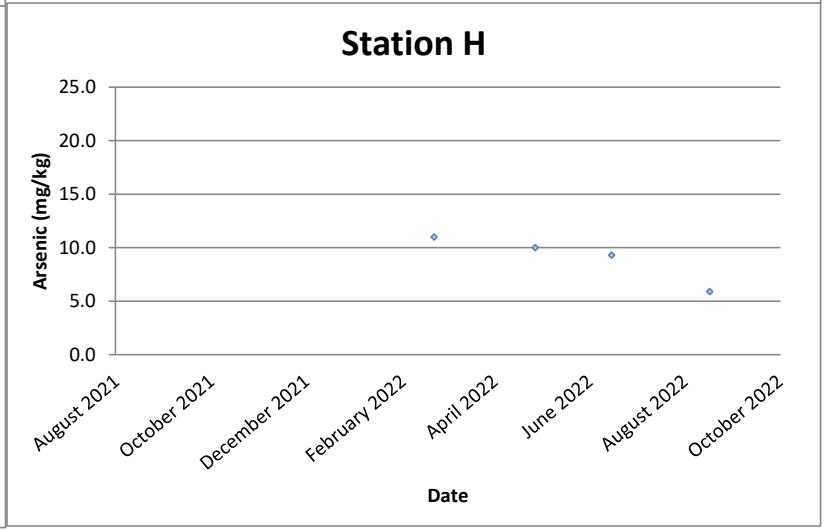
Arsenic (mg/kg)



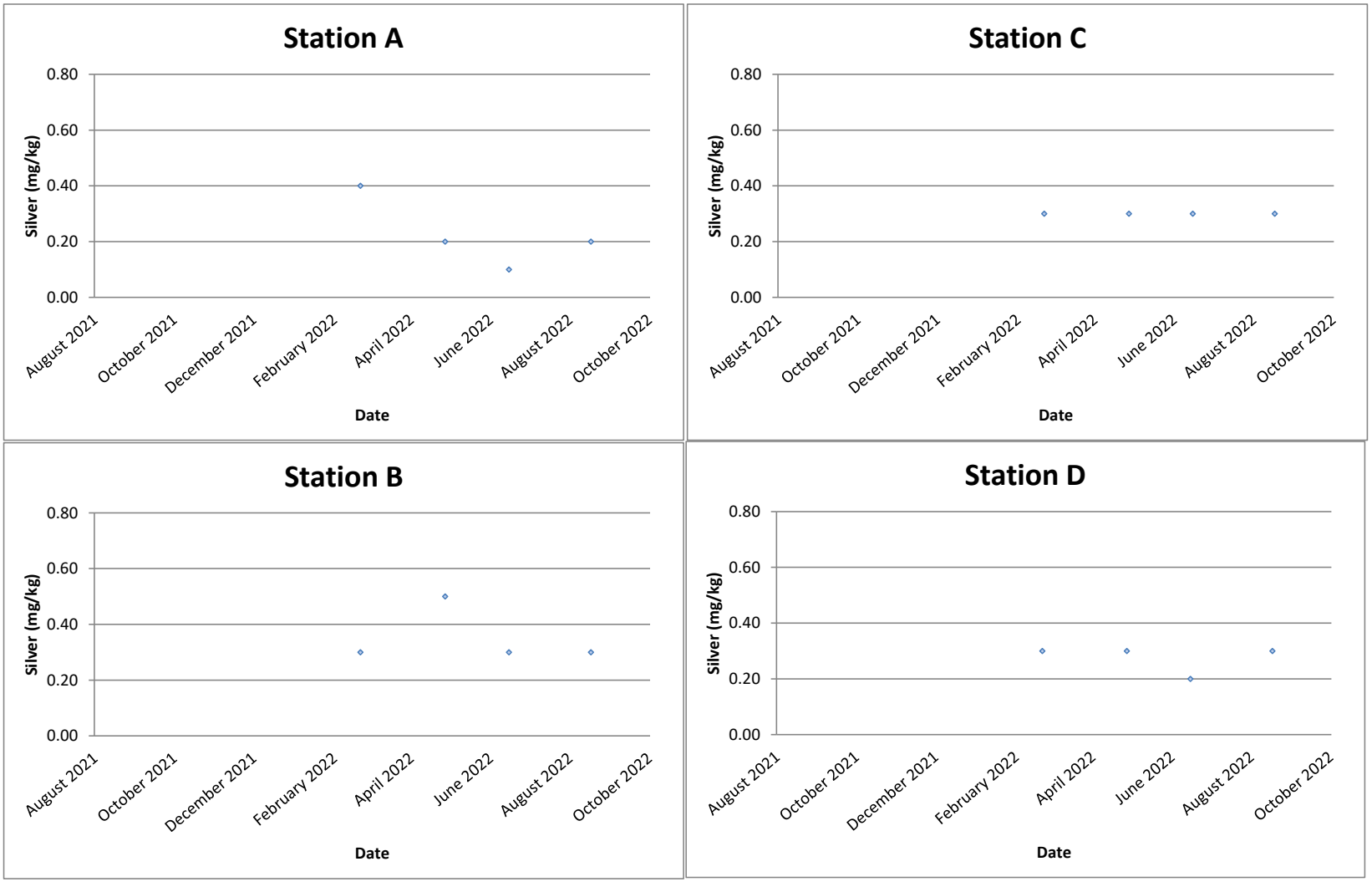

Station E
25.0
20.0
15.0
10.0
5.0
0.0
Arsenic (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

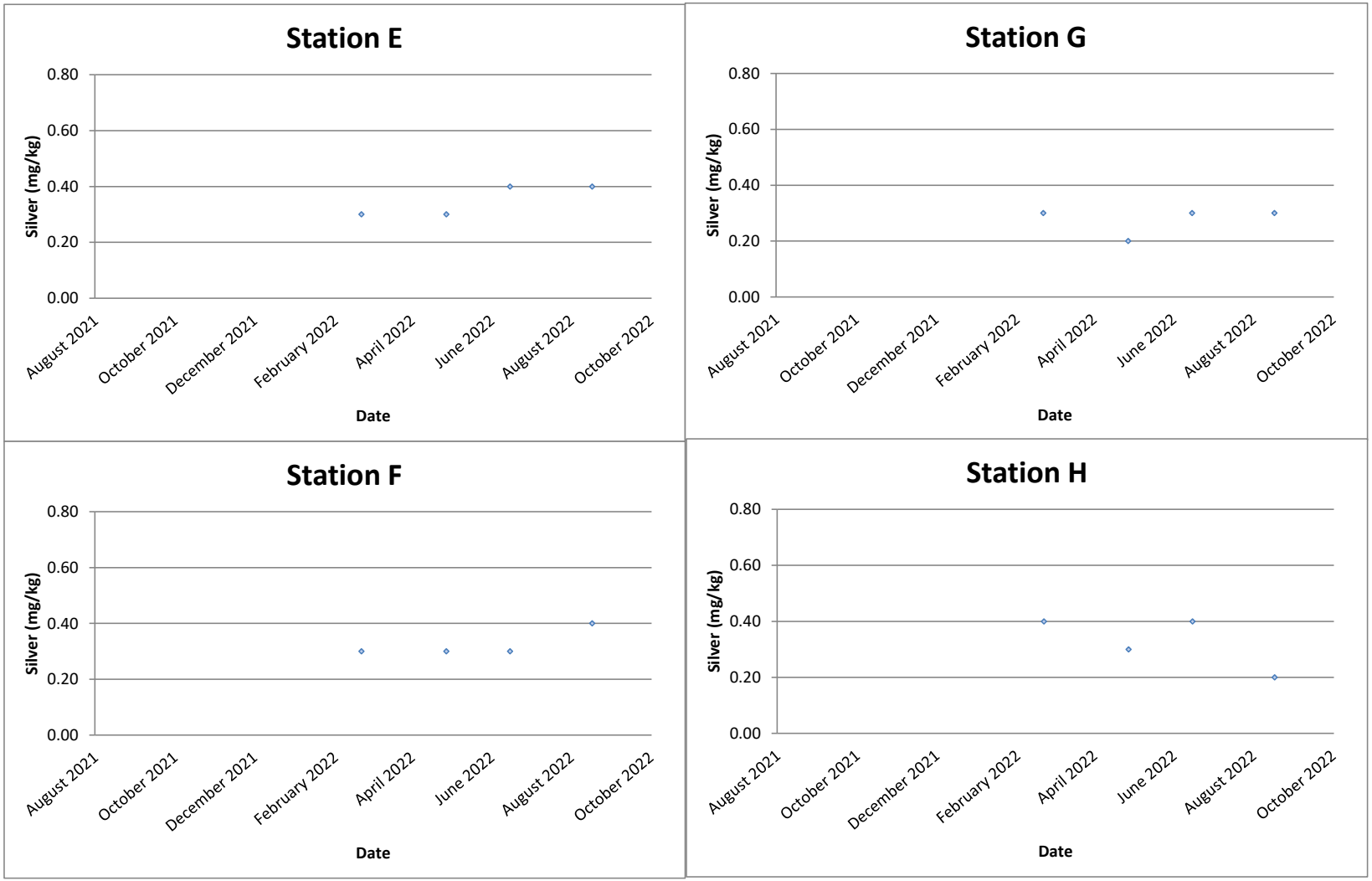

Station G
25.0
20.0
15.0
10.0
5.0
0.0
Arsenic (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station F
25.0
20.0
15.0
10.0
5.0
0.0
Arsenic (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station H
25.0
20.0
15.0
10.0
5.0
0.0
Arsenic (mg/kg)
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

Silver (mg/kg)


Station A
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station C
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station B
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station D
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date


Station E
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station G
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station F
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date
Station H
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
August 2021
October 2021
December 2021
February 2022
April 2022
June 2022
August 2022
October 2022
Date

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Appendix I

Benthic Survey Report

Benthic Survey Report (17 August 2022)

Abundance

A total of 437 benthic organisms were recorded from the eight monitoring stations during August 2022 monitoring period. Current monitoring results showed lower total monthly abundance compared to both dry (March 2004) and wet (August 2004) seasons baseline data results (**Figure 1**). Similar with previous monitoring periods, total monthly abundance of benthic organisms exhibits significant seasonal variation (F-value = 4.56; F-crit =1.53; p-value = 7.64E-11; α = 0.05).

In terms of spatial distribution, the lowest abundance of 26 ind. was recorded in the reference station, Station H, while the highest (84 ind.) was also noted in other reference station, Station B (**Figure 2**). Total macrobenthic abundances, similar with the previous monitoring periods, showed statistically significant spatial distribution (F-value = 3.55; F-crit = 2.05; P-value = 0.001; α = 0.05).

Biomass

The total wet biomass recorded in the eight monitoring stations was 42.51 g with the highest biomass recorded in the reference station, Station A (20.01 g) while the lowest biomass (0.15 g) was observed in the reference station, Station H. Relative to the June 2022 period, a general increase in biomass was observed during the current monitoring period (**Figure 3)**. Most of the current increase was attributed to the biomass increase of *Trypauchen* and *Styela* in the benthic community.

Taxonomic Composition

A total of five phyla comprising of 18 families and about 22 genera were identified. During the current monitoring period, the annelids (88.56%) dominated the macrobenthic assemblage, followed by the molluscs (8.47%) (**Figure 4**). Relative to June 2022 community assemblage, current results showed that annelids still maintained to dominate the community.

The dominance of annelids in the community assemblage was still noted as it is still wet season during the current survey.

Diversity

Benthic diversity index (H') in the impact stations ranged from 1.06 to 1.40. In the reference stations, H' values ranged from 0.92 to 1.35. Currently, reference station, Station D had the highest diversity value among the different monitoring stations, while the lowest was the reference station, Station B. In terms of evenness index (J) values, impact Station D was noted with relatively high value as compared to other monitoring stations. Moreover, current monitoring results indicated an overall increase in both diversity and evenness values from the baseline survey condition.

Summary Tables

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 are shown in the last pages of this benthic survey report.

Figures

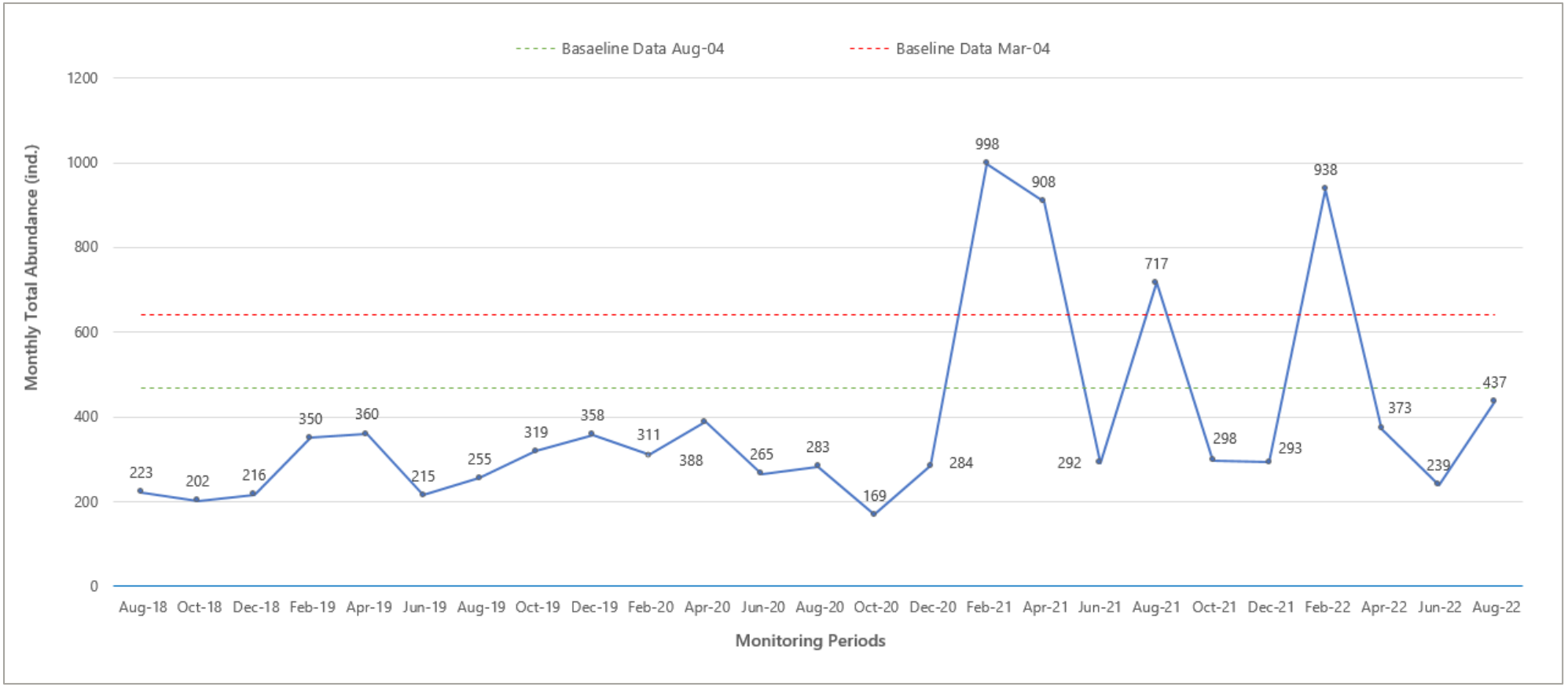


Figure 1: Monthly total abundance (ind.) of benthic organisms across monitoring periods

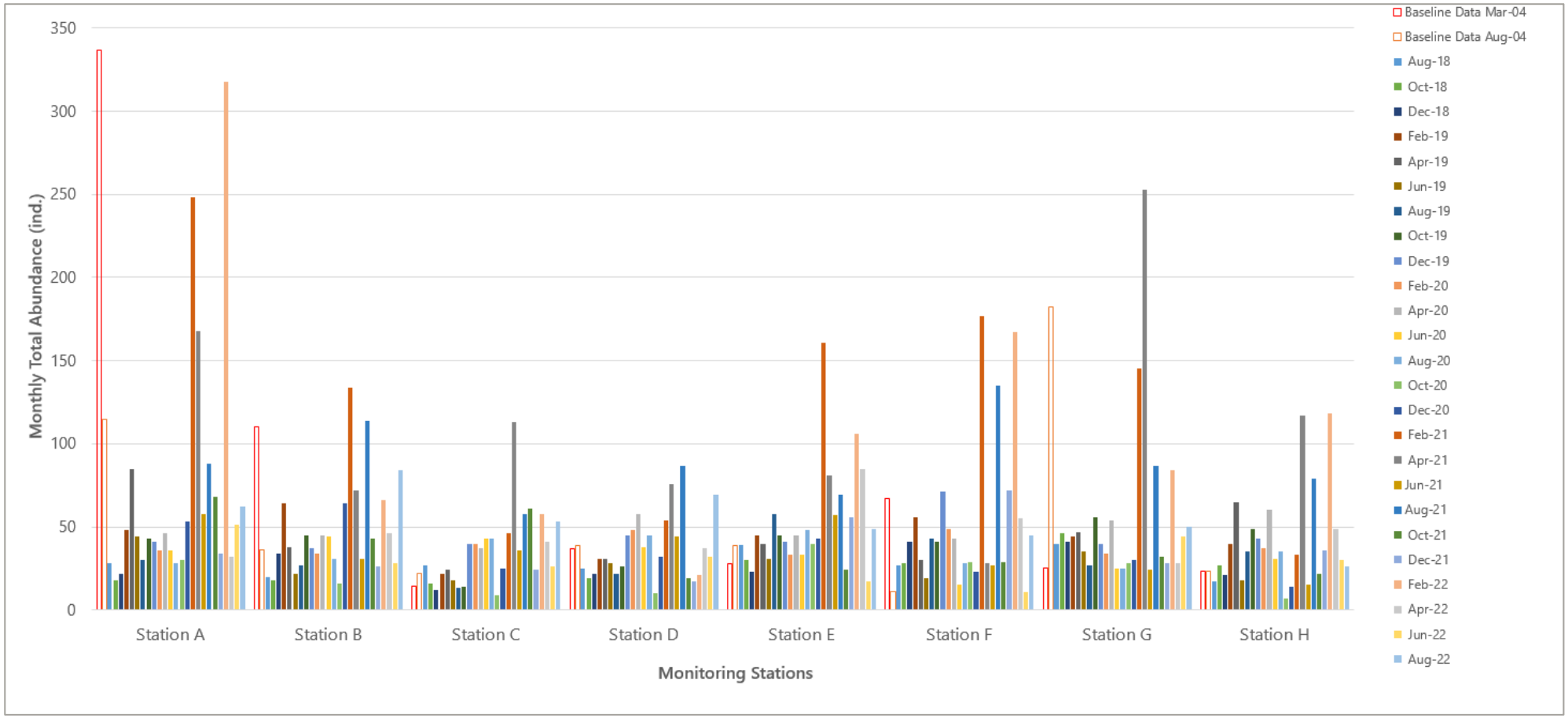


Figure 2: Monthly total abundance (ind.) of benthic organisms across monitoring stations

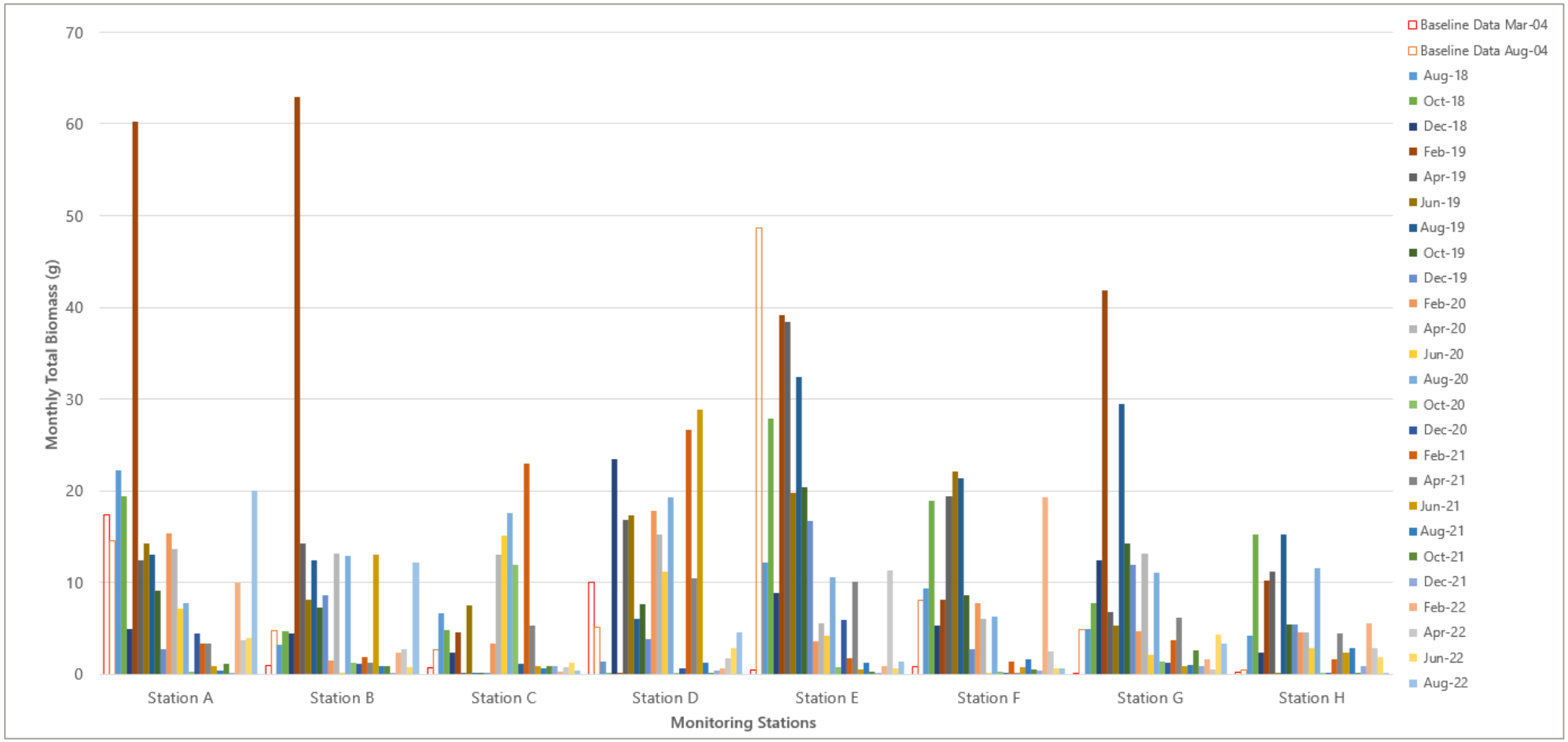


Figure 3: Monthly total biomass (g) of benthic organisms across monitoring stations

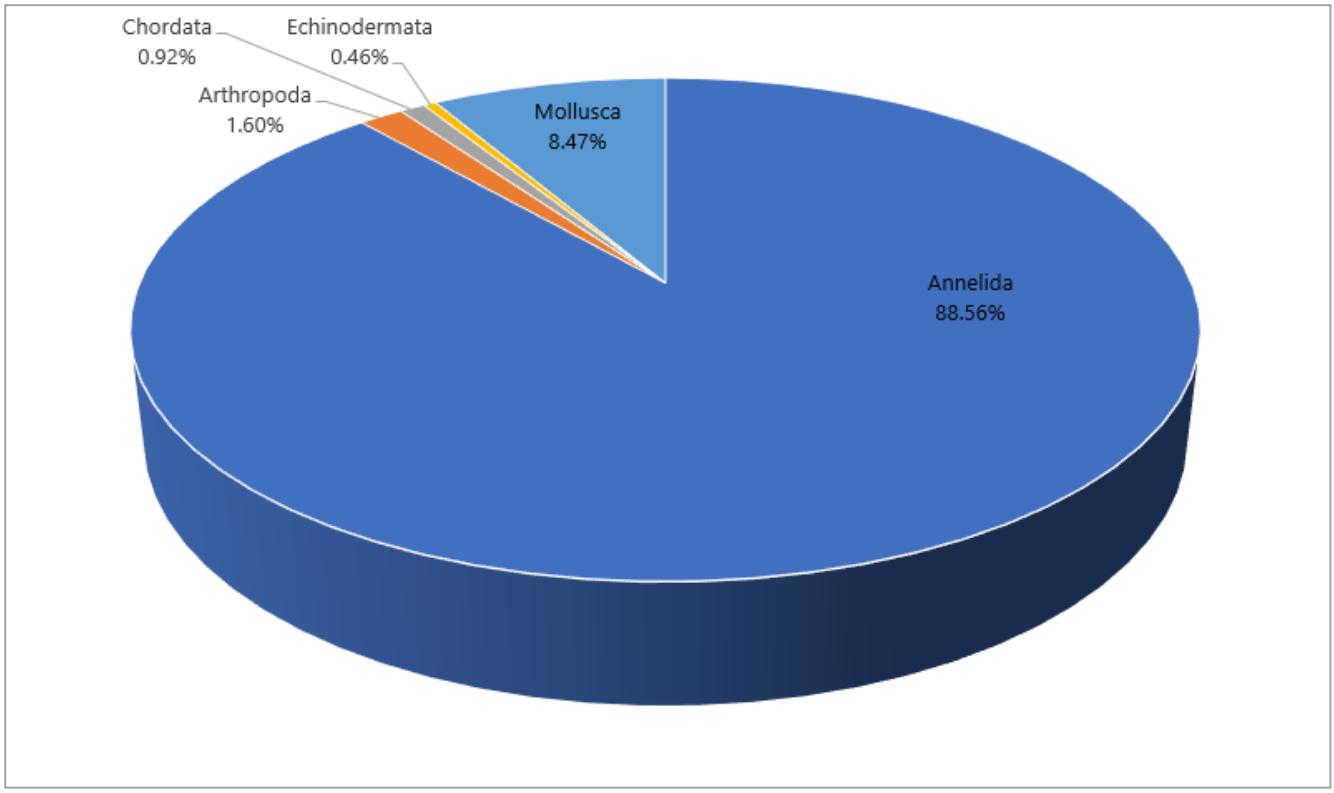


Figure 4: Percent composition of benthic organisms

Data Summaries

Table 1: Abundance (ind.) of macrobenthic communities in the eight monitoring stations, 17 August 2022

Phylum	Class	Order	Family	Genus	Monitoring Stations							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Aglaophamus*	1							
Annelida	Polychaeta	Terebellida	Terebellidae	*Amaeana*		1						
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*	46	64	38	32	30	22	34	17
Annelida	Polychaeta	Phyllodocida	Nereididae	*Ceratonereis*	1		2		1	3		
Annelida	Polychaeta	Amphinomida	Amphinomidae	*Chloeia*		1						
Annelida	Polychaeta	Phyllodocida	Phyllodocidae	*Eteone*		10						
Annelida	Polychaeta	Sedentaria	Opheliidae	*Ophelia*								3
Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*				1				
Annelida	Polychaeta	Eunicida	Lumbrineridae	*Scoletoma*			3	14	6	5	5	3
Annelida	Polychaeta	Phyllodocida	Pilargidae	*Sigambra*		2	5	12	5	12	6	2
Arthropoda	Malacostraca	Decapoda	Scalopidiidae	*Scalopidia*	2							
Arthropoda	Malacostraca	Decapoda	Penaeidae	Shrimp juvenile	2					1	1	
Arthropoda	Malacostraca	Decapoda	Pilumnidae	*Typhlocarcinus*							1	
Chordata	Ascidiacea	Stolidobranchia	Styelidae	*Styela*	2							
Chordata	Actinopterygii	Gobiiformes	Gobiidae	*Trypauchen*		1			1			
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*	2							
Mollusca	Bivalvia	Cardiida	Tellinidae	*Macoma*	2				1			
Mollusca	Bivalvia	Cardiida	Tellinidae	c.f. *Phylloda foliacea*	4		3	6	2	2		
Mollusca	Bivalvia	Cardiida	Tellinidae	c.f. *Angulus*		2		3	3		2	
Mollusca	Bivalvia	Venerida	Veneridae	*Timoclea*			1					1
Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*		3	1					
Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes (R. philippinarum)*							1	

Table 2: Biomass (g) of macrobenthic communities in the eight monitoring stations, 17 August 2022

Phylum	Class	Order	Family	Genus	Monitoring Stations							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Aglaophamus*	0.001							
Annelida	Polychaeta	Terebellida	Terebellidae	*Amaeana*		0.013						
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*	0.096	0.038	0.033	0.069	0.092	0.037	0.072	0.033
Annelida	Polychaeta	Phyllodocida	Nereididae	*Ceratonereis*	0.001		0.002		0.004	0.023		
Annelida	Polychaeta	Amphinomida	Amphinomidae	*Chloeia*		0.861						
Annelida	Polychaeta	Phyllodocida	Phyllodocidae	*Eteone*		0.022						
Annelida	Polychaeta	Sedentaria	Opheliidae	*Ophelia*								0.031
Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*				0.006				
Annelida	Polychaeta	Eunicida	Lumbrineridae	*Scoletoma*			0.005	0.103	0.133	0.035	0.038	0.04
Annelida	Polychaeta	Phyllodocida	Pilargidae	*Sigambra*		0.031	0.026	0.041	0.266	0.03	0.144	0.017
Arthropoda	Malacostraca	Decapoda	Scalopidiidae	*Scalopidia*	0.341							
Arthropoda	Malacostraca	Decapoda	Penaeidae	Shrimp juvenile	0.035					0.013	0.113	
Arthropoda	Malacostraca	Decapoda	Pilumnidae	*Typhlocarcinus*							1.415	
Chordata	Ascidiacea	Stolidobranchia	Styelidae	*Styela*	18.93							
Chordata	Actinopterygii	Gobiiformes	Gobiidae	*Trypauchen*		10.66			0.041			
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*	0.217							
Mollusca	Bivalvia	Cardiida	Tellinidae	*Macoma*	0.215				0.672			
Mollusca	Bivalvia	Cardiida	Tellinidae	c.f. *Phylloda foliacea*	0.169		0.253	4.142	0.103	0.478		
Mollusca	Bivalvia	Cardiida	Tellinidae	c.f. *Angulus*		0.084		0.097	0.102		0.044	
Mollusca	Bivalvia	Venerida	Veneridae	*Timoclea*			0.012					0.024
Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*		0.49	0.063					
Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes (R. philippinarum)*							1.45	

Table 3: Summary of Benthic Survey Data, August 2022

Stations	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	62	20.01	9	1.09	0.49
B	84	12.20	8	0.92	0.44
C*	53	0.39	7	1.06	0.54
D*	68	4.46	6	1.40	0.78
E	49	1.41	8	1.33	0.64
F	45	0.62	6	1.35	0.75
G	50	3.28	7	1.11	0.57
H	26	0.15	5	1.10	0.68

*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	0.3
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

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

Taxa	Feb-21	Apr-21	Jun-21	Aug-21	Oct-21	Dec-21	Feb-22	Apr-22	Jun-22	Aug-22
Annelida	22.75	31.72	73.63	78.52	64.43	45.05	15.57	33.78	57.32	88.56
Sipuncula	0.70	0.00	0.34	0.00	8.05	0.00	0.00	1.34	6.28	0.00
Arthropoda	70.14	55.95	10.27	9.90	11.41	36.86	78.25	26.54	5.86	1.60
Echinodermata	0.30	1.43	4.11	1.39	4.03	4.10	0.43	0.80	1.26	0.46
Cnidaria	0.00	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00
Mollusca	5.81	10.90	11.64	10.04	11.74	9.22	5.22	37.27	28.87	8.47
Chordata	0.10	0.00	0.00	0.14	0.34	0.00	0.11	0.00	0.42	0.92
Nemertea	0.00	0.00	0.00	0.00	0.00	4.10	0.43	0.27	0.00	0.00

Table 7: Taxonomic Composition (Abundance) of Benthic Survey

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

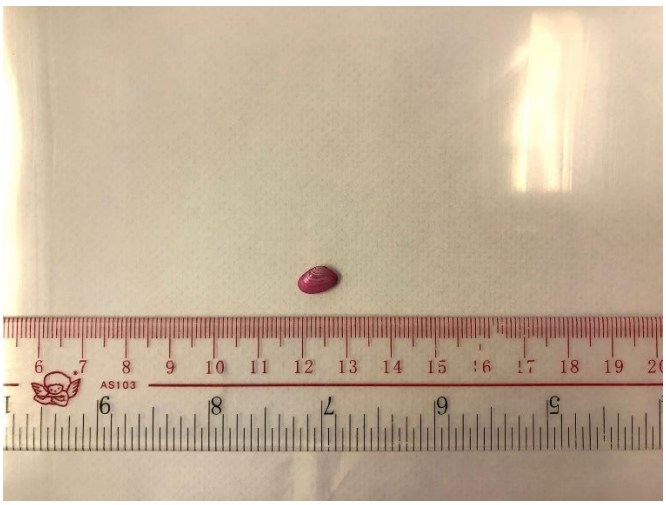
Taxa	Feb-21	Apr-21	Jun-21	Aug-21	Oct-21	Dec-21	Feb-22	Apr-22	Jun-22	Aug-22
Annelida	227	288	215	563	192	132	146	126	137	387
Sipuncula	7	0	1	0	24	0	0	5	15	0
Arthropoda	700	508	30	71	34	108	734	99	14	7
Echinodermata	3	13	12	10	12	12	4	3	3	2
Cnidaria	0	0	0	0	0	2	0	0	0	0
Mollusca	58	99	34	72	35	27	49	139	69	37
Chordata	1	0	0	1	1	0	1	0	1	4
Nemertea	2	0	0	0	0	12	4	1	0	0

Photos of Representative Taxa Identified

Trypauchen

Ilyoplax

Paphia (P. undulata)



Macoma

Ruditapes (R. philippinarum)

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Appendix J

Photos of Grab Samplers

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Report No.: 0041/17/ED/0684

Photo 1. A ponar grab sampler

Photo 2. Grab dimension 1

Photo3. Grab dimension 2

Photo4. Grab dimension 3

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Report No.: 0041/17/ED/0684

Photo 1. A modified Van Veen grab sampler

Photo 2. Grab dimension 1

Photo3. Grab dimension 2

Photo4. Grab dimension 3

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Appendix K

Annual Abundance of Chinese White Dolphins from 2001 – 2021

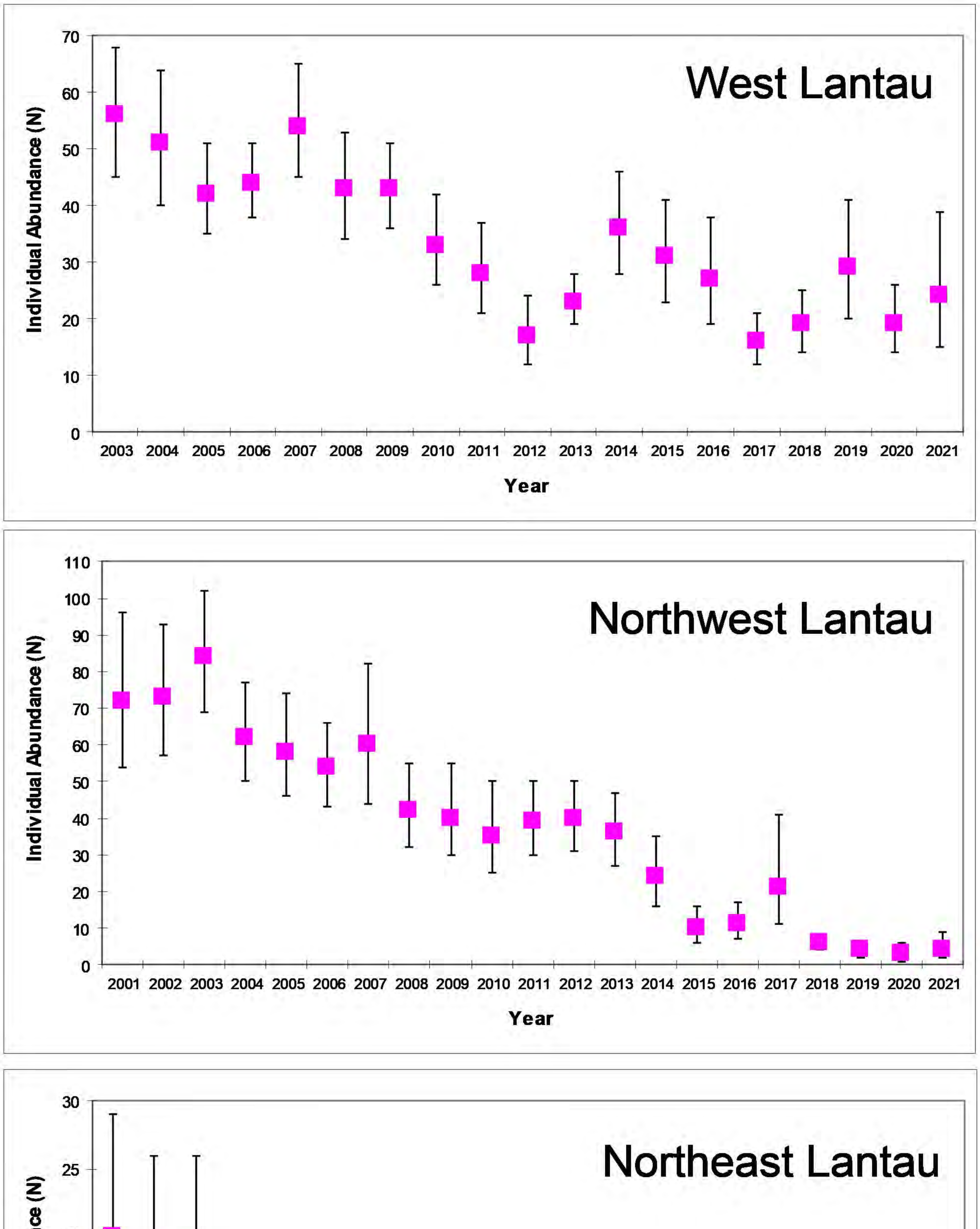

Figure 50. Temporal trends in annual abundance estimates of Chinese White Dolphins in WL, NWL & NEL from 2001-21 (error bars: 95% confidence interval of abundance estimates)

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Appendix L

Environmental Complaints Log

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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.

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Appendix M

Environmental Mitigation Implementation Schedule (EMIS)

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

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

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