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Report No.: 0041/17/ED/0642A

Monthly EM&A Report August 2021

Client : Drainage Services Department

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

Report No.: : 0041/17/ED/0642A

Prepared by: Andy K. H. Choi

Reviewed by: Cyrus C. Y. Lai

Certified by:

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

Colin K. L. Yung
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Attn: Mr. LAU Ka Kin, Marcus (E/CM16)

13 September 2021

By Post and E-mail

Dear Sir,

RE: CONTRACT No. CM 13/2016
INDEPENDENT ENVIRONMENTAL CHECKER FOR OPERATIONAL ENVIRONMENTAL MONITORING
AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT WORKS (SHWSTW)
MONTHLY ENVIRONMENTAL MONITORING AND AUDIT (EM&A) REPORT (AUGUST 2021)

Reference is made to the submission of Monthly Environmental Monitoring and Audit (EM&A) Report for August 2021 (Report No.: 0041/17/ED/0642A) from the Environmental Team (ET), Fugro Technical Services Ltd., received on 10 September 2021 via email.

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

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

Yours faithfully,

For and on behalf of
Allied Environmental Consultants Ltd.

A handwritten signature in black ink, appearing to be 'Grace M. H. Kwok', written in a cursive style.

Grace M. H. KWOK
Independent Environmental Checker

GK/jn/cl

c.c. Fugro Technical Service (ET Leader)
AECOM

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

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

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**EXECUTIVE SUMMARY**

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

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

In accordance with the EP, an approved operational EM&A Plan was submitted. According to the approved EM&A plan, air quality monitoring (i.e. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis of H₂S), in addition, water quality monitoring, sediment quality monitoring, benthic survey, Chinese White Dolphin (CWD) monitoring and waste management are the key environmental concern of the Project.

This is the Forty-ninth Monthly EM&A Report for the Project which summarizes findings of the EM&A works during the reporting period from 1 August 2021 to 31 August 2021 (the “reporting period”).

Breaches of Action and Limit Levels

Odour patrol monitoring was resumed from January 2020 and carried out on 2, 10, 16, 24 and 30 August 2021. The modified odour patrol monitoring plan including updated Event and Action Plan was approved on March 2020, and modified odour patrol monitoring was commenced from 20 March 2020. No exceedances of Action/Limit levels at Air Sensitive Receivers (ASR) and odour patrol points were recorded and no non-compliance of odour monitoring at ASR were recorded in the reporting period.

Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 9 August 2021. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

Complaint Log

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

Notifications of Summons and Successful Prosecutions

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



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 H₂S concentration (ppb) with the odour unit (OU/m³). H₂S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). 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. EIA-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 H₂S Concentration Monitoring

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

Table 2.1 Equipment used for H₂S Concentration Monitoring

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

2.2 Methodology of 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 method: 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 H₂S concentration monitoring and odour sampling at ASR, Cheung Tung Road near the Bus Depot at the west of the Siu Ho Wan Treatment Plant, were temporarily suspended from 14 May 2018. The location of ASR is shown in **Figure 1**.
- 2.4.2 9 odour patrol points is chosen to conduct the modified odour patrol for collecting more representative data and identify the particular source of odour in the site. The nine odour patrol points is as below:

Table 2.3 Odour Patrol Point

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

Note:

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



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

2.5 Monitoring Frequency and Duration

2.5.1 The durations and frequencies of H₂S 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 ₂ S concentration monitoring	15 minutes	¹ Weekly basis for 6 months during the initial operation stage
Odour patrol		⁴ Weekly basis
Odour sampling for olfactometry analysis	³ 15 minutes	² First week of the odour patrol monitoring

Remark:

- 1) In case excessive odour nuisance was detected during the odour patrol monitoring or the standard of the 5 odour units cannot be complied with during the odour panel monitoring, the odour patrol monitoring and H₂S concentration monitoring shall be extended for a period of three months to cater for the warm-up period of the functioning of the additional mitigation measures.
- 2) In case the relationship between H₂S concentration (ppb) with the odour unit (OU/m³) cannot conclude from the correlation study carried out at the first week of the odour patrol monitoring due to invalid data, additional odour sampling for olfactometry analysis shall be carried out for the correlation study.
- 3) Sufficient air samples (approximate 60L) may be collected in less than 15 minutes during odour sampling.
- 4) As advice by EPD on the odour complaint received in November 2019, odour patrol monitoring was resumed on weekly basis from 15 January 2020.

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

2.6 Event and Action Plan

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

Table 2.5 Action and Limit Levels for Air Quality Monitoring

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



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

2.7 Quality Assurance and Quality Control

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

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

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

2.8 Monitoring Results and Observations

2.8.1 As advice by EPD on the odour complaint received in November 2019, odour patrol monitoring was resumed on weekly basis. The odour patrol monitoring was carried out on 2, 10, 16, 24 and 30 August 2021. As access permission from the company of Discovery Bay Tunnel is under requisition progress, OD5 (Spur Road near Discovery Bay Tunnel Outlet) was not covered in odour patrol monitoring in the reporting period temporarily.

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

Table 2.6 Summary of Meteorological Data in Reporting Period

Date	Location	Temperature (°C)	Relative Humidity (%)	Wind Direction	Wind Speed (m/s)
2 August 2021	OD1	30.6	78	NE	0.2
	OD2			-	0.0
	OD3			-	0.0
	OD4			N	0.5
	OD6			NE	0.4
	OD7			-	0.0
	OD8			-	0.0
	OD9			NE	0.5
	10 August 2021			OD1	29.2
OD2		-	0.0		
OD3		-	0.0		
OD4		NW	0.2		
OD6		NW	0.9		
OD7		NW	1.1		
OD8		NW	0.4		
OD9		NW	0.8		
16 August 2021		OD1	27.0	84	
	OD2	N			0.2
	OD3	NW			0.3
	OD4	NW			0.3
	OD6	NW			0.5
	OD7	NW			0.5
	OD8	NW			0.3

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24 August 2021	OD9	31.5	64	NW	0.6
	OD1			SW	0.6
	OD2			SW	0.3
	OD3			-	0.0
	OD4			SW	0.7
	OD6			SW	0.6
	OD7			SW	0.9
	OD8			SW	0.4
	OD9			SW	0.7
30 August 2021	OD1	29.9	70	E	0.6
	OD2			-	0.0
	OD3			-	0.0
	OD4			-	0.0
	OD6			-	0.0
	OD7			E	0.5
	OD8			E	0.2
	OD9			E	1.2

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

Table 2.7 Summary of Air Quality Monitoring Result in Reporting Period

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

Remark:

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



- 2.8.4 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). H₂S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspension on air quality monitoring was approved by EPD's memo dated 14 May 2018. In order to recommence the monitoring, a review on air quality monitoring had been carried out to determine reasonable odour-related criteria and was submitted to EPD for approval on 24 March 2020. Comments from EPD was received on 1 April 2020 and the review is currently under revision for further submission to the EPD.
- 2.8.5 No exceedances of Action/Limit levels at ASR were recorded as no complaint was received during the reporting period.
- 2.8.6 Odour mitigation measures such as aeration, chemical dosing system, covering or enclosing the pressing and sludge thickening facilities and ventilating air to a biological treatment unit prior to stack exhaust were implemented during the reporting period.



3. WATER QUALITY MONITORING

3.1 Monitoring Station

3.1.1 In accordance with Section 5 of the EM&A Plan, water quality monitoring should be carried out at eight designated monitoring stations (two impact stations and six control stations) during the first five years of the operational phase of the Project. The monitoring stations shall be the same monitoring stations that were used for the baseline monitoring programme and have been approved by EPD. The coordinates of the monitoring stations are shown in **Table 3.1** and their locations are shown in **Figure 3**.

Table 3.1 Location of Water Quality Monitoring

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

3.2 Monitoring Parameter

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

Table 3.2 Parameters for Water Quality Monitoring

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



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

3.2.3 The tidal data will be obtained from the tide gauge installed in Ma Wan Marine Traffic Station, managed by the Hydrographic Office of Marine Department. Location of the tide gauge is shown in **Figure 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	512112
Acoustic Doppler Current Profiler	RiverSurveyor M9	5906

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

3.3.3 Water samples will be collected by water sampler and stored in high density polythene bottles and sterilized glass bottles (for bacterial analysis), packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory on the same day of collection for analysis. All sampling bottles will be pre-rinsed with the same water samples. The sampling bottles will then be taken to a HOKLAS accredited laboratory for analysis of *E. coli*, BOD₅, Suspended Solids, NH₃-N, NO₃-N, NO₂-N, Total inorganic nitrogen, Total phosphorus (soluble and particulate).

3.4 Laboratory Measurement and Analysis

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

Table 3.5 Laboratory Measurement/Analysis Methods and Reporting Limits

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



3.5 Monitoring Frequency and Duration

- 3.5.1 The water quality monitoring programme will be carried out once per two months for a period of five years of the operational phase of the Project.
- 3.5.2 Water quality monitoring for two tides at eight designated stations will be carried out for each monitoring event. For each station at each tide, duplicate samples for in-situ parameter and laboratory analysis at three designated water depths (1 m below water surface, mid-depth and 1 m above the seabed) will be taken and analyzed.
- 3.5.3 The monitoring schedule for the present and next reporting period is provided in **Appendix B**.

3.6 Quality Assurance / Quality Control

- 3.6.1 The equipment is in compliance with the requirements set out in the EM&A Plan. All in-situ monitoring instruments were calibrated by a HOKLAS-accredited laboratory or by standard solutions. Calibration of temperature, DO, salinity, pH and turbidity is conducted in three month interval.
- 3.6.2 During the measurements of DO concentration, DO saturation, salinity, turbidity, pH and temperature, duplicate readings will be taken. If the difference between the first and second readings of DO or turbidity is more than 25% of the value of the first reading, the reading was discarded and further readings will be taken.
- 3.6.3 The laboratory incorporates a variety of QA/QC monitoring programme into their testing system. Where applicable or available, the quality of the analysis will be monitored by conducting the following QC analysis:

For each batch of 20 samples:

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

3.7 Event and Action Plan

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

3.8 Monitoring Results and Observations

- 3.8.1 Water quality monitoring is carried out was 9 August 2021. A summary of the in-situ water quality monitoring results are presented in **Table 3.6** (Mid-ebb) and **Table 3.7** (Mid-flood) respectively. The complete record and graphical presentation of the in-situ water quality monitoring results is given in **Appendix F**.

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)	Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	17	S 1	5.60	28.60	8.76	24.67	5.1	0.12	74.2

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Monitoring Station	Water Depth (m)	Sampling Depth (m)	Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
		S 1	5.61	28.71	8.74	24.68	5.0	0.14	73.1
		M 8.5	5.40	28.52	8.69	24.88	6.5	0.19	90.6
		M 8.5	5.42	28.51	8.68	24.89	6.4	0.18	91.2
		B 16	5.14	27.71	8.70	26.91	10.9	0.21	92.5
		B 16	5.15	27.72	8.70	26.92	10.6	0.24	91.4
B	14	S 1	6.00	28.98	8.62	23.79	5.2	0.24	164.5
		S 1	6.01	28.92	8.61	23.78	5.1	0.29	166.8
		M 7	5.42	27.08	8.64	27.39	10.8	0.32	149.1
		M 7	5.40	27.09	8.66	27.38	10.4	0.34	144.5
		B 13	4.61	26.40	8.70	28.74	11.9	0.24	153.1
		B 13	4.57	26.41	8.71	28.76	11.4	0.22	152.6
C	12	S 1	5.54	29.97	8.71	31.93	7.9	0.11	67.4
		S 1	5.61	29.98	8.72	31.94	7.1	0.13	67.2
		M 6	4.99	28.46	8.73	25.56	8.0	0.14	51.3
		M 6	4.98	28.47	8.74	25.54	8.9	0.17	54.6
		B 11	4.37	27.81	8.68	26.15	9.3	0.18	58.7
		B 11	4.38	27.82	8.67	26.14	9.4	0.14	58.6
D	13	S 1	5.37	28.32	8.71	25.33	8.8	0.06	68.8
		S 1	5.34	28.34	8.72	25.39	8.3	0.04	68.7
		M 6.5	4.60	28.32	8.68	25.38	10.8	0.08	64.1
		M 6.5	4.53	28.31	8.64	25.39	10.4	0.04	64.3
		B 12	4.36	27.88	8.69	25.93	13.4	0.12	72.5
		B 12	4.34	27.84	8.68	25.94	13.2	0.10	72.8
E	16	S 1	6.10	26.68	8.71	24.56	7.1	0.12	340.7
		S 1	6.13	26.67	8.72	2.57	7.3	0.14	336.2
		M 8	5.20	28.17	8.70	25.36	13.8	0.07	317.1
		M 8	5.23	28.18	8.71	25.34	13.9	0.09	314.5
		B 15	4.92	27.78	8.71	25.74	15.6	0.13	350.5
		B 15	4.89	27.74	8.70	25.78	15.4	0.17	337.8
F	23	S 1	5.66	28.89	8.74	24.78	6.8	0.41	307.4
		S 1	5.63	28.84	8.72	24.75	6.4	0.43	308.1
		M 11.5	5.44	28.49	8.72	25.24	7.8	0.37	291.4
		M 11.5	5.42	28.41	8.39	25.28	7.9	0.34	292.5
		B 22	5.17	28.23	8.75	26.41	10.2	0.30	297.6
		B 22	5.14	28.24	8.76	26.49	10.3	0.31	298.9
G	22	S 1	6.35	28.86	8.77	27.37	4.9	0.23	4.1
		S 1	6.34	28.84	8.74	27.38	4.8	0.24	4.2
		M 11	6.21	28.76	8.79	28.07	4.4	0.18	351.4
		M 11	6.18	28.78	8.78	28.04	4.8	0.17	350.6
		B 21	5.81	28.16	8.73	28.53	9.3	0.21	5.6
		B 21	5.84	28.14	8.74	28.54	9.4	0.24	5.4
H	19	S 1	6.36	28.79	8.77	26.93	4.8	0.34	82.4
		S 1	6.41	28.78	8.74	26.94	4.9	0.36	83.6
		M 9.5	6.30	28.59	8.68	27.54	4.9	0.28	71.4
		M 9.5	6.32	28.58	8.69	27.55	4.9	0.27	71.9
		B 18	6.28	28.52	8.75	27.46	5.7	0.30	71.8
		B 18	6.29	28.51	8.77	27.44	5.8	0.31	90.2



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	4.58	28.12	8.31	28.04	4.7	0.31	156.4
		S 1	4.57	28.41	8.32	28.05	4.6	0.34	156.9
		M 7.5	4.41	27.64	8.19	28.34	4.4	0.14	171.2
		M 7.5	4.42	27.66	8.18	28.36	4.3	0.13	172.4
		B 14	4.09	27.23	8.23	28.71	5.2	0.34	163.4
		B 14	4.08	27.24	8.24	28.74	5.6	0.36	164.8
B	14	S 1	6.12	28.30	8.62	27.10	4.4	0.21	89.1
		S 1	6.17	28.31	8.61	27.14	4.4	0.24	89.0
		M 7	5.41	27.64	8.44	28.24	5.2	0.18	74.5
		M 7	5.42	27.63	8.41	28.26	5.4	0.17	74.4
		B 13	5.36	27.41	8.45	28.54	5.4	0.14	86.4
		B 13	5.37	27.29	8.46	28.55	5.6	0.17	86.0
C	12	S 1	5.10	28.36	8.28	27.07	6.9	0.24	94.5
		S 1	5.09	28.34	8.27	27.04	6.8	0.27	95.9
		M 6	4.92	27.54	8.18	27.84	6.4	0.11	124.5
		M 6	4.93	27.55	8.19	27.88	6.3	0.12	122.6
		B 11	4.58	27.54	8.03	28.14	7.9	0.13	103.5
		B 11	4.62	27.41	8.18	28.26	0.4	0.17	103.7
D	14	S 1	5.38	28.53	8.44	26.21	4.4	0.31	141.5
		S 1	5.37	28.54	8.41	26.22	4.5	0.36	144.2
		M 7	5.06	28.11	8.31	26.86	4.9	0.30	124.5
		M 7	5.08	28.06	8.32	26.87	4.7	0.38	124.7
		B 13	4.60	28.34	8.40	26.90	5.8	0.14	89.5
		B 13	4.61	28.37	8.38	27.11	5.6	0.18	89.7
E	14	S 1	4.48	27.44	8.32	29.80	4.7	0.13	103.4
		S 1	4.49	27.49	8.31	29.37	4.8	0.18	104.1
		M 7	4.02	27.03	8.11	29.58	5.8	0.14	87.5
		M 7	4.01	27.04	8.14	29.59	5.9	0.19	87.7
		B 13	3.84	27.01	8.03	30.02	6.4	0.21	114.5
		B 13	3.82	26.99	8.04	30.04	6.7	0.19	102.9
F	18	S 1	5.30	27.53	8.60	29.28	6.5	0.26	72.6
		S 1	5.31	27.54	8.59	29.29	6.5	0.24	71.4
		M 9	4.64	27.32	8.60	29.44	6.4	0.23	95.1
		M 9	4.63	27.42	8.60	29.51	6.3	0.24	90.2
		B 17	4.48	27.78	8.51	29.81	7.1	0.26	80.5
		B 17	4.49	27.74	8.52	29.84	7.3	0.25	84.0
G	13	S 1	5.10	28.07	8.40	26.95	5.9	0.24	81.4
		S 1	5.12	28.08	8.40	26.99	5.8	0.80	81.7
		M 6.5	4.53	28.14	8.37	27.83	6.9	0.14	92.5
		M 6.5	4.54	28.19	8.31	27.84	6.8	0.13	92.8
		B 12	4.53	28.36	8.29	28.14	7.3	0.14	86.3
		B 12	4.51	28.37	8.26	28.15	7.6	0.19	86.4
H	19	S 1	4.37	28.03	8.58	27.53	7.7	0.13	56.4
		S 1	4.36	28.04	8.59	27.54	7.8	0.17	56.9
		M 9.5	4.24	28.01	8.58	27.28	8.5	0.26	50.1
		M 9.5	4.23	28.01	8.54	27.29	8.4	0.29	50.2
		B 18	4.19	28.34	8.44	27.18	8.8	0.14	54.1
		B 18	4.16	28.39	8.49	27.14	8.9	0.17	54.5



3.8.2 Results of laboratory analysis of water quality are presented in **Table 3.8** (Mid-ebb) and **Table 3.9** (Mid-flood) respectively. The complete record and graphical presentation of laboratory analysis results are given in **Appendix 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	4.2	0.018	0.088	0.536	0.642	10	0.04	2.1
		S 1	4.5	0.021	0.089	0.528	0.639	7	0.04	1.3
		M 8.5	5.0	0.022	0.087	0.524	0.633	11	0.04	1.3
		M 8.5	5.1	0.021	0.087	0.536	0.644	8	0.03	1.4
		B 16	7.5	0.016	0.089	0.535	0.640	9	0.03	2.2
		B 16	7.4	0.020	0.086	0.534	0.640	13	0.04	2.8
B	14	S 1	5.1	0.016	0.086	0.549	0.650	5	0.04	2.3
		S 1	4.7	0.020	0.084	0.521	0.625	7	0.04	1.8
		M 7	5.5	0.028	0.084	0.528	0.640	8	0.04	1.3
		M 7	5.4	0.026	0.088	0.544	0.658	9	0.03	1.3
		B 13	6.6	0.018	0.088	0.546	0.652	10	0.03	1.8
		B 13	6.3	0.015	0.085	0.512	0.612	11	0.03	2.1
C	12	S 1	6.1	0.019	0.084	0.512	0.616	6	0.03	1.7
		S 1	6.2	0.018	0.084	0.511	0.614	8	0.04	1.5
		M 6	6.3	0.020	0.081	0.491	0.592	5	0.04	1.2
		M 6	6.4	0.018	0.084	0.499	0.601	4	0.04	1.4
		B 11	6.4	0.019	0.080	0.512	0.610	5	0.04	1.2
		B 11	6.6	0.018	0.078	0.505	0.601	4	0.03	2.0
D	13	S 1	7.1	0.023	0.079	0.494	0.596	4	0.04	1.8
		S 1	6.7	0.026	0.076	0.497	0.599	2	0.04	2.2
		M 6.5	6.4	0.017	0.080	0.490	0.588	2	0.03	<1.0
		M 6.5	6.0	0.016	0.078	0.492	0.586	1	0.03	1.1
		B 12	6.0	0.026	0.078	0.498	0.602	1	0.03	1.7
		B 12	6.2	0.025	0.086	0.485	0.596	1	0.03	1.7
E	16	S 1	7.0	0.019	0.080	0.484	0.584	8	0.03	1.3
		S 1	6.6	0.012	0.077	0.487	0.576	6	0.03	1.4
		M 8	6.7	0.017	0.073	0.478	0.569	16	0.03	1.2
		M 8	6.3	0.013	0.073	0.470	0.556	12	0.03	<1.0
		B 15	6.1	0.016	0.073	0.462	0.551	7	0.03	<1.0
		B 15	6.0	0.016	0.072	0.465	0.554	8	0.03	1.5
F	23	S 1	7.2	0.015	0.073	0.471	0.559	7	0.03	<1.0
		S 1	7.4	0.018	0.072	0.469	0.559	11	0.03	1.4
		M 11.5	7.5	0.012	0.074	0.462	0.548	7	0.03	1.4
		M 11.5	7.2	0.012	0.079	0.478	0.569	5	0.04	1.9
		B 22	8.0	0.013	0.078	0.455	0.546	6	0.03	1.6
		B 22	8.4	0.012	0.083	0.482	0.577	9	0.04	1.3
G	22	S 1	5.4	0.013	0.080	0.464	0.556	3	0.03	2.2
		S 1	5.1	0.011	0.076	0.472	0.559	4	0.04	3.3
		M 11	5.8	0.020	0.074	0.472	0.565	9	0.03	3.6
		M 11	5.7	0.020	0.074	0.470	0.565	7	0.04	2.6
		B 21	6.4	0.009	0.078	0.487	0.574	4	0.04	2.6
		B 21	6.0	0.008	0.077	0.482	0.567	6	0.04	2.9
H	19	S 1	4.9	0.007	0.078	0.477	0.562	6	0.04	2.9
		S 1	5.3	<0.005	0.078	0.483	0.561	7	0.04	2.5
		M 9.5	6.0	<0.005	0.080	0.476	0.556	1	0.04	1.9

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Monitoring Station	Water Depth (m)	Sampling Depth (m)	TSS (mg/L)	NH ₃ as N (mg/L)	NO ₂ ⁻ as N (mg/L)	NO ₃ ⁻ as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD ₅ (mg/L)
		M 9.5	5.8	<0.005	0.073	0.487	0.560	3	0.04	2.4
		B 18	6.8	0.006	0.076	0.479	0.560	4	0.04	2.5
		B 18	6.4	<0.005	0.078	0.487	0.565	3	0.04	2.0

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)	TSS (mg/L)	NH ₃ as N (mg/L)	NO ₂ ⁻ as N (mg/L)	NO ₃ ⁻ as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD ₅ (mg/L)
A	15	S 1	5.0	0.050	0.078	0.481	0.609	79	0.04	<1.0
		S 1	4.8	0.046	0.075	0.480	0.602	67	0.03	<1.0
		M 7.5	5.7	0.071	0.067	0.497	0.635	23	0.04	<1.0
		M 7.5	5.4	0.064	0.066	0.488	0.618	27	0.04	<1.0
		B 14	5.8	0.058	0.068	0.494	0.620	66	0.04	<1.0
		B 14	6.0	0.067	0.069	0.494	0.630	81	0.04	1.1
B	14	S 1	6.8	0.077	0.089	0.504	0.670	92	0.04	<1.0
		S 1	6.5	0.080	0.094	0.496	0.669	87	0.04	<1.0
		M 7	7.5	0.078	0.094	0.497	0.669	59	0.04	<1.0
		M 7	8.0	0.076	0.085	0.504	0.665	41	0.04	<1.0
		B 13	8.9	0.078	0.089	0.502	0.669	21	0.04	<1.0
		B 13	8.4	0.080	0.096	0.497	0.674	18	0.04	<1.0
C	12	S 1	7.0	0.067	0.089	0.492	0.649	13	0.04	1.0
		S 1	6.6	0.073	0.086	0.498	0.657	16	0.04	<1.0
		M 6	5.8	0.070	0.094	0.489	0.652	21	0.04	<1.0
		M 6	5.6	0.074	0.092	0.490	0.657	17	0.04	<1.0
		B 11	5.0	0.073	0.084	0.501	0.658	30	0.04	<1.0
		B 11	5.3	0.068	0.085	0.497	0.651	23	0.04	1.1
D	14	S 1	5.4	0.069	0.072	0.422	0.563	49	0.04	<1.0
		S 1	5.1	0.067	0.076	0.416	0.559	37	0.03	<1.0
		M 7	5.7	0.068	0.076	0.417	0.561	76	0.04	<1.0
		M 7	6.0	0.064	0.078	0.408	0.551	89	0.03	<1.0
		B 13	6.6	0.056	0.080	0.405	0.541	68	0.03	<1.0
		B 13	6.9	0.067	0.080	0.410	0.558	52	0.04	<1.0
E	14	S 1	4.9	0.078	0.074	0.427	0.578	18	0.04	<1.0
		S 1	4.5	0.070	0.080	0.420	0.569	21	0.04	<1.0
		M 7	5.6	0.084	0.077	0.421	0.581	19	0.04	<1.0
		M 7	5.1	0.079	0.078	0.448	0.604	25	0.03	<1.0
		B 13	5.9	0.078	0.068	0.487	0.634	12	0.03	1.0
		B 13	6.3	0.072	0.068	0.486	0.626	15	0.03	1.2
F	18	S 1	4.6	0.069	0.079	0.463	0.611	42	0.03	1.3
		S 1	4.8	0.074	0.083	0.454	0.611	33	0.03	1.2
		M 9	5.4	0.078	0.080	0.461	0.620	14	0.03	1.3
		M 9	5.8	0.077	0.086	0.456	0.618	16	0.03	1.5
		B 17	5.9	0.076	0.073	0.466	0.616	14	0.03	1.3
		B 17	6.4	0.067	0.078	0.468	0.612	13	0.03	<1.0
G	13	S 1	4.8	0.078	0.082	0.481	0.640	13	0.03	1.2
		S 1	4.4	0.074	0.080	0.450	0.603	17	0.03	1.1
		M 6.5	5.0	0.071	0.069	0.454	0.594	19	0.03	1.1
		M 6.5	5.6	0.082	0.068	0.490	0.640	16	0.03	<1.0
		B 12	6.2	0.079	0.081	0.477	0.637	31	0.03	<1.0
		B 12	6.4	0.078	0.078	0.480	0.635	39	0.03	1.2

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Monitoring Station	Water Depth (m)	Sampling Depth (m)	TSS (mg/L)	NH ₃ as N (mg/L)	NO ₂ ⁻ as N (mg/L)	NO ₃ ⁻ as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD ₅ (mg/L)	
H	19	S	1	7.4	0.062	0.082	0.484	0.628	23	0.04	1.1
		S	1	7.0	0.066	0.075	0.493	0.634	26	0.03	1.2
		M	9.5	6.2	0.065	0.084	0.486	0.635	25	0.03	1.1
		M	9.5	6.0	0.062	0.080	0.489	0.631	29	0.04	1.2
		B	18	5.8	0.068	0.073	0.497	0.638	15	0.04	<1.0
		B	18	5.5	0.068	0.079	0.484	0.631	19	0.04	<1.0

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)		
9 August 2021	31.3	29.1	27.2	85	36.3

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 $\pm 1\text{m}$ at 95% confidence level will be installed on the survey vessel to ascertain that measurement can be made accurately on the specific transects. All GPS data collected during the whole survey will be automatically and electronically logged. Powered winch will be used on-board the survey vessel to assist the monitoring. 4 fixed sieve stations will be equipped on survey vessel. Experienced supervisor will be present all throughout the monitoring activity on-board the survey vessel.

4.4 Sampling Procedure

Benthic Survey, Particle Size Distribution and TOC Analysis

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



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

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

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

4.5 Laboratory Measurement and Analysis

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

Table 4.3 Laboratory Measurement/Analysis Methods and Reporting Limits

Analysis Description	Method	Reporting limits
Particle Size Distribution	Geospec 3: 2001 Test method 8.1, 8.5 and 8.7 (Wet Sieve and Hydrometer Method)	1%
Total Organic Carbon	APHA 5310B	0.05%
pH value	APHA 4500H: B	0.1 pH unit
Ammonia as N	APHA 4500 NH3: B&G	0.5 mg/kg
Total Nitrogen	APHA 4500 Norg: D & APHA 4500 NO3: I	10 mg/kg
Total Phosphorus	APHA 4500P: B&H	10 mg/kg
Cadmium	USEPA 6020A Digestion method: 3051A	0.1 mg/kg
Chromium		0.5 mg/kg
Copper		0.2 mg/kg
Lead		0.2 mg/kg
Mercury		0.05 mg/kg
Nickel		0.2 mg/kg
Zinc		0.5 mg/kg
Arsenic		0.5 mg/kg
Silver		0.1 mg/kg

4.6 Taxonomic Identification of Benthic Organism

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

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

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

4.7 Monitoring Frequency and Duration

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

4.8 Quality Assurance / Quality Control

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

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

For each batch of 20 samples:

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

4.9 Event and Action Plan

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

4.10 Monitoring Results and Observations

4.10.1 Sediment quality monitoring and benthic survey is carried out on 9 August 2021. A summary of laboratory analysis results for the sediment quality monitoring and benthic survey are presented in **Table 4.4** and **Table 4.5** respectively. The complete record and graphical presentation of the sediment quality monitoring results is given in **Appendix H**.

Table 4.4 Summary of laboratory analysis results for sediment monitoring

Monitoring Station	pH value	NH ₃ as N (mg/L)	Total N (mg-N/kg)	Total P (mg-P/kg)	Cd (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Hg (mg/kg)	Ni (mg/kg)	Zn (mg/kg)	As (mg/kg)	Ag (mg/kg)
A	8.4	1.3	960	458	<0.10	27.8	25.1	35.1	0.10	16.2	81.8	12.8	0.20
B	8.2	7.4	1350	531	<0.10	31.6	32.8	38.0	0.10	18.9	98.0	10.9	0.28
C	8.2	10.0	1300	545	<0.10	37.8	34.8	43.1	0.10	22.9	111	11.6	0.29
D	8.2	9.1	1360	558	<0.10	33.4	35.6	43.5	0.12	20.2	106	11.5	0.32
E	8.2	19.7	1580	541	<0.10	31.7	34.0	38.8	0.11	18.8	97.1	10.4	0.32
F	8.2	50.4	1650	601	<0.10	32.5	34.9	40.2	0.11	19.9	101	11.4	0.31
G	8.3	17.0	1680	601	0.10	42.9	48.7	46.3	0.14	25.2	129	12.2	0.42
H	8.3	4.7	1200	517	0.12	40.3	73.4	45.8	0.13	22.8	124	12.2	0.50

Table 4.5 Summary of laboratory analysis results for benthic survey

Monitoring Station	Total organic carbon (%)	Grain size profile (%)				Description
		Gravel	Sand	Silt	Clay	
A	0.77	9	46	25	20	Dark grey, slightly gravelly, sandy, SILT/CLAY with shell fragments
B	1.04	0	18	49	33	Dark grey, slightly sandy, SILT/CLAY with shell fragments
C	1.10	0	6	56	38	Dark grey, slightly sandy, SILT/CLAY with shell fragments
D	1.07	0	5	56	39	Dark grey, slightly sandy, SILT/CLAY with shell fragments
E	1.31	0	5	56	39	Dark grey, slightly sandy, SILT/CLAY with shell fragments
F	1.37	0	3	59	38	Dark grey, SILT/CLAY with shell fragments
G	1.26	1	9	52	38	Dark grey, slightly sandy, SILT/CLAY with shell fragments
H	1.03	0	7	55	38	Dark grey, slightly sandy, SILT/CLAY with shell fragments

4.10.2 Rinsate blank was collected for chemical analysis. The laboratory data results are provided in **Appendix 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)		
9 August 2021	31.3	29.1	27.2	85	36.3

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 9 August 2021

Monitoring Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	88	0.37	9	0.96	0.44
B	114	0.89	10	1.56	0.68
C	58	0.68	13	1.63	0.63
D	87	1.26	14	1.92	0.73
E	69	1.27	10	1.64	0.71
F	135	1.67	16	2.34	0.84
G	87	0.99	12	1.87	0.75
H	79	2.81	14	1.68	0.64
TOTAL	717	9.94			

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

i) Abundance

A total of 717 benthic organisms was recorded from the eight monitoring stations during August 2021 monitoring period. Current monitoring results showed higher total monthly abundance compared to both dry (March 2004) and wet (August 2004) seasons baseline data; and to June 2021 results. The increase in overall abundance may be attributed to the significant increase in capitellid abundance, which may have been influenced by the concurrent increase in total organic carbon of the sediments. As shown in several studies, distribution of *Capitella* populations are restricted to organically enriched areas as a result of a physiological requirement for sediment with high levels of organic matter for their normal growth (Tutsumi, et al 1990). Same as previous monitoring periods, total monthly abundance of benthic organisms exhibits significant seasonal variation (F-value = 4.62; F-crit = 1.61; p-value = 4.27E-09; $\alpha = 0.05$).

In terms of spatial distribution, the lowest abundance of 58 ind. was recorded in the impact station, Station C, while the highest (135 ind.) was noted in the reference station, Station H. It should be noted, however, that the abundance of benthic organisms in all stations increased relative to June 2021 monitoring results. Total macrobenthic abundances, similar with the previous monitoring periods, showed statistically significant spatial distribution (F-value = 2.88; F-crit = 2.06; P-value = 0.007; $\alpha = 0.05$).

ii) Biomass

The total wet biomass recorded in the eight monitoring stations was 9.95 g with the highest biomass recorded in the reference station, Station H (2.81 g) while the lowest biomass was observed in the reference station, Station A (0.37 g). Relative to the June 2021 period, a general decrease in biomass was observed during the current monitoring period. The decrease might be attributed to the continued dominance of smaller benthic organisms, i.e. capitellids.



iii) Taxonomic Composition

A total of five phyla comprising of 22 families and about 25 genera were identified. During the current monitoring period, the annelids (78.52%) dominated the macrobenthic assemblage followed by the molluscs (10.04%), and arthropods (9.90%) while the group with the lowest dominance were the chordates (0.14%). The decrease in arthropod abundance in June 2021 brought about a consequent change in community assemblage, a shift from arthropod-dominated community in April 2021 to annelid-dominated in June 2021 and August 2021. This shift in community assemblage with shift in season was also observed during the previous monitoring years.

iv) Diversity

Benthic diversity index (H') in the impact stations ranged from 1.63 to 1.92. In the reference stations, H' values ranged from 0.96 to 2.34. Impact stations remained to have relatively higher diversity values compared to reference stations. In terms of evenness index (J) values, current monitoring results showed that both the impact Stations C and D were able to maintain high evenness index. Current monitoring results indicated an overall increase in diversity and evenness values from the baseline survey condition.

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

5. CHINESE WHITE DOLPHIN MONITORING

5.1 Data Interpretation

- 5.1.1 In accordance with Section 4.1 of the EM&A Plan, relevant information on the distribution and abundance of CWDs in Hong Kong should be obtained from the Agriculture, Fisheries and Conservation Department (AFCD), and be reviewed on a bimonthly basis during the operational phase of the Project for a period of 5 years.
- 5.1.2 The latest AFCD's report dated 27 August 2021, "*Monitoring of Marine Mammals in Hong Kong Waters (2020-21)*", 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 1 km off Northeast Lantau (NEL), as such our scope shall focus solely on CWDs findings within this area. The increased amount of sewage discharged from Siu Ho Wan Sewage Treatment Works was identified as a potential issue of concern for CWDs. Referring to the latest AFCD's report, "*Monitoring of Marine Mammals in Hong Kong Waters (2020-21)*", 174 line-transect vessel surveys with a total survey effort of 6,018km was conducted amongst 10 survey areas in Hong Kong from April 2020 to March 2021; 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 total survey effort of 3549.4km were conducted at NEL, NWL and WL, bringing the total survey effort to 5,132.2km for these three areas.
- 5.1.3 During the 12-month monitoring period – from the AFCD monitoring surveys, 174 groups of 520 CWDs were sighted from April 2020 to March 2021. Also, additional sighting contributed from various HZMB-related EM&A surveys with a total of 243 groups of 758 dolphins were sighted altogether during the same 12-month periods. Among them, 211 were sighted during on-effort line-transect surveys, while the remaining numbers were made during off-effort search.
- 5.1.4 During the 2020-2021 monitoring period, majority of dolphin sightings were made at WL (152 sightings), NWL (27) and SWL (63), while one lone sighting was made at the SEL survey area. Despite the large survey effort conducted in the NEL and DB survey area, no sightings were present from the combined data sets. As in previous monitored periods, no dolphin was sighting in LM, PT or NP survey areas, where porpoises appear on regular basis. Details of the CWDs abundances in WL, NWL and NEL mentioned above are presented in **Appendix K**.
- 5.1.5 The impact of increased effluent discharged from Siu Ho Wan outfall on CWDs is not mentioned in this report. In the North Lantau region, a dramatic decline in dolphin habitat use pattern has been well documented in recent years, with greatly diminished dolphin occurrences since 2013. Presently, there is a complete absence of dolphins in NEL waters, as no dolphin was sighted there in the recent years during AFCD surveys. Furthermore, there is a continuous decline in dolphin movement across SWL and WL in recent years, other than a slight rebound in 2019-20 monitoring period before dipping lower in 2020-2021.
- 5.1.6 The continuing absence of dolphins in the central and eastern portions of the Lantau region since 2015 is of great concern, as there have been no signs of recovery in dolphin habitat use. There has been no sign of recovery even after the marine works associated with the HZMB construction was completed in 2016, and the majority of the massive reclamation

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works associated with the third runway expansion was near completion in 2020. With near-absence of dolphins in several in several once-important dolphin habitats, continuous acoustic monitoring of these areas would be vital for detecting any signs of dolphin recovery even at very low levels.

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6. ADVICE ON IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

6.1 Implementation Status

- 6.1.1 Although no site inspection is prescribed during the operation of the Plant in accordance with the approved EM&A Plan, SHWSTW is reminded to fully and properly implement the mitigation measures specified in the EP and EIA Report. Mitigation measures such as aeration, chemical dosing system, covering or enclosing the pressing and sludge thickening facilities and ventilating air to a biological treatment prior to stack exhaust was implemented in the reporting period. A summary of mitigation measures implementation schedule is provided in **Appendix 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 2, 10, 16, 24 and 30 August 2021. No exceedances of Action/Limit levels at ASRs were recorded.
- 8.1.2 Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 9 August 2021. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.



9. SUMMARY OF ENVIRONMENTAL COMPLAINTS

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

Table 9.1 Cumulative Statistics on Complaints

Environmental Parameters	Cumulative No. Brought Forward	No. of Complaints This Month	Cumulative Project-to-Date
Air	0	0	1
Noise	0	0	0
Water	0	0	0
Waste	0	0	0
Others	0	0	0
Total	0	0	0

Table 9.2 Cumulative Statistics on Notification of Summons and Successful Prosecutions

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

9.1.2 The cumulative complaint log and summaries of complaints are presented in **Appendix 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 H₂S concentration (ppb) with the odour unit (OU/m³). H₂S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). 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, 10, 16, 24 and 30 August 2021. The modified odour patrol monitoring plan including updated Event and Action Plan was approved on March 2020, and odour patrol monitoring was commenced from 20 March 2020. No exceedances of Action/Limit levels at Air Sensitive Receivers (ASR) and odour patrol points were recorded and no non-compliance of odour monitoring at odour patrol points were recorded in the reporting period.
- 11.1.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). H₂S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). 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 18 June 2021 to collect data for future reference in accordance with Section 5.5 and 6.5 of the Operational EM&A Plan. The details of methodology and results collected of the monitoring were presented in Section 3 and Section 4. Heavy marine traffic and construction works from expansion of Hong Kong International Airport were observed nearby the Project site and its vicinity and may affect the water and sediment quality The above conditions may affect monitoring results.
- 11.1.4 The latest AFCD's report dated 27 August 2021, "*Monitoring of Marine Mammals in Hong Kong Waters (2020-21)*" 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 (2021-22) is uploaded to AFCD's webpage.
- 11.1.5 SHWSTW is reminded to fully *comply with EP conditions. All environmental mitigation measures* and recommendations in the EP, EIA Report and approved waste management plan shall be fully and properly implemented.
- 11.1.6 No complaint (written or verbal), inspection notice, notification of summons or prosecution was received in relation to environmental impact during the report period.

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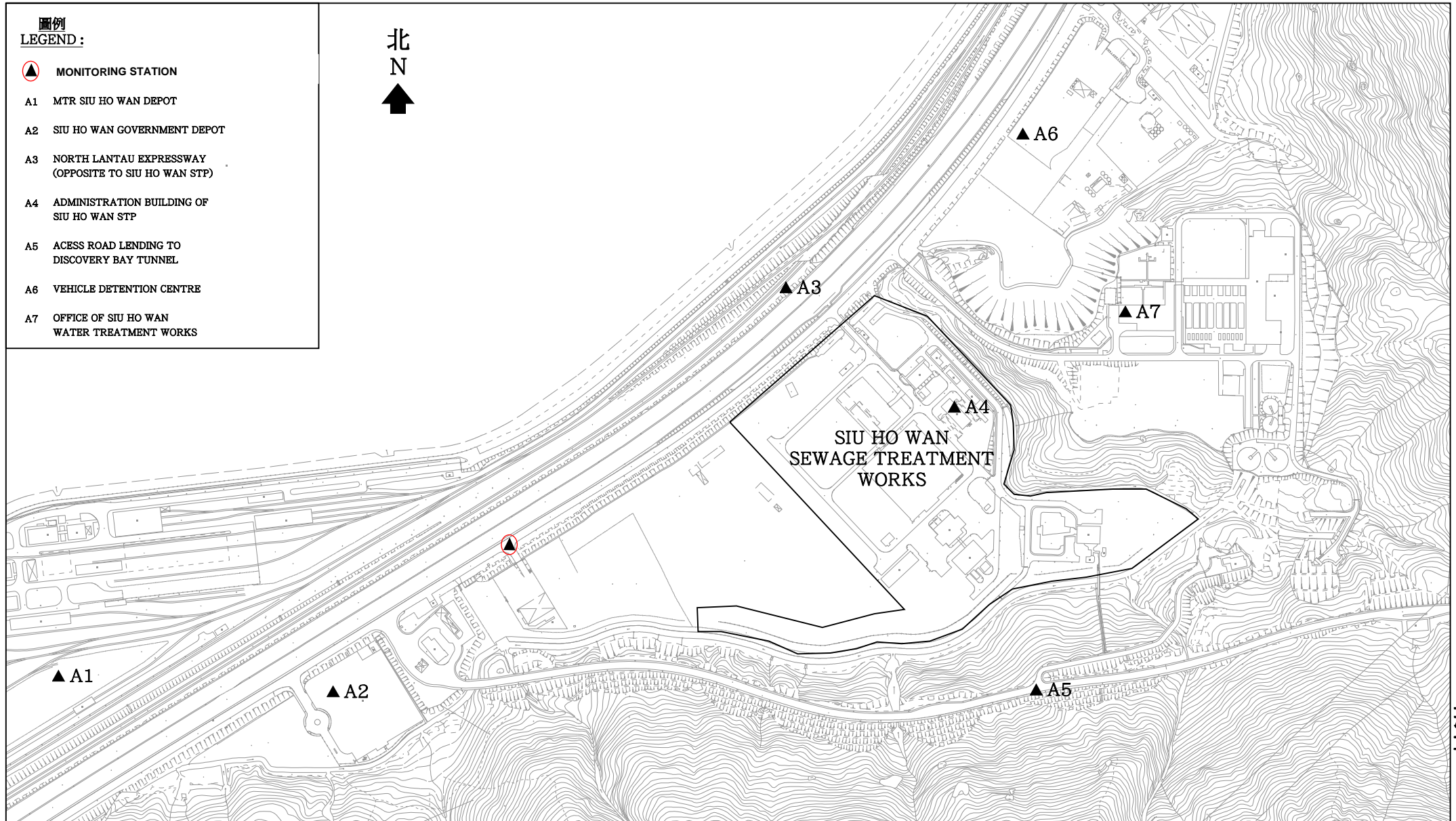
Report No.: 0041/17/ED/0642A

Figure 1

Monitoring Stations of Air Sensitive Receivers

圖例
LEGEND :

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



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.

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DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE
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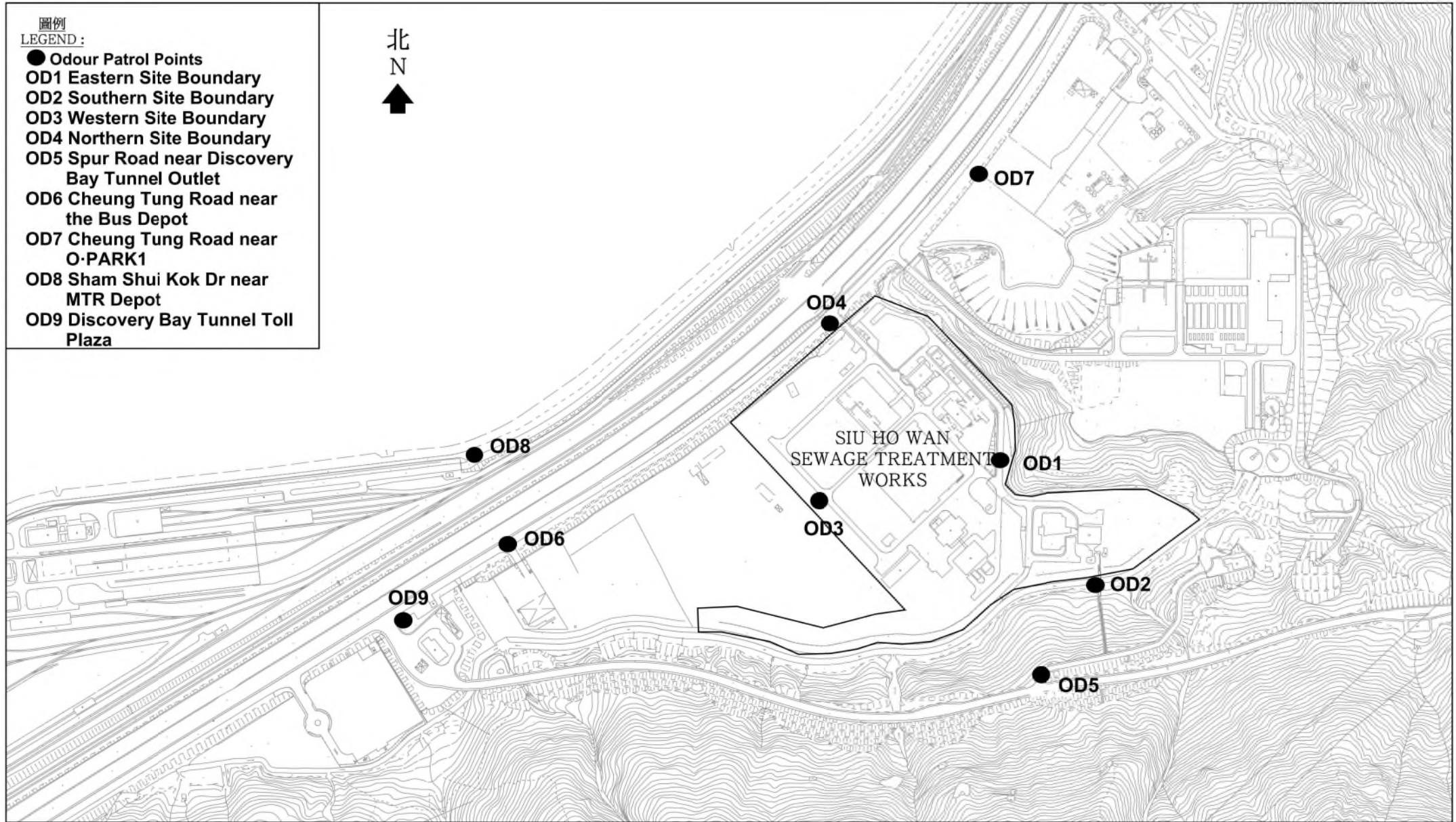
Report No.: 0041/17/ED/0642A

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



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Figure 3

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



816000E

818000E

820000E

822000E

822000N

大小磨刀
BROTHERS

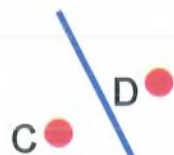
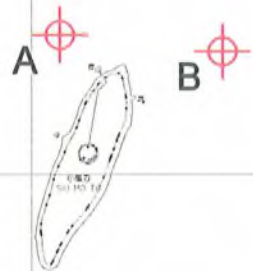
820000N

CO-ORDINATES OF CONTROL STATIONS :

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

CO-ORDINATES OF IMPACT STATIONS :

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

圖例
LEGEND :

- IMPACT STATION
- ⊕ CONTROL STATION
- SUBMARINE OUTFALL

圖則名稱 drawing title

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

繪畫 drawn

H.K. LAI

日期 date
06-02-2004

核對 checked

C.K. LAM

日期 date
04-03-2004

批核 approved

S.K. WONG

日期 date
04-03-2004

部門 office

顧問工程管理部

CONSULTANTS MANAGEMENT DIVISION

圖則編號 drawing no.

DCM/2004/002

比例 scale

N.T.S.

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Figure 4

Location of the Tide Gauge

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Location of the Tide Gauge

Source: Google Maps

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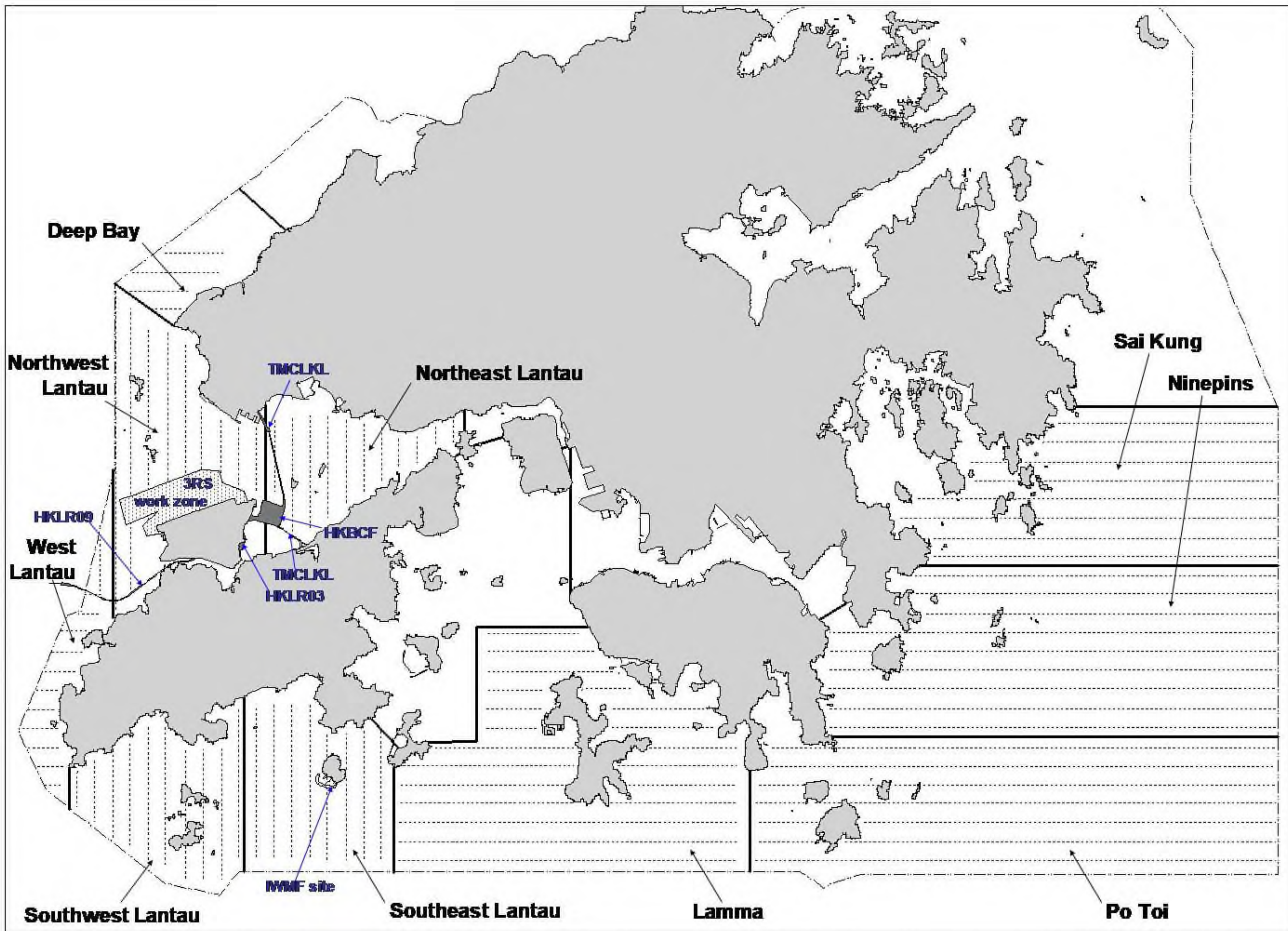
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Figure 5

Location of Survey Areas of Chinese White Dolphins



Ten Line-Transect Survey Areas within the Study Area for the 2020-21 Monitoring Study

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Appendix A Project Organization Chart

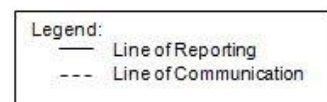
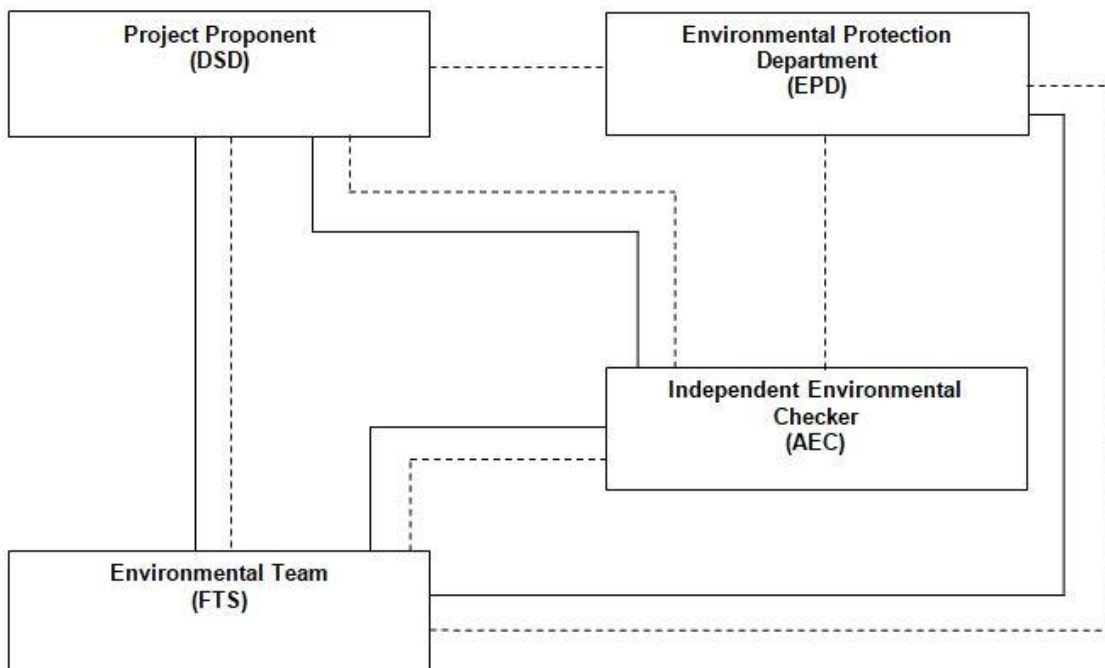
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Appendix B

Monitoring Schedule for Present and Next Reporting Period

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Report No.: 0041/17/ED/0642A

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	9 Water Quality Monitoring and Sediment Quality Monitoring and Benthic Survey Mid-Flood (06:13) Mid-Ebb (13:18)	10 Odour Patrol	11	12	13	14
15	16 Odour Patrol	17	18	19	20	21
22	23	24 Odour Patrol	25	26	27	28
29	30 Odour Patrol	31				

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Report No.: 0041/17/ED/0642A

Monitoring Schedule for the Next Reporting Period

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

Remarks

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

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Appendix C

Event and Action Plan for Air Quality Monitoring

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EVENT	ACTION		
	ET	IEC	*Operator
Action Level			
One complaint received for specific odour event / Odour intensity of 2 or above is measured from odour patrol	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 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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	<p>Operator on the required remedial actions;</p> <ol style="list-style-type: none">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; and13. 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

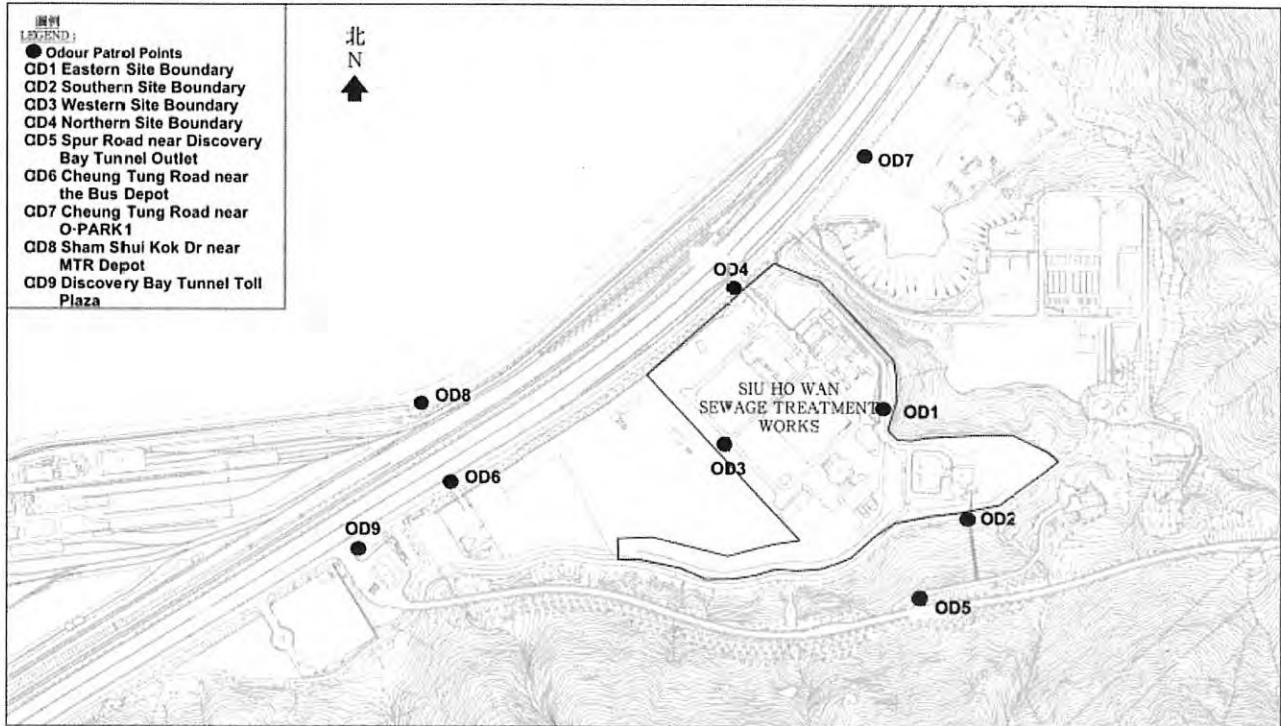
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Contract No. CM 14/2016 Environmental Team for Operational Environmental Monitoring and Audit for Siu Ho Wan Sewage Treatment Works Odour Patrol Record Sheet



Date	2/8/2021	Weather	Cloudy	Temperature	30.6°C	Humidity	78%
ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics	
OD1	Eastern Site Boundary	10:34	NE	0.2	0	/	
OD2	Southern Site Boundary	10:36	/	0	0	/	
OD3	Western Site Boundary	10:32	/	0	0	/	
OD4	Northern Site Boundary	10:29	N	0.5	0	/	
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/	
OD6	Cheung Tung Road near the Bus Depot	10:19	NE	0.4	0	/	
OD7	Cheung Tung Road near O-PARK1	10:22	/	0	0	/	
OD8	Sham Shui Kok Dr near MTR Depot	10:14	/	0	0	/	
OD9	Discovery Bay Tunnel Toll Plaza	10:17	NE	0.5	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 Hin
Name: Ip Tsz Hin
Date: 2/8/2021

Checked by: [Signature]
Name: CHOE KAM HO
Date: 2 August 2021

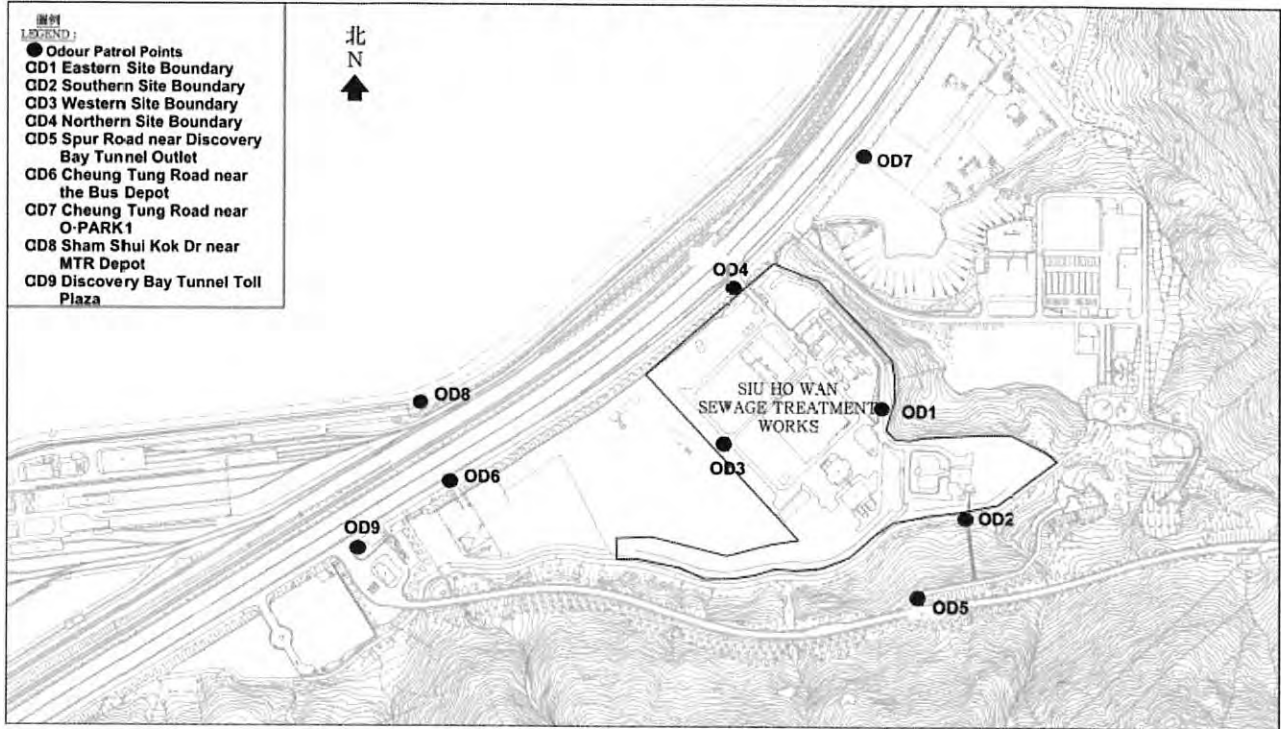
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Contract No. CM 14/2016 Environmental Team for Operational Environmental Monitoring and Audit for Siu Ho Wan Sewage Treatment Works Odour Patrol Record Sheet



Date	10/8/2021	Weather	cloudy	Temperature	29.2°C	Humidity	90%
ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics	
OD1	Eastern Site Boundary	1046	NW	0.4	0	/	
OD2	Southern Site Boundary	1048	/	.0	0	/	
OD3	Western Site Boundary	1043	/	.0	0	/	
OD4	Northern Site Boundary	1041	NW	0.2	0	/	
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/	
OD6	Cheung Tung Road near the Bus Depot	1032	NW	0.9	0	/	
OD7	Cheung Tung Road near O-PARK1	1034	NW	1.1	0	/	
OD8	Sham Shui Kok Dr near MTR Depot	1026	NW	0.4	0	/	
OD9	Discovery Bay Tunnel Toll Plaza	1030	NW	0.8	0	/	

***Classification Criteria:**

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

Recorded by: Woo
Name: Woo Ka Ho
Date: 10/8/2021

Checked by: [Signature]
Name: Choe Kam Ho
Date: 10 August 2021

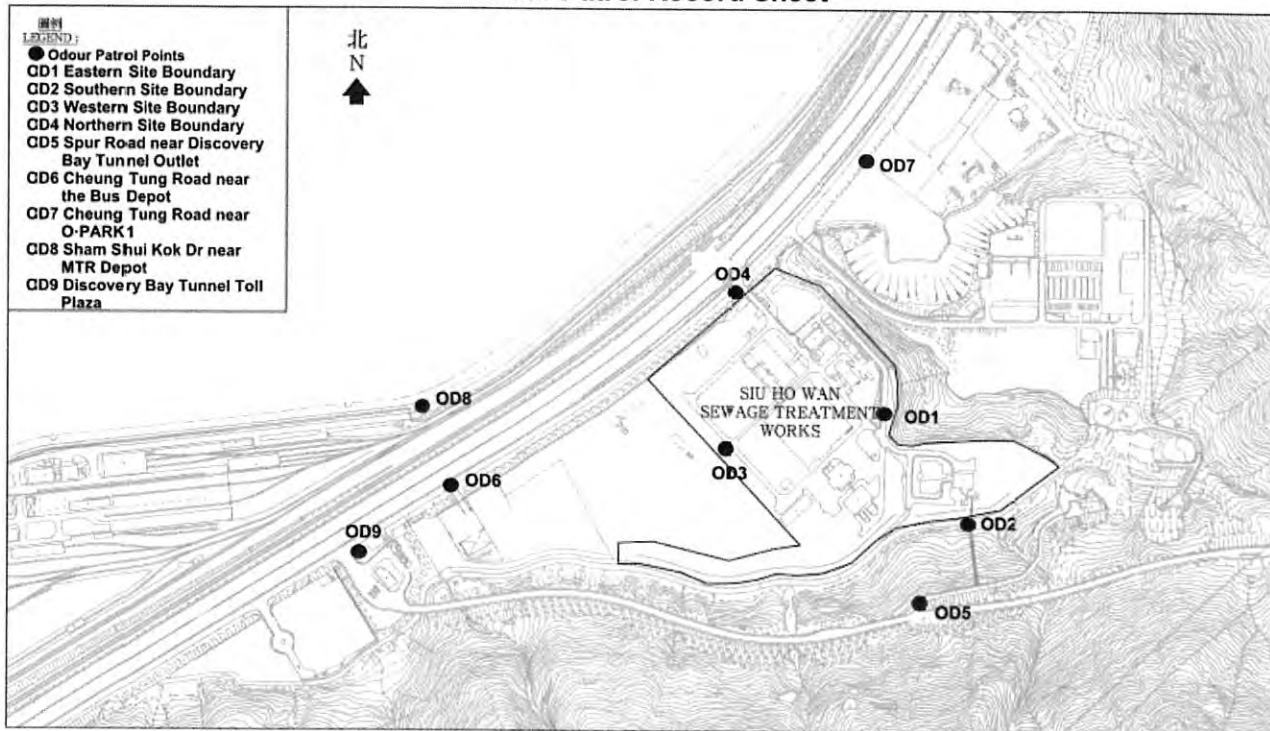
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Contract No. CM 14/2016 Environmental Team for Operational Environmental Monitoring and Audit for Siu Ho Wan Sewage Treatment Works Odour Patrol Record Sheet



Date	10-8-21		Weather	Cloudy	Temperature	29.2°C		Humidity	90%	
ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics				
OD1	Eastern Site Boundary	10:46	NW	0.4	0	/				
OD2	Southern Site Boundary	10:48	/	0	0	/				
OD3	Western Site Boundary	10:43	/	0	0	/				
OD4	Northern Site Boundary	10:41	NW	0.2	0	/				
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/				
OD6	Cheung Tung Road near the Bus Depot	10:32	NW	0.9	0	/				
OD7	Cheung Tung Road near O-PARK1	10:34	NW	1.1	0	/				
OD8	Sham Shui Kok Dr near MTR Depot	10:26	NW	0.4	0	/				
OD9	Discovery Bay Tunnel Toll Plaza	10:30	NW	0.8	0	/				

***Classification Criteria:**

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

Recorded by: zle
Name: Cheng Wang Ching
Date: 10-8-21

Checked by: AS
Name: CHOI KAM HO
Date: 10 August 2021

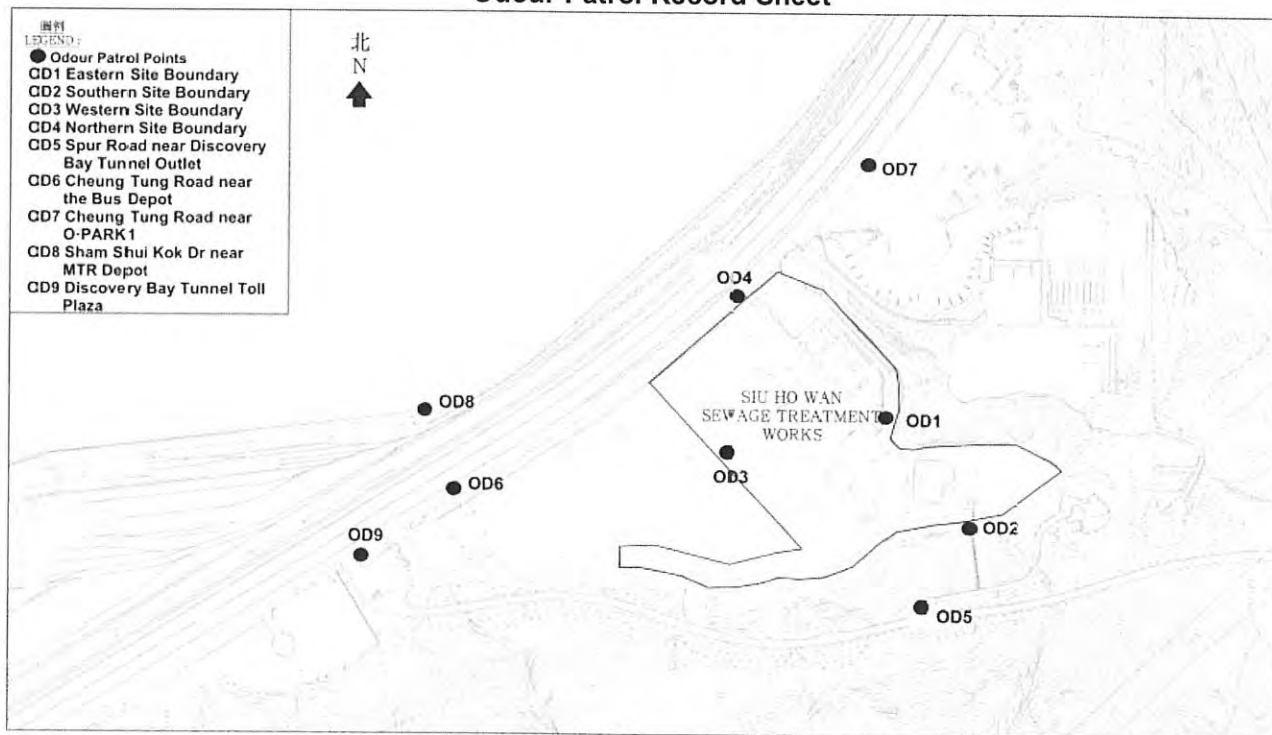
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Email : mcl@fugro.com.hk



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	16-8-21	Weather	Cloudy	Temperature	27°C	Humidity	84%
ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics	
OD1	Eastern Site Boundary	11:16	N	0.2	0	/	
OD2	Southern Site Boundary	11:18	N	0.2	0	/	
OD3	Western Site Boundary	11:14	NW	0.3	0	/	
OD4	Northern Site Boundary	11:12	NW	0.2	0	/	
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/	
OD6	Cheung Tung Road near the Bus Depot	10:27	NW	0.5	0	/	
OD7	Cheung Tung Road near O-PARK1	10:30	NW	0.5	0	/	
OD8	Sham Shui Kok Dr near MTR Depot	10:20	NW	0.3	0	/	
OD9	Discovery Bay Tunnel Toll Plaza	10:25	NW	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: zh
Name: Cheung Wang Ching
Date: 16-8-21

Checked by: AS
Name: CHOI KAM HO
Date: 16 August 2021

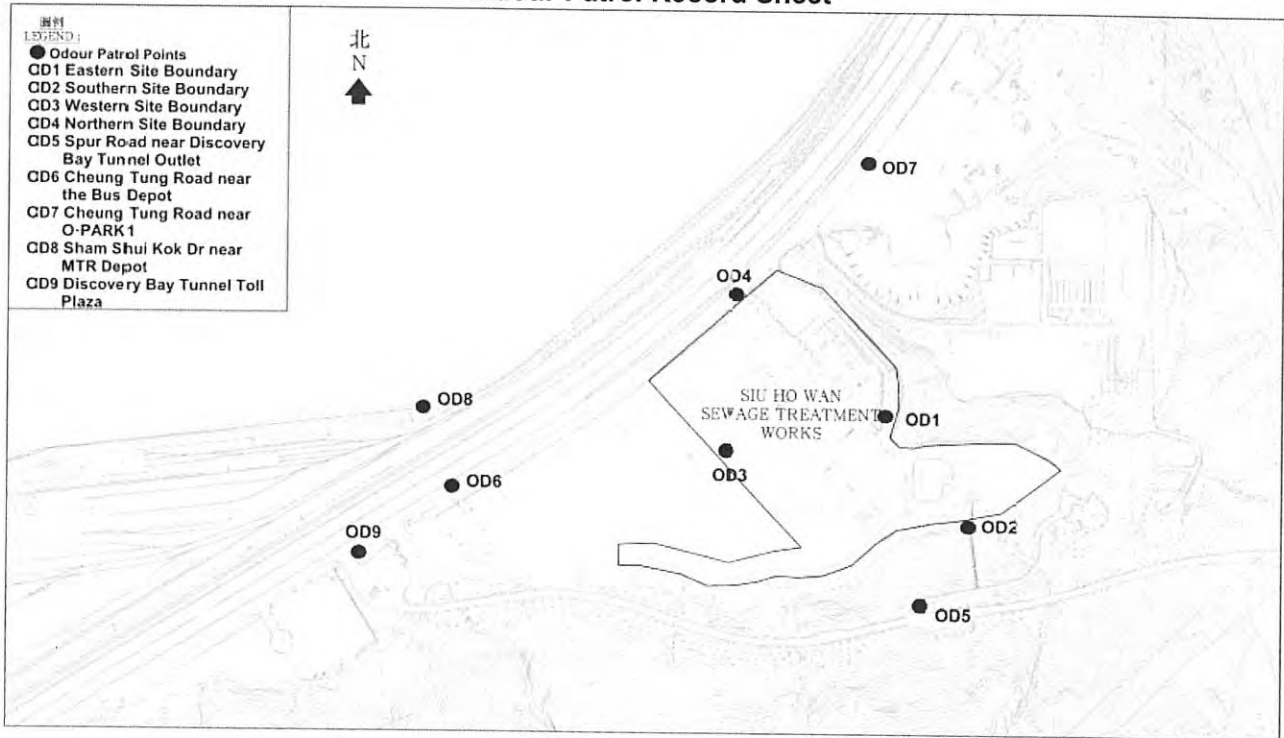
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Contract No. CM 14/2016 Environmental Team for Operational Environmental Monitoring and Audit for Siu Ho Wan Sewage Treatment Works Odour Patrol Record Sheet



Date	16/8/21		Weather	Cloudy		Temperature	27°C		Humidity	84%	
ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics					
OD1	Eastern Site Boundary	11:16	N	0.2	0	/					
OD2	Southern Site Boundary	11:18	N	0.2	0	/					
OD3	Western Site Boundary	11:14	NW	0.3	0	/					
OD4	Northern Site Boundary	11:12	NW	0.3	0	/					
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/					
OD6	Cheung Tung Road near the Bus Depot	10:27	NW	0.5	0	/					
OD7	Cheung Tung Road near O-PARK1	10:30	NW	0.5	0	/					
OD8	Sham Shui Kok Dr near MTR Depot	10:20	NW	0.3	0	/					
OD9	Discovery Bay Tunnel Toll Plaza	10:25	NW	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: [Signature]
Name: KAM KIL TUNG
Date: 16/8/21

Checked by: [Signature]
Name: CHOI KAM HO
Date: 16 August 2021

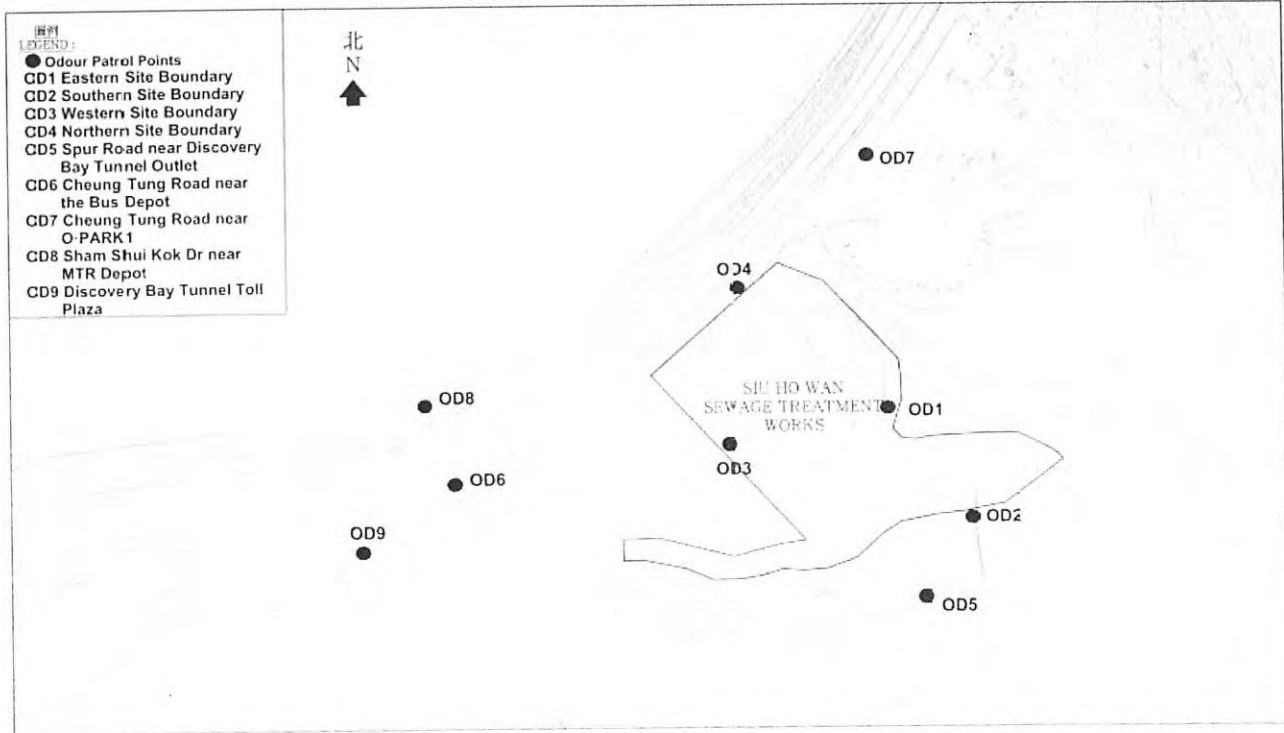
FUGRO TECHNICAL SERVICES LIMITED

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

Tel : (852)-24508238
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



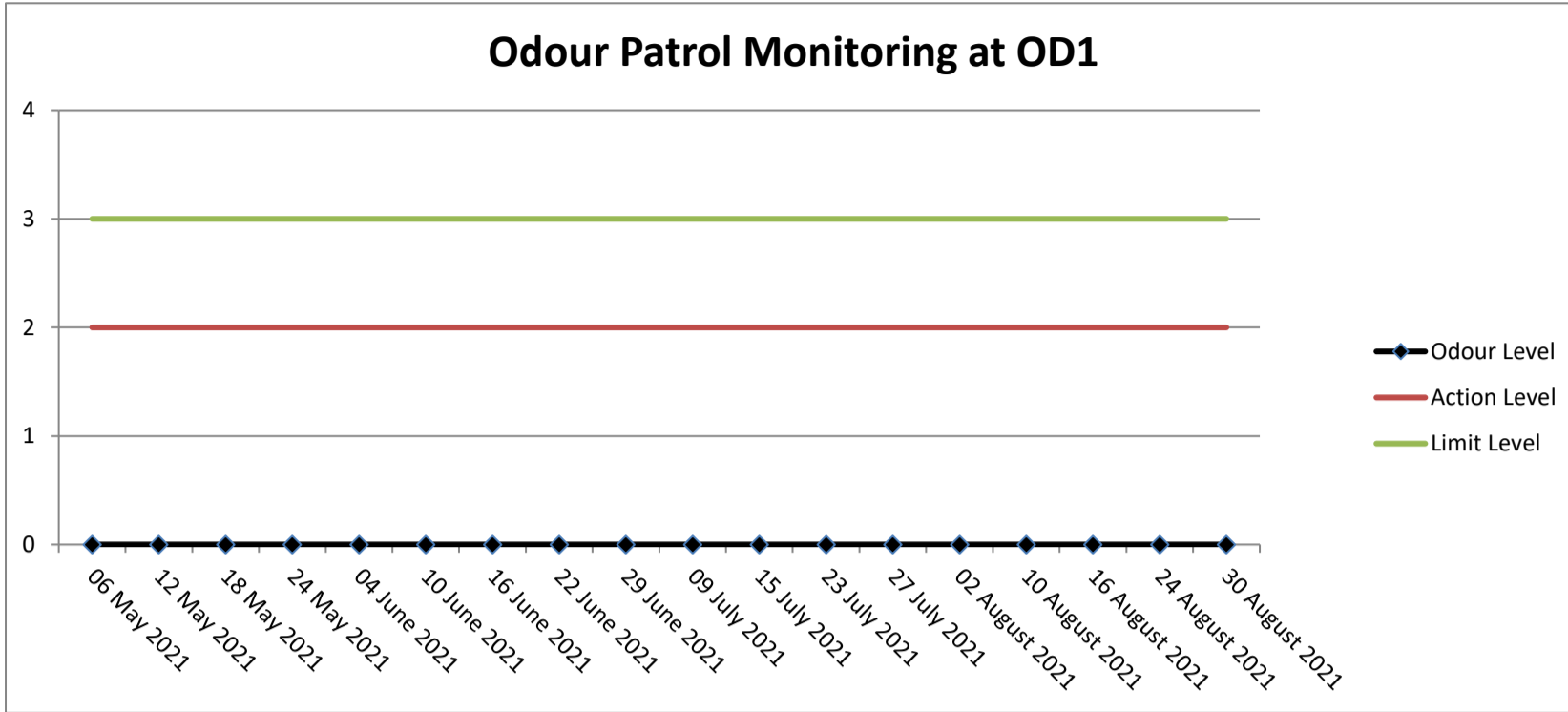
Date	30-8-21	Weather	Fine	Temperature	29.9°C	Humidity	70%
ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics	
OD1	Eastern Site Boundary	10:55	E	0.6	0	/	
OD2	Southern Site Boundary	10:57	/	0	1	EFFLUENT	
OD3	Western Site Boundary	10:53	/	0	0	/	
OD4	Northern Site Boundary	10:50	/	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	10:41	E	0.5	0	/	
OD8	Sham Shui Kok Dr near MTR Depot	10:32	E	0.2	0	/	
OD9	Discovery Bay Tunnel Toll Plaza	10:37	E	1.2	0	/	

***Classification Criteria:**

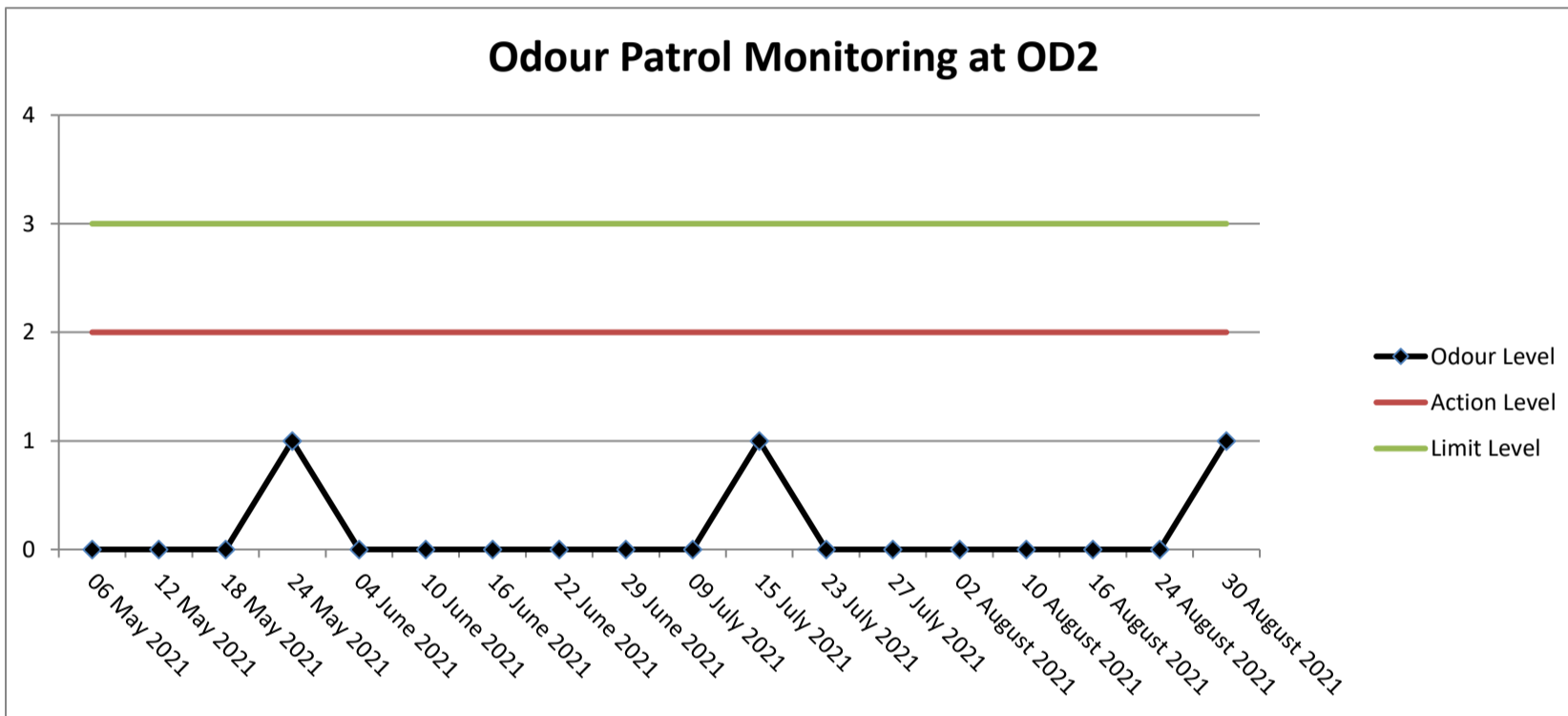
- Not detected : No odour perceived or an odour so weak that it cannot be easily characterised or described
- Slight : Slight identifiable odour, and slight chance to have odour nuisance
- Moderate : Moderate identifiable odour, and moderate chance to have odour nuisance
- Strong : Strong identifiable,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

Recorded by: [Signature]
Name: Chan Sun Tung
Date: 30-8-21

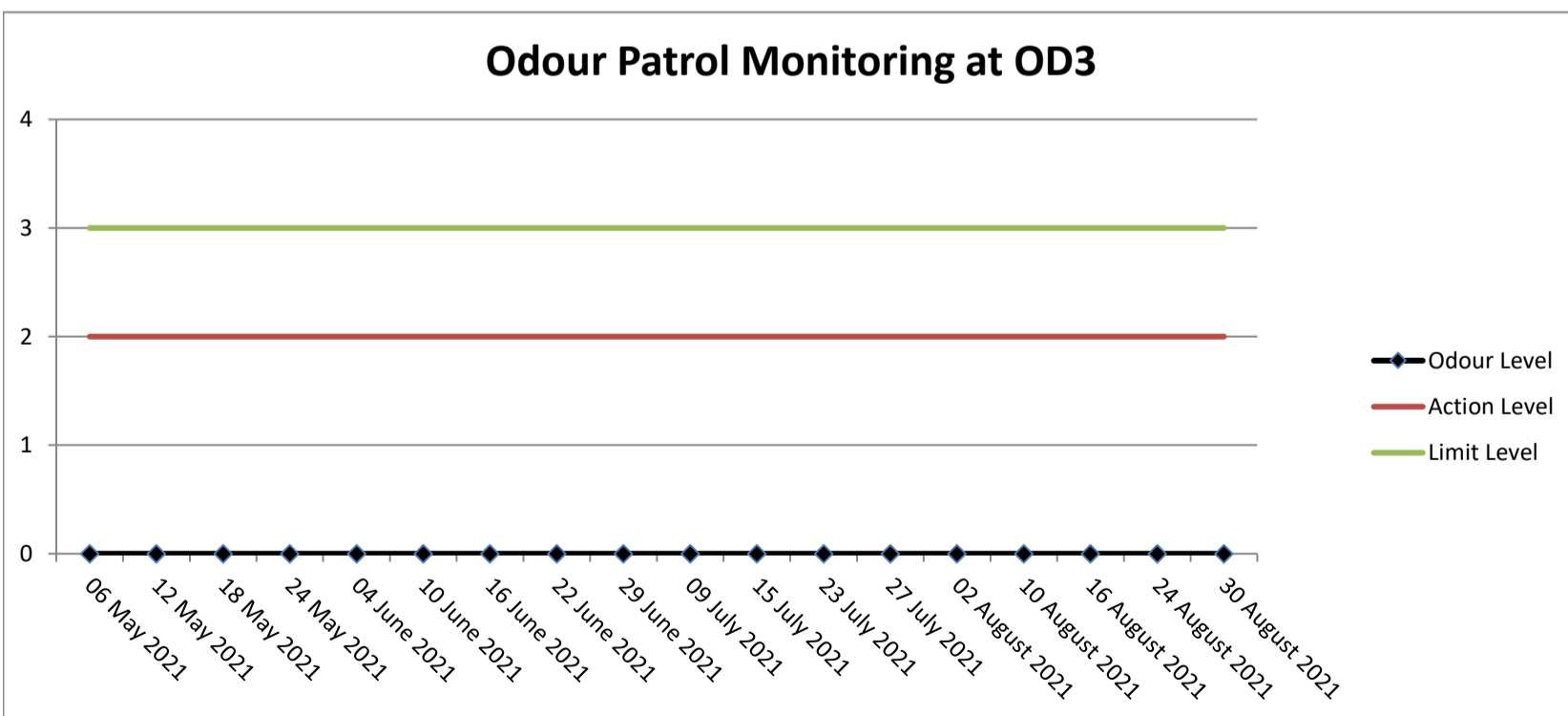
Checked by: [Signature]
Name: CHOI KAM HO
Date: 30 August 2021



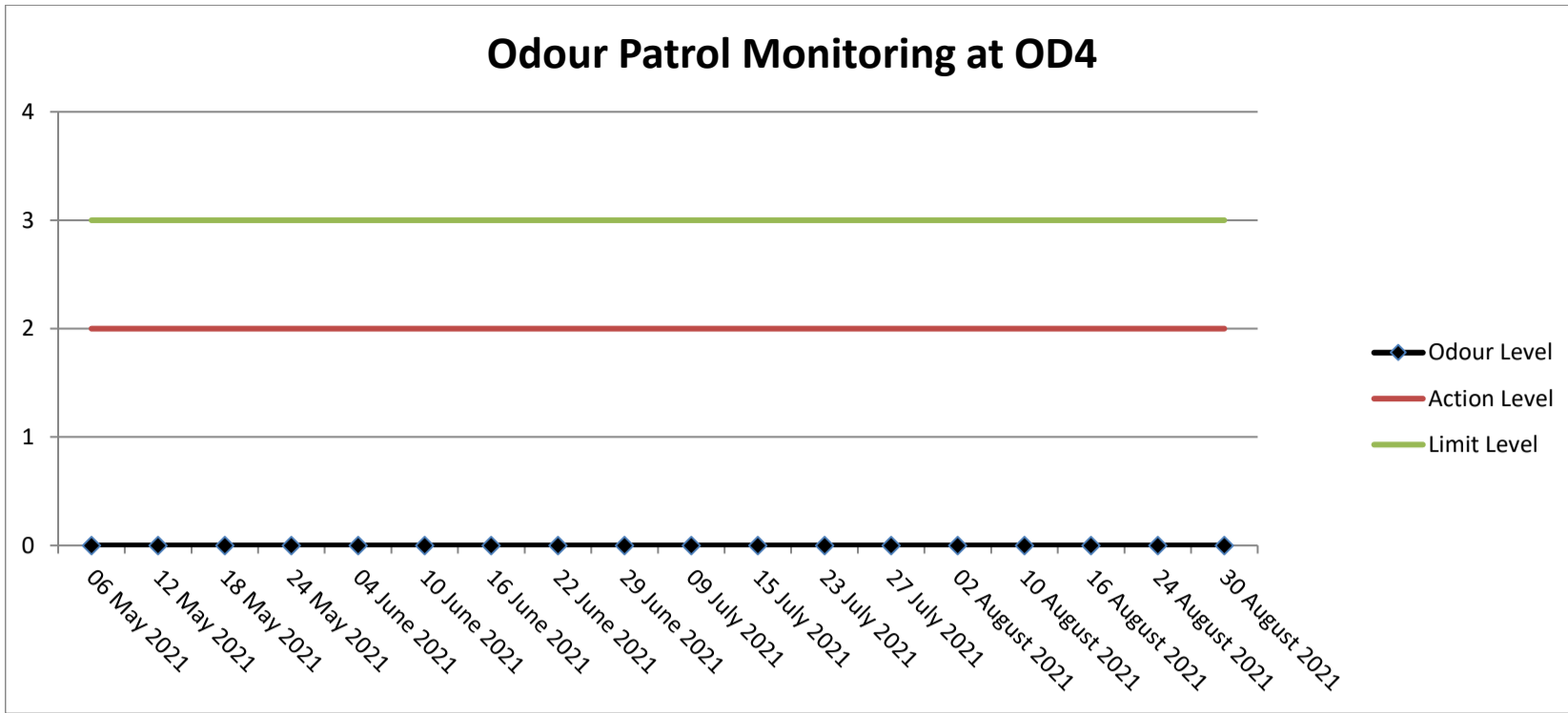
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



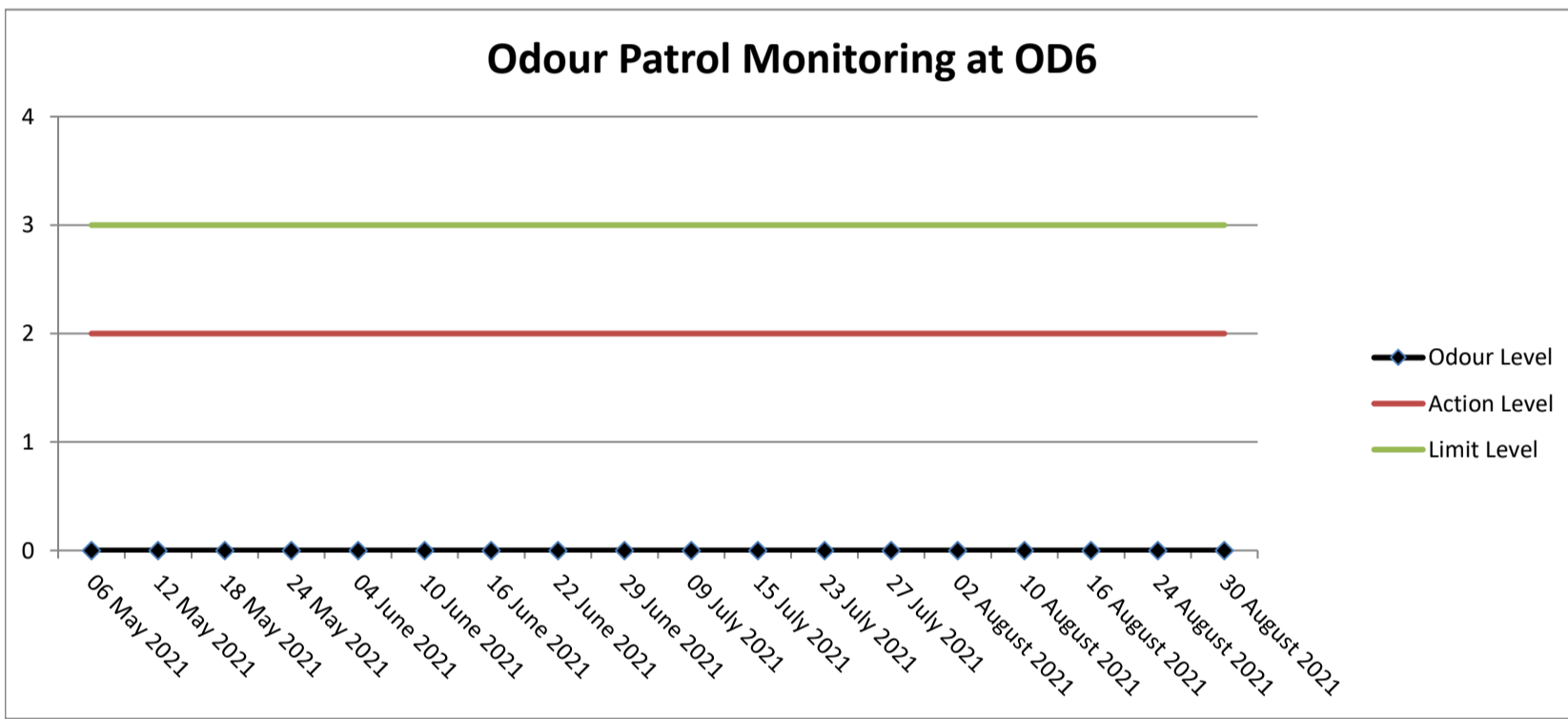
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



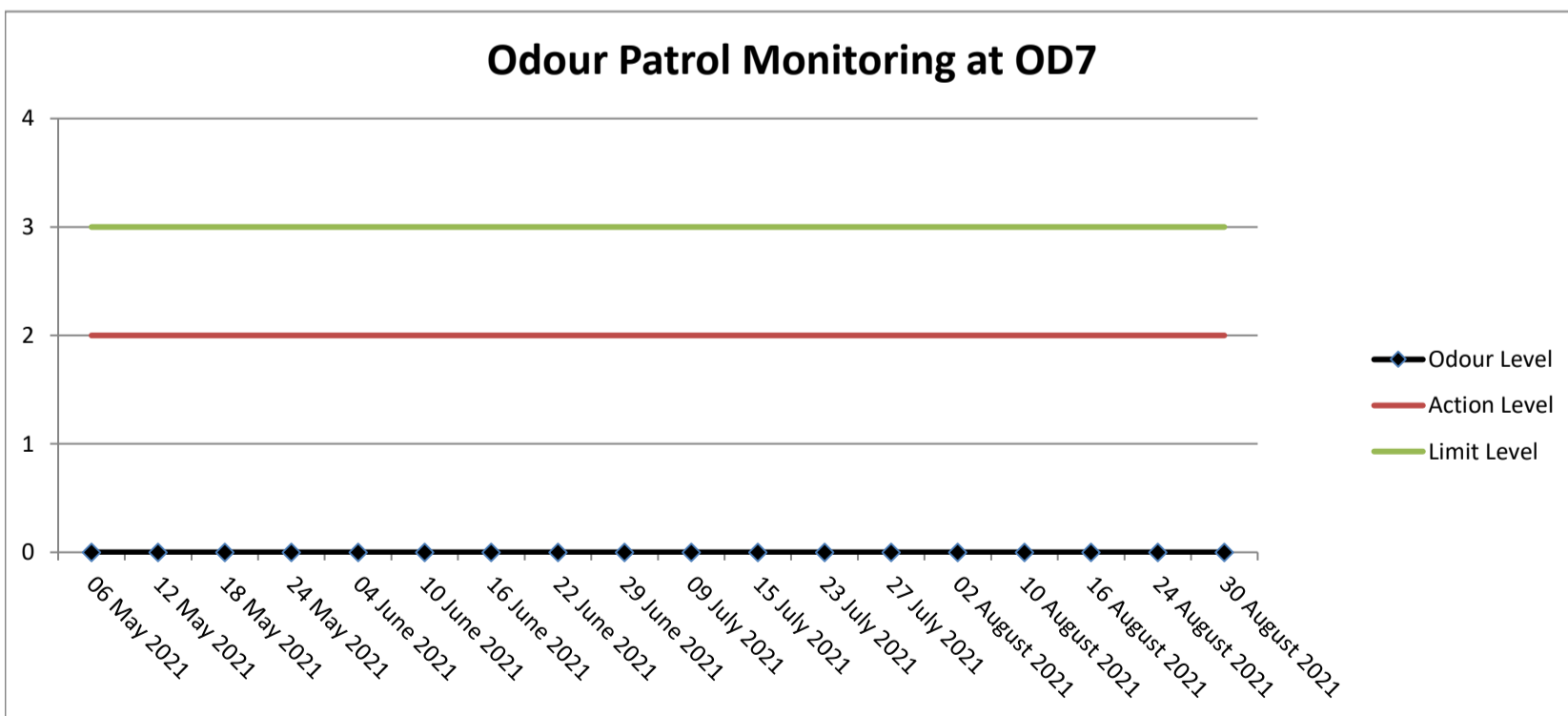
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



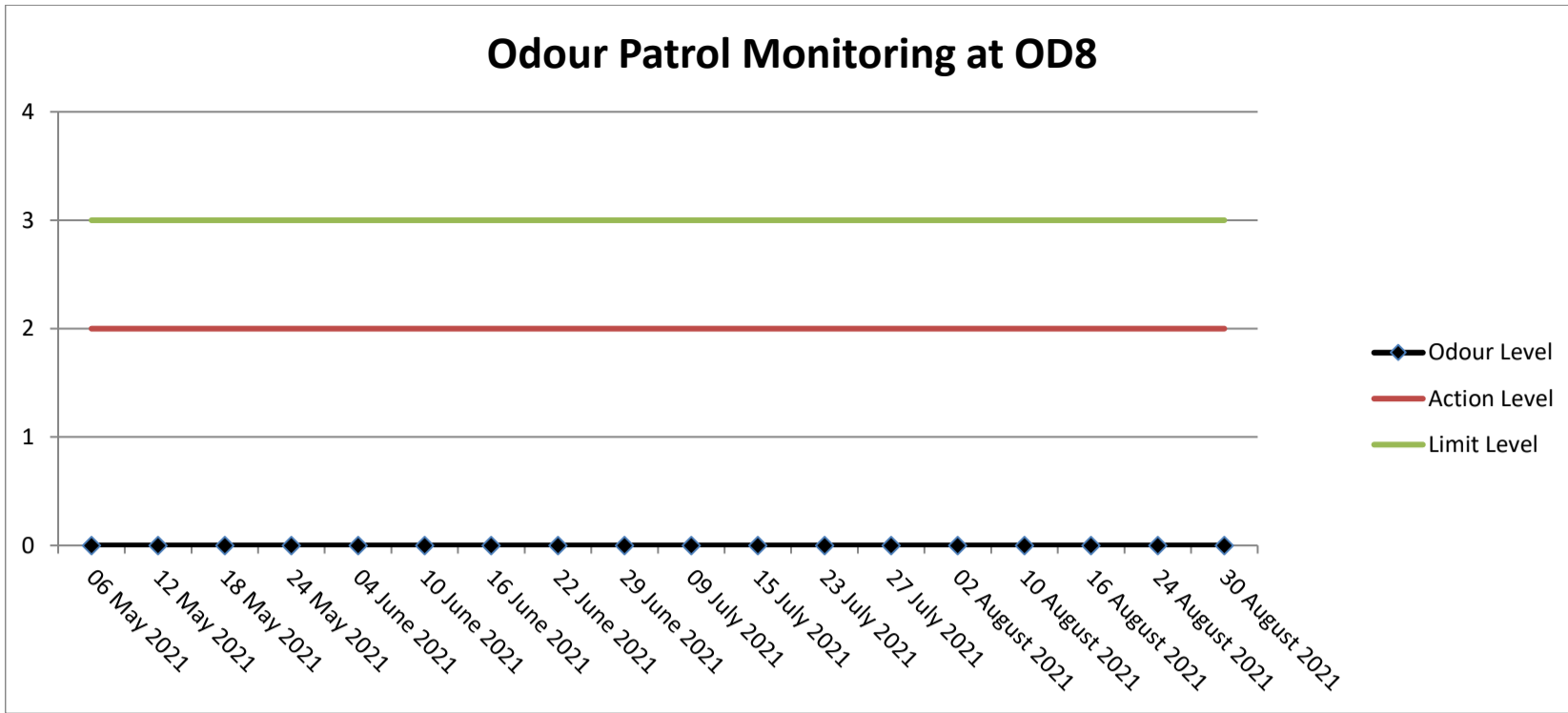
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



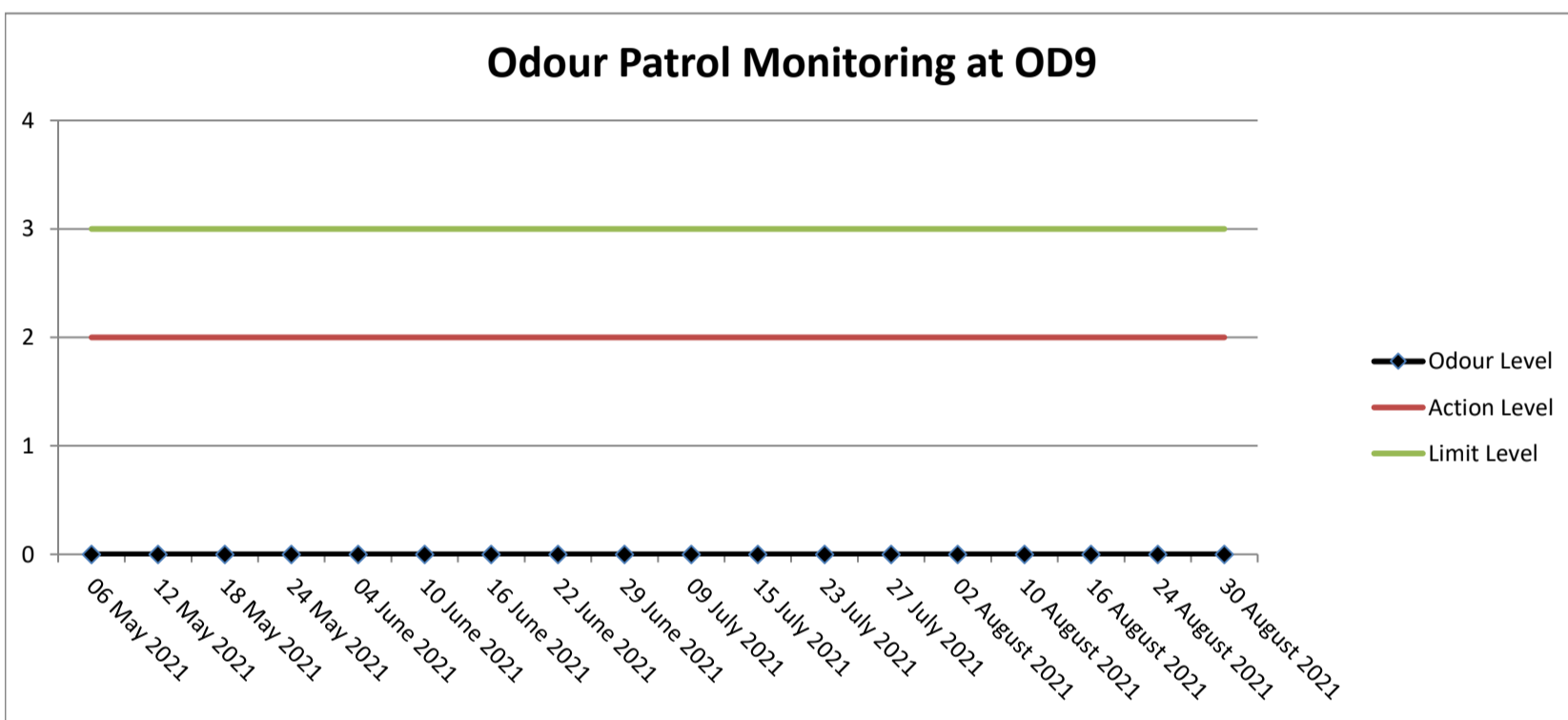
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



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



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



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

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

FUGRO TECHNICAL SERVICES LIMITED

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Report No.: 0041/17/ED/0642A

Appendix E

Copy of the Calibration Certificates for Water Quality Monitoring Equipment

Report No. : 142626WA211663



Page 1 of 3

Report on Calibration of Aqua Troll 600 Multi-parameter Water Quality Meter**Information Supplied by Client**

Client : Materialab Consultants Limited

Client's address : Rm. 723-726, 7/F, Profit Industrial Building, No. 1-15,
Kwai Fung Crescent, Kwai Chung, N.T.

Sample description : One Aqua Troll 600 Multi-parameter Water Quality Meter

Client sample ID : Serial No. 512112

Test required : Calibration of the Aqua Troll 600 Multi-parameter Water Quality
Meter

Laboratory Information

Lab. sample ID : WA211663/1

Date of calibration : 26/07/2021

Next calibration date : 25/10/2021

Test method used : In-house comparison method

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

Report No. : 142626WA211663

Page 2 of 3

Results :
A. pH calibration

pH reading at 25°C for Q.C. solution(6.86) and at 25°C for Q.C. solution(9.18)		
Theoretical	Measured	Deviation
9.18	9.17	-0.01
6.86	6.86	0.00

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.04	+0.04	± 0.5
20	20.06	+0.06	± 1.0
30	29.85	-0.15	± 1.5
40	39.76	-0.24	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	7.41	7.42
2	7.40	7.41
3	7.40	7.42
Average	7.40	7.42

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 :

18/8/2021

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

Report No. : 142626WA211663

Page 3 of 3

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
24.92	24.88

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.07	+0.07	± 0.6
8	8.09	+0.09	± 0.8
40	39.72	-0.28	± 3.0
80	79.57	-0.43	± 4.0

Certified by : 

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

Date

: 18/8/2021

** End of Report **

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



a xylem brand

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

Certificate of Calibration

TEST REPORT

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

POWER TEST

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

NOISE TEST

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

VERIFICATION

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

OPTIONS

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

Verified by: **ainthasane**

This report was generated on 5/24/2017.

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

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

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

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

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

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

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

FUGRO TECHNICAL SERVICES LIMITED

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Tuen Mun, N.T.,
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E-mail : matlab@fugro.com
Website : www.fugro.com



Report No.: 0041/17/ED/0642A

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 (soluble and particulate) (mg/L)	BOD ₅ (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	9/8/2021	Mid-Ebb	Fine	Moderate	12:30	17	S	1	1	8.76	24.67	28.60	86.3	5.60	5.1	0.12	74.2	4.2	0.018	0.088	0.536	0.642	10	0.04	2.1
A	9/8/2021	Mid-Ebb	Fine	Moderate	12:30	17	S	1	2	8.74	24.68	28.71	86.4	5.61	5.0	0.14	73.1	4.5	0.021	0.089	0.528	0.639	7	0.04	1.3
A	9/8/2021	Mid-Ebb	Fine	Moderate	12:30	17	M	8.5	1	8.69	24.88	28.52	85.3	5.40	6.5	0.19	90.6	5.0	0.022	0.087	0.524	0.633	11	0.04	1.3
A	9/8/2021	Mid-Ebb	Fine	Moderate	12:30	17	M	8.5	2	8.68	24.89	28.51	85.4	5.42	6.4	0.18	91.2	5.1	0.021	0.087	0.536	0.644	8	0.03	1.4
A	9/8/2021	Mid-Ebb	Fine	Moderate	12:30	17	B	16	1	8.70	26.91	27.71	82.6	5.14	10.9	0.21	92.5	7.5	0.016	0.089	0.535	0.640	9	0.03	2.2
A	9/8/2021	Mid-Ebb	Fine	Moderate	12:30	17	B	16	2	8.70	26.92	27.72	82.4	5.15	10.6	0.24	91.4	7.4	0.020	0.086	0.534	0.640	13	0.04	2.8
B	9/8/2021	Mid-Ebb	Fine	Moderate	12:47	14	S	1	1	8.62	23.79	28.98	93.6	6.00	5.2	0.24	164.5	5.1	0.016	0.086	0.549	0.650	5	0.04	2.3
B	9/8/2021	Mid-Ebb	Fine	Moderate	12:47	14	S	1	2	8.61	23.78	28.92	93.7	6.01	5.1	0.29	166.8	4.7	0.020	0.084	0.521	0.625	7	0.04	1.8
B	9/8/2021	Mid-Ebb	Fine	Moderate	12:47	14	M	7	1	8.64	27.39	27.08	81.9	5.42	10.8	0.32	149.1	5.5	0.028	0.084	0.528	0.640	8	0.04	1.3
B	9/8/2021	Mid-Ebb	Fine	Moderate	12:47	14	M	7	2	8.66	27.38	27.09	81.7	5.40	10.4	0.34	144.5	5.4	0.026	0.088	0.544	0.658	9	0.03	1.3
B	9/8/2021	Mid-Ebb	Fine	Moderate	12:47	14	B	13	1	8.70	28.74	26.40	70.5	4.61	11.9	0.24	153.1	6.6	0.018	0.088	0.546	0.652	10	0.03	1.8
B	9/8/2021	Mid-Ebb	Fine	Moderate	12:47	14	B	13	2	8.71	28.76	26.41	70.2	4.57	11.4	0.22	152.6	6.3	0.015	0.085	0.512	0.612	11	0.03	2.1
C	9/8/2021	Mid-Ebb	Fine	Moderate	13:10	12	S	1	1	8.71	31.93	29.97	85.5	5.54	7.9	0.11	67.4	6.1	0.019	0.084	0.512	0.616	6	0.03	1.7
C	9/8/2021	Mid-Ebb	Fine	Moderate	13:10	12	S	1	2	8.72	31.94	29.98	85.7	5.61	7.1	0.13	67.2	6.2	0.018	0.084	0.511	0.614	8	0.04	1.5
C	9/8/2021	Mid-Ebb	Fine	Moderate	13:10	12	M	6	1	8.73	25.56	28.46	76.5	4.99	8.0	0.14	51.3	6.3	0.020	0.081	0.491	0.592	5	0.04	1.2
C	9/8/2021	Mid-Ebb	Fine	Moderate	13:10	12	M	6	2	8.74	25.54	28.47	76.4	4.98	8.9	0.17	54.6	6.4	0.018	0.084	0.499	0.601	4	0.04	1.4
C	9/8/2021	Mid-Ebb	Fine	Moderate	13:10	12	B	11	1	8.68	26.15	27.81	66.4	4.37	9.3	0.18	58.7	6.4	0.019	0.080	0.512	0.610	5	0.04	1.2
C	9/8/2021	Mid-Ebb	Fine	Moderate	13:10	12	B	11	2	8.67	26.14	27.82	66.5	4.38	9.4	0.14	58.6	6.6	0.018	0.078	0.505	0.601	4	0.03	2.0
D	9/8/2021	Mid-Ebb	Fine	Moderate	13:28	13	S	1	1	8.71	25.33	28.32	81.2	5.37	8.8	0.06	68.8	7.1	0.023	0.079	0.494	0.596	4	0.04	1.8
D	9/8/2021	Mid-Ebb	Fine	Moderate	13:28	13	S	1	2	8.72	25.39	28.34	81.3	5.34	8.3	0.04	68.7	6.7	0.026	0.076	0.497	0.599	2	0.04	2.2
D	9/8/2021	Mid-Ebb	Fine	Moderate	13:28	13	M	6.5	1	8.68	25.38	28.32	70.5	4.60	10.8	0.08	64.1	6.4	0.017	0.080	0.490	0.588	2	0.03	<1.0
D	9/8/2021	Mid-Ebb	Fine	Moderate	13:28	13	M	6.5	2	8.64	25.39	28.31	70.4	4.53	10.4	0.04	64.3	6.0	0.016	0.078	0.492	0.586	1	0.03	1.1
D	9/8/2021	Mid-Ebb	Fine	Moderate	13:28	13	B	12	1	8.69	25.93	27.88	66.8	4.36	13.4	0.12	72.5	6.0	0.026	0.078	0.498	0.602	1	0.03	1.7
D	9/8/2021	Mid-Ebb	Fine	Moderate	13:28	13	B	12	2	8.68	25.94	27.84	66.7	4.34	13.2	0.10	72.8	6.2	0.025	0.086	0.485	0.596	1	0.03	1.7
E	9/8/2021	Mid-Ebb	Fine	Moderate	13:40	16	S	1	1	8.71	24.56	26.68	90.4	6.10	7.1	0.12	340.7	7.0	0.019	0.080	0.484	0.584	8	0.03	1.3
E	9/8/2021	Mid-Ebb	Fine	Moderate	13:40	16	S	1	2	8.72	2.57	26.67	90.7	6.13	7.3	0.14	336.2	6.6	0.012	0.077	0.487	0.576	6	0.03	1.4
E	9/8/2021	Mid-Ebb	Fine	Moderate	13:40	16	M	8	1	8.70	25.36	28.17	79.4	5.20	13.8	0.07	317.1	6.7	0.017	0.073	0.478	0.569	16	0.03	1.2
E	9/8/2021	Mid-Ebb	Fine	Moderate	13:40	16	M	8	2	8.71	25.34	28.18	79.5	5.23	13.9	0.09	314.5	6.3	0.013	0.073	0.470	0.556	12	0.03	<1.0
E	9/8/2021	Mid-Ebb	Fine	Moderate	13:40	16	B	15	1	8.71	25.74	27.78	74.7	4.92	15.6	0.13	350.5	6.1	0.016	0.073	0.462	0.551	7	0.03	<1.0
E	9/8/2021	Mid-Ebb	Fine	Moderate	13:40	16	B	15	2	8.70	25.78	27.74	74.8	4.89	15.4	0.17	337.8	6.0	0.016	0.072	0.465	0.554	8	0.03	1.5
F	9/8/2021	Mid-Ebb	Fine	Moderate	14:00	23	S	1	1	8.74	24.78	28.89	87.5	5.66	6.8	0.41	307.4	7.2	0.015	0.073	0.471	0.559	7	0.03	<1.0
F	9/8/2021	Mid-Ebb	Fine	Moderate	14:00	23	S	1	2	8.72	24.75	28.84	87.4	5.63	6.4	0.43	308.1	7.4	0.018	0.072	0.469	0.559	11	0.03	1.4
F	9/8/2021	Mid-Ebb	Fine	Moderate	14:00	23	M	11.5	1	8.72	25.24	28.49	83.5	5.44	7.8	0.37	291.4	7.5	0.012	0.074	0.462	0.548	7	0.03	1.4
F	9/8/2021	Mid-Ebb	Fine	Moderate	14:00	23	M	11.5	2	8.39	25.28	28.41	83.4	5.42	7.9	0.34	292.5	7.2	0.012	0.079	0.478	0.569	5	0.04	1.9
F	9/8/2021	Mid-Ebb	Fine	Moderate	14:00	23	B	22	1	8.75	26.41	28.23	79.9	5.17	10.2	0.30	297.6	8.0	0.013	0.078	0.455	0.546	6	0.03	1.6
F	9/8/2021	Mid-Ebb	Fine	Moderate	14:00	23	B	22	2	8.76	26.49	28.24	79.8	5.14	10.3	0.31	298.9	8.4	0.012	0.083	0.482	0.577	9	0.04	1.3
G	9/8/2021	Mid-Ebb	Fine	Moderate	14:20	22	S	1	1	8.77	27.37	28.86	98.3	6.35	4.9	0.23	4.1	5.4	0.013	0.080	0.464	0.556	3	0.03	2.2
G	9/8/2021	Mid-Ebb	Fine	Moderate	14:20	22	S	1	2	8.74	27.38	28.84	98.1	6.34	4.8	0.24	4.2	5.1	0.011	0.076	0.472	0.559	4	0.04	3.3
G	9/8/2021	Mid-Ebb	Fine	Moderate	14:20	22	M	11	1	8.79	28.07	28.76	96.3	6.21	4.4	0.18	351.4	5.8	0.020	0.074	0.472	0.565	9	0.03	3.6
G	9/8/2021	Mid-Ebb	Fine	Moderate	14:20	22	M	11	2	8.78	28.04	28.78	96.4	6.18	4.8	0.17	350.6	5.7	0.020	0.074	0.470	0.565	7	0.04	2.6
G	9/8/2021	Mid-Ebb	Fine	Moderate	14:20	22	B	21	1	8.73	28.53	28.16	90.3	5.81	9.3	0.21	5.6	6.4	0.009	0.078	0.487	0.574	4	0.04	2.6
G	9/8/2021	Mid-Ebb	Fine	Moderate	14:20	22	B	21	2	8.74	28.54	28.14	90.4	5.84	9.4	0.24	5.4	6.0	0.008	0.077	0.482	0.567	6	0.04	2.9
H	9/8/2021	Mid-Ebb	Fine	Moderate	14:37	19	S	1	1	8.77	26.93	28.79	97.9	6.36	4.8	0.34	82.4	4.9	0.007	0.078	0.477	0.562	6	0.04	2.9
H	9/8/2021	Mid-Ebb	Fine	Moderate	14:37	19	S	1	2	8.74	26.94	28.78	99.9	6.41	4.9	0.36	83.6	5.3	<0.005	0.078	0.483	0.561	7	0.04	2.5
H	9/8/2021	Mid-Ebb	Fine	Moderate	14:37	19	M	9.5	1	8.68	27.54	28.59	98.4	6.30	4.9	0.28	71.4	6.0	<0.005	0.080	0.476	0.556	1	0.04	1.9
H	9/8/2021	Mid-Ebb	Fine	Moderate	14:37	19	M	9.5	2	8.69	27.55	28.58	98.1	6.32	4.9	0.27	71.9	5.8	<0.005	0.073	0.487	0.560	3	0.04	2.4
H	9/8/2021	Mid-Ebb	Fine	Moderate	14:37	19	B	18	1	8.75	27.46	28.52	96.4	6.28	5.7	0.30	71.8	6.8	0.006	0.076	0.479	0.560	4	0.04	2.5
H	9/8/2021	Mid-Ebb	Fine	Moderate	14:37	19	B	18	2	8.77	27.44	28.51	96.1	6.29	5.8	0.31	90.2	6.4	<0.005	0.078	0.487	0.565	3	0.04	2.0

Note: 1. ND: Not Detected

Water Quality Monitoring Data

Monitoring Location	Date	Tide Mode	Weather	Sea Condition	Time	Water Depth (m)	Monitoring Level	Monitoring Level (m)	Replicate	In-situ Measurement								Laboratory Analysis							
										pH	Salinity (ppt)	Temperature (degree C)	DO Saturation (%)	DO (mg/L)	Turbidity (NTU)	Current Speed (m/s)	Current Direction (degree magnetic)	Total Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Nitrate Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (soluble and particulate) (mg/L)	BOD ₅ (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	9/8/2021	Mid-Flood	Fine	Moderate	07:30	15	S	1	1	8.31	28.04	28.12	69.9	4.58	4.7	0.31	156.4	5.0	0.050	0.078	0.481	0.609	79	0.04	<1.0
A	9/8/2021	Mid-Flood	Fine	Moderate	07:30	15	S	1	2	8.32	28.05	28.41	69.9	4.57	4.6	0.34	156.9	4.8	0.046	0.075	0.480	0.602	67	0.03	<1.0
A	9/8/2021	Mid-Flood	Fine	Moderate	07:30	15	M	7.5	1	8.19	28.34	27.64	68.1	4.41	4.4	0.14	171.2	5.7	0.071	0.067	0.497	0.635	23	0.04	<1.0
A	9/8/2021	Mid-Flood	Fine	Moderate	07:30	15	M	7.5	2	8.18	28.36	27.66	68.2	4.42	4.3	0.13	172.4	5.4	0.064	0.066	0.488	0.618	27	0.04	<1.0
A	9/8/2021	Mid-Flood	Fine	Moderate	07:30	15	B	14	1	8.23	28.71	27.23	64.5	4.09	5.2	0.34	163.4	5.8	0.058	0.068	0.494	0.620	66	0.04	<1.0
A	9/8/2021	Mid-Flood	Fine	Moderate	07:30	15	B	14	2	8.24	28.74	27.24	64.7	4.08	5.6	0.36	164.8	6.0	0.067	0.069	0.494	0.630	81	0.04	<1.0
B	9/8/2021	Mid-Flood	Fine	Moderate	07:11	14	S	1	1	8.62	27.10	28.30	88.9	6.12	4.4	0.21	89.1	6.8	0.077	0.089	0.504	0.670	92	0.04	<1.0
B	9/8/2021	Mid-Flood	Fine	Moderate	07:11	14	S	1	2	8.61	27.14	28.31	88.4	6.17	4.4	0.24	89.0	6.5	0.080	0.094	0.496	0.669	87	0.04	<1.0
B	9/8/2021	Mid-Flood	Fine	Moderate	07:11	14	M	7	1	8.44	28.24	27.64	82.5	5.41	5.2	0.18	74.5	7.5	0.078	0.094	0.497	0.669	59	0.04	<1.0
B	9/8/2021	Mid-Flood	Fine	Moderate	07:11	14	M	7	2	8.41	28.26	27.63	82.6	5.42	5.4	0.17	74.4	8.0	0.076	0.085	0.504	0.665	41	0.04	<1.0
B	9/8/2021	Mid-Flood	Fine	Moderate	07:11	14	B	13	1	8.45	28.54	27.41	78.2	5.36	5.4	0.14	86.4	8.9	0.078	0.089	0.502	0.669	21	0.04	<1.0
B	9/8/2021	Mid-Flood	Fine	Moderate	07:11	14	B	13	2	8.46	28.55	27.29	78.3	5.37	5.6	0.17	86.0	8.4	0.080	0.096	0.497	0.674	18	0.04	<1.0
C	9/8/2021	Mid-Flood	Fine	Moderate	06:52	12	S	1	1	8.28	27.07	28.36	74.4	5.10	6.9	0.24	94.5	7.0	0.067	0.089	0.492	0.649	13	0.04	<1.0
C	9/8/2021	Mid-Flood	Fine	Moderate	06:52	12	S	1	2	8.27	27.04	28.34	74.3	5.09	6.8	0.27	95.9	6.6	0.073	0.086	0.498	0.657	16	0.04	<1.0
C	9/8/2021	Mid-Flood	Fine	Moderate	06:52	12	M	6	1	8.18	27.84	27.54	72.5	4.92	6.4	0.11	124.5	5.8	0.070	0.094	0.489	0.652	21	0.04	<1.0
C	9/8/2021	Mid-Flood	Fine	Moderate	06:52	12	M	6	2	8.19	27.88	27.55	72.6	4.93	6.3	0.12	122.6	5.6	0.074	0.092	0.490	0.657	17	0.04	<1.0
C	9/8/2021	Mid-Flood	Fine	Moderate	06:52	12	B	11	1	8.03	28.14	27.54	70.6	4.58	7.9	0.13	103.5	5.0	0.073	0.084	0.501	0.658	30	0.04	<1.0
C	9/8/2021	Mid-Flood	Fine	Moderate	06:52	12	B	11	2	8.18	28.26	27.41	70.9	4.62	0.4	0.17	103.7	5.3	0.068	0.085	0.497	0.651	23	0.04	<1.0
D	9/8/2021	Mid-Flood	Fine	Moderate	06:32	14	S	1	1	8.44	26.21	28.53	81.6	5.38	4.4	0.31	141.5	5.4	0.069	0.072	0.422	0.563	49	0.04	<1.0
D	9/8/2021	Mid-Flood	Fine	Moderate	06:32	14	S	1	2	8.41	26.22	28.54	81.6	5.37	4.5	0.36	144.2	5.1	0.067	0.076	0.416	0.559	37	0.03	<1.0
D	9/8/2021	Mid-Flood	Fine	Moderate	06:32	14	M	7	1	8.31	26.86	28.11	74.5	5.06	4.9	0.30	124.5	5.7	0.068	0.076	0.417	0.561	76	0.04	<1.0
D	9/8/2021	Mid-Flood	Fine	Moderate	06:32	14	M	7	2	8.32	26.87	28.06	74.6	5.08	4.7	0.38	124.7	6.0	0.064	0.078	0.408	0.551	89	0.03	<1.0
D	9/8/2021	Mid-Flood	Fine	Moderate	06:32	14	B	13	1	8.40	26.90	28.34	70.4	4.60	5.8	0.14	89.5	6.6	0.056	0.080	0.405	0.541	68	0.03	<1.0
D	9/8/2021	Mid-Flood	Fine	Moderate	06:32	14	B	13	2	8.38	27.11	28.37	70.5	4.61	5.6	0.18	89.7	6.9	0.067	0.080	0.410	0.558	52	0.04	<1.0
E	9/8/2021	Mid-Flood	Fine	Moderate	06:10	14	S	1	1	8.32	29.80	27.44	64.7	4.48	4.7	0.13	103.4	4.9	0.078	0.074	0.427	0.578	18	0.04	<1.0
E	9/8/2021	Mid-Flood	Fine	Moderate	06:10	14	S	1	2	8.31	29.37	27.49	64.8	4.49	4.8	0.18	104.1	4.5	0.070	0.080	0.420	0.569	21	0.04	<1.0
E	9/8/2021	Mid-Flood	Fine	Moderate	06:10	14	M	7	1	8.11	29.58	27.03	61.6	4.02	5.8	0.14	87.5	5.6	0.084	0.077	0.421	0.581	19	0.04	<1.0
E	9/8/2021	Mid-Flood	Fine	Moderate	06:10	14	M	7	2	8.14	29.59	27.04	61.3	4.01	5.9	0.19	87.7	5.1	0.079	0.078	0.448	0.604	25	0.03	<1.0
E	9/8/2021	Mid-Flood	Fine	Moderate	06:10	14	B	13	1	8.03	30.02	27.01	59.7	3.84	6.4	0.21	114.5	5.9	0.078	0.068	0.487	0.634	12	0.03	1.0
E	9/8/2021	Mid-Flood	Fine	Moderate	06:10	14	B	13	2	8.04	30.04	26.99	59.4	3.82	6.7	0.19	102.9	6.3	0.072	0.068	0.486	0.626	15	0.03	1.2
F	9/8/2021	Mid-Flood	Fine	Moderate	05:48	18	S	1	1	8.60	29.28	27.53	80.7	5.30	6.5	0.26	72.6	4.6	0.069	0.079	0.463	0.611	42	0.03	1.3
F	9/8/2021	Mid-Flood	Fine	Moderate	05:48	18	S	1	2	8.59	29.29	27.54	80.8	5.31	6.5	0.24	71.4	4.8	0.074	0.083	0.454	0.611	33	0.03	1.2
F	9/8/2021	Mid-Flood	Fine	Moderate	05:48	18	M	9	1	8.60	29.44	27.32	71.3	4.64	6.4	0.23	95.1	5.4	0.078	0.080	0.461	0.620	14	0.03	1.3
F	9/8/2021	Mid-Flood	Fine	Moderate	05:48	18	M	9	2	8.60	29.51	27.42	70.6	4.63	6.3	0.24	90.2	5.8	0.077	0.086	0.456	0.618	16	0.03	1.5
F	9/8/2021	Mid-Flood	Fine	Moderate	05:48	18	B	17	1	8.51	29.81	27.78	68.4	4.48	7.1	0.26	80.5	5.9	0.076	0.073	0.466	0.616	14	0.03	1.3
F	9/8/2021	Mid-Flood	Fine	Moderate	05:48	18	B	17	2	8.52	29.84	27.74	68.5	4.49	7.3	0.25	84.0	6.4	0.067	0.078	0.468	0.612	13	0.03	<1.0
G	9/8/2021	Mid-Flood	Fine	Moderate	05:24	13	S	1	1	8.40	26.95	28.07	77.5	5.10	5.9	0.24	81.4	4.8	0.078	0.082	0.481	0.640	13	0.03	1.2
G	9/8/2021	Mid-Flood	Fine	Moderate	05:24	13	S	1	2	8.40	26.99	28.08	77.8	5.12	5.8	0.80	81.7	4.4	0.074	0.080	0.450	0.603	17	0.03	1.1
G	9/8/2021	Mid-Flood	Fine	Moderate	05:24	13	M	6.5	1	8.37	27.83	28.14	71.4	4.53	6.9	0.14	92.5	5.0	0.071	0.069	0.454	0.594	19	0.03	1.1
G	9/8/2021	Mid-Flood	Fine	Moderate	05:24	13	M	6.5	2	8.31	27.84	28.19	71.8	4.54	6.8	0.13	92.8	5.6	0.082	0.068	0.490	0.640	16	0.03	<1.0
G	9/8/2021	Mid-Flood	Fine	Moderate	05:24	13	B	12	1	8.29	28.14	28.36	68.4	4.53	7.3	0.14	86.3	6.2	0.079	0.081	0.477	0.637	31	0.03	<1.0
G	9/8/2021	Mid-Flood	Fine	Moderate	05:24	13	B	12	2	8.26	28.15	28.37	68.3	4.51	7.6	0.19	86.4	6.4	0.078	0.078	0.480	0.635	39	0.03	1.2
H	9/8/2021	Mid-Flood	Fine	Moderate	05:03	19	S	1	1	8.58	27.53	28.03	72.6	4.37	7.7	0.13	56.4	7.4	0.062	0.082	0.484	0.628	23	0.04	1.1
H	9/8/2021	Mid-Flood	Fine	Moderate	05:03	19	S	1	2	8.59	27.54	28.04	72.8	4.36	7.8	0.17	56.9	7.0	0.066	0.075	0.493	0.634	26	0.03	1.2
H	9/8/2021	Mid-Flood	Fine	Moderate	05:03	19	M	9.5	1	8.58	27.28	28.01	67.8	4.24	8.5	0.26	50.1	6.2	0.065	0.084	0.486	0.635	25	0.03	1.1
H	9/8/2021	Mid-Flood	Fine	Moderate	05:03	19	M	9.5	2	8.54	27.29	28.01	67.7	4.23	8.4	0.29	50.2	6.0	0.062	0.080	0.489	0.631	29	0.04	1.2
H	9/8/2021	Mid-Flood	Fine	Moderate	05:03	19	B	18	1	8.44	27.18	28.34	63.1	4.19	8.8	0.14	54.1	5.8	0.068	0.073	0.497	0.638	15	0.04	<1.0
H	9/8/2021	Mid-Flood	Fine	Moderate	05:03	19	B	18	2	8.49	27.14	28.39	63.8	4.16	8.9	0.17	54.5	5.5	0.068	0.079	0.484	0.631	19	0.04	<1.0

Note: 1. ND: Not Detected





CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 28
Contact	: CYRUS LAI	Contact	: Richard Fung	Work Order	: HK2131237
Address	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
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Telephone	: +852 3565 4374	Telephone	: +852 2610 1044		
Facsimile	: ---	Facsimile	: +852 2610 2021		
Project	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT			Date Samples Received	: 09-Aug-2021
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 23-Aug-2021
C-O-C number	: ---			No. of samples received	: 96
Site	: ---			No. of samples analysed	: 96

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

<u>Signatories</u>	<u>Position</u>	<u>Authorised results for</u>
		
Fung Lim Chee, Richard	Managing Director	Inorganics
		
Ng Sin Kou, May	Laboratory Manager	Microbiology_ENV



General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 09-Aug-2021 to 23-Aug-2021.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK2131237

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

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

Microbiological sample(s) was/ were collected in 125mL sterile plastic bottles containing sodium thiosulfate. Sample(s) arrived at the laboratory at 15:15.

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

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

EK067P - Total Phosphorus - Filtered is not HOKLAS accredited.

EP030 - The accredited LOR of Biochemical Oxygen Demand is 2mg/L. Results reported below LOR and with decimal value are for reference only.



Analytical Results

Sub-Matrix: WATER

				Sample ID	A/S/E	A/S/E/Dup	A/M/E	A/M/E/Dup	A/B/E
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit		HK2131237-001	HK2131237-002	HK2131237-003	HK2131237-004	HK2131237-005
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		4.2	4.5	5.0	5.1	7.5
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.018	0.021	0.022	0.021	0.016
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.088	0.089	0.087	0.087	0.089
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.536	0.528	0.524	0.536	0.535
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L		0.642	0.639	0.633	0.644	0.640
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.04	0.04	0.04	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		0.01	0.01	0.01	0.01	0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		2.1	1.3	1.3	1.4	2.2
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		10	7	11	8	9



Sub-Matrix: WATER				Sample ID	A/B/E/Dup	B/S/E	B/S/E/Dup	B/M/E	B/M/E/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-006	HK2131237-007	HK2131237-008	HK2131237-009	HK2131237-010	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.4	5.1	4.7	5.5	5.4	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.020	0.016	0.020	0.028	0.026	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.086	0.086	0.084	0.084	0.088	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.534	0.549	0.521	0.528	0.544	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.640	0.650	0.625	0.640	0.658	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.02	0.01	0.02	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.8	2.3	1.8	1.3	1.3	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	13	5	7	8	9	



Sub-Matrix: WATER				Sample ID	B/B/E	B/B/E/Dup	C/S/E	C/S/E/Dup	C/M/E
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-011	HK2131237-012	HK2131237-013	HK2131237-014	HK2131237-015	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.6	6.3	6.1	6.2	6.3	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.018	0.015	0.019	0.018	0.020	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.088	0.085	0.084	0.084	0.081	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.546	0.512	0.512	0.511	0.491	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.652	0.612	0.616	0.614	0.592	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.04	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	0.01	0.01	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.8	2.1	1.7	1.5	1.2	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	10	11	6	8	5	



Sub-Matrix: WATER				Sample ID	C/M/E/Dup	C/B/E	C/B/E/Dup	D/S/E	D/S/E/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-016	HK2131237-017	HK2131237-018	HK2131237-019	HK2131237-020	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.4	6.4	6.6	7.1	6.7	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.018	0.019	0.018	0.023	0.026	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.084	0.080	0.078	0.079	0.076	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.499	0.512	0.505	0.494	0.497	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.601	0.610	0.601	0.596	0.599	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.03	0.04	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	0.01	0.01	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.4	1.2	2.0	1.8	2.2	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	4	5	4	4	2	



Sub-Matrix: WATER				Sample ID	D/M/E	D/M/E/Dup	D/B/E	D/B/E/Dup	E/S/E
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-021	HK2131237-022	HK2131237-023	HK2131237-024	HK2131237-025	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.4	6.0	6.0	6.2	7.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.017	0.016	0.026	0.025	0.019	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.080	0.078	0.078	0.086	0.080	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.490	0.492	0.498	0.485	0.484	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.588	0.586	0.602	0.596	0.584	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	0.01	0.01	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.1	1.7	1.7	1.3	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	2	1	1	1	8	



Sub-Matrix: WATER				Sample ID	E/S/E/Dup	E/M/E	E/M/E/Dup	E/B/E	E/B/E/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-026	HK2131237-027	HK2131237-028	HK2131237-029	HK2131237-030	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.6	6.7	6.3	6.1	6.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.012	0.017	0.013	0.016	0.016	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.077	0.073	0.073	0.073	0.072	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.487	0.478	0.470	0.462	0.465	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.576	0.569	0.556	0.551	0.554	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	0.01	0.01	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.4	1.2	<1.0	<1.0	1.5	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	6	16	12	7	8	



Sub-Matrix: WATER				Sample ID	F/S/E	F/S/E/Dup	F/M/E	F/M/E/Dup	F/B/E
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-031	HK2131237-032	HK2131237-033	HK2131237-034	HK2131237-035	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.2	7.4	7.5	7.2	8.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.015	0.018	0.012	0.012	0.013	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.073	0.072	0.074	0.079	0.078	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.471	0.469	0.462	0.478	0.455	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.559	0.559	0.548	0.569	0.546	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.04	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.4	1.4	1.9	1.6	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	7	11	7	5	6	



Sub-Matrix: WATER				Sample ID	F/B/E/Dup	G/S/E	G/S/E/Dup	G/M/E	G/M/E/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-036	HK2131237-037	HK2131237-038	HK2131237-039	HK2131237-040	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.4	5.4	5.1	5.8	5.7	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.012	0.013	0.011	0.020	0.020	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.083	0.080	0.076	0.074	0.074	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.482	0.464	0.472	0.472	0.470	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.577	0.556	0.559	0.565	0.565	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	0.04	0.03	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.01	0.01	<0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.3	2.2	3.3	3.6	2.6	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	9	3	4	9	7	



Sub-Matrix: WATER				Sample ID	G/B/E	G/B/E/Dup	H/S/E	H/S/E/Dup	H/M/E
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-041	HK2131237-042	HK2131237-043	HK2131237-044	HK2131237-045	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.4	6.0	4.9	5.3	6.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.009	0.008	0.007	<0.005	<0.005	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.078	0.077	0.078	0.078	0.080	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.487	0.482	0.477	0.483	0.476	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.574	0.567	0.562	0.561	0.556	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.6	2.9	2.9	2.5	1.9	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	4	6	6	7	1	



Sub-Matrix: WATER				Sample ID	H/M/E/Dup	H/B/E	H/B/E/Dup	A/S/F	A/S/F/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-046	HK2131237-047	HK2131237-048	HK2131237-049	HK2131237-050	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.8	6.8	6.4	5.0	4.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.006	<0.005	0.050	0.046	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.073	0.076	0.078	0.078	0.075	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.487	0.479	0.487	0.481	0.480	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.560	0.560	0.565	0.609	0.602	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	<0.01	0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.4	2.5	2.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	3	4	3	79	67	



Sub-Matrix: WATER				Sample ID	A/M/F	A/M/F/Dup	A/B/F	A/B/F/Dup	B/S/F
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-051	HK2131237-052	HK2131237-053	HK2131237-054	HK2131237-055	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.7	5.4	5.8	6.0	6.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.071	0.064	0.058	0.067	0.077	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.067	0.066	0.068	0.069	0.089	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.497	0.488	0.494	0.494	0.504	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.635	0.618	0.620	0.630	0.670	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	<0.01	<0.01	0.01	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	1.1	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	23	27	66	81	92	



Sub-Matrix: WATER				Sample ID	B/S/F/Dup	B/M/F	B/M/F/Dup	B/B/F	B/B/F/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-056	HK2131237-057	HK2131237-058	HK2131237-059	HK2131237-060	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.5	7.5	8.0	8.9	8.4	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.080	0.078	0.076	0.078	0.080	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.094	0.094	0.085	0.089	0.096	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.496	0.497	0.504	0.502	0.497	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.669	0.669	0.665	0.669	0.674	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	0.01	0.01	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	87	59	41	21	18	



Sub-Matrix: WATER				Sample ID	C/S/F	C/S/F/Dup	C/M/F	C/M/F/Dup	C/B/F
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-061	HK2131237-062	HK2131237-063	HK2131237-064	HK2131237-065	HK2131237-065
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.0	6.6	5.8	5.6	5.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.067	0.073	0.070	0.074	0.073	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.089	0.086	0.094	0.092	0.084	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.492	0.498	0.489	0.490	0.501	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.649	0.657	0.652	0.657	0.658	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.01	0.02	0.02	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	13	16	21	17	30	



Sub-Matrix: WATER				Sample ID	C/B/F/Dup	D/S/F	D/S/F/Dup	D/M/F	D/M/F/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-066	HK2131237-067	HK2131237-068	HK2131237-069	HK2131237-070	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.3	5.4	5.1	5.7	6.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.068	0.069	0.067	0.068	0.064	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.085	0.072	0.076	0.076	0.078	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.497	0.422	0.416	0.417	0.408	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.651	0.563	0.559	0.561	0.551	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.03	0.04	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	0.01	0.01	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	<1.0	<1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	23	49	37	76	89	



Sub-Matrix: WATER				Sample ID	D/B/F	D/B/F/Dup	E/S/F	E/S/F/Dup	E/M/F
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-071	HK2131237-072	HK2131237-073	HK2131237-074	HK2131237-075	HK2131237-075
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.6	6.9	4.9	4.5	5.6	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.056	0.067	0.078	0.070	0.084	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.080	0.080	0.074	0.080	0.077	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.405	0.410	0.427	0.420	0.421	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.541	0.558	0.578	0.569	0.581	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.04	0.04	0.04	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	<0.01	0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	68	52	18	21	19	



Sub-Matrix: WATER				Sample ID	E/M/F/Dup	E/B/F	E/B/F/Dup	F/S/F	F/S/F/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-076	HK2131237-077	HK2131237-078	HK2131237-079	HK2131237-080	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.1	5.9	6.3	4.6	4.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.079	0.078	0.072	0.069	0.074	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.078	0.068	0.068	0.079	0.083	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.448	0.487	0.486	0.463	0.454	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.604	0.634	0.626	0.611	0.611	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	0.01	<0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.0	1.2	1.3	1.2	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	25	12	15	42	33	



Sub-Matrix: WATER				Sample ID	F/M/F	F/M/F/Dup	F/B/F	F/B/F/Dup	G/S/F
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-081	HK2131237-082	HK2131237-083	HK2131237-084	HK2131237-085	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.4	5.8	5.9	6.4	4.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.078	0.077	0.076	0.067	0.078	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.080	0.086	0.073	0.078	0.082	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.461	0.456	0.466	0.468	0.481	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.620	0.618	0.616	0.612	0.640	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	<0.01	0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.3	1.5	1.3	<1.0	1.2	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	14	16	14	13	13	



Sub-Matrix: WATER				Sample ID	G/S/F/Dup	G/M/F	G/M/F/Dup	G/B/F	G/B/F/Dup
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-086	HK2131237-087	HK2131237-088	HK2131237-089	HK2131237-090	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.4	5.0	5.6	6.2	6.4	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.074	0.071	0.082	0.079	0.078	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.080	0.069	0.068	0.081	0.078	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.450	0.454	0.490	0.477	0.480	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.603	0.594	0.640	0.637	0.635	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	1.1	<1.0	<1.0	1.2	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	17	19	16	31	39	



Sub-Matrix: WATER				Sample ID	H/S/F	H/S/F/Dup	H/M/F	H/M/F/Dup	H/B/F
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131237-091	HK2131237-092	HK2131237-093	HK2131237-094	HK2131237-095	HK2131237-095
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.4	7.0	6.2	6.0	5.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.062	0.066	0.065	0.062	0.068	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.082	0.075	0.084	0.080	0.073	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.484	0.493	0.486	0.489	0.497	
EK063A: Total Inorganic Nitrogen as N	----	0.010	mg/L	0.628	0.634	0.635	0.631	0.638	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	0.03	0.04	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	0.01	0.01	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	1.2	1.1	1.2	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	23	26	25	29	15	



Sub-Matrix: WATER				Sample ID	H/B/F/Dup	---	---	---	---
				Sampling date / time	09-Aug-2021	---	---	---	---
Compound	CAS Number	LOR	Unit	HK2131237-096	---	---	---	---	---
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	---	0.5	mg/L	5.5	---	---	---	---	---
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.068	---	---	---	---	---
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.079	---	---	---	---	---
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.484	---	---	---	---	---
EK063A: Total Inorganic Nitrogen as N	---	0.010	mg/L	0.631	---	---	---	---	---
EK067P: Total Phosphorus as P	---	0.01	mg/L	0.04	---	---	---	---	---
EK067P: Total Phosphorus - Filtered	---	0.01	mg/L	0.02	---	---	---	---	---
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	---	1.0	mg/L	<1.0	---	---	---	---	---
EM: Microbiological Testing									
EM002: E. coli	---	1	CFU/100mL	19	---	---	---	---	---



Laboratory Duplicate (DUP) Report

Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 3836395)								
HK2131237-001	A/S/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	4.2	3.8	11.3
HK2131237-011	B/B/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	6.6	6.1	8.7
EA/ED: Physical and Aggregate Properties (QC Lot: 3836396)								
HK2131237-021	D/M/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	6.4	6.8	6.5
HK2131237-031	F/S/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	7.2	7.1	2.4
EA/ED: Physical and Aggregate Properties (QC Lot: 3836397)								
HK2131237-041	G/B/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	6.4	6.9	7.5
HK2131237-051	A/M/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	5.7	5.5	3.1
EA/ED: Physical and Aggregate Properties (QC Lot: 3836398)								
HK2131237-061	C/S/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	7.0	6.7	4.0
HK2131237-071	D/B/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	6.6	7.0	5.5
EA/ED: Physical and Aggregate Properties (QC Lot: 3836399)								
HK2131237-081	F/M/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	5.4	5.7	4.5
HK2131237-091	H/S/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	7.4	7.4	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837383)								
HK2131237-020	D/S/E/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.026	0.024	6.6
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837384)								
HK2131237-040	G/M/E/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.020	0.020	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837385)								
HK2131237-060	B/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.080	0.086	6.9
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837386)								
HK2131237-080	F/S/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.074	0.087	16.2
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837387)								
HK2131237-096	H/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.068	0.064	6.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837391)								
HK2131237-020	D/S/E/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.076	0.077	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837393)								
HK2131237-040	G/M/E/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.074	0.076	2.4
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837395)								
HK2131237-060	B/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.096	0.083	14.6



Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837397)								
HK2131237-080	F/S/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.083	0.084	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837399)								
HK2131237-096	H/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.079	0.075	5.2
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840071)								
HK2131237-020	D/S/E/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840072)								
HK2131237-020	D/S/E/Dup	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840073)								
HK2131237-040	G/M/E/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840074)								
HK2131237-040	G/M/E/Dup	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840075)								
HK2131237-060	B/B/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840076)								
HK2131237-060	B/B/F/Dup	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840077)								
HK2131237-080	F/S/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840078)								
HK2131237-080	F/S/F/Dup	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840080)								
HK2131237-096	H/B/F/Dup	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.0

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

Matrix: WATER				Method Blank (MB) Report		Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EA/ED: Physical and Aggregate Properties (QC Lot: 3836395)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	92.5	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 3836396)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	99.0	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 3836397)											



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
		LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
Method: Compound	CAS Number					LCS	DCS	Low	High	Value	Control Limit
EA/ED: Physical and Aggregate Properties (QC Lot: 3836397) - Continued											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	106	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 3836398)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	100	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 3836399)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	110	----	85.9	117	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837383)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	96.8	----	85.0	111	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837384)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.5 mg/L	98.5	----	85.0	111	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837385)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.5 mg/L	98.7	----	85.0	111	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837386)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	101	----	85.0	111	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837387)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	94.8	----	85.0	111	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837391)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	103	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837393)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	102	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837395)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	100	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837397)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	107	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837399)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	110	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840071)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.9	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840072)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	95.2	----	92.1	102	----	----



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
		LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
Method: Compound	CAS Number					LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840073)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840073)	---	0.01	mg/L	<0.01	0.5 mg/L	97.2	---	85.0	115	---	---
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840074)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840074)	---	0.01	mg/L	<0.01	0.5 mg/L	95.2	---	92.1	102	---	---
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840075)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840075)	---	0.01	mg/L	<0.01	0.5 mg/L	97.2	---	85.0	115	---	---
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840076)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840076)	---	0.01	mg/L	<0.01	0.5 mg/L	96.7	---	92.1	102	---	---
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840077)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840077)	---	0.01	mg/L	<0.01	0.5 mg/L	98.0	---	85.0	115	---	---
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840078)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840078)	---	0.01	mg/L	<0.01	0.5 mg/L	96.6	---	92.1	102	---	---
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840079)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840079)	---	0.01	mg/L	<0.01	0.5 mg/L	98.9	---	85.0	115	---	---
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840080)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840080)	---	0.01	mg/L	<0.01	0.5 mg/L	97.4	---	92.1	102	---	---
EP: Aggregate Organics (QC Lot: 3836572)											
EP: Aggregate Organics (QC Lot: 3836572)	---	---	mg/L	---	198 mg/L	95.9	---	81.0	115	---	---
EP: Aggregate Organics (QC Lot: 3836573)											
EP: Aggregate Organics (QC Lot: 3836573)	---	---	mg/L	---	198 mg/L	101	---	81.0	115	---	---
EP: Aggregate Organics (QC Lot: 3836574)											
EP: Aggregate Organics (QC Lot: 3836574)	---	---	mg/L	---	198 mg/L	93.4	---	81.0	115	---	---
EP: Aggregate Organics (QC Lot: 3836575)											
EP: Aggregate Organics (QC Lot: 3836575)	---	---	mg/L	---	198 mg/L	98.0	---	81.0	115	---	---
EP: Aggregate Organics (QC Lot: 3836576)											
EP: Aggregate Organics (QC Lot: 3836576)	---	---	mg/L	---	198 mg/L	102	---	81.0	115	---	---



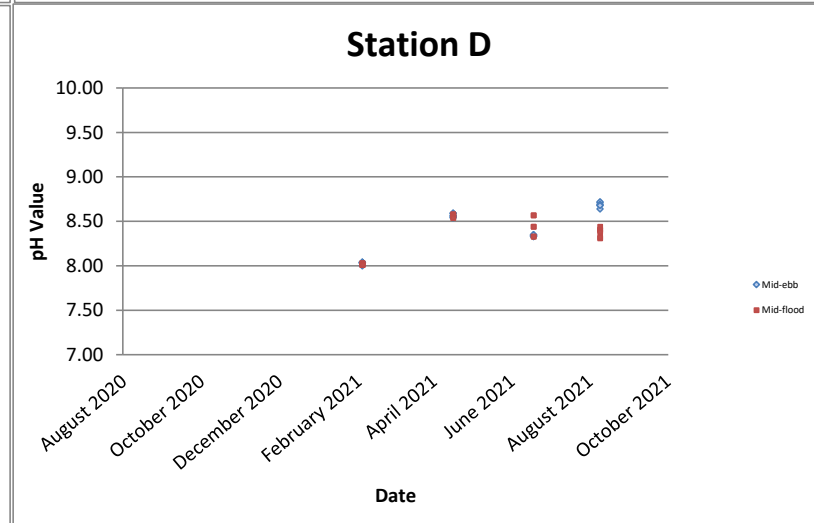
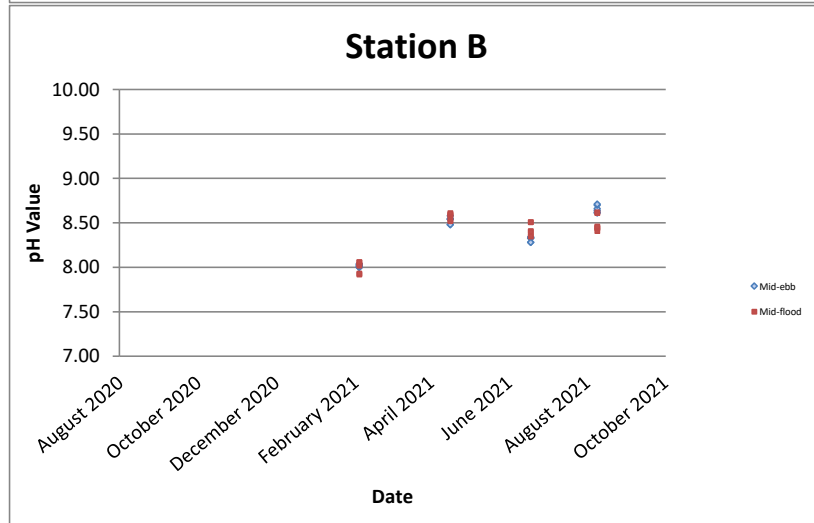
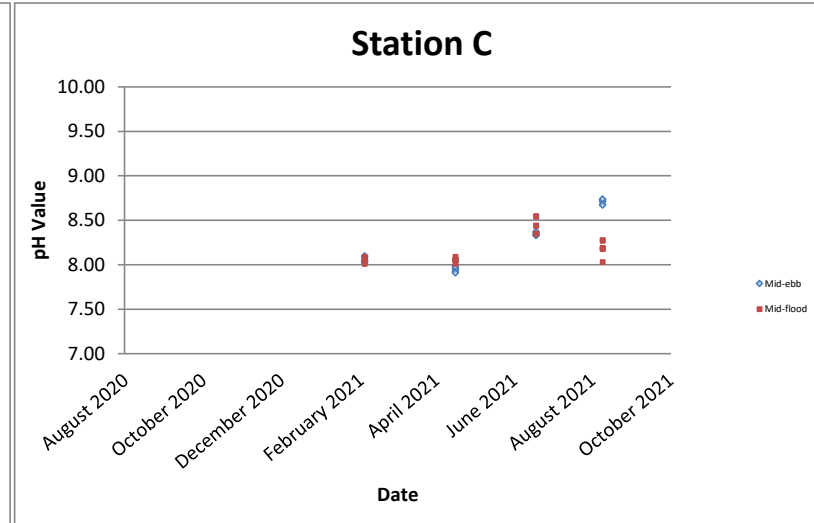
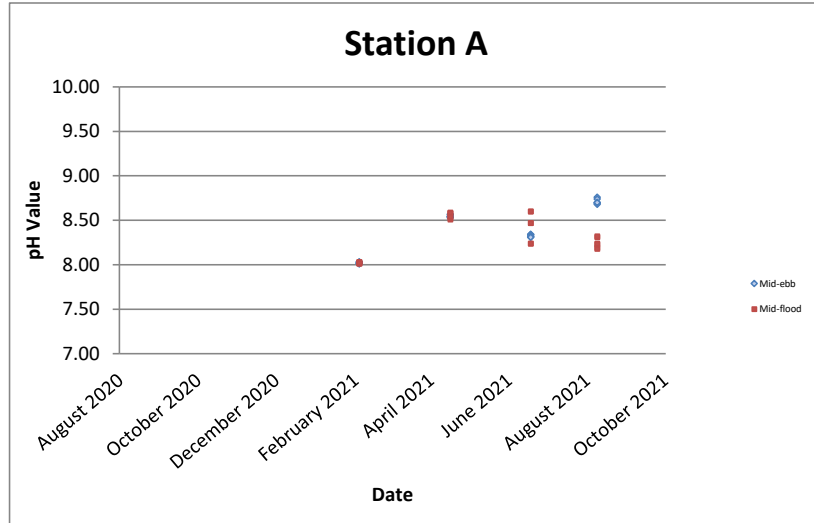
Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: WATER					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)		
					MS	MSD	Low	High	Value	Control Limit	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837383)											
HK2131237-020	D/S/E/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	99.1	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837384)											
HK2131237-040	G/M/E/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	95.9	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837385)											
HK2131237-060	B/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	105	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837386)											
HK2131237-080	F/S/F/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	98.2	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837387)											
HK2131237-096	H/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	94.1	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837391)											
HK2131237-020	D/S/E/Dup	EK057A: Nitrite as N	14797-65-0	0.25 mg/L	101	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837393)											
HK2131237-040	G/M/E/Dup	EK057A: Nitrite as N	14797-65-0	0.25 mg/L	103	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837395)											
HK2131237-060	B/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.25 mg/L	96.1	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837397)											
HK2131237-080	F/S/F/Dup	EK057A: Nitrite as N	14797-65-0	0.25 mg/L	96.3	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837399)											
HK2131237-096	H/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.25 mg/L	99.7	----	75.0	125	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840071)											
HK2131237-020	D/S/E/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	94.2	----	75.0	125	----	25	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840072)											

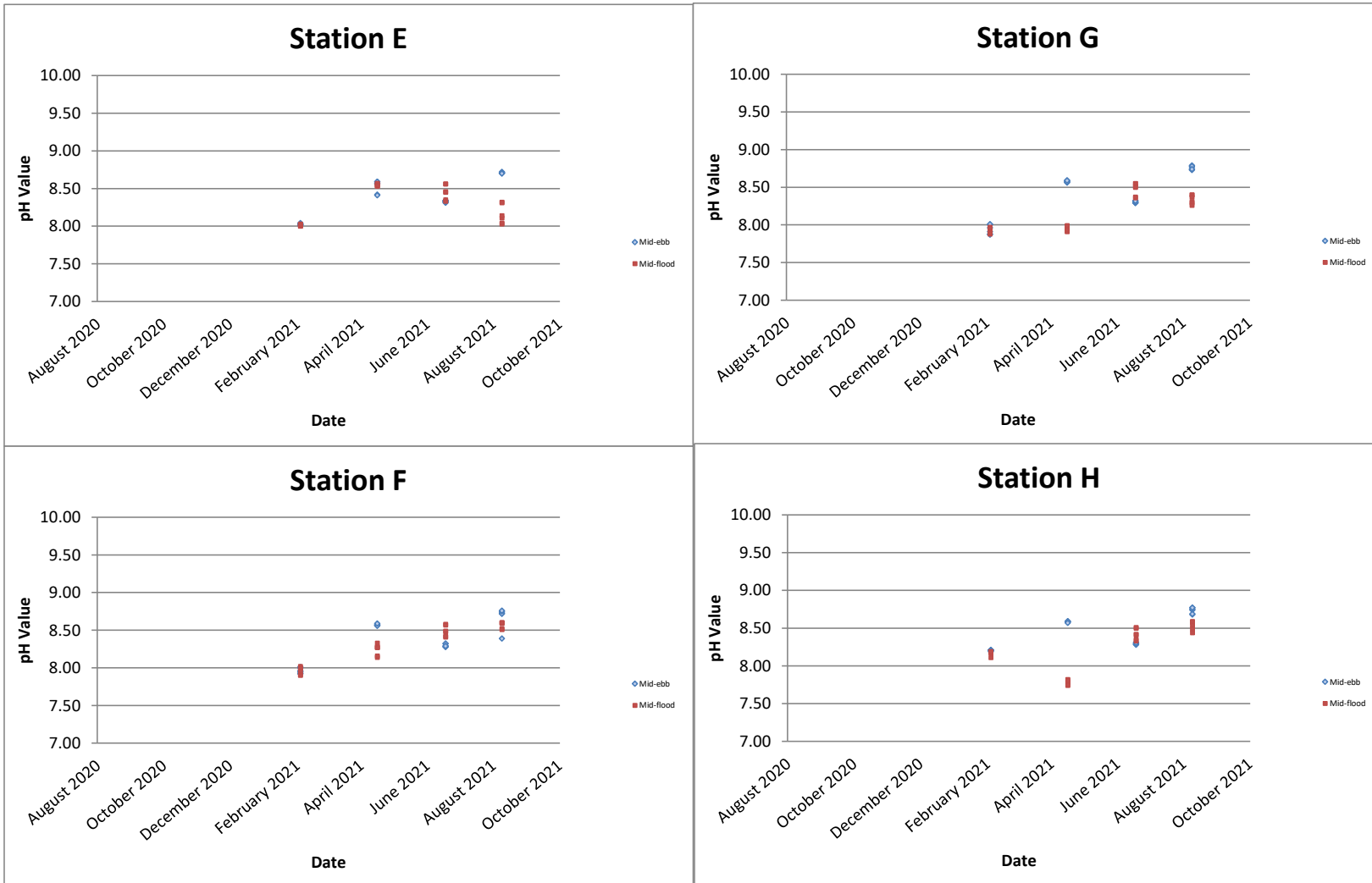


Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840072) - Continued										
HK2131237-020	D/S/E/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	94.4	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840073)										
HK2131237-040	G/M/E/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	95.2	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840074)										
HK2131237-040	G/M/E/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	95.4	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840075)										
HK2131237-060	B/B/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	91.4	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840076)										
HK2131237-060	B/B/F/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	92.0	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840077)										
HK2131237-080	F/S/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	95.9	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840078)										
HK2131237-080	F/S/F/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	95.0	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840079)										
HK2131237-096	H/B/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	95.0	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3840080)										
HK2131237-096	H/B/F/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	90.0	----	75.0	125	----	----

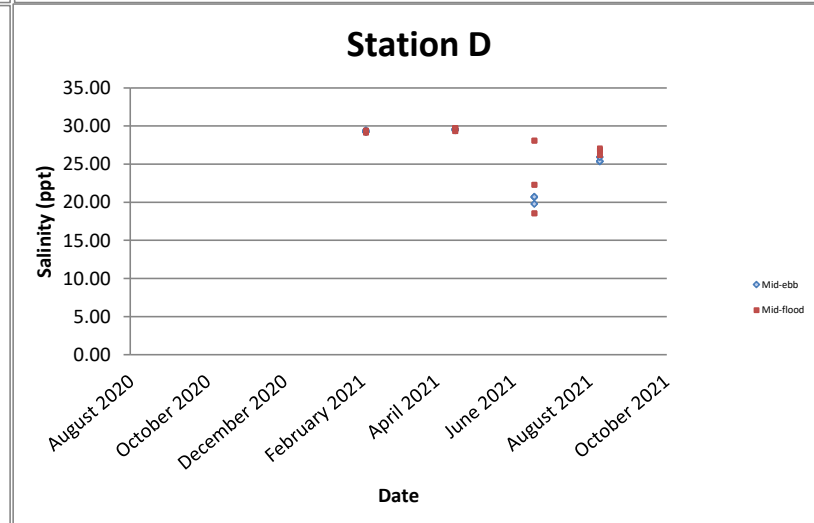
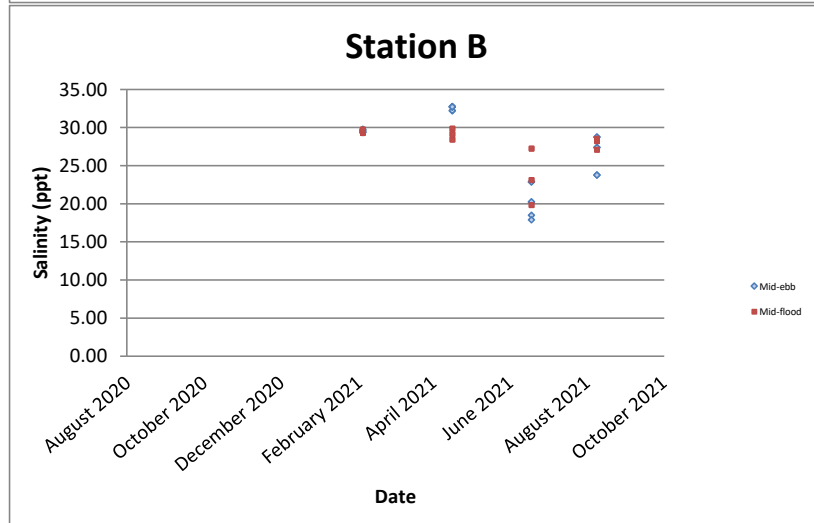
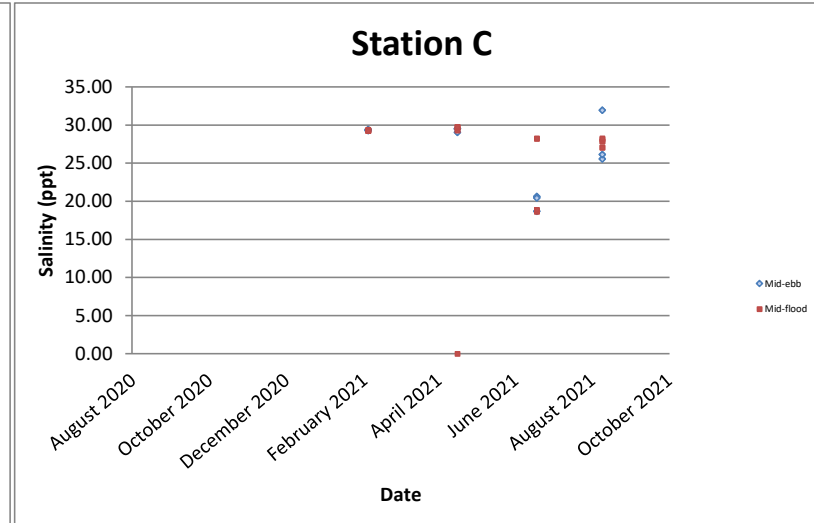
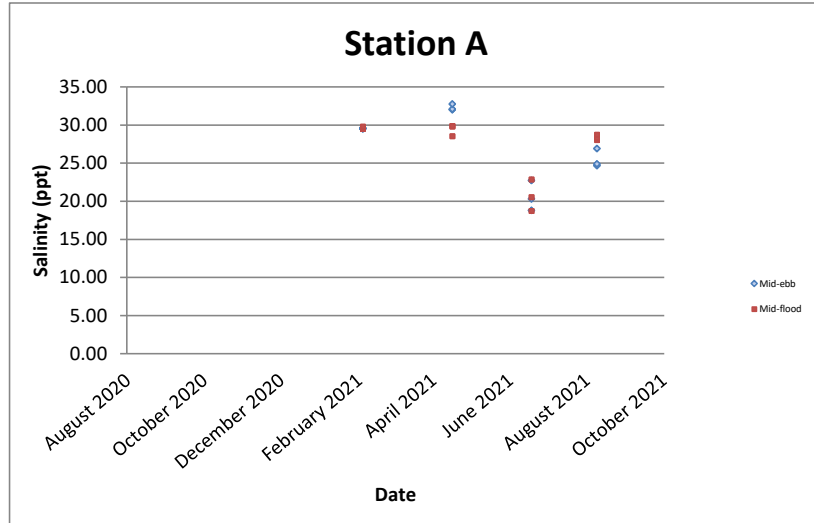
pH value



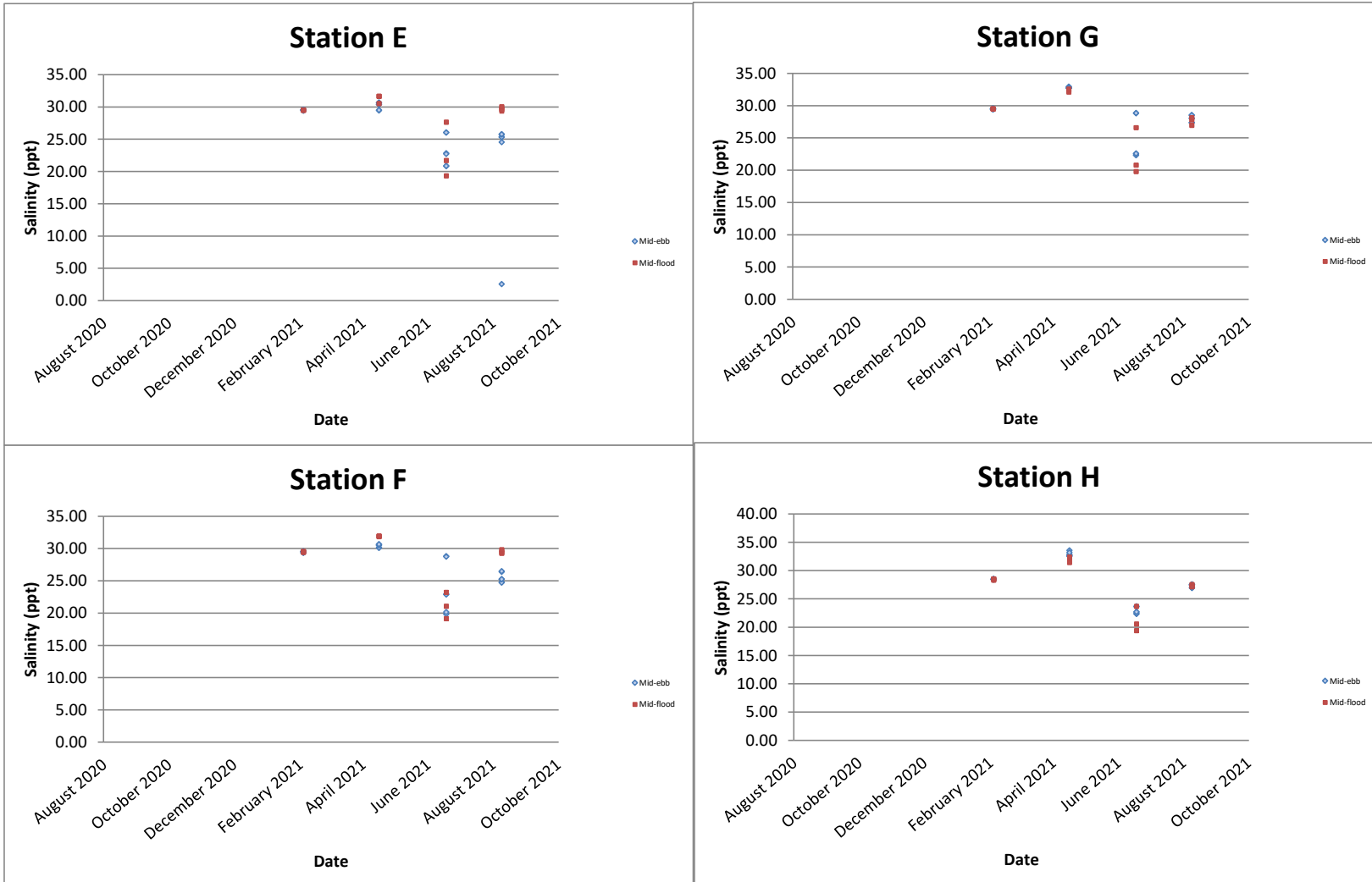
pH value



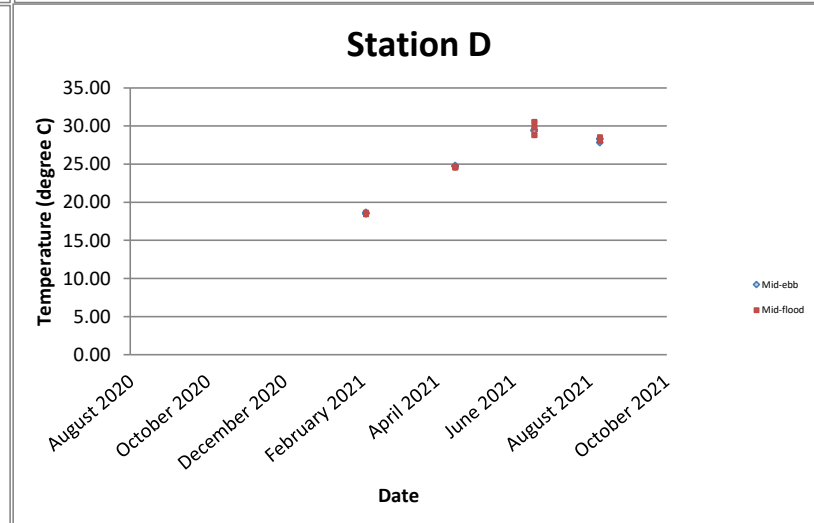
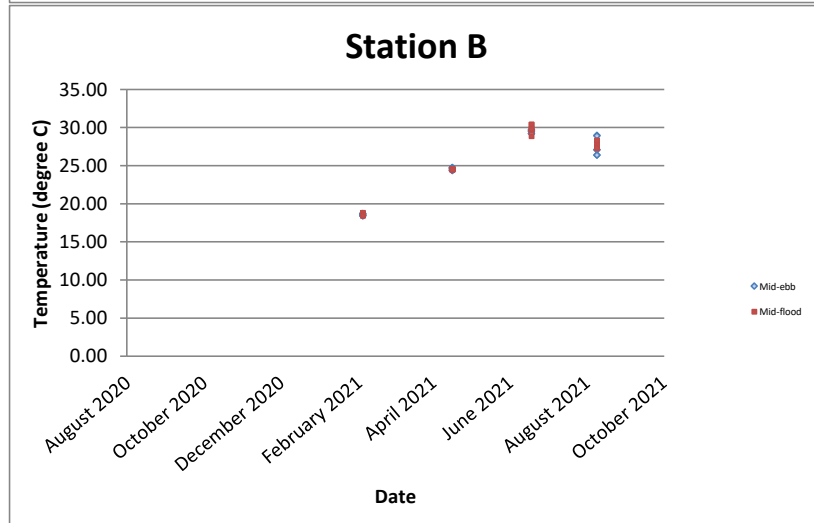
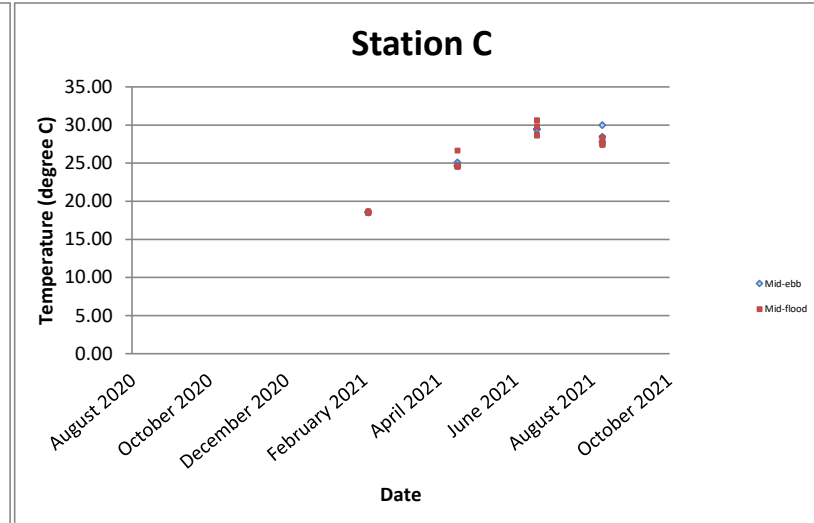
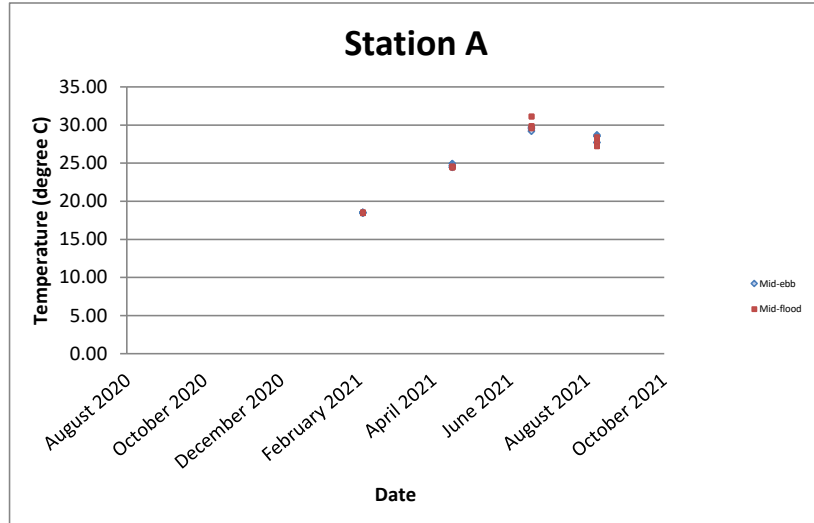
Salinity (ppt)



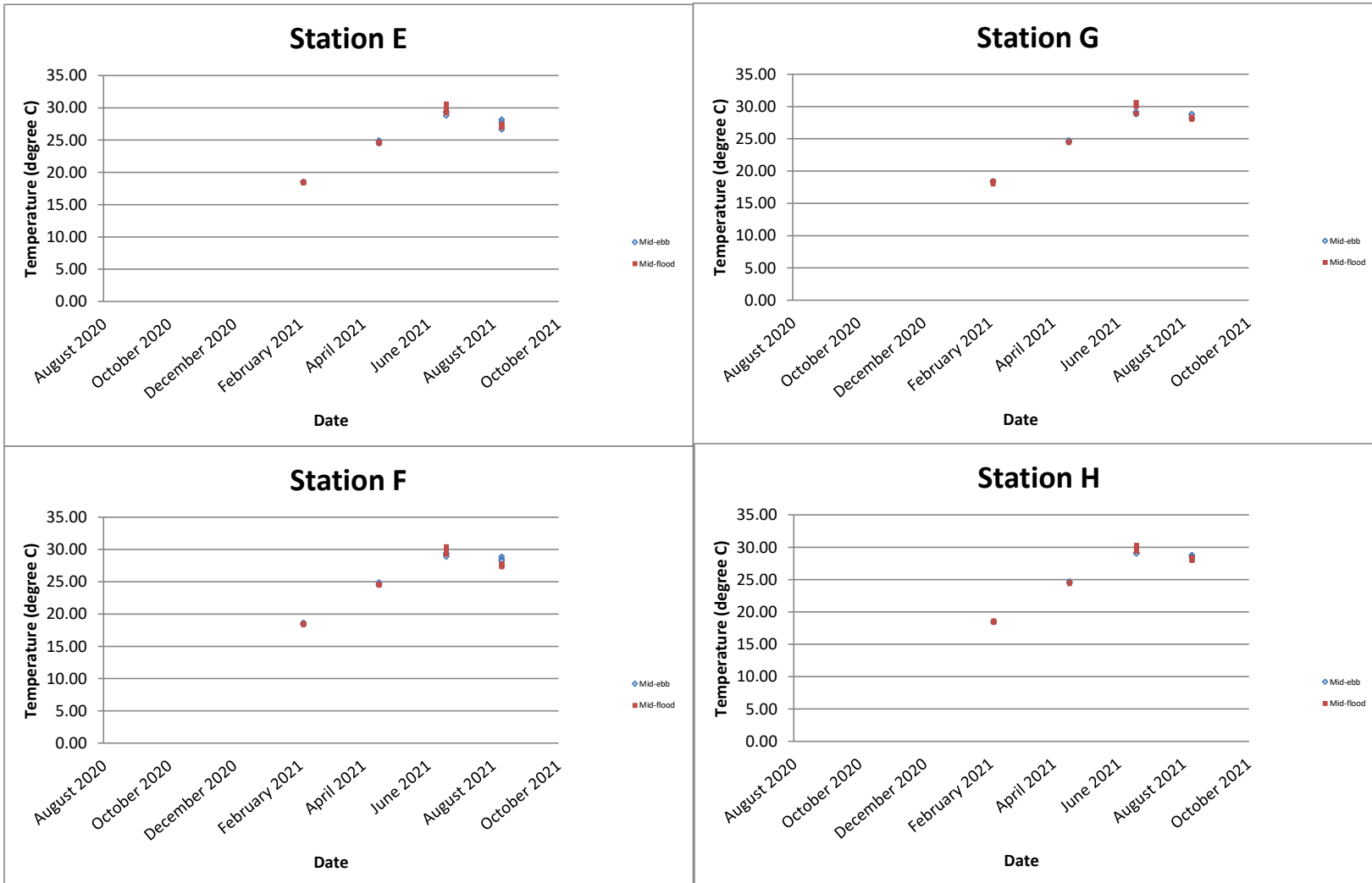
Salinity (ppt)



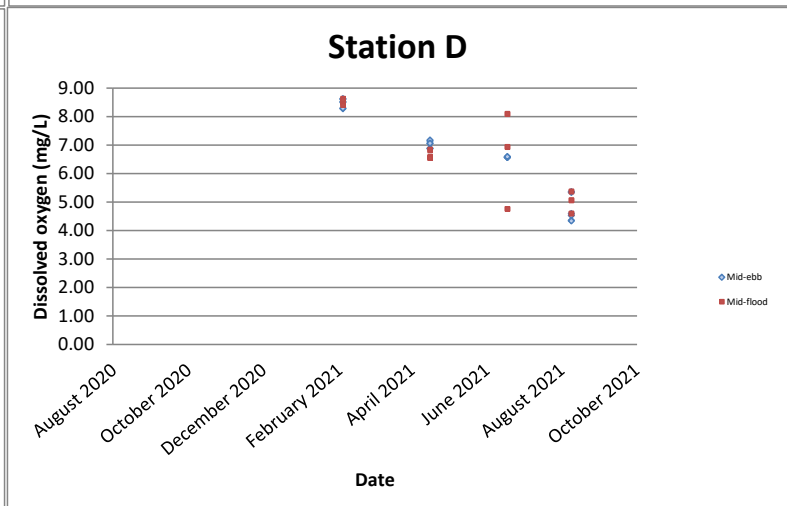
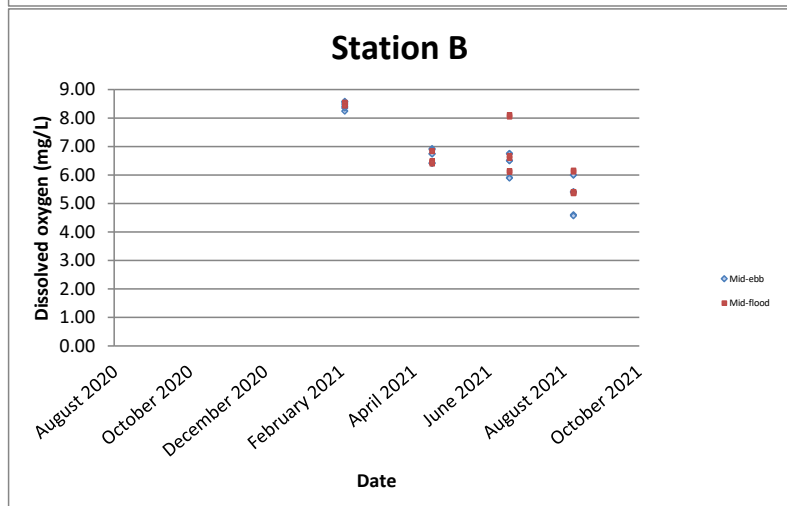
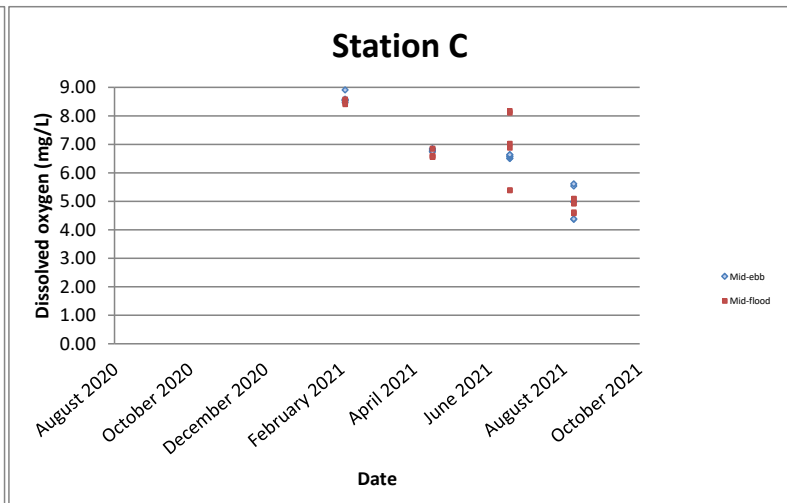
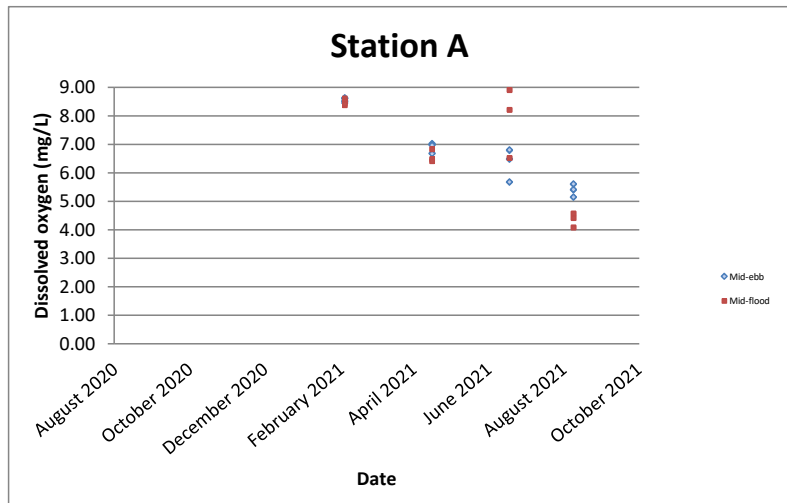
Temperature (degree C)



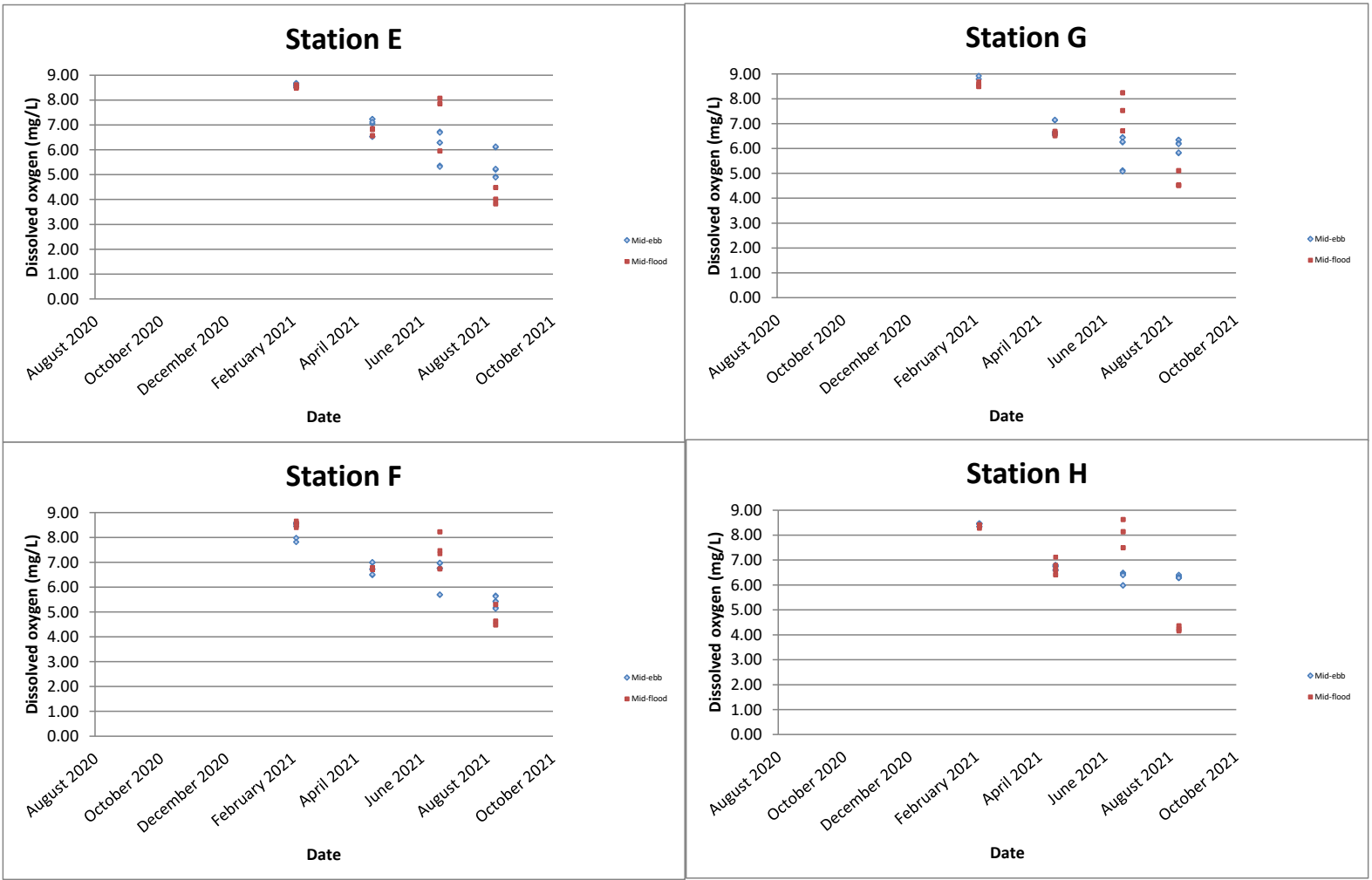
Temperature (degree C)



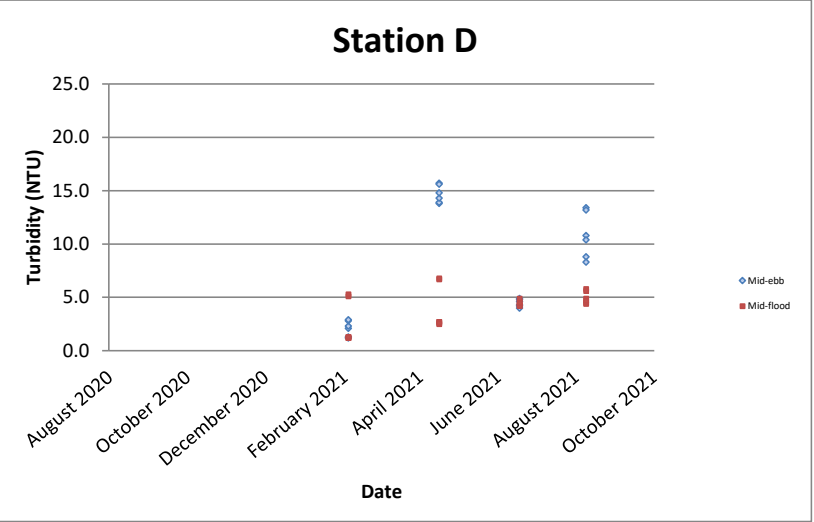
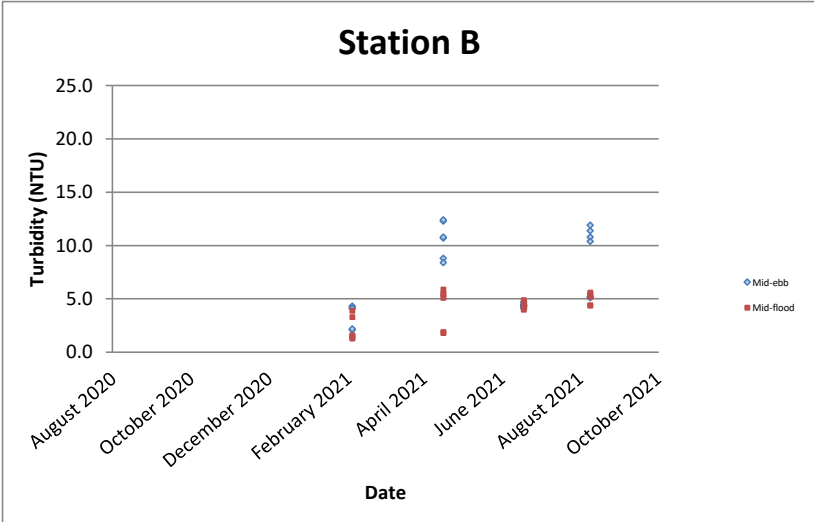
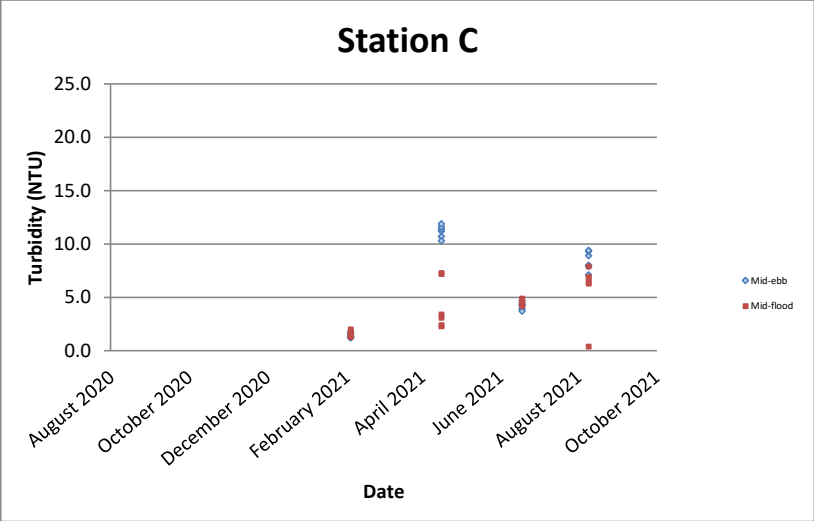
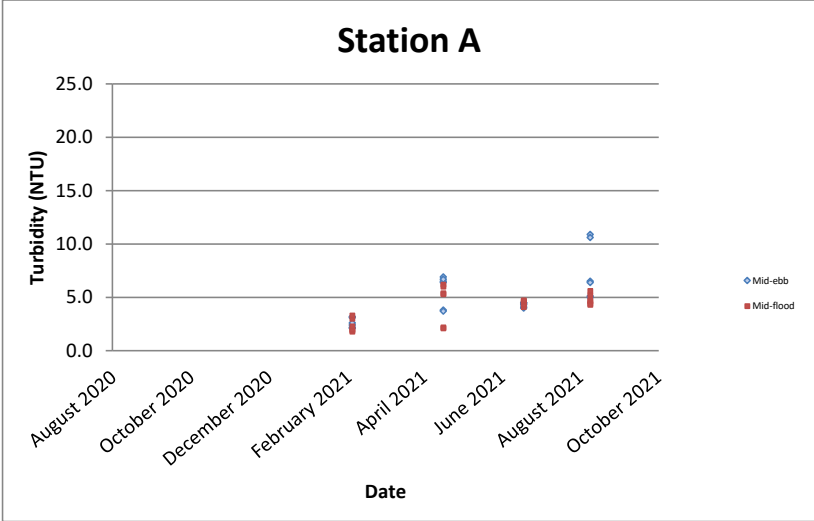
Dissolved oxygen (mg/L)



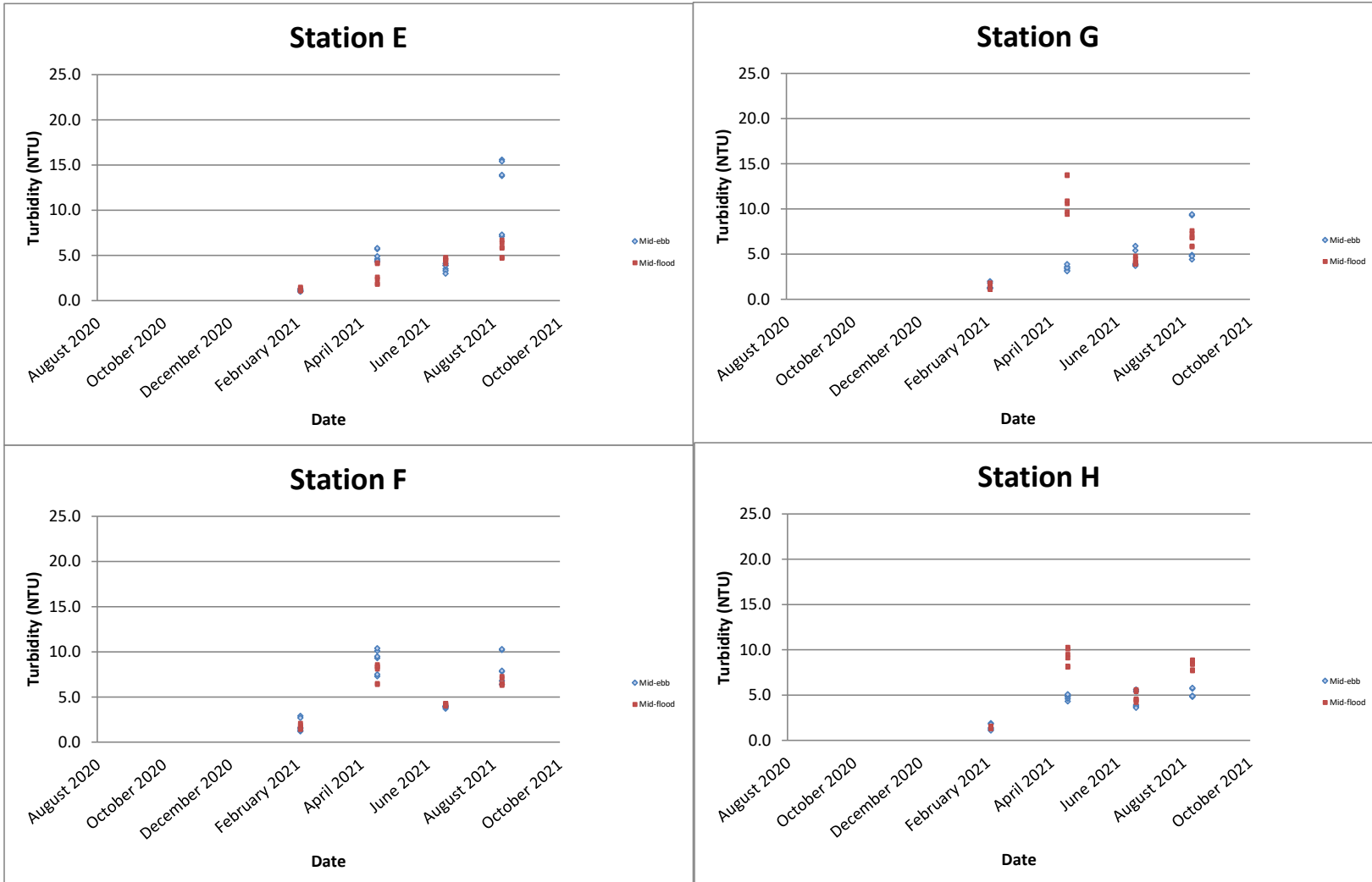
Dissolved oxygen (mg/L)



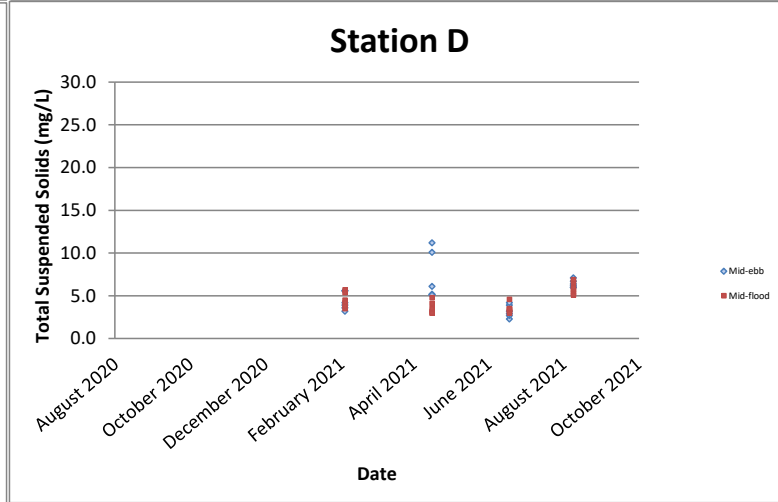
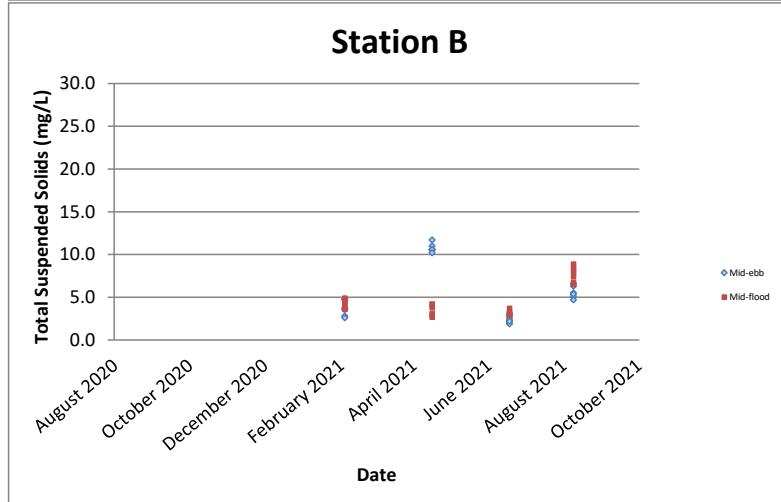
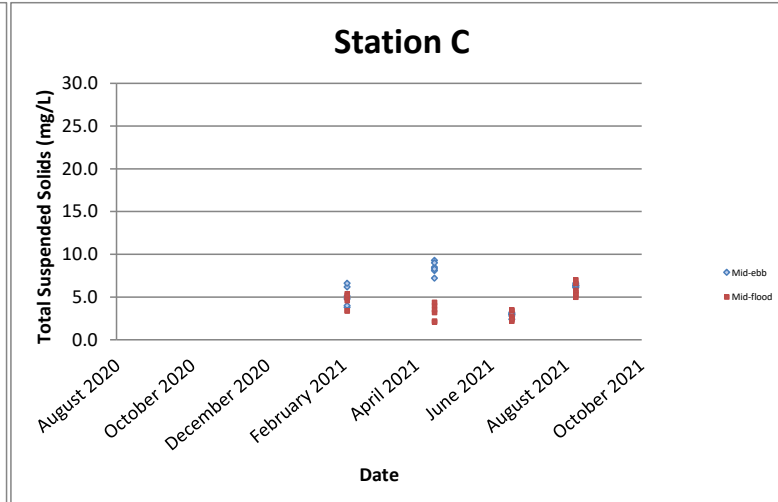
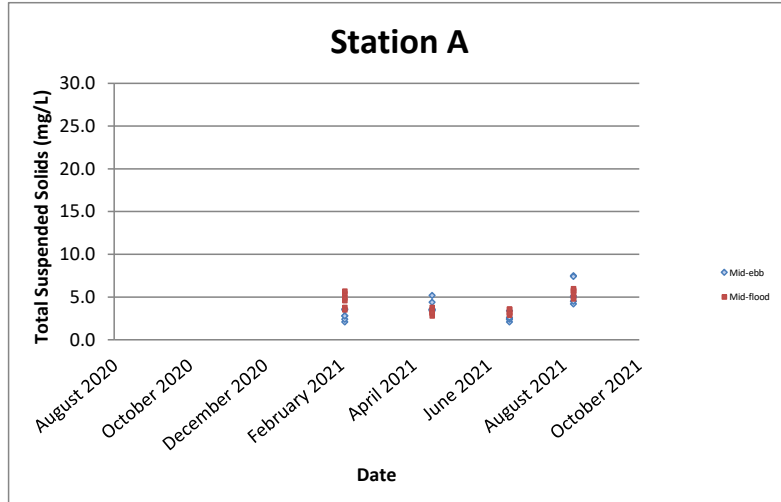
Turbidity (NTU)



Turbidity (NTU)

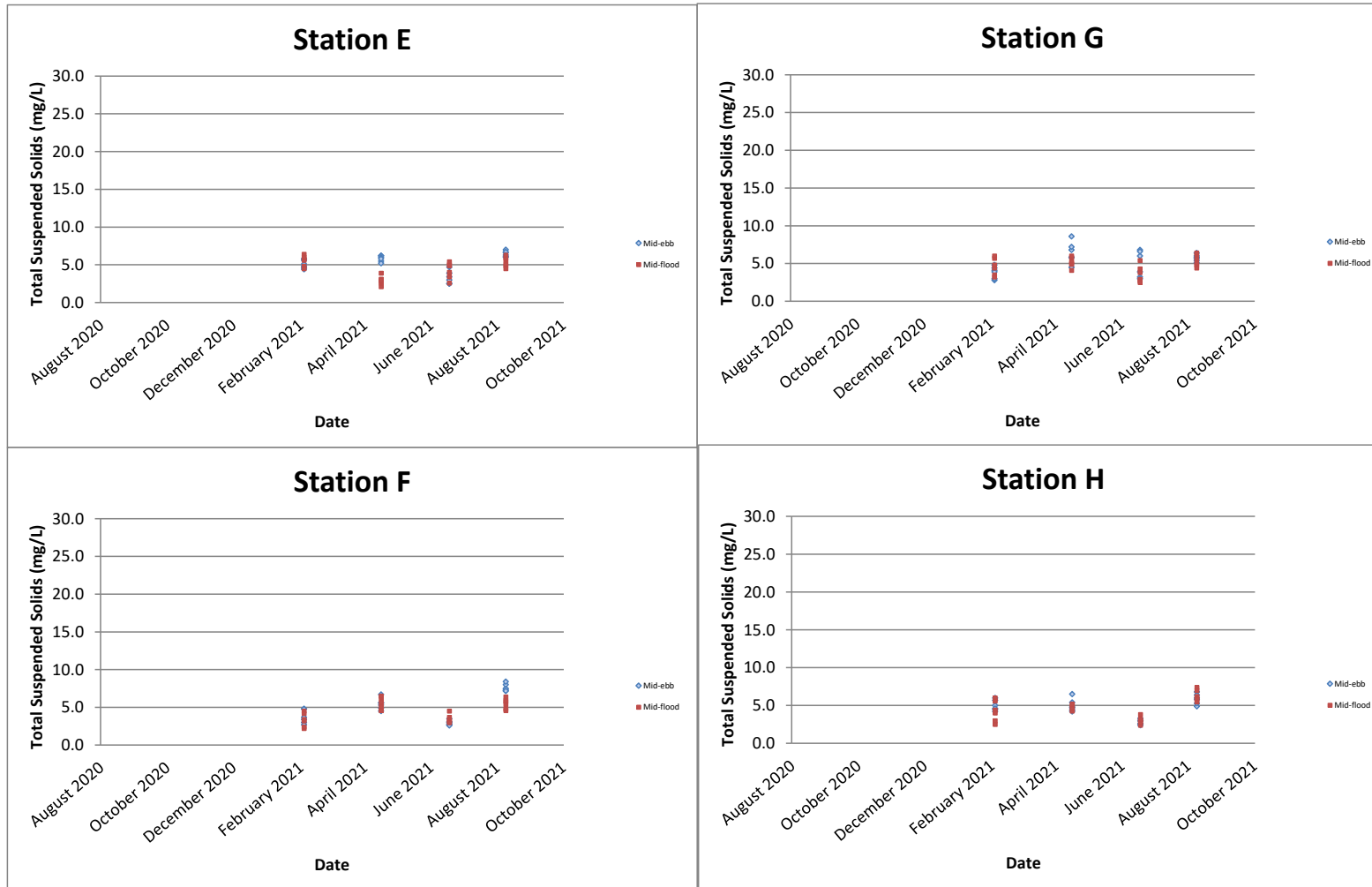


Total Suspended Solids (mg/L)



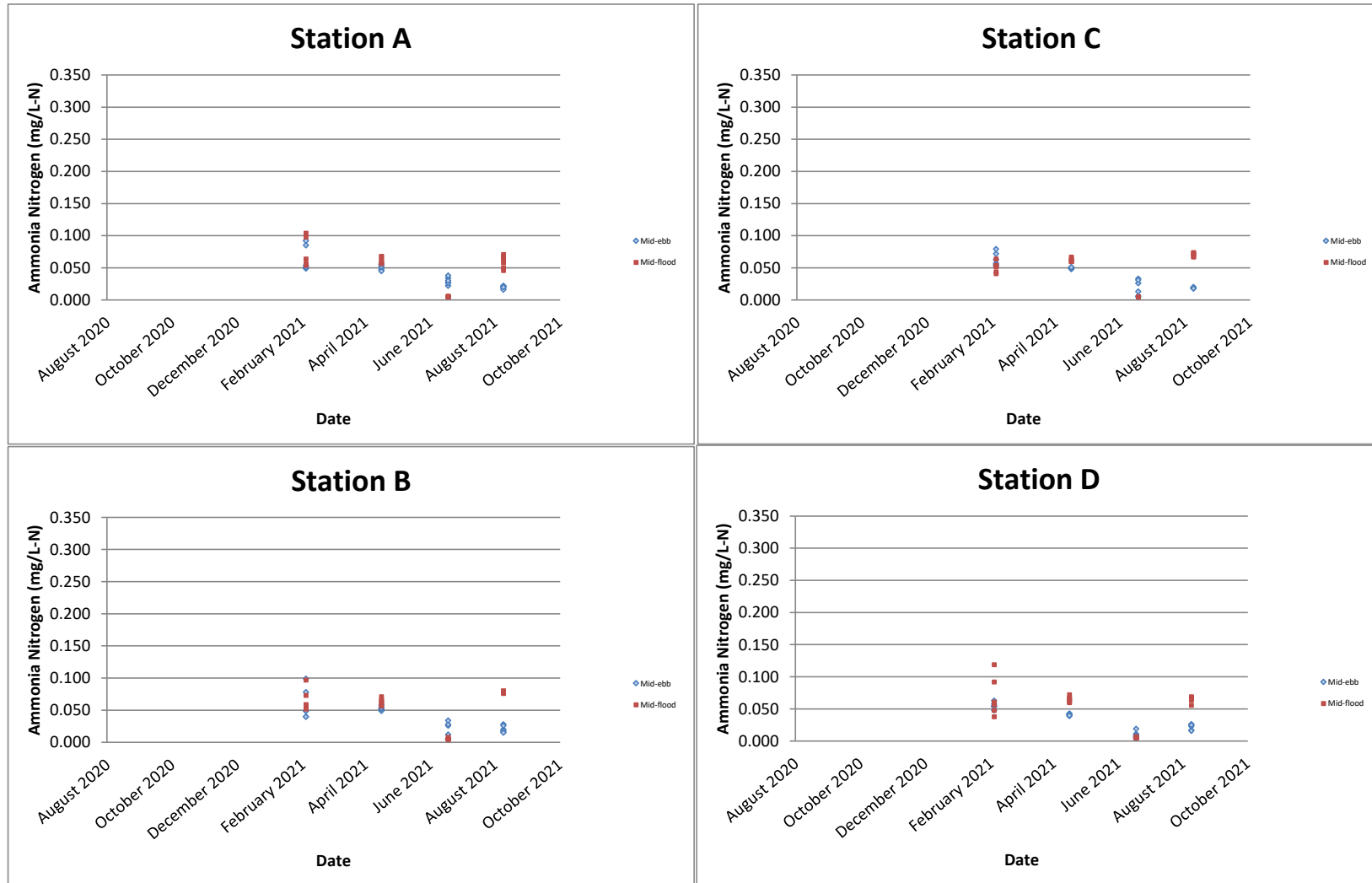
Remark: All below the Limit of Report sample results (<0.5 mg/L) for Total Suspended Solids is regarded as 0.5 mg/L in graphical presentation.

Total Suspended Solids (mg/L)



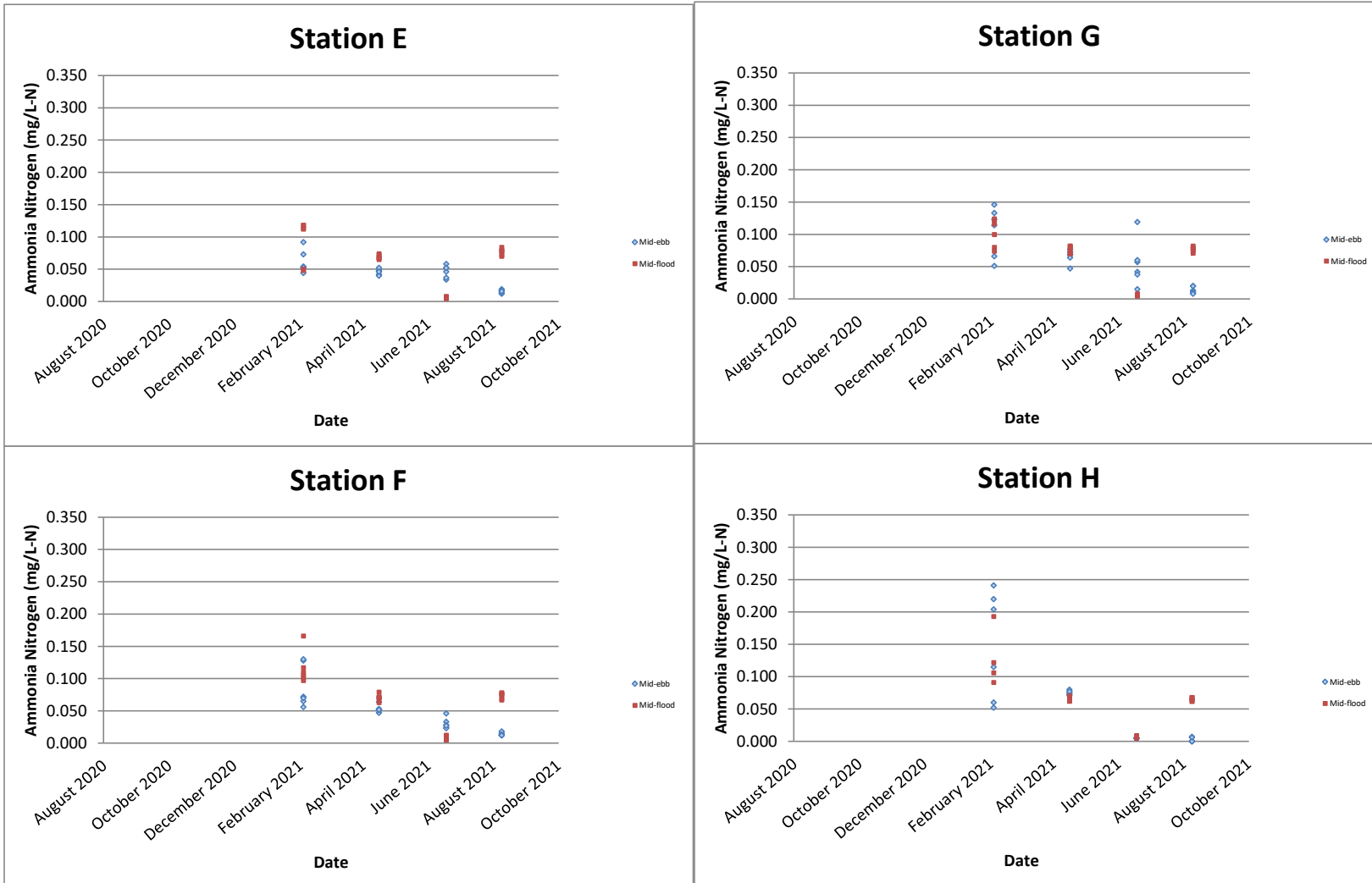
Remark: All below the Limit of Report sample results (<0.5 mg/L) for Total Suspended Solids is regarded as 0.5 mg/L in graphical presentation.

Ammonia Nitrogen (mg/L-N)



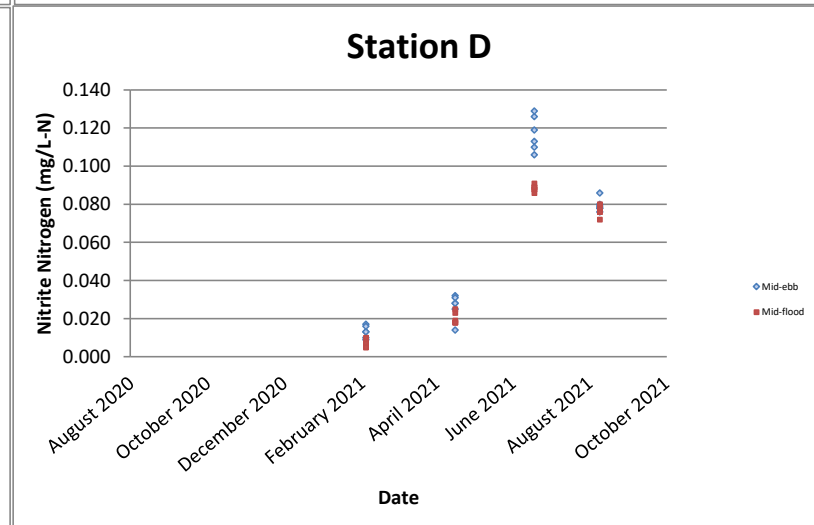
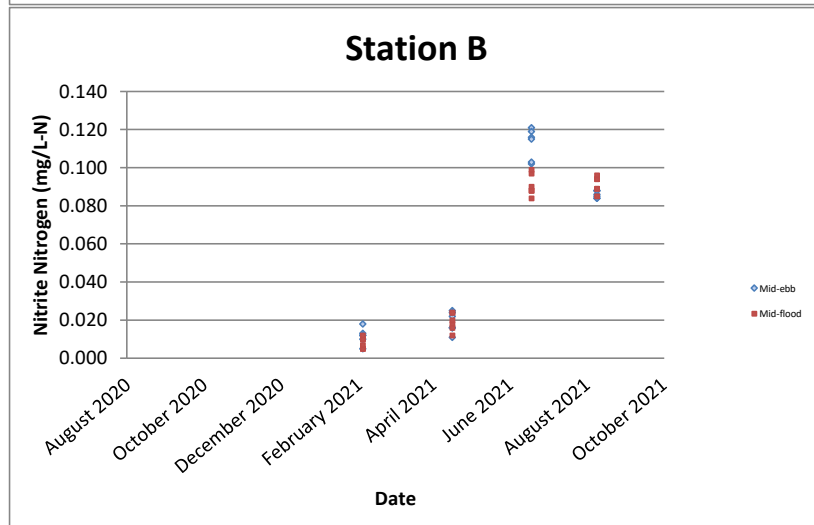
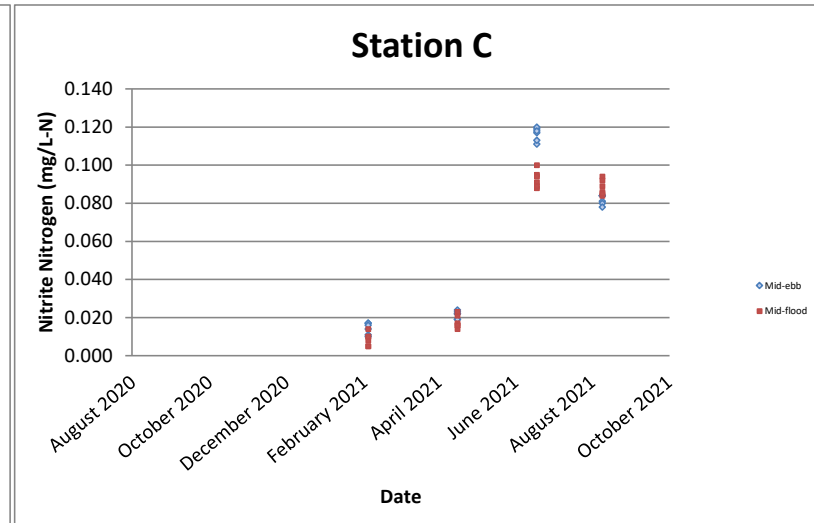
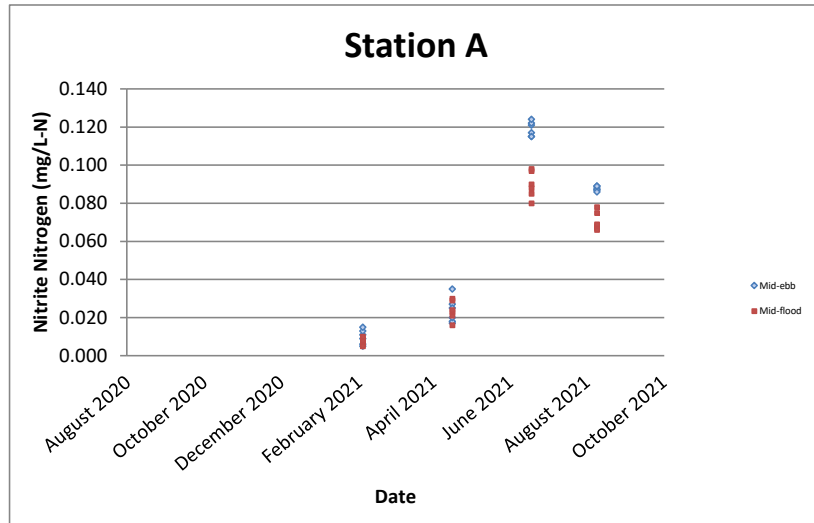
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Ammonia Nitrogen (mg/L-N)



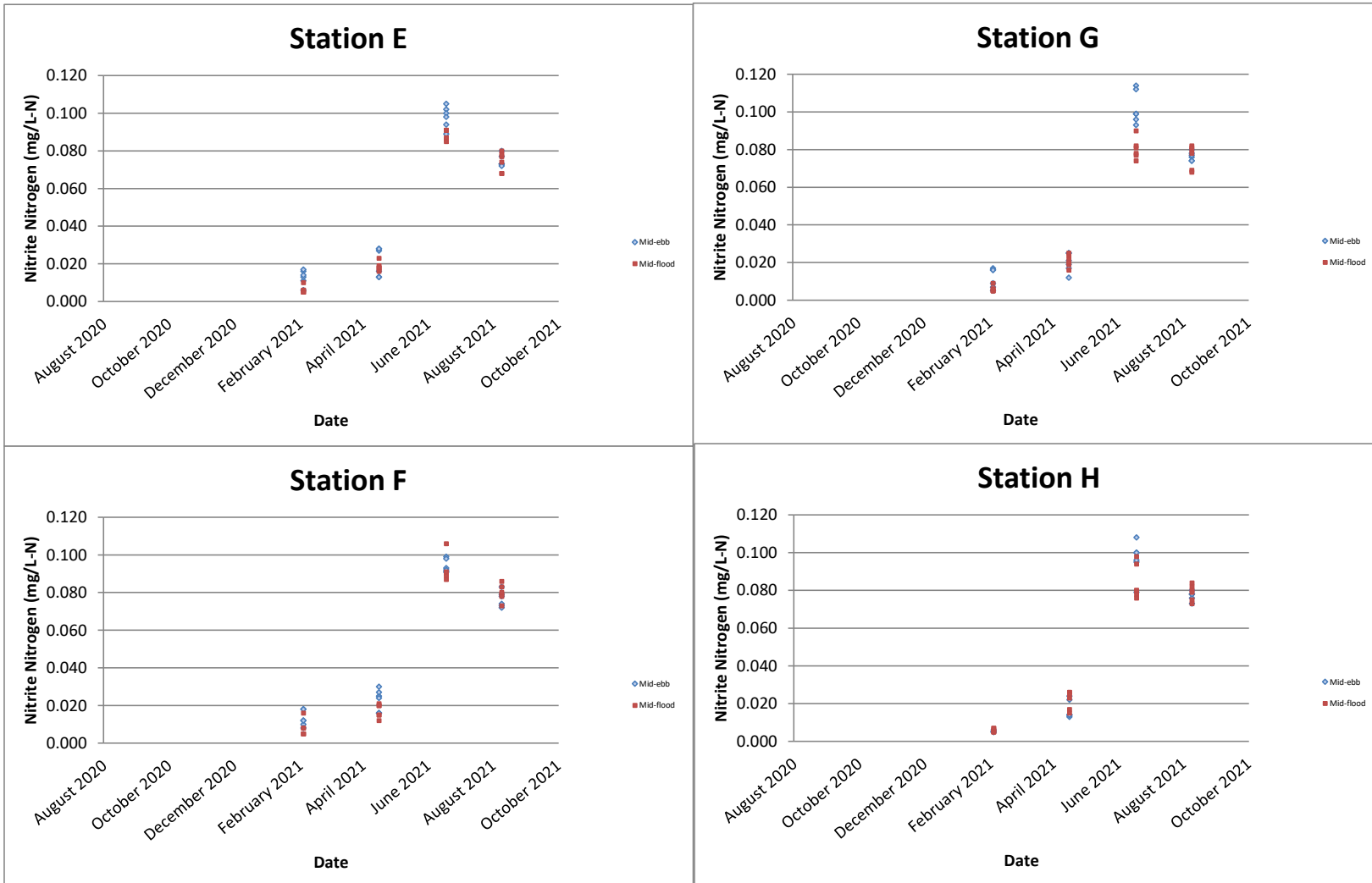
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Nitrite Nitrogen (mg/L-N)



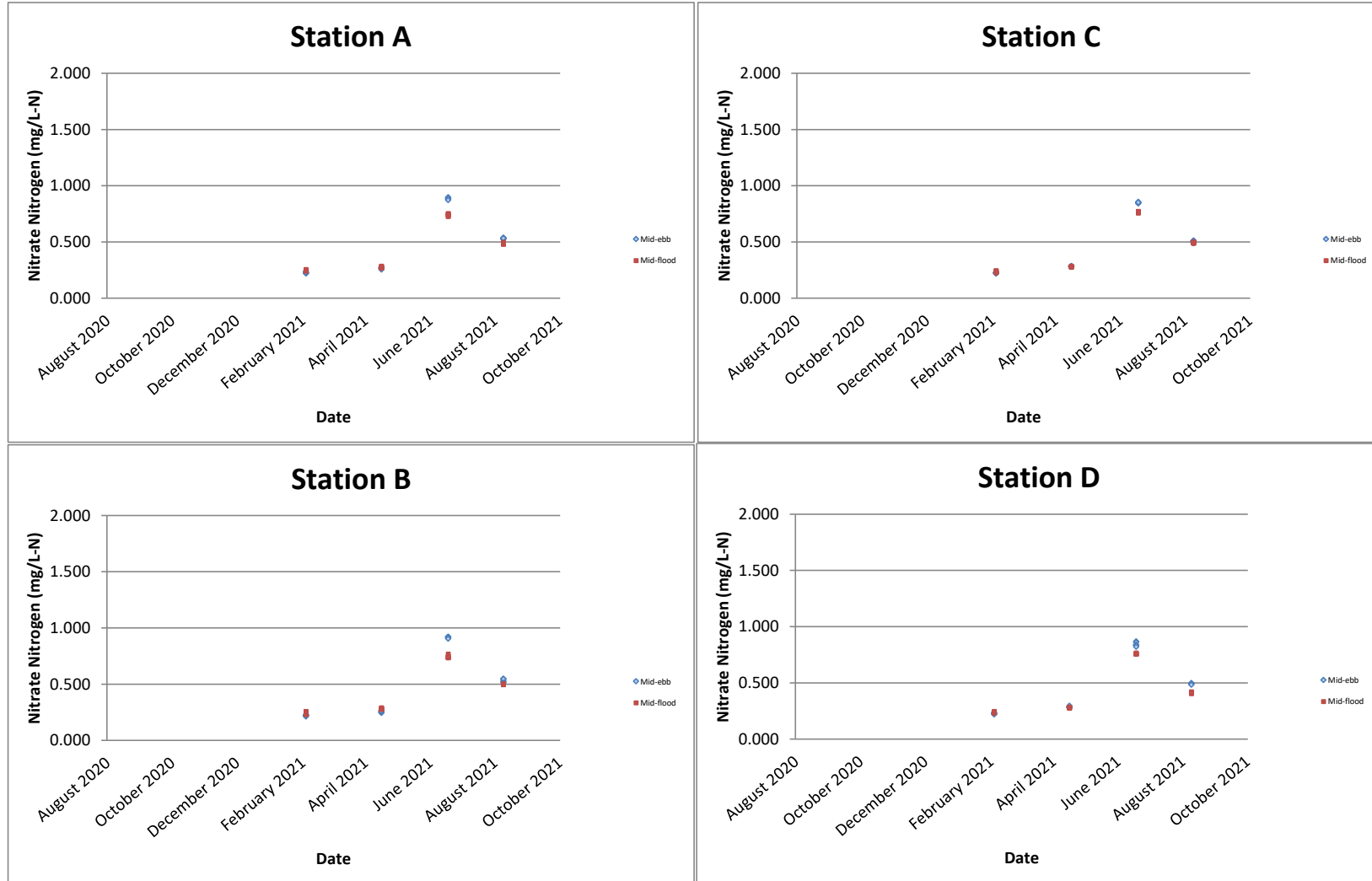
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Nitrite Nitrogen (mg/L-N)



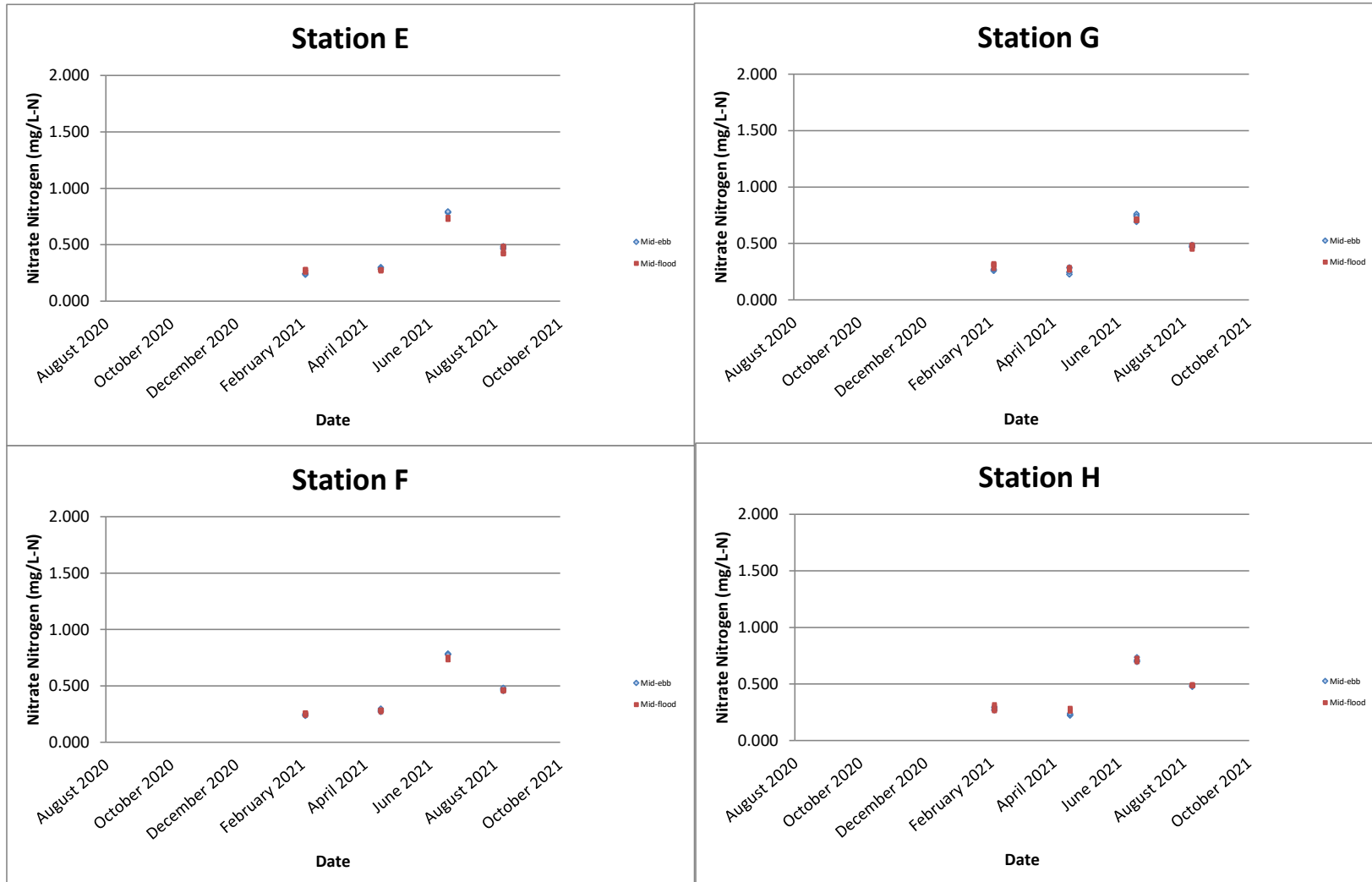
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Nitrate Nitrogen (mg/L-N)



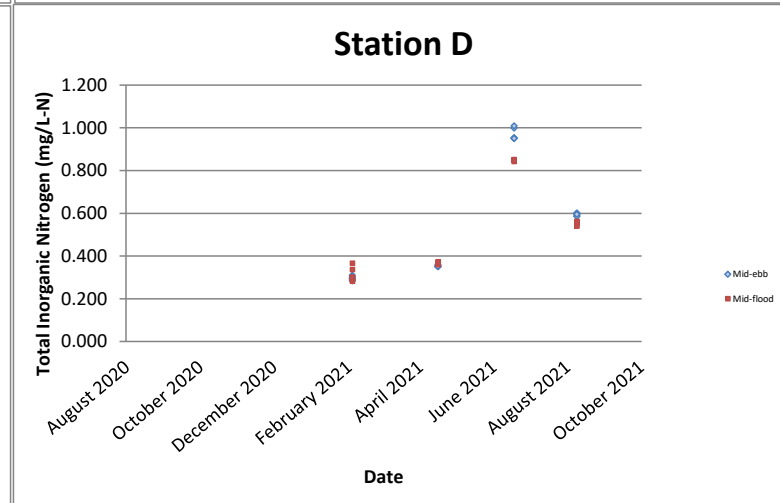
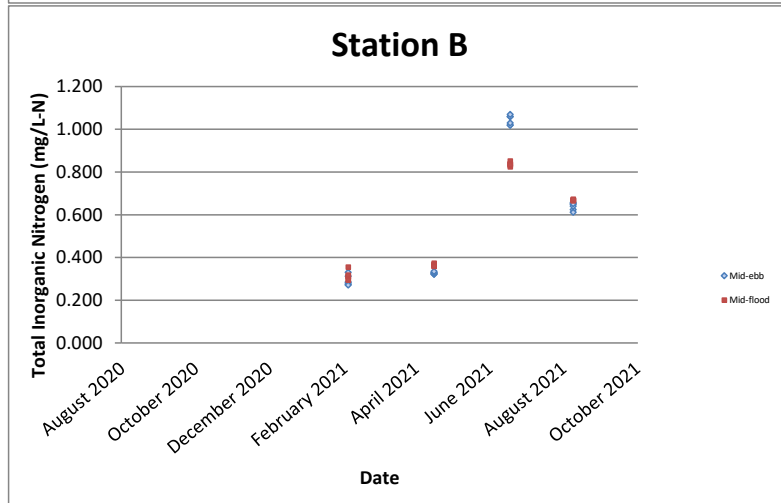
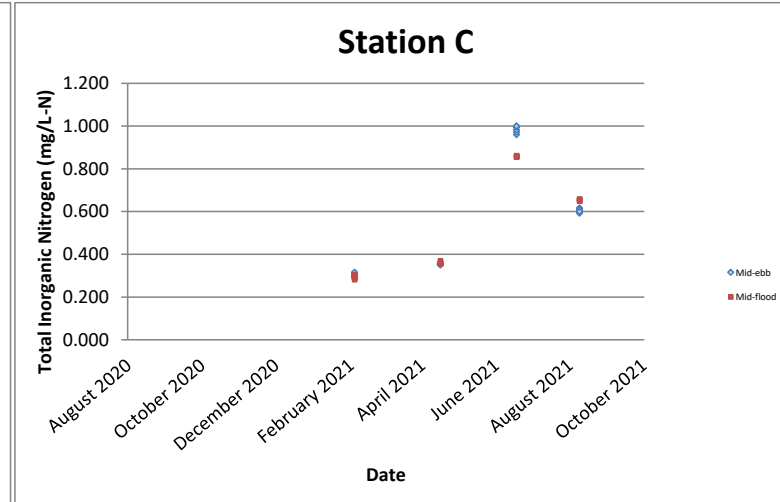
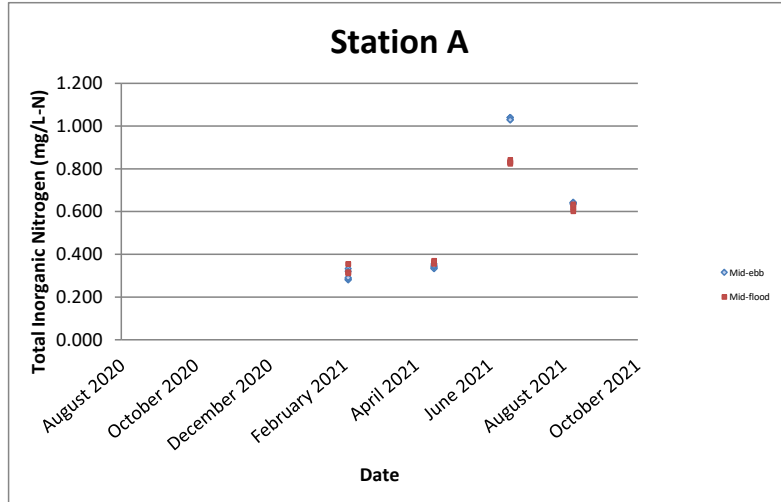
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Nitrate Nitrogen (mg/L-N)



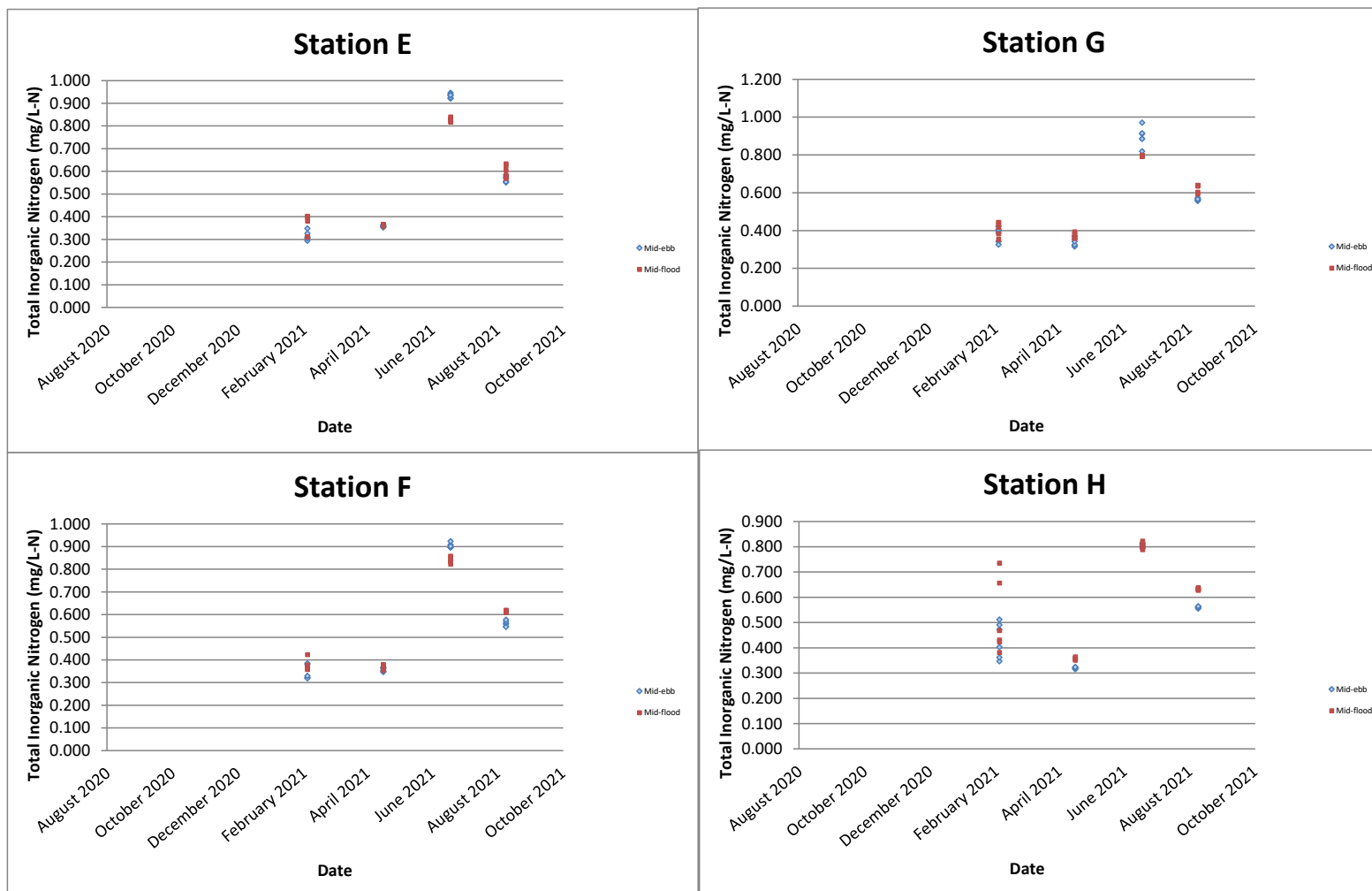
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Total Inorganic Nitrogen (mg/L-N)



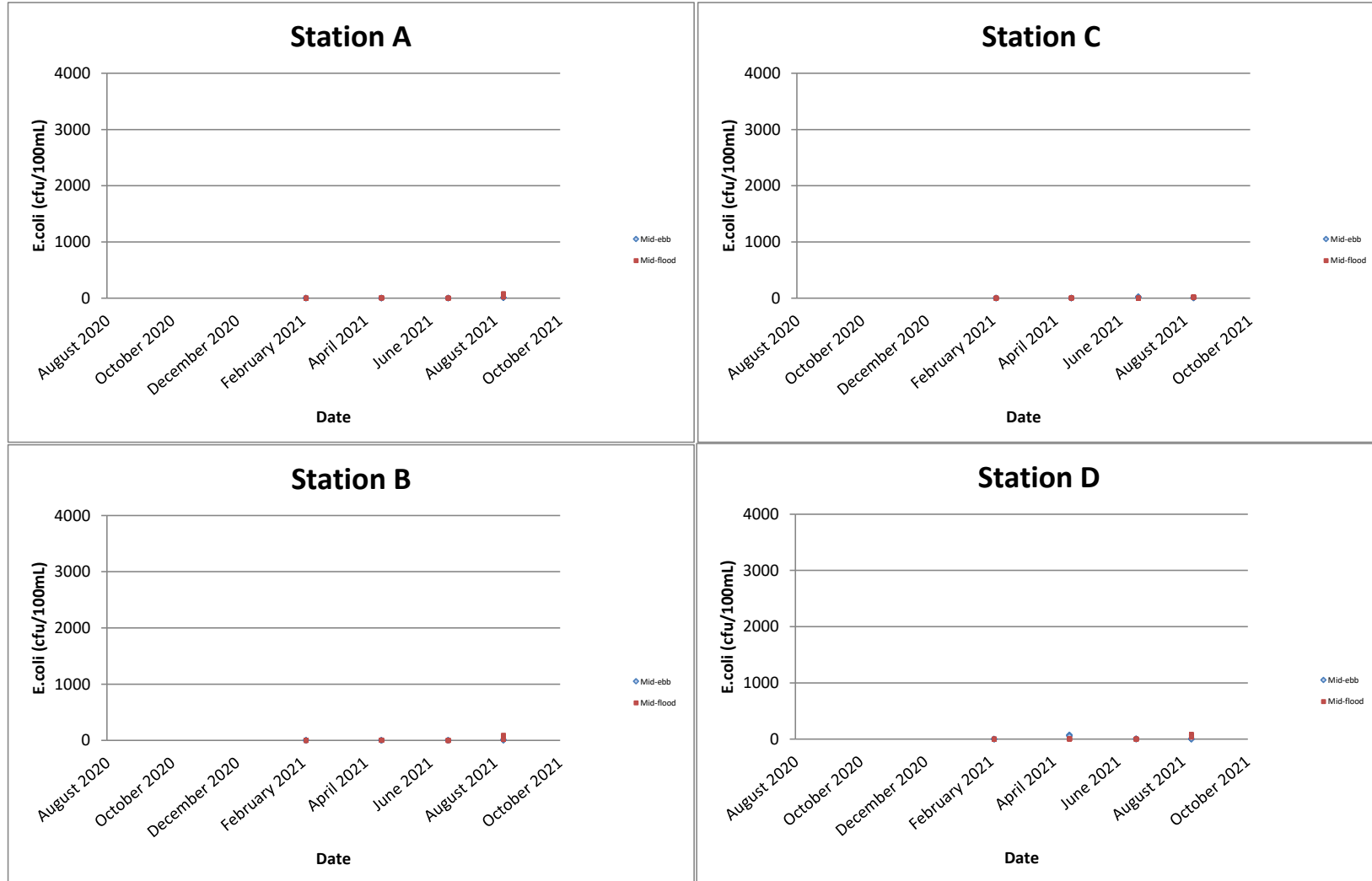
Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

Total Inorganic Nitrogen (mg/L-N)



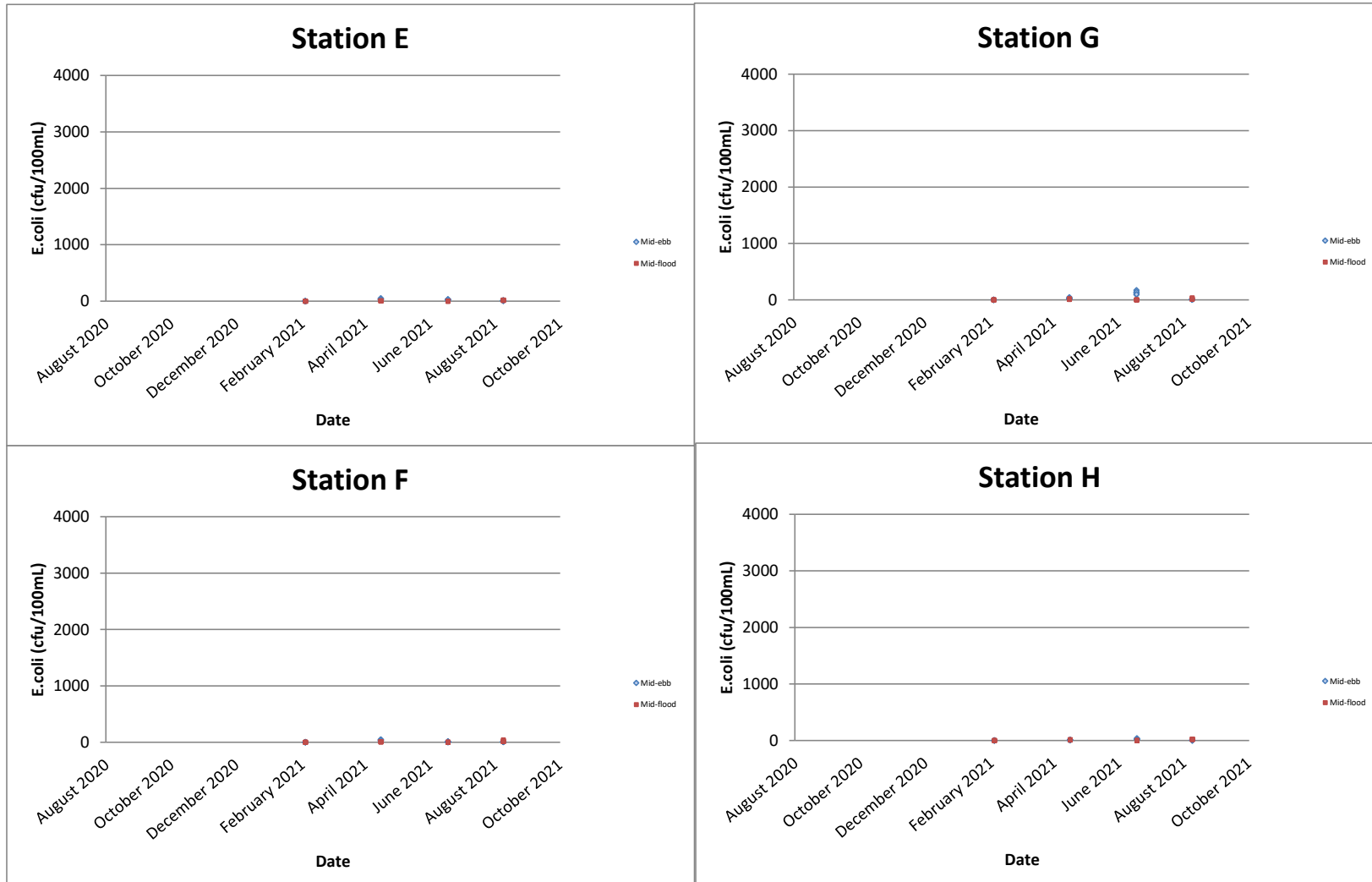
Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

E.coli (cfu/100mL)



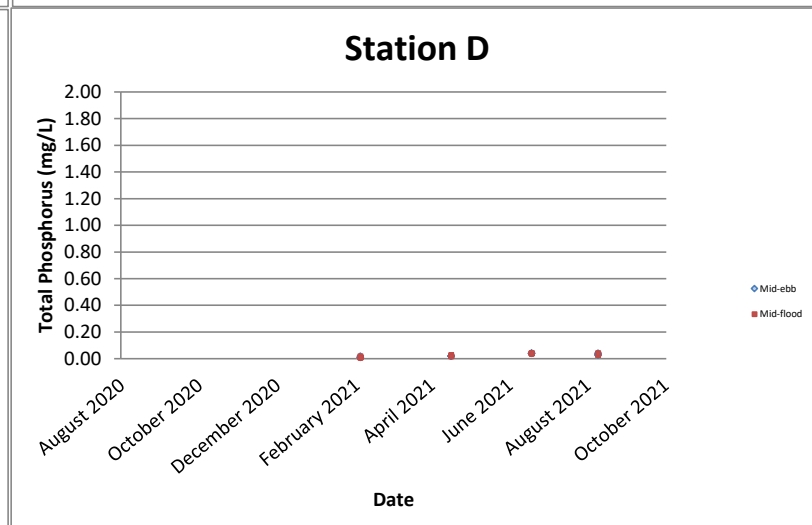
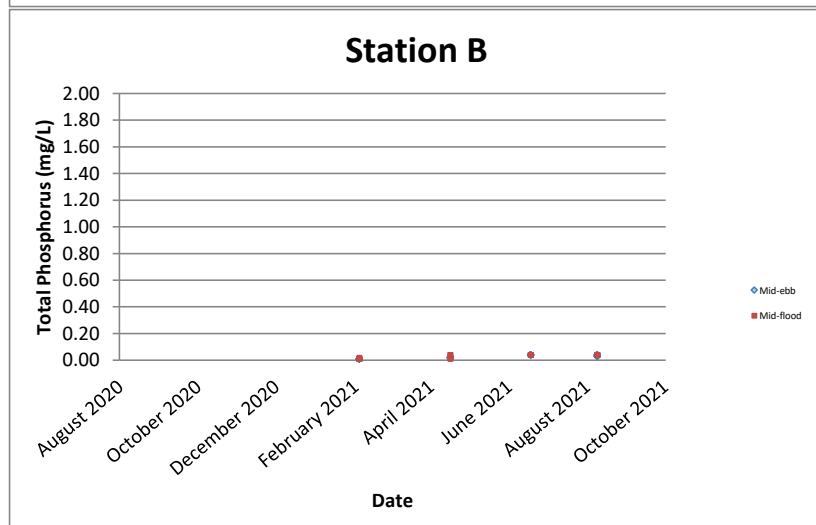
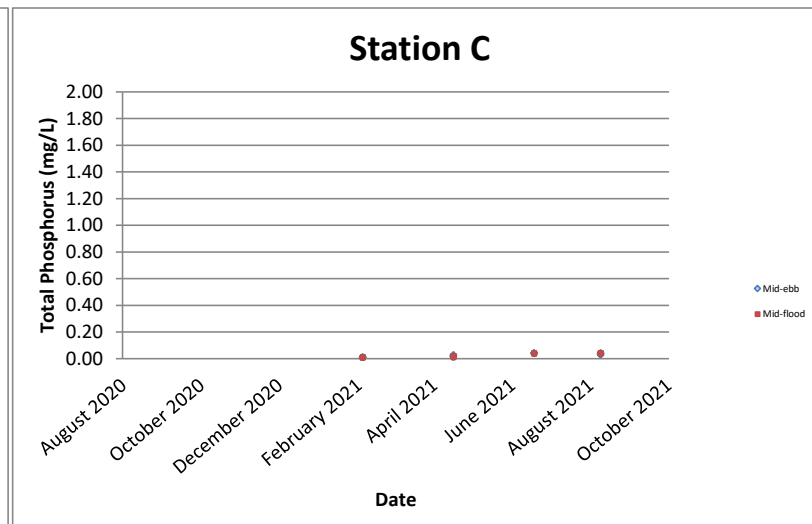
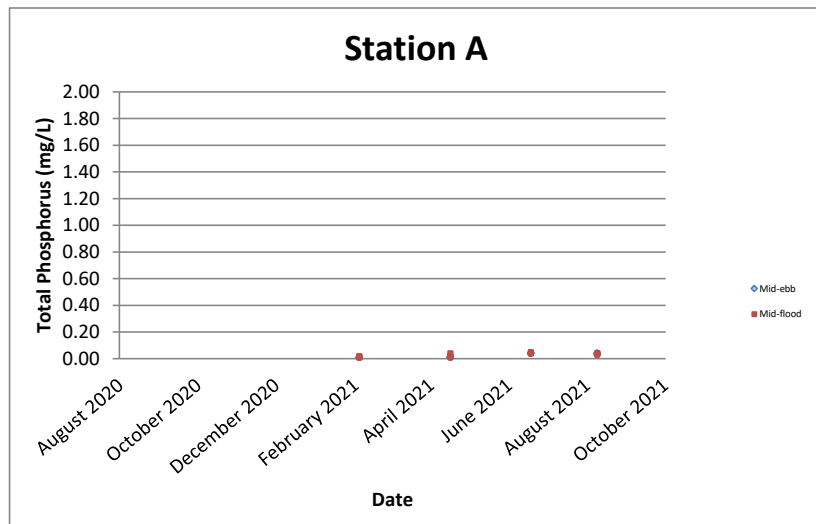
Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 1 CFU/100mL in graphical presentation.

E.coli (cfu/100mL)



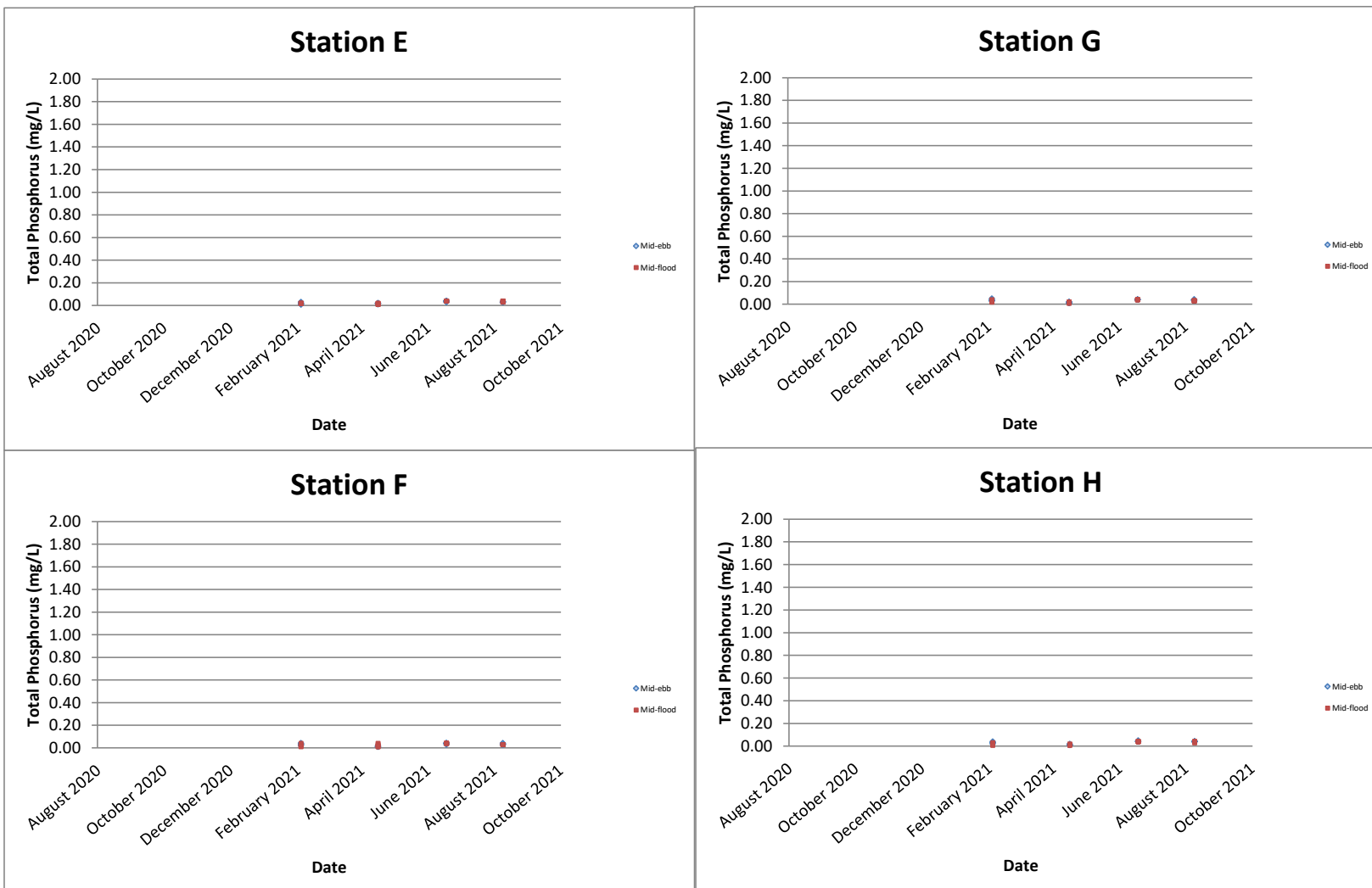
Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 1 CFU/100mL in graphical presentation.

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



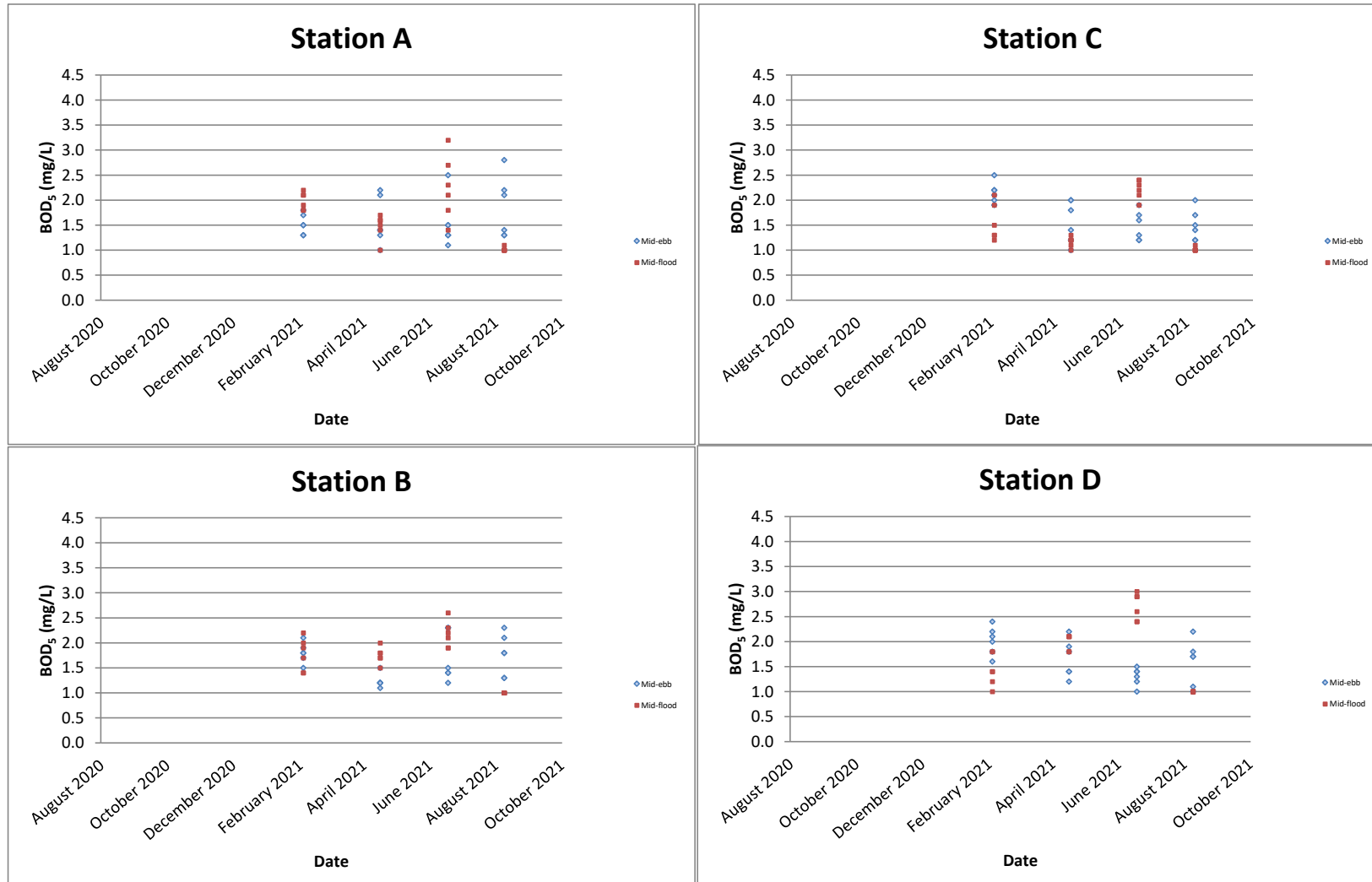
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Total Phosphorus (soluble and particulate) (mg/L)



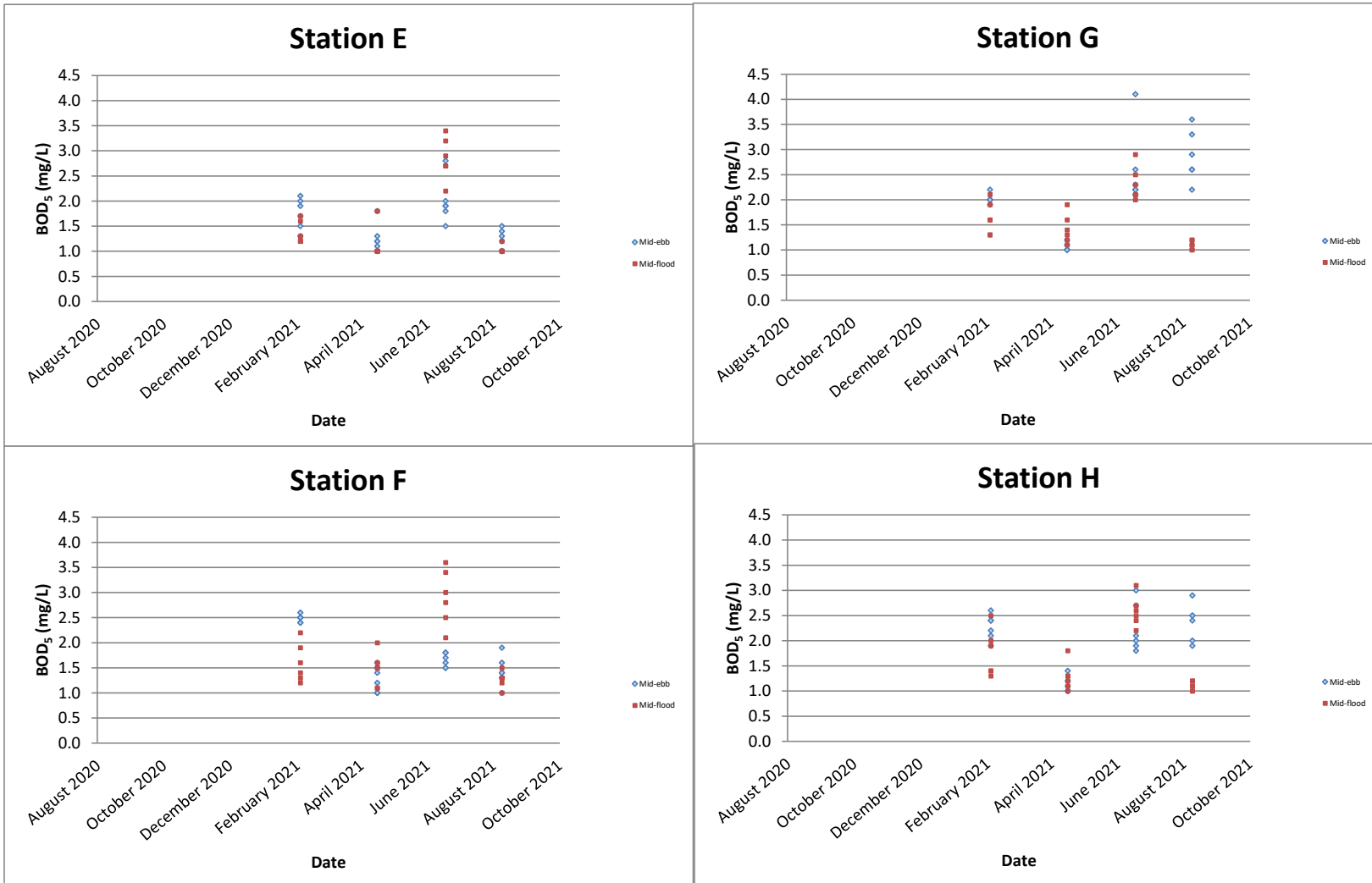
Remark: All below the Limit of Report sample results (<0.01 mg/L) for Total Phosphorus is regarded as 0.01 mg/L in graphical presentation.

BOD₅ (mg/L)



Remark: All below the Limit of Report sample results (<1.0 mg/L) for BOD₅ is regarded as 1.0 mg/L in graphical presentation.

BOD₅ (mg/L)



Remark: All below the Limit of Report sample results (<1.0 mg/L) for BOD₅ is regarded as 1.0 mg/L in graphical presentation.

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Website : www.fugro.com



Report No.: 0041/17/ED/0642A

Appendix G

Tidal Data obtained from Ma Wan Marine Traffic Station

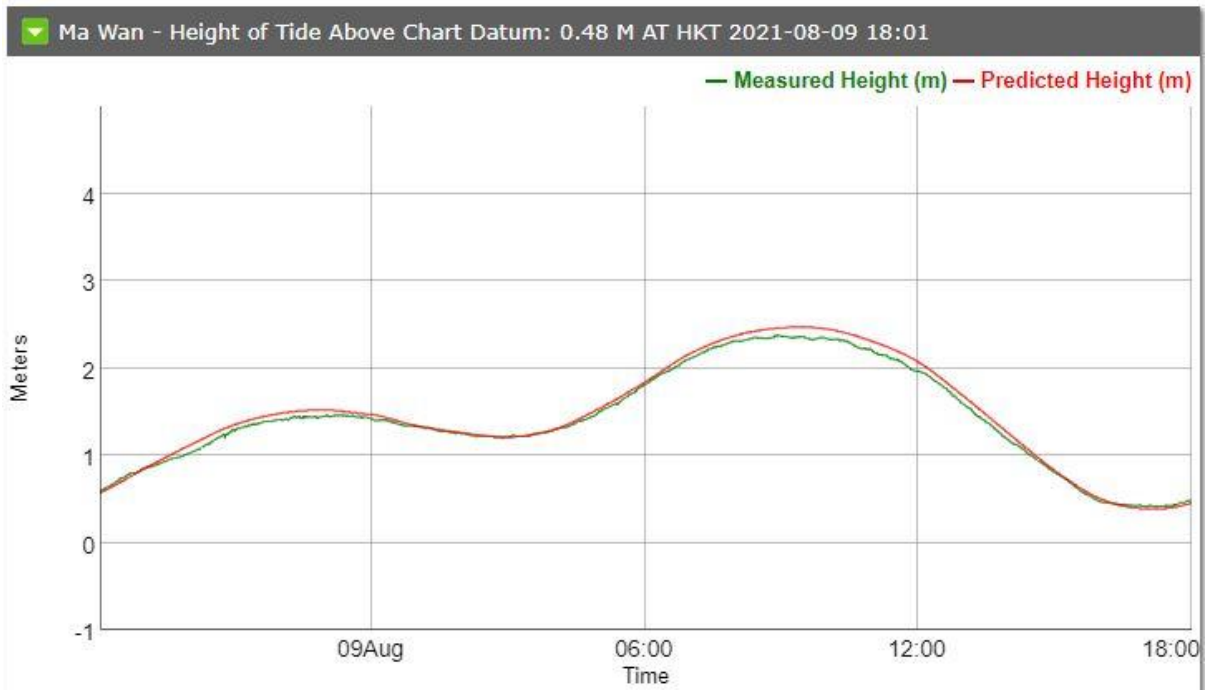
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Report No.: 0041/17/ED/0642A

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	9/8/2021	Fine	Moderate	10:50	8.4	1.3	960	458	<0.10	27.8	25.1	35.1	0.10	16.2	81.8	12.8	0.20
B	9/8/2021	Fine	Moderate	10:31	8.2	7.4	1350	531	<0.10	31.6	32.8	38.0	0.10	18.9	98.0	10.9	0.28
C	9/8/2021	Fine	Moderate	10:14	8.2	10.0	1300	545	<0.10	37.8	34.8	43.1	0.10	22.9	111	11.6	0.29
D	9/8/2021	Fine	Moderate	10:00	8.2	9.1	1360	558	<0.10	33.4	35.6	43.5	0.12	20.2	106	11.5	0.32
E	9/8/2021	Fine	Moderate	09:35	8.2	19.7	1580	541	<0.10	31.7	34.0	38.8	0.11	18.8	97.1	10.4	0.32
F	9/8/2021	Fine	Moderate	09:20	8.2	50.4	1650	601	<0.10	32.5	34.9	40.2	0.11	19.9	101	11.4	0.31
G	9/8/2021	Fine	Moderate	08:59	8.3	17.0	1680	601	0.10	42.9	48.7	46.3	0.14	25.2	129	12.2	0.42
H	9/8/2021	Fine	Moderate	08:45	8.3	4.7	1200	517	0.12	40.3	73.4	45.8	0.13	22.8	124	12.2	0.50

Monitoring Location	Date	Weather	Sea Condition	Time	Benthic Survey				
					Total Organic Carbon (%)	Particle Size Distribution			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)
A	9/8/2021	Fine	Moderate	10:50	0.77	9	46	25	20
B	9/8/2021	Fine	Moderate	10:31	1.04	0	18	49	33
C	9/8/2021	Fine	Moderate	10:14	1.10	0	6	56	38
D	9/8/2021	Fine	Moderate	10:00	1.07	0	5	56	39
E	9/8/2021	Fine	Moderate	09:35	1.31	0	5	56	39
F	9/8/2021	Fine	Moderate	09:20	1.37	0	3	59	38
G	9/8/2021	Fine	Moderate	08:59	1.26	1	9	52	38
H	9/8/2021	Fine	Moderate	08:45	1.03	0	7	55	38





CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 13
Contact	: CYRUS LAI	Contact	: Richard Fung	Work Order	: HK2131259
Address	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: C.Lai@fugro.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 3565 4374	Telephone	: +852 2610 1044		
Facsimile	: ---	Facsimile	: +852 2610 2021		
Project	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT			Date Samples Received	: 09-Aug-2021
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 23-Aug-2021
C-O-C number	: ---			No. of samples received	: 24
Site	: ---			No. of samples analysed	: 24

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

<u>Signatories</u>	<u>Position</u>	<u>Authorised results for</u>
		
Fung Lim Chee, Richard	Managing Director	Inorganics
		
Fung Lim Chee, Richard	Managing Director	Metals_ENV



General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 09-Aug-2021 to 23-Aug-2021.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK2131259

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

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

Result(s) of soil/sediment sample(s) is/are reported on dry weight basis.

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

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

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

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

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

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

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

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

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



Analytical Results

Sub-Matrix: SEDIMENT

				Sample ID	A/Sediment	B/Sediment	C/Sediment	D/Sediment	E/Sediment
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131259-001	HK2131259-002	HK2131259-003	HK2131259-004	HK2131259-005	
EA/ED: Physical and Aggregate Properties									
EA002SOIL: pH Value	----	0.1	pH Unit	8.4	8.2	8.2	8.2	8.2	
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	49.2	56.4	59.0	58.2	61.5	
ED/EK: Inorganic Nonmetallic Parameters									
EK055S: Ammonia as N	7664-41-7	0.5	mg/kg	1.3	7.4	10.0	9.1	19.7	
EK062A: Total Nitrogen as N	----	10	mg/kg	960	1350	1300	1360	1580	
EK067A: Total Phosphorus as P	----	10	mg/kg	458	531	545	558	541	
EG: Metals and Major Cations									
EG020: Arsenic	7440-38-2	0.5	mg/kg	12.8	10.9	11.6	11.5	10.4	
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	
EG020: Chromium	7440-47-3	0.5	mg/kg	27.8	31.6	37.8	33.4	31.7	
EG020: Copper	7440-50-8	0.20	mg/kg	25.1	32.8	34.8	35.6	34.0	
EG020: Lead	7439-92-1	0.20	mg/kg	35.1	38.0	43.1	43.5	38.8	
EG020: Mercury	7439-97-6	0.05	mg/kg	0.10	0.10	0.10	0.12	0.11	
EG020: Nickel	7440-02-0	0.20	mg/kg	16.2	18.9	22.9	20.2	18.8	
EG020: Silver	7440-22-4	0.10	mg/kg	0.20	0.28	0.29	0.32	0.32	
EG020: Zinc	7440-66-6	0.5	mg/kg	81.8	98.0	111	106	97.1	



Sub-Matrix: SEDIMENT				Sample ID	F/Sediment	G/Sediment	H/Sediment	A/Benthic Survey	B/Benthic Survey
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131259-006	HK2131259-007	HK2131259-008	HK2131259-009	HK2131259-010	
EA/ED: Physical and Aggregate Properties									
EA002SOIL: pH Value	----	0.1	pH Unit	8.2	8.3	8.3	---	---	
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	63.4	64.6	59.3	42.9	55.2	
ED/EK: Inorganic Nonmetallic Parameters									
EK055S: Ammonia as N	7664-41-7	0.5	mg/kg	50.4	17.0	4.7	---	---	
EK062A: Total Nitrogen as N	----	10	mg/kg	1650	1680	1200	---	---	
EK067A: Total Phosphorus as P	----	10	mg/kg	601	601	517	---	---	
EG: Metals and Major Cations									
EG020: Arsenic	7440-38-2	0.5	mg/kg	11.4	12.2	12.2	---	---	
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	0.10	0.12	---	---	
EG020: Chromium	7440-47-3	0.5	mg/kg	32.5	42.9	40.3	---	---	
EG020: Copper	7440-50-8	0.20	mg/kg	34.9	48.7	73.4	---	---	
EG020: Lead	7439-92-1	0.20	mg/kg	40.2	46.3	45.8	---	---	
EG020: Mercury	7439-97-6	0.05	mg/kg	0.11	0.14	0.13	---	---	
EG020: Nickel	7440-02-0	0.20	mg/kg	19.9	25.2	22.8	---	---	
EG020: Silver	7440-22-4	0.10	mg/kg	0.31	0.42	0.50	---	---	
EG020: Zinc	7440-66-6	0.5	mg/kg	101	129	124	---	---	
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%	---	---	---	0.77	1.04	



Sub-Matrix: SEDIMENT				Sample ID	C/Benthic Survey	D/Benthic Survey	E/Benthic Survey	F/Benthic Survey	G/Benthic Survey
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131259-011	HK2131259-012	HK2131259-013	HK2131259-014	HK2131259-015	
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	57.5	58.9	63.4	63.8	61.6	
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%	1.10	1.07	1.31	1.37	1.26	



Sub-Matrix: SEDIMENT				Sample ID	H/Benthic Survey	---	---	---	---
				Sampling date / time	09-Aug-2021	---	---	---	---
Compound	CAS Number	LOR	Unit	HK2131259-016	---	---	---	---	---
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	---	0.1	%	60.0	---	---	---	---	---
EP: Aggregate Organics									
EP005: Total Organic Carbon	---	0.05	%	1.03	---	---	---	---	---



Sub-Matrix: WATER				Sample ID	A/Rinsate Blank	B/Rinsate Blank	C/Rinsate Blank	D/Rinsate Blank	E/Rinsate Blank
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021	09-Aug-2021
Compound	CAS Number	LOR	Unit	HK2131259-017	HK2131259-018	HK2131259-019	HK2131259-020	HK2131259-021	
EG: Metals and Major Cations - Total									
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	<10	
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	
EG020: Chromium	7440-47-3	1	µg/L	<1	<1	<1	<1	<1	
EG020: Copper	7440-50-8	1	µg/L	2	2	2	2	2	
EG020: Lead	7439-92-1	1	µg/L	<1	<1	<1	<1	<1	
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	
EG020: Nickel	7440-02-0	1	µg/L	3	3	3	3	3	
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1	
EG020: Zinc	7440-66-6	10	µg/L	<10	<10	<10	<10	<10	



Sub-Matrix: WATER				Sample ID	F/Rinsate Blank	G/Rinsate Blank	H/Rinsate Blank	---	---
				Sampling date / time	09-Aug-2021	09-Aug-2021	09-Aug-2021	----	----
Compound	CAS Number	LOR	Unit	HK2131259-022	HK2131259-023	HK2131259-024	-----	-----	
EG: Metals and Major Cations - Total									
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	---	---	
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	---	---	
EG020: Chromium	7440-47-3	1	µg/L	<1	<1	<1	---	---	
EG020: Copper	7440-50-8	1	µg/L	2	2	2	---	---	
EG020: Lead	7439-92-1	1	µg/L	<1	<1	<1	---	---	
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	<0.5	---	---	
EG020: Nickel	7440-02-0	1	µg/L	3	3	3	---	---	
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	---	---	
EG020: Zinc	7440-66-6	10	µg/L	<10	10	10	---	---	



Laboratory Duplicate (DUP) Report

Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 3837339)								
HK2131259-001	A/Sediment	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	49.2	49.2	0.0
HK2131259-011	C/Benthic Survey	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	57.5	57.1	0.7
EA/ED: Physical and Aggregate Properties (QC Lot: 3837352)								
HK2131259-001	A/Sediment	EA002SOIL: pH Value	----	0.1	pH Unit	8.4	8.4	0.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3850228)								
HK2131259-001	A/Sediment	EK067A: Total Phosphorus as P	----	10	mg/kg	458	430	6.5
EG: Metals and Major Cations (QC Lot: 3837444)								
HK2131259-002	B/Sediment	EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.10	<0.10	0.0
		EG020: Mercury	7439-97-6	0.02	mg/kg	0.10	0.11	10.1
		EG020: Copper	7440-50-8	0.05	mg/kg	32.8	32.2	1.8
		EG020: Lead	7439-92-1	0.05	mg/kg	38.0	38.8	2.1
		EG020: Nickel	7440-02-0	0.05	mg/kg	18.9	18.8	0.5
		EG020: Silver	7440-22-4	0.05	mg/kg	0.28	0.29	0.0
		EG020: Arsenic	7440-38-2	0.5	mg/kg	10.9	11.3	3.3
		EG020: Chromium	7440-47-3	0.5	mg/kg	31.6	32.0	1.2
EG020: Zinc	7440-66-6	0.5	mg/kg	98.0	98.1	0.2		
EP: Aggregate Organics (QC Lot: 3855058)								
HK2131259-010	B/Benthic Survey	EP005: Total Organic Carbon	----	0.05	%	1.04	1.04	0.0
Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 3844756)								
HK2131259-018	B/Rinsate Blank	EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	0.0
		EG020: Arsenic	7440-38-2	1	µg/L	<10	<10	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	0.0
		EG020: Copper	7440-50-8	1	µg/L	2	2	0.0
		EG020: Lead	7439-92-1	1	µg/L	<1	<1	0.0
		EG020: Nickel	7440-02-0	1	µg/L	3	3	0.0
		EG020: Silver	7440-22-4	1	µg/L	<1	<1	0.0



Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 3844756) - Continued								
HK2131259-018	B/Rinsate Blank	EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.0

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

Matrix: SOIL				Method Blank (MB) Report		Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3837350)											
EK055S: Ammonia as N	7664-41-7	1	mg/kg	<1	10 mg/kg	98.6	----	85.8	109	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3850228)											
EK067A: Total Phosphorus as P	----	10	mg/kg	<10	512 mg/kg	90.4	----	85.0	115	----	----
EG: Metals and Major Cations (QC Lot: 3837444)											
EG020: Arsenic	7440-38-2	0.5	mg/kg	<0.5	5 mg/kg	93.2	----	82.8	110	----	----
EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.01	0.5 mg/kg	96.6	----	78.7	110	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg	<0.5	5 mg/kg	91.4	----	84.3	111	----	----
EG020: Copper	7440-50-8	0.05	mg/kg	<0.05	5 mg/kg	92.5	----	89.4	115	----	----
EG020: Lead	7439-92-1	0.05	mg/kg	<0.05	5 mg/kg	94.2	----	87.8	112	----	----
EG020: Mercury	7439-97-6	0.02	mg/kg	<0.02	0.1 mg/kg	97.2	----	76.8	115	----	----
EG020: Nickel	7440-02-0	0.05	mg/kg	<0.05	5 mg/kg	93.3	----	86.8	111	----	----
EG020: Silver	7440-22-4	0.05	mg/kg	<0.05	5 mg/kg	96.2	----	80.6	110	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg	<0.5	5 mg/kg	91.8	----	80.7	115	----	----
EP: Aggregate Organics (QC Lot: 3855058)											
EP005: Total Organic Carbon	----	0.05	%	<0.05	40 %	104	----	93.1	109	----	----

Matrix: WATER				Method Blank (MB) Report		Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 3844756)											
EG020: Arsenic	7440-38-2	1	µg/L	<1	50 µg/L	93.4	----	85.0	110	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	5 µg/L	99.6	----	85.0	109	----	----
EG020: Chromium	7440-47-3	1	µg/L	<1	50 µg/L	94.8	----	86.0	111	----	----



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
		LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
Method: Compound	CAS Number					LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 3844756) - Continued											
EG020: Copper	7440-50-8	1	µg/L	<1	50 µg/L	98.9	----	90.0	111	----	----
EG020: Lead	7439-92-1	1	µg/L	<1	50 µg/L	99.8	----	89.0	111	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	107	----	85.0	115	----	----
EG020: Nickel	7440-02-0	1	µg/L	<1	50 µg/L	97.8	----	87.0	110	----	----
EG020: Silver	7440-22-4	1	µg/L	<1	50 µg/L	101	----	85.0	114	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	50 µg/L	95.6	----	86.0	114	----	----



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

Matrix: SOIL					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3850228)										
HK2131259-001	A/Sediment	EK067A: Total Phosphorus as P	----	160 mg/kg	105	----	75.0	125	----	----
EG: Metals and Major Cations (QC Lot: 3837444)										
HK2131259-001	A/Sediment	EG020: Arsenic	7440-38-2	5 mg/kg	84.4	----	75.0	125	----	----
		EG020: Cadmium	7440-43-9	0.5 mg/kg	97.6	----	75.0	125	----	----
		EG020: Chromium	7440-47-3	5 mg/kg	79.5	----	75.0	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	79.2	----	75.0	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	79.4	----	75.0	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	94.3	----	75.0	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	75.4	----	75.0	125	----	----
		EG020: Silver	7440-22-4	5 mg/kg	93.3	----	75.0	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75.0	125	----	----
EP: Aggregate Organics (QC Lot: 3855058)										
HK2131259-009	A/Benthic Survey	EP005: Total Organic Carbon	----	0.78516 %	107	----	75.0	125	----	----
Matrix: WATER					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 3844756)										
HK2131259-017	A/Rinsate Blank	EG020: Arsenic	7440-38-2	50 µg/L	96.8	----	75.0	125	----	----
		EG020: Cadmium	7440-43-9	5 µg/L	106	----	75.0	125	----	----
		EG020: Chromium	7440-47-3	50 µg/L	97.6	----	75.0	125	----	----
		EG020: Copper	7440-50-8	50 µg/L	100	----	75.0	125	----	----
		EG020: Lead	7439-92-1	50 µg/L	101	----	75.0	125	----	----
		EG020: Mercury	7439-97-6	2 µg/L	114	----	75.0	125	----	----
		EG020: Nickel	7440-02-0	50 µg/L	100	----	75.0	125	----	----
		EG020: Silver	7440-22-4	50 µg/L	102	----	75.0	125	----	----
		EG020: Zinc	7440-66-6	50 µg/L	100	----	75.0	125	----	----





SUB-CONTRACTING REPORT

CONTACT	: CYRUS LAI	WORK ORDER	: HK2131259
CLIENT	: FUGRO TECHNICAL SERVICES LIMITED		
ADDRESS	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	SUB-BATCH	: 1
		DATE RECEIVED	: 9-AUG-2021
		DATE OF ISSUE	: 23-AUG-2021
PROJECT	: CONTRACT NO. CM 14/2016	NO. OF SAMPLES	: 24
	ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT	CLIENT ORDER	: 0041/17

General Comments

- Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.
- Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.
- Result(s) of soil/sediment sample(s) is/are reported on dry weight basis.
- Particle Size Distribution was subcontracted to and analysed by Gammon Construction Limited.
- EA002SOIL - pH value is reported as at 25°C.
- EK055S - Ammoniacal Nitrogen was determined on a 1:5 soil / 1M KCl solution extract.
- EK059A - Nitrate and Nitrite were determined on a 1:5 soil / 1M KCl solution extract.
- EA002SOIL - Calibration range of pH value is 4.0 - 10.0. Results exceeding this range is for reference only.
- EK062A - Total Nitrogen is the sum of Total Oxidizable (NOx) and Total Kjeldahl Nitrogen.
- EA002SOIL - Soil sample(s) analysed on as air-dry sample basis. pH value determined and reported on a 1:5 soil / water extract.
- Water sample(s) digested by in-house method E-3005 prior to the determination of total metals. The in-house method is developed based on USEPA method 3005.
- Sample(s) as received, digested by in-house method E-3051A prior to the determination of metals. The in-house method is developed based on USEPA method 3051A.

Signatories

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

Signatories

Position

Richard Fung

Managing Director

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

All pages of this report have been checked and approved for release.

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

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WORK ORDER : HK2131259
 SUB-BATCH : 1
 CLIENT : FUGRO TECHNICAL SERVICES LIMITED
 PROJECT : CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL
 ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE
 TREATMENT PLANT



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2131259-001	A/Sediment	SEDIMENT	09-Aug-2021	
HK2131259-002	B/Sediment	SEDIMENT	09-Aug-2021	
HK2131259-003	C/Sediment	SEDIMENT	09-Aug-2021	
HK2131259-004	D/Sediment	SEDIMENT	09-Aug-2021	
HK2131259-005	E/Sediment	SEDIMENT	09-Aug-2021	
HK2131259-006	F/Sediment	SEDIMENT	09-Aug-2021	
HK2131259-007	G/Sediment	SEDIMENT	09-Aug-2021	
HK2131259-008	H/Sediment	SEDIMENT	09-Aug-2021	
HK2131259-009	A/Benthic Survey	SEDIMENT	09-Aug-2021	J2999-365.8
HK2131259-010	B/Benthic Survey	SEDIMENT	09-Aug-2021	J2999-365.8
HK2131259-011	C/Benthic Survey	SEDIMENT	09-Aug-2021	J2999-365.8
HK2131259-012	D/Benthic Survey	SEDIMENT	09-Aug-2021	J2999-365.8
HK2131259-013	E/Benthic Survey	SEDIMENT	09-Aug-2021	J2999-365.8
HK2131259-014	F/Benthic Survey	SEDIMENT	09-Aug-2021	J2999-365.8
HK2131259-015	G/Benthic Survey	SEDIMENT	09-Aug-2021	J2999-365.8
HK2131259-016	H/Benthic Survey	SEDIMENT	09-Aug-2021	J2999-365.8
HK2131259-017	A/Rinsate Blank	WATER	09-Aug-2021	
HK2131259-018	B/Rinsate Blank	WATER	09-Aug-2021	
HK2131259-019	C/Rinsate Blank	WATER	09-Aug-2021	
HK2131259-020	D/Rinsate Blank	WATER	09-Aug-2021	
HK2131259-021	E/Rinsate Blank	WATER	09-Aug-2021	
HK2131259-022	F/Rinsate Blank	WATER	09-Aug-2021	
HK2131259-023	G/Rinsate Blank	WATER	09-Aug-2021	
HK2131259-024	H/Rinsate Blank	WATER	09-Aug-2021	

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

Report No : J2999-365.8

Customer : ALS Technichem (HK) Pty Ltd

Job No. : J2999

Works Order No. : 365

Project : -

Contract No.:

Date : 10/08/2021

Sample ID	Sample		Δ Moisture Content (%)	Test 6.1 Liquid Limit (%)	Test 6.1 Plastic Limit (%)	Test 6.1 Plasticity Index (%)	Test 6.2 Liquidity Index	Passing 425µm Test Sieve (%)	Preparation Method	Particle Size Distribution			Description	Sample Origin		
	No.	Type								Depth (m)	# Test Method	Gravel (%)			Sand (%)	Silt Clay (%)
HK2131259-009	A/Benthic Survey	D								1,5,7	9	46	25	20	Dark grey, slightly gravelly, sandy, SILT/CLAY with shell fragments	- †
HK2131259-010	B/Benthic Survey	D								1,5,7	0	18	49	33	Dark grey, slightly sandy, SILT/CLAY with shell fragments	- †
HK2131259-011	C/Benthic Survey	D								1,5,7	0	6	56	38	Dark grey, slightly sandy, SILT/CLAY with shell fragments	- †
HK2131259-012	D/Benthic Survey	D								1,5,7	0	5	56	39	Dark grey, slightly sandy, SILT/CLAY with shell fragments	- †
HK2131259-013	E/Benthic Survey	D								1,5,7	0	5	56	39	Dark grey, slightly sandy, SILT/CLAY with shell fragments	- †

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

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

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

Checked by : T K Lam

Approved By : Lee Ming Fat
Deputy Laboratory Manager

Date : 17/08/2021

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel : 2699 1980, Fax : 269 17547

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

Report No : J2999-365.8

Works Order No. : 365

Job No. : J2999

Customer : ALS Technichem (HK) Pty Ltd

Date : 10/08/2021

Contract No. :

Project : -

Sample ID	Sample		Preparation Method	Particle Size Distribution			Description	Sample Origin			
	No.	Type		# Test Method	Gravel (%)	Sand (%)			Silt Clay (%)		
HK2131259-014	F/Benthic Survey	D		1,5,7	0	3	59	38	Dark grey, SILT/CLAY with shell fragments	- †	
HK2131259-015	G/Benthic Survey	D		1,5,7	1	9	52	38	Dark grey, slightly sandy, SILT/CLAY with shell fragments	- †	
HK2131259-016	H/Benthic Survey	D		1,5,7	0	7	55	38	Dark grey, slightly sandy, SILT/CLAY with shell fragments	- †	
Legend :		Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C ± 5°C (C) # = Test Method in accordance with GEOSPEC 3 : 2001 Test 8.1 (1), 8.2 (2), 8.3 (3), 8.4 (4), 8.5 (5), 8.6 (6), 8.7 (7).									
Symbols :		U - Undisturbed Sample; N.P. - Non Plastic; A.D. - Air Dried; - Refer the Individual Test Report; LB - Large Disturbed Sample; A.R. - As Received; O.D. - Oven Dried; - Refer the Individual Test Report; BLK - Block Sample; D - Small Disturbed Sample; H.P. - Hand Picked; W.S. - Wet Sieved; - Information provided by customer. SPTL - SPT Split-Barrel Sample; PT - Portable triple tube Sample; - Moisture Content for A.L. Test.									
Notes:		IS - Insufficient Sample; TF - To Follow on supplementary Report.									
Checked by :		T K Lam		Approved By :		Lee Ming Fat		Deputy Laboratory Manager		Date :	17/08/2021
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© Gammon Construction Ltd 21 Chun Wang Street, Tseung Kwan O Industrial Estate, Tseung Kwan O, N.T. Tel : 26991980, Fax : 26917547 Form : GESS001 / Sept.14.18 / Issue 1 / Rev 4											

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

Report No. : J2999-365.8

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

Contract No. :

Works Order No. : 365
Sample ID No. : HK2131259-009
Sample No. : A/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -[‡]

Date Received : 10/08/2021
Tested Date : 10/08/2021

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

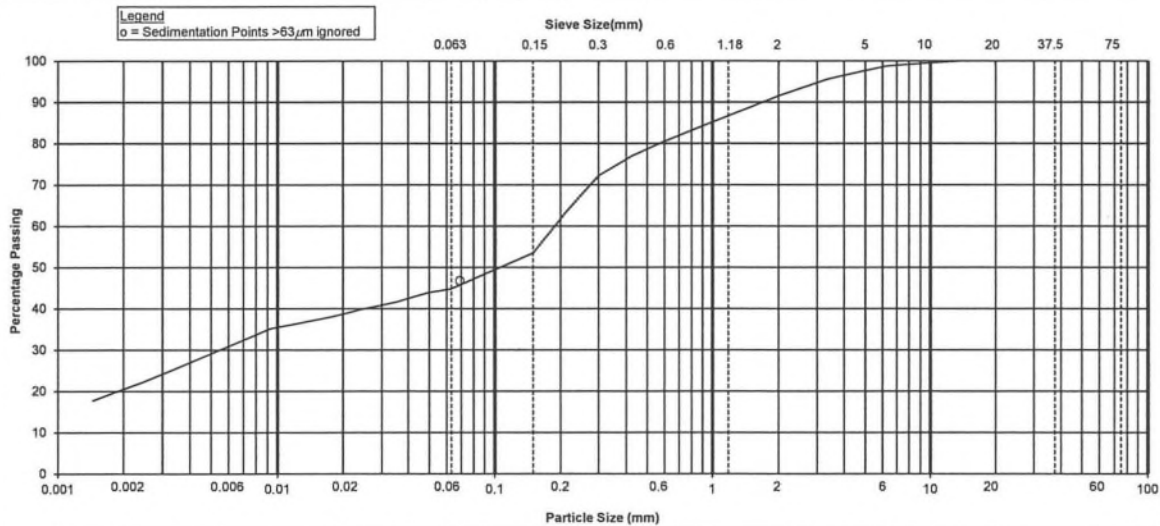
Sieve Method : Method A

[^] Upon request

^{*} Delete as appropriate

[‡] Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	[^] Expanded Uncertainty of the Percent Passing (%)	[^] Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	[^] Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	[^] Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0691	-	47	-
20.0 mm	100	-	-	0.0495	-	44	-
14.0 mm	100	-	-	0.0353	-	42	-
10.0 mm	99	-	-	0.0251	-	40	-
6.30 mm	99	-	-	0.0179	-	38	-
5.00 mm	98	-	-	0.0094	-	35	-
3.35 mm	96	-	-	0.0048	-	29	-
2.00 mm	91	-	-	0.0025	-	22	-
1.18 mm	87	-	-	0.0014	-	18	-
600 µm	81	-	-	SUMMARY :			
425 µm	77	-	-	Gravel (%) :	9		
300 µm	72	-	-	Sand (%) :	46		
212 µm	63	-	-	Silt (%) :	25		
150 µm	53	-	-	Clay (%) :	20		
63 µm	45	-	-				
0 µm	0	-	-				



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

Technician : C M Yip

Checked By : T K Lam

Approved By : Lee Ming Fat

Date : 10/08/2021

Date : 17/08/2021

Date : 17/08/2021

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

Report No. : J2999-365.8

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

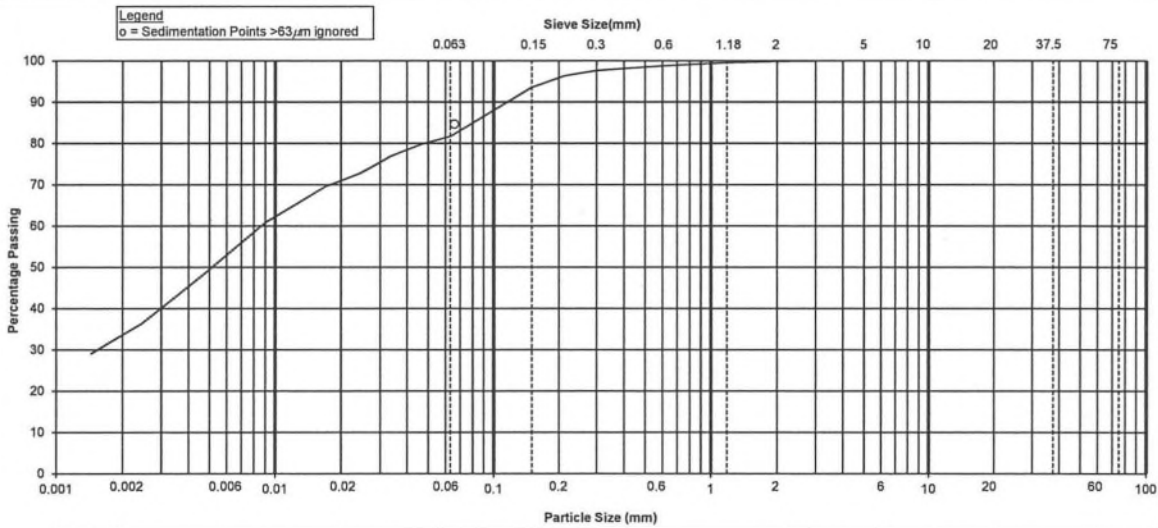
Works Order No. : 365
Sample ID No. : HK2131259-010
Sample No. : B/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -[‡]

Date Received : 10/08/2021
Tested Date : 10/08/2021

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

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


SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	[^] Expanded Uncertainty of the Percent Passing (%)	[^] Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter	[^] Expanded Uncertainty of the Particle Diameter	% Finer than D K	[^] Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	(mm)	(mm)	(%)	(%)
20.0 mm	100	-	-	0.0660	-	85	-
14.0 mm	100	-	-	0.0474	-	80	-
10.0 mm	100	-	-	0.0338	-	77	-
6.30 mm	100	-	-	0.0242	-	73	-
5.00 mm	100	-	-	0.0173	-	70	-
3.35 mm	100	-	-	0.0091	-	61	-
2.00 mm	100	-	-	0.0047	-	48	-
1.18 mm	99	-	-	0.0024	-	36	-
600 µm	99	-	-	0.0014	-	29	-
425 µm	98	-	-	SUMMARY :			
300 µm	98	-	-	Gravel (%) :	0		
212 µm	96	-	-	Sand (%) :	18		
150 µm	94	-	-	Silt (%) :	49		
63 µm	82	-	-	Clay (%) :	33		
0 µm	0	-	-				



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

Technician : C M Yip

Checked By : 
Name : T K Lam
Date : 17/08/2021

Approved By : 
Signatory : Lee Ming Fat
Date : 17/08/2021

Date : 10/08/2021

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

Report No. : J2999-365.8

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

Contract No. :

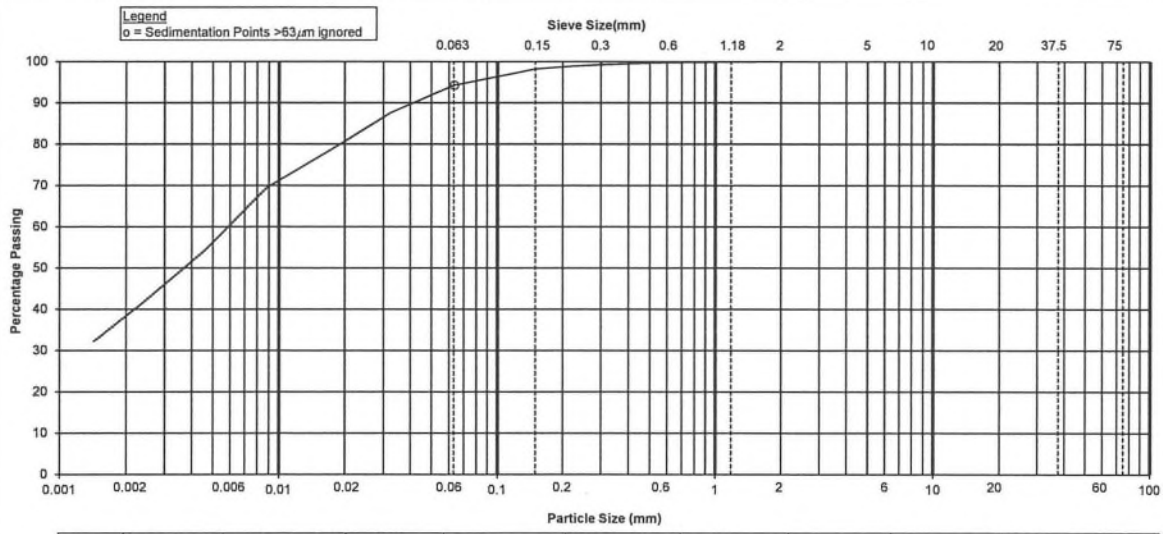
Works Order No. : 365
 Sample ID No. : HK2131259-011
 Sample No. : C/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : -[‡]

Date Received : 10/08/2021
 Tested Date : 10/08/2021

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

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

SIEVE ANALYSIS	Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	SEDIMENTATION ANALYSIS						
					Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)			
	100.0 mm	100	-	-	Specific Gravity (# if assumed) : 2.65 #						
	75.0 mm	100	-	-	Dispersant Details : Sodium hexametaphosphate, Sodium carbonate						
	63.0 mm	100	-	-	Sampling History : As received						
	50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None						
	37.5 mm	100	-	-							
	28.0 mm	100	-	-							
	20.0 mm	100	-	-	0.0635	-	94	-			
	14.0 mm	100	-	-	0.0454	-	91	-			
	10.0 mm	100	-	-	0.0325	-	88	-			
	6.30 mm	100	-	-	0.0233	-	83	-			
	5.00 mm	100	-	-	0.0168	-	78	-			
	3.35 mm	100	-	-	0.0089	-	70	-			
	2.00 mm	100	-	-	0.0046	-	54	-			
	1.18 mm	100	-	-	0.0024	-	42	-			
	600 µm	100	-	-	0.0014	-	32	-			
	425 µm	100	-	-	SUMMARY :						
	300 µm	99	-	-					Gravel (%)	:	0
	212 µm	99	-	-					Sand (%)	:	6
	150 µm	98	-	-					Silt (%)	:	56
	63 µm	94	-	-					Clay (%)	:	38
	0 µm	0	-	-							



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

Technician : C M Yip
 Date : 10/08/2021

Checked By : T K Lam
 Name : T K Lam
 Date : 17/08/2021

Approved By : Lee Ming Fat
 Signatory : Lee Ming Fat
 Date : 17/08/2021

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

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

Report No. : J2999-365.8

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

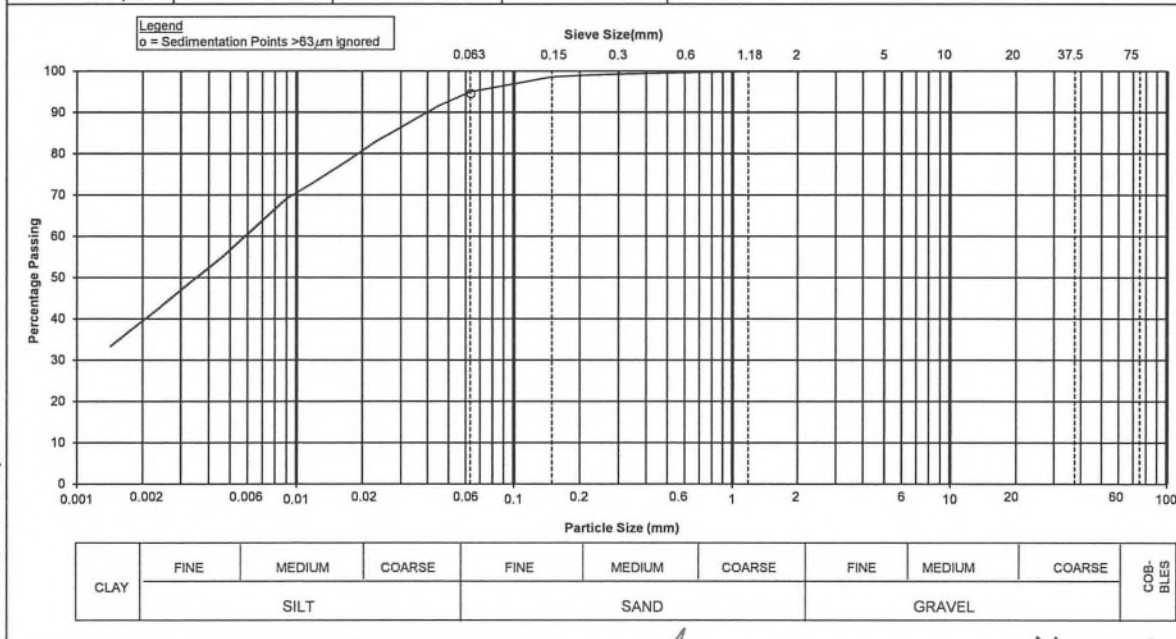
Works Order No. : 365
 Sample ID No. : HK2131259-012
 Sample No. : D/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : -[‡]

Date Received : 10/08/2021
 Tested Date : 10/08/2021

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

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

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	[^] Expanded Uncertainty of the Percent Passing (%)	[^] Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter	[^] Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	[^] Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	(mm)			
20.0 mm	100	-	-	0.0636	-	95	-
14.0 mm	100	-	-	0.0454	-	92	-
10.0 mm	100	-	-	0.0326	-	87	-
6.30 mm	100	-	-	0.0234	-	83	-
5.00 mm	100	-	-	0.0168	-	78	-
3.35 mm	100	-	-	0.0089	-	69	-
2.00 mm	100	-	-	0.0046	-	55	-
1.18 mm	100	-	-	0.0024	-	43	-
600 µm	100	-	-	0.0014	-	33	-
425 µm	99	-	-	SUMMARY :			
300 µm	99	-	-	Gravel (%)	: 0		
212 µm	99	-	-	Sand (%)	: 5		
150 µm	99	-	-	Silt (%)	: 56		
63 µm	95	-	-	Clay (%)	: 39		
0 µm	0	-	-				



Technician : C M Yip
 Date : 10/08/2021

Checked By : T K Lam
 Name : T K Lam
 Date : 17/08/2021

Approved By : Lee Ming Fat
 Signatory : Lee Ming Fat
 Date : 17/08/2021

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

Report No. : J2999-365.8

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

Works Order No. : 365
 Sample ID No. : HK2131259-013
 Sample No. : E/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : -[‡]

Date Received : 10/08/2021
 Tested Date : 10/08/2021

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

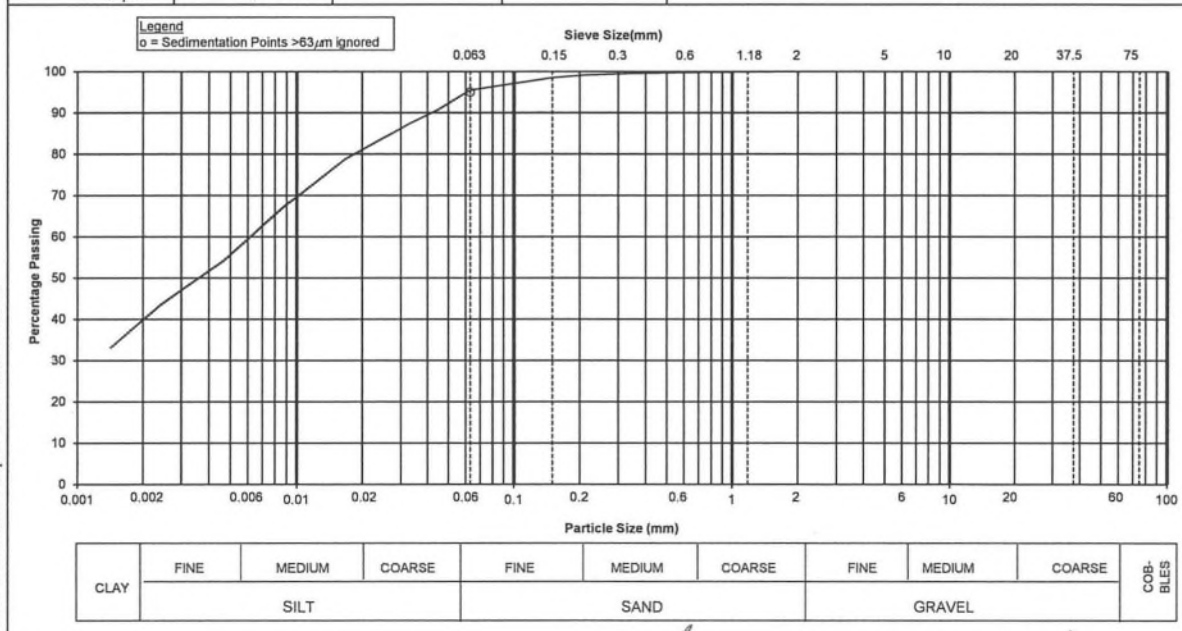
Sieve Method : Method A

[^] Upon request


^{*} Delete as appropriate


[‡] Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	[^] Expanded Uncertainty of the Percent Passing (%)	[^] Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	[^] Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	[^] Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0630	-	95	-
20.0 mm	100	-	-	0.0452	-	91	-
14.0 mm	100	-	-	0.0324	-	87	-
10.0 mm	100	-	-	0.0232	-	83	-
6.30 mm	100	-	-	0.0167	-	79	-
5.00 mm	100	-	-	0.0089	-	68	-
3.35 mm	100	-	-	0.0046	-	54	-
2.00 mm	100	-	-	0.0024	-	43	-
1.18 mm	100	-	-	0.0014	-	33	-
600 µm	100	-	-	SUMMARY :			
425 µm	100	-	-	Gravel (%)	: 0		
300 µm	99	-	-	Sand (%)	: 5		
212 µm	99	-	-	Silt (%)	: 56		
150 µm	99	-	-	Clay (%)	: 39		
63 µm	95	-	-				
0 µm	0	-	-				



Technician : C M Yip
 Date : 10/08/2021

Checked By : 
 Name : T K Lam
 Date : 17/08/2021

Approved By : 
 Signatory : Lee Ming Kit
 Date : 17/08/2021

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Form : GESR003.5 / Sept.14,18 / Issue 1 / Rev 3

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

Report No. : J2999-365.8

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

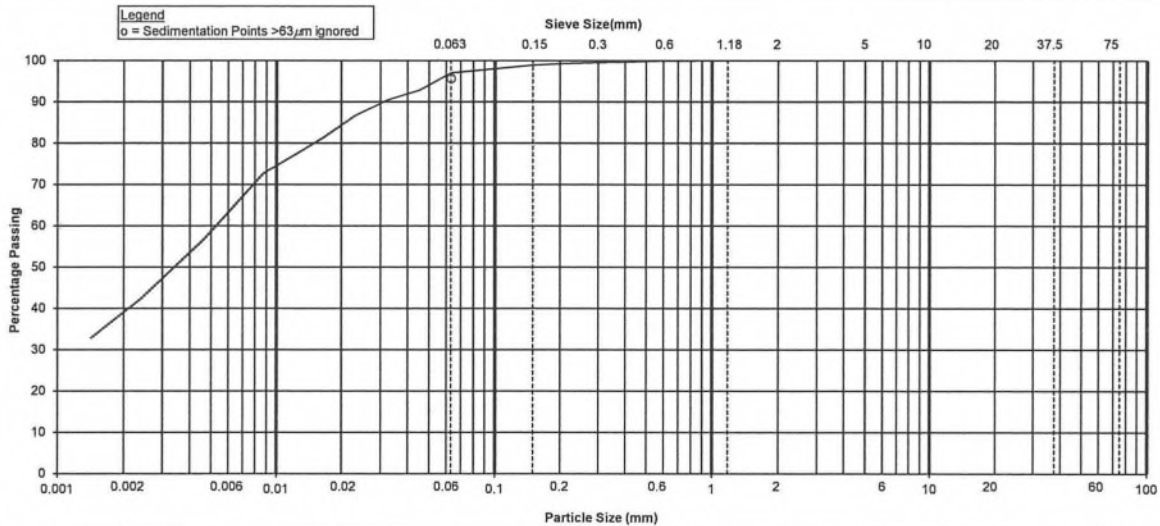
Works Order No. : 365
 Sample ID No. : HK2131259-014
 Sample No. : F/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : -[‡]

Date Received : 10/08/2021
 Tested Date : 10/08/2021

Description : Dark grey, SILT/CLAY with shell fragments

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

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	[^] Expanded Uncertainty of the Percent Passing (%)	[^] Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	[^] Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	[^] Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0633	-	96	-
20.0 mm	100	-	-	0.0452	-	93	-
14.0 mm	100	-	-	0.0322	-	90	-
10.0 mm	100	-	-	0.0231	-	87	-
6.30 mm	100	-	-	0.0166	-	81	-
5.00 mm	100	-	-	0.0088	-	73	-
3.35 mm	100	-	-	0.0046	-	57	-
2.00 mm	100	-	-	0.0024	-	42	-
1.18 mm	100	-	-	0.0014	-	33	-
600 µm	100	-	-	SUMMARY :			
425 µm	100	-	-	Gravel (%) :	0		
300 µm	100	-	-	Sand (%) :	3		
212 µm	99	-	-	Silt (%) :	59		
150 µm	99	-	-	Clay (%) :	38		
63 µm	97	-	-				
0 µm	0	-	-				



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

Technician : C M Yip
 Date : 10/08/2021

Checked By : T K Lam
 Name : T K Lam
 Date : 17/08/2021

Approved By : Lee Ming Fat
 Signatory : Lee Ming Fat
 Date : 17/08/2021

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

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

Report No. : J2999-365.8

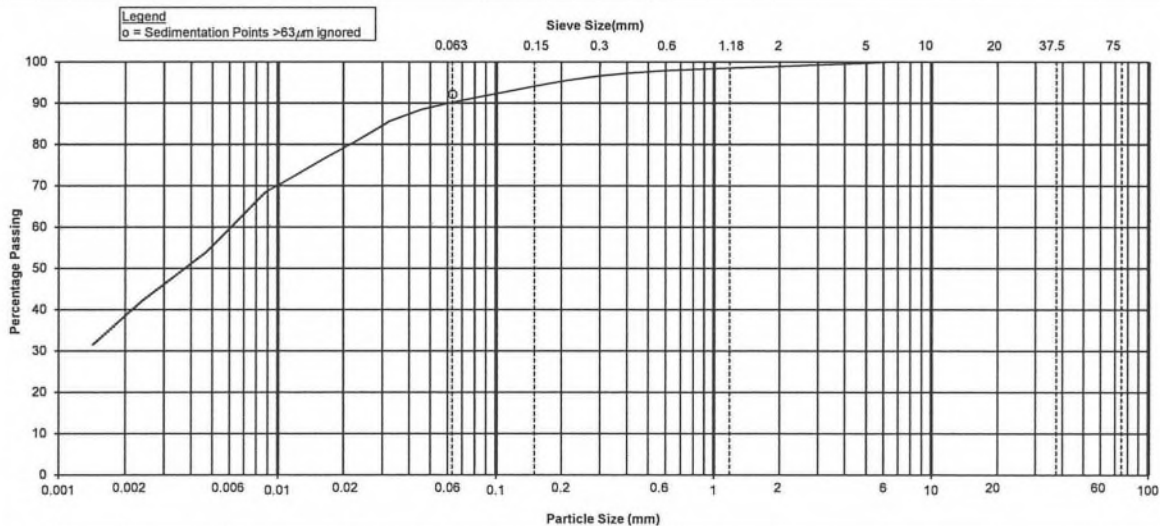
Date Received : 10/08/2021
Tested Date : 10/08/2021

Works Order No. : 365
Sample ID No. : HK2131259-015
Sample No. : G/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -[‡]

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

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

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	[^] Expanded Uncertainty of the Percent Passing (%)	[^] Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	[^] Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	[^] Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0635	-	92	-
20.0 mm	100	-	-	0.0455	-	88	-
14.0 mm	100	-	-	0.0325	-	86	-
10.0 mm	100	-	-	0.0233	-	81	-
6.30 mm	100	-	-	0.0167	-	77	-
5.00 mm	100	-	-	0.0089	-	69	-
3.35 mm	99	-	-	0.0046	-	54	-
2.00 mm	99	-	-	0.0024	-	42	-
1.18 mm	98	-	-	0.0014	-	31	-
600 µm	98	-	-	SUMMARY :			
425 µm	97	-	-	Gravel (%) :	1		
300 µm	97	-	-	Sand (%) :	9		
212 µm	95	-	-	Silt (%) :	52		
150 µm	94	-	-	Clay (%) :	38		
63 µm	90	-	-				
0 µm	0	-	-				



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

Technician : C M Yip
Date : 10/08/2021

Checked By : T K Lam
Name : T K Lam
Date : 17/08/2021

Approved By : Lee Ming Pat
Signatory : Lee Ming Pat
Date : 17/08/2021

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

Report No. : J2999-365.8

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

Contract No. :

Works Order No. : 365
Sample ID No. : HK2131259-016
Sample No. : H/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : [‡]

Date Received : 10/08/2021
Tested Date : 10/08/2021

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

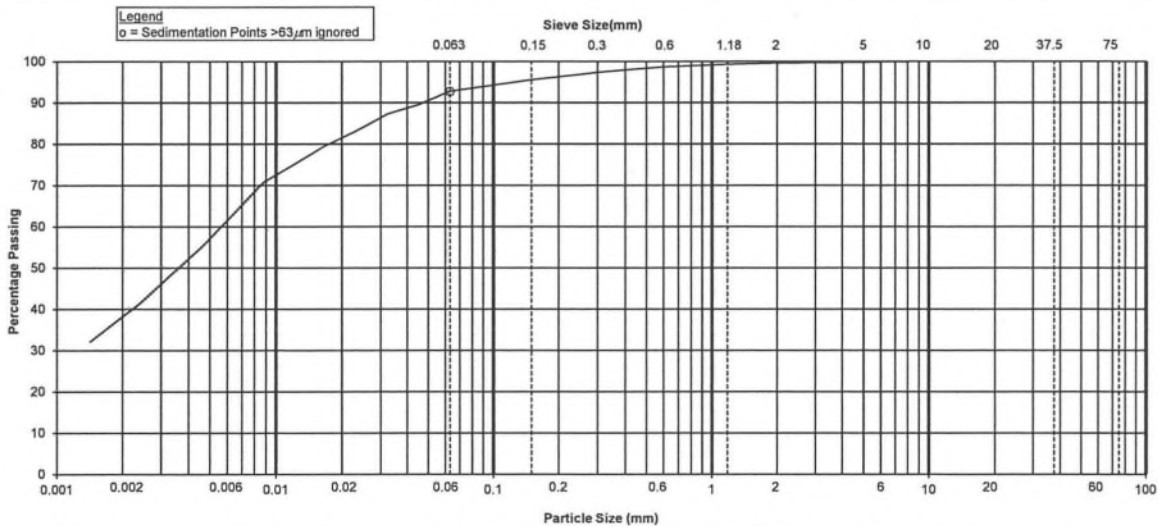
Sieve Method : Method A

[^] Upon request

* Delete as appropriate

[‡] Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	[^] Expanded Uncertainty of the Percent Passing (%)	[^] Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	[^] Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	[^] Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0631	-	93	-
20.0 mm	100	-	-	0.0452	-	90	-
14.0 mm	100	-	-	0.0322	-	87	-
10.0 mm	100	-	-	0.0231	-	83	-
6.30 mm	100	-	-	0.0165	-	79	-
5.00 mm	100	-	-	0.0088	-	71	-
3.35 mm	100	-	-	0.0046	-	55	-
2.00 mm	100	-	-	0.0024	-	41	-
1.18 mm	99	-	-	0.0014	-	32	-
600 µm	99	-	-	SUMMARY :			
425 µm	98	-	-	Gravel (%) :	0		
300 µm	97	-	-	Sand (%) :	7		
212 µm	96	-	-	Silt (%) :	55		
150 µm	96	-	-	Clay (%) :	38		
63 µm	93	-	-				
0 µm	0	-	-				



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

Technician : C M Yip

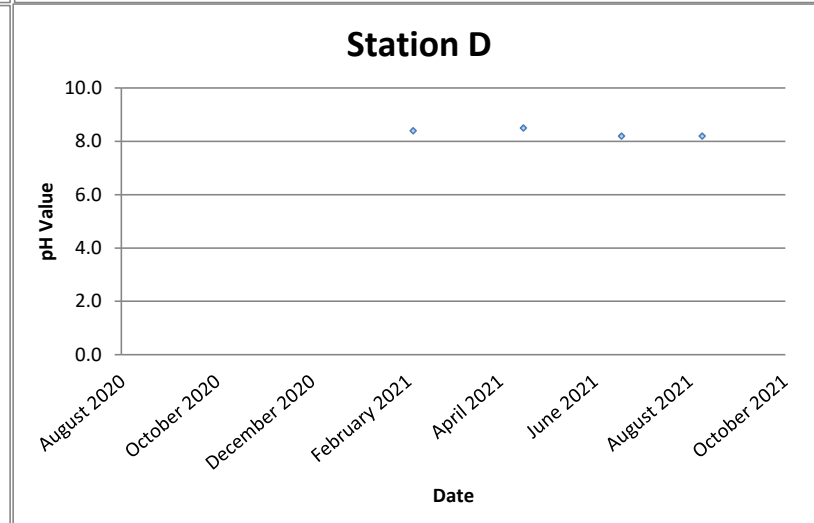
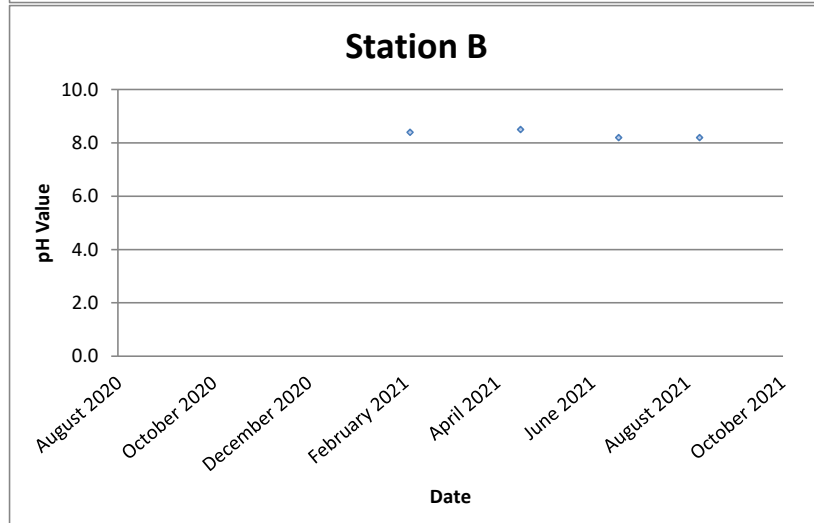
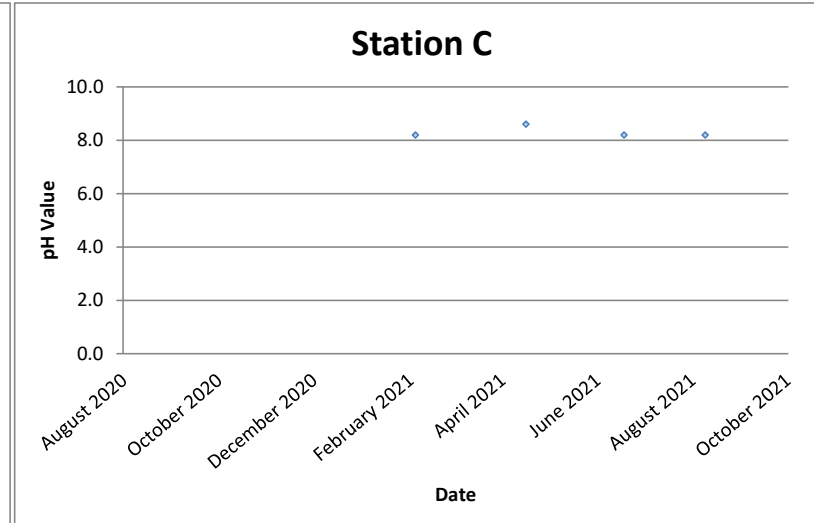
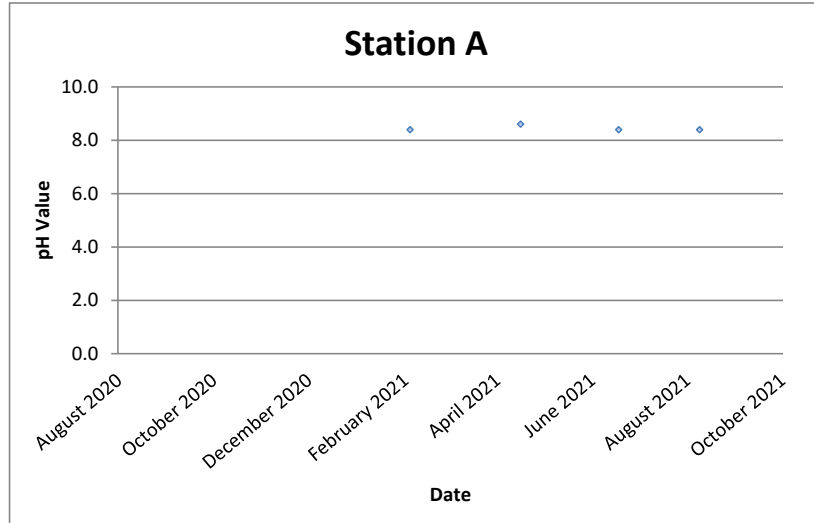
Checked By : T K Lam
Name : T K Lam
Date : 17/08/2021

Approved By : Lee Ming Hat
Signatory : Lee Ming Hat
Date : 17/08/2021

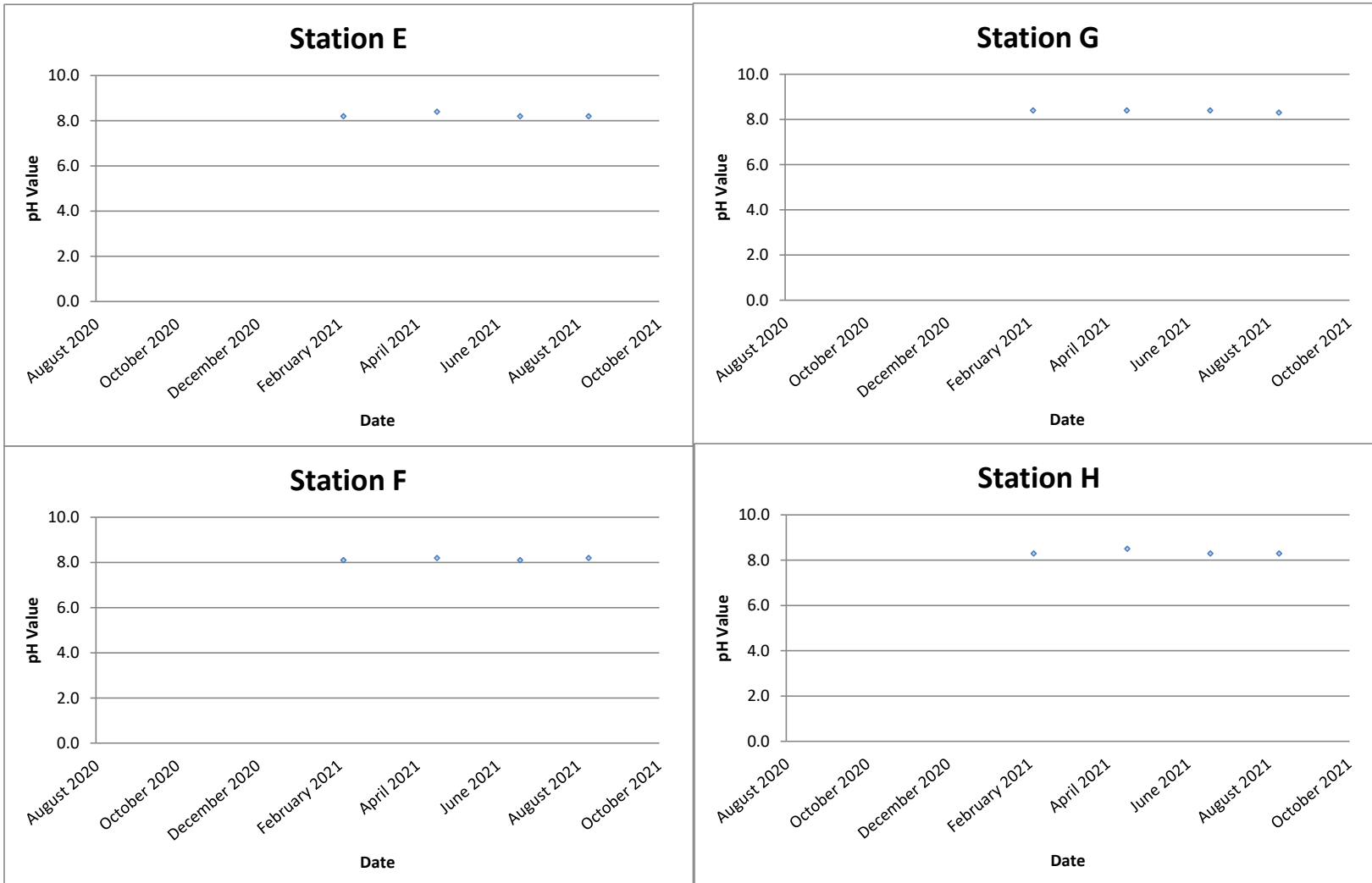
Date : 10/08/2021

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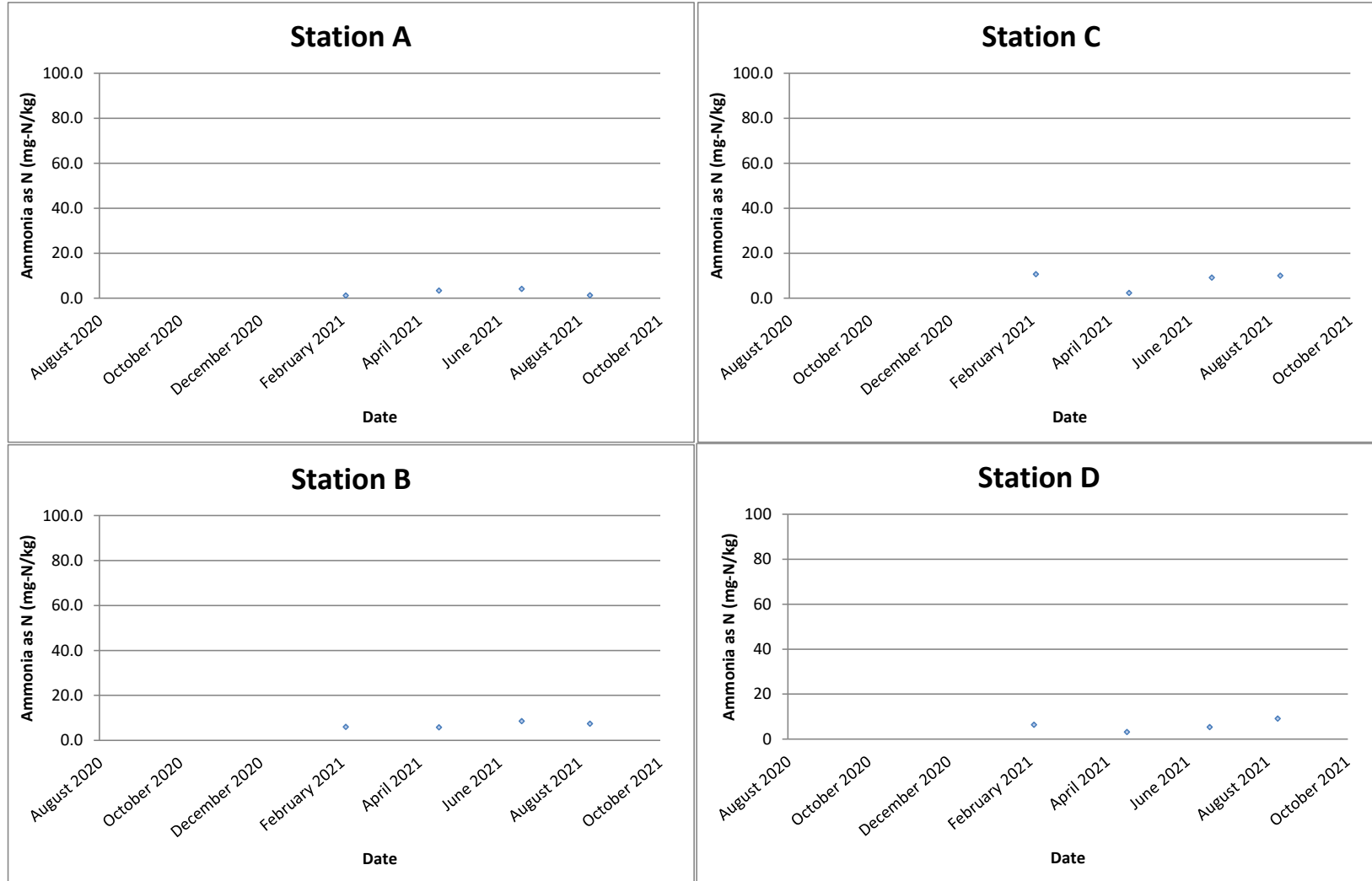
pH value



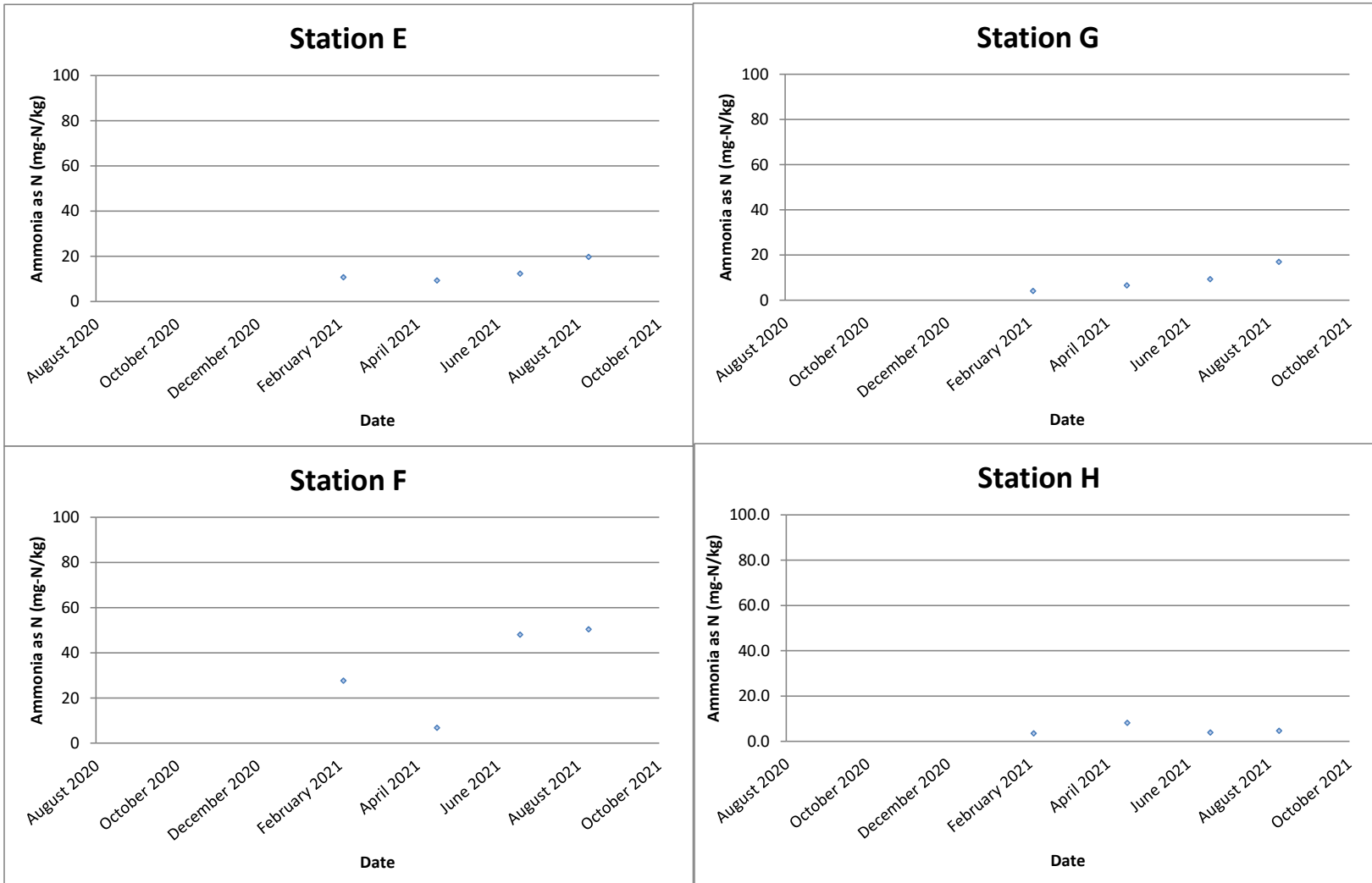
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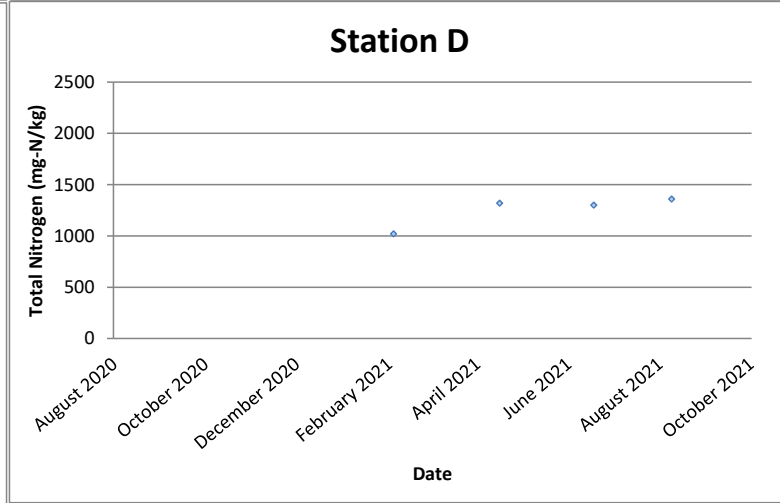
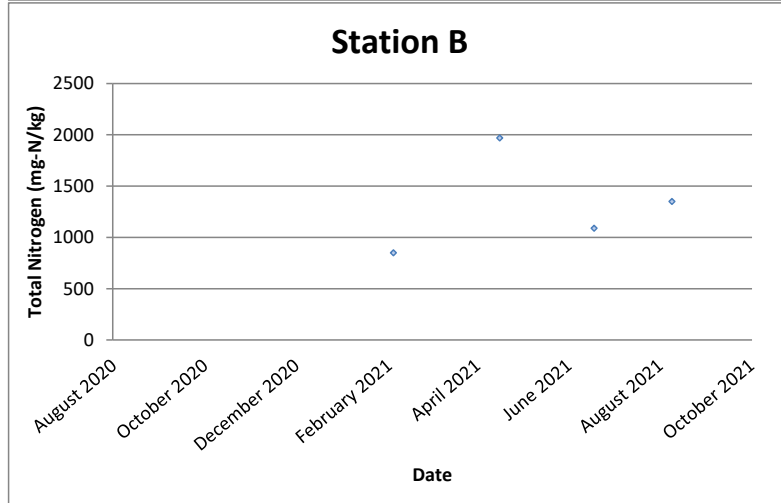
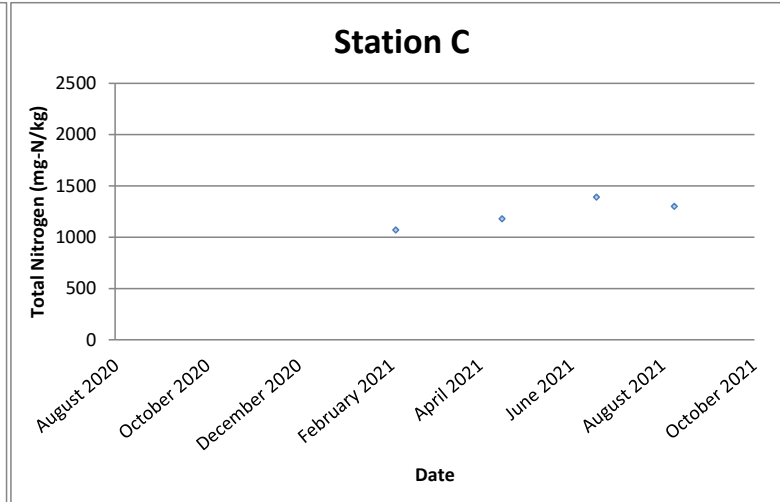
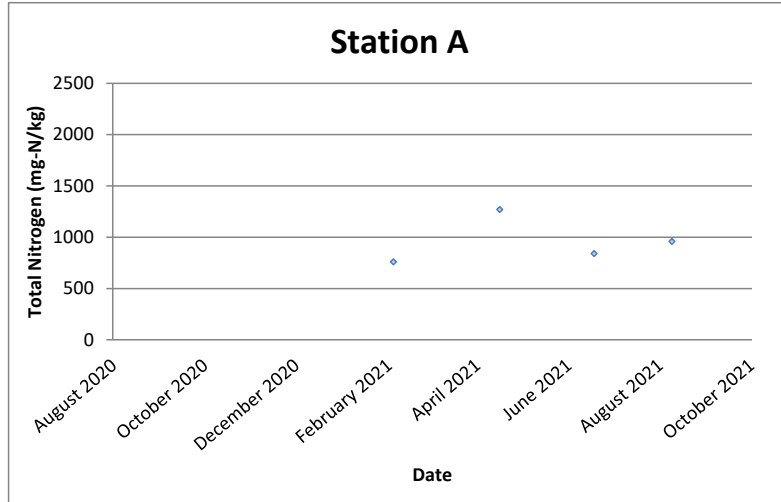
Ammonia Nitrogen (mg-N/kg)



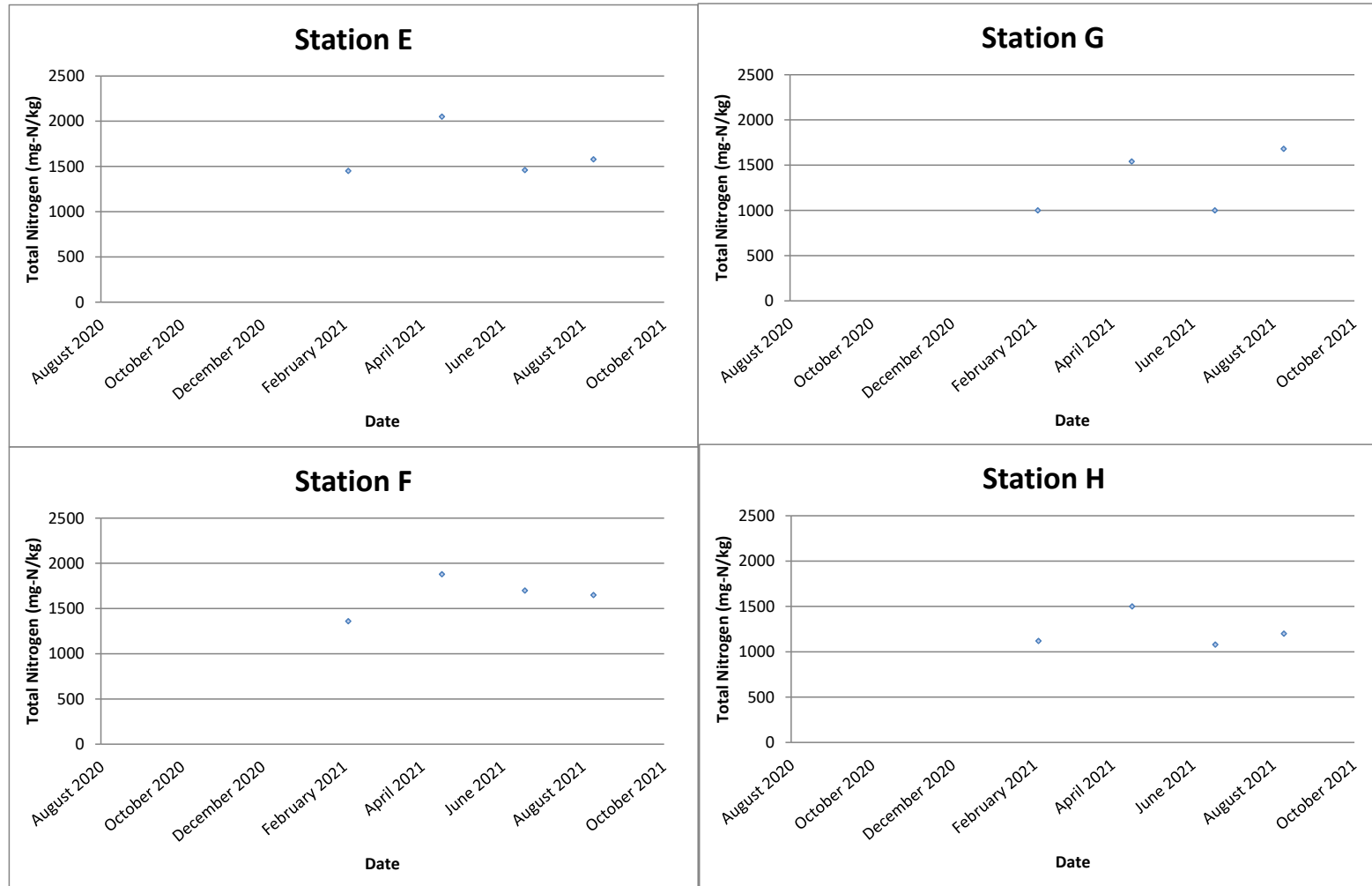
Ammonia Nitrogen (mg-N/kg)



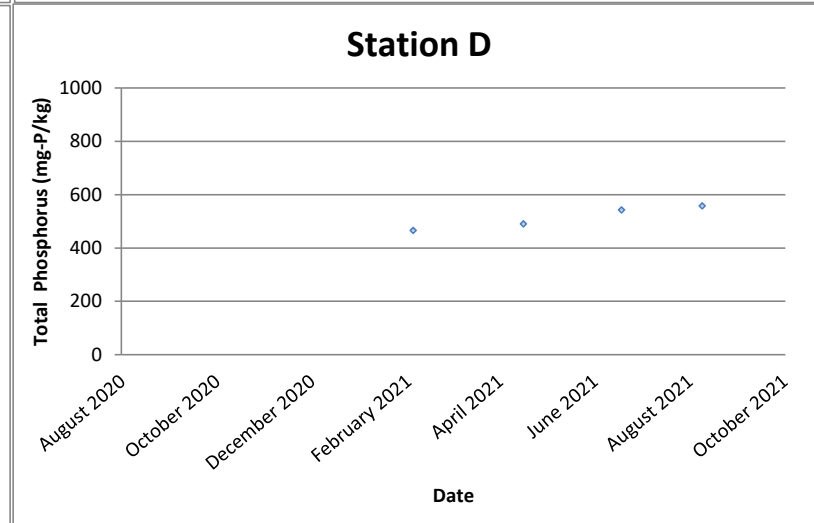
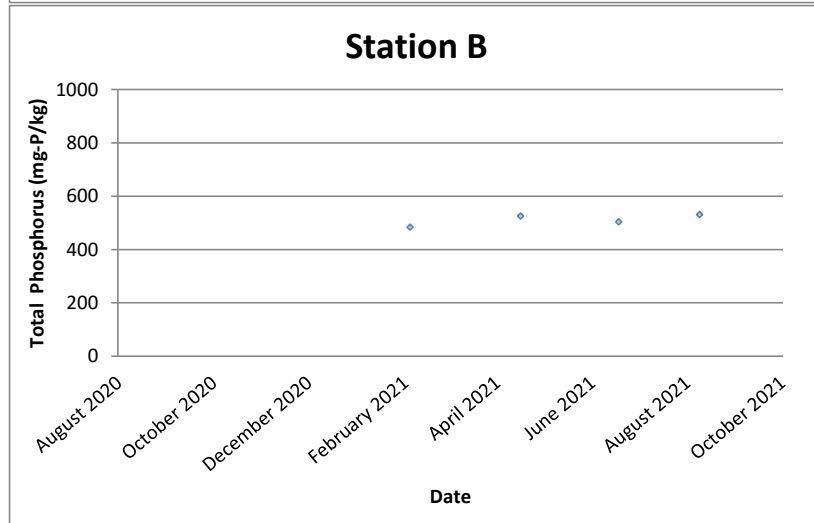
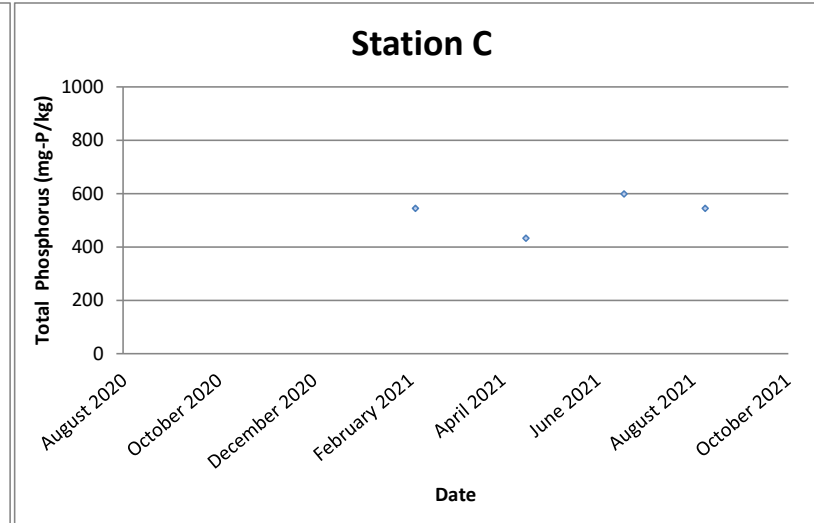
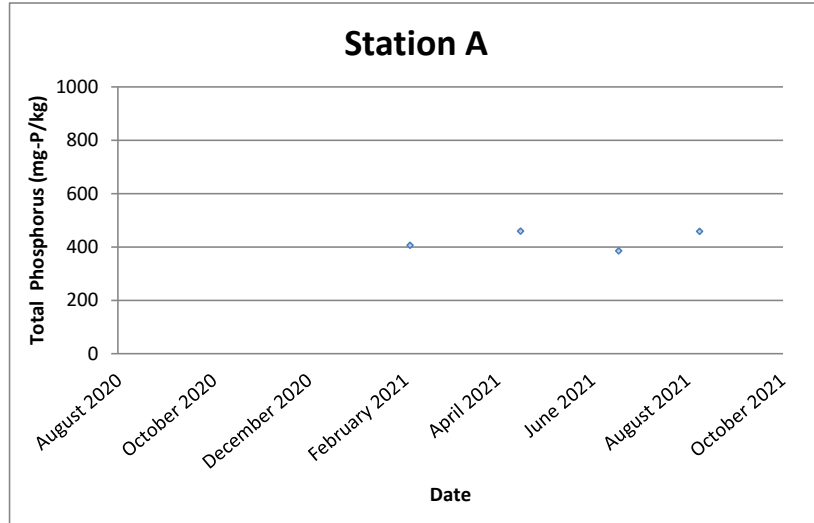
Total Nitrogen (mg-N/kg)



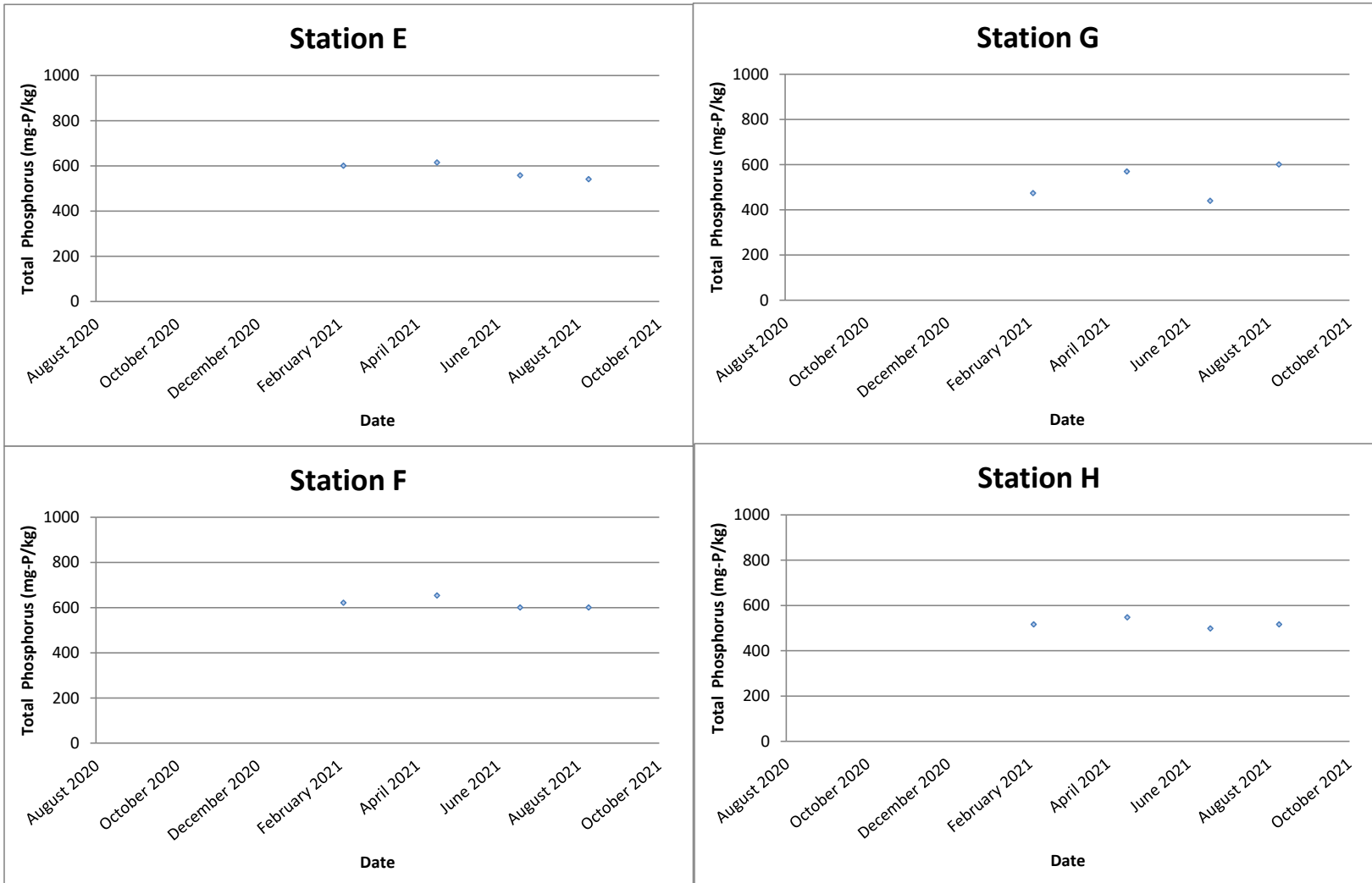
Total Nitrogen (mg-N/kg)



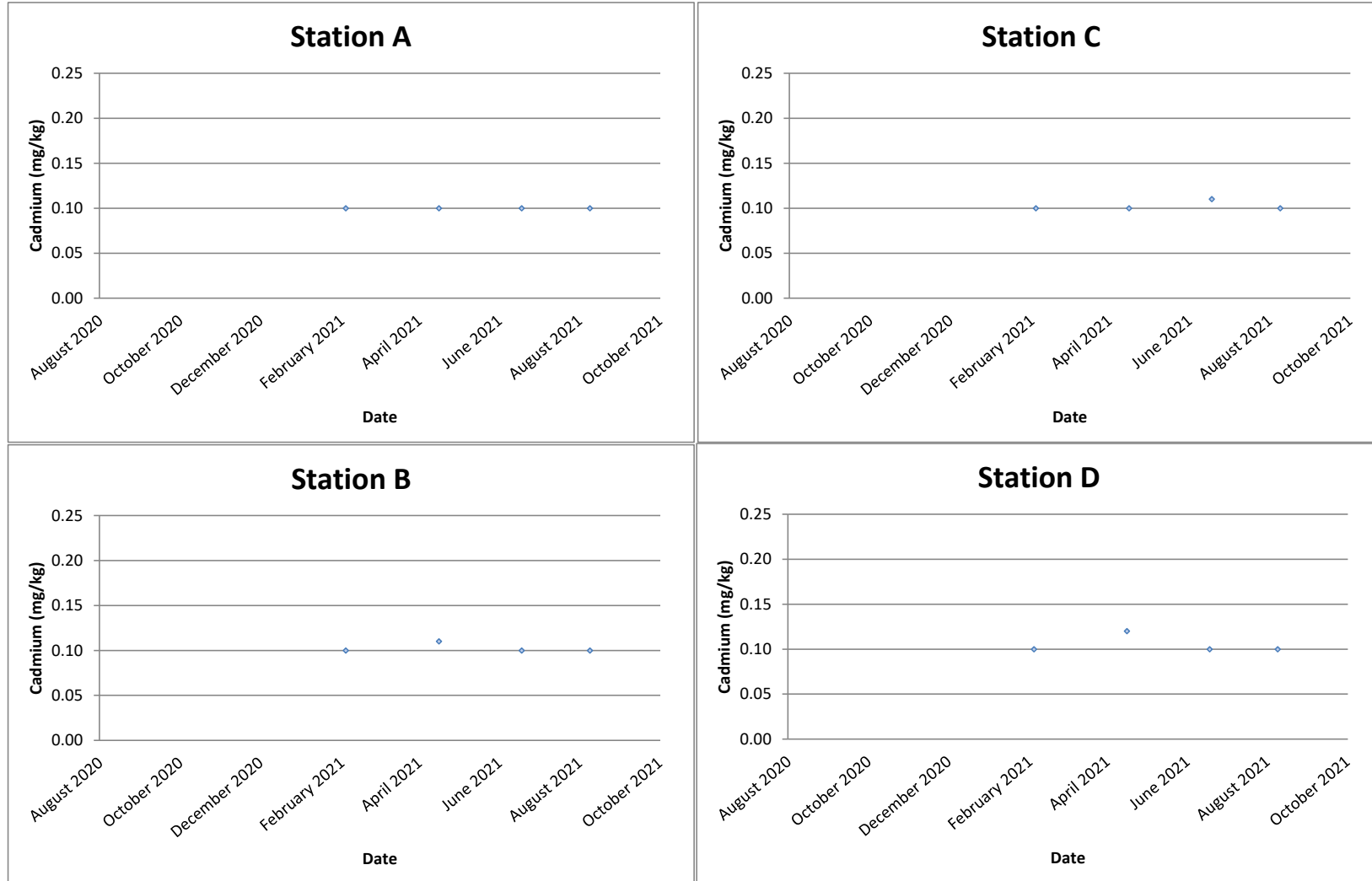
Total Phosphorus (mg-P/kg)



Total Phosphorus (mg-P/kg)

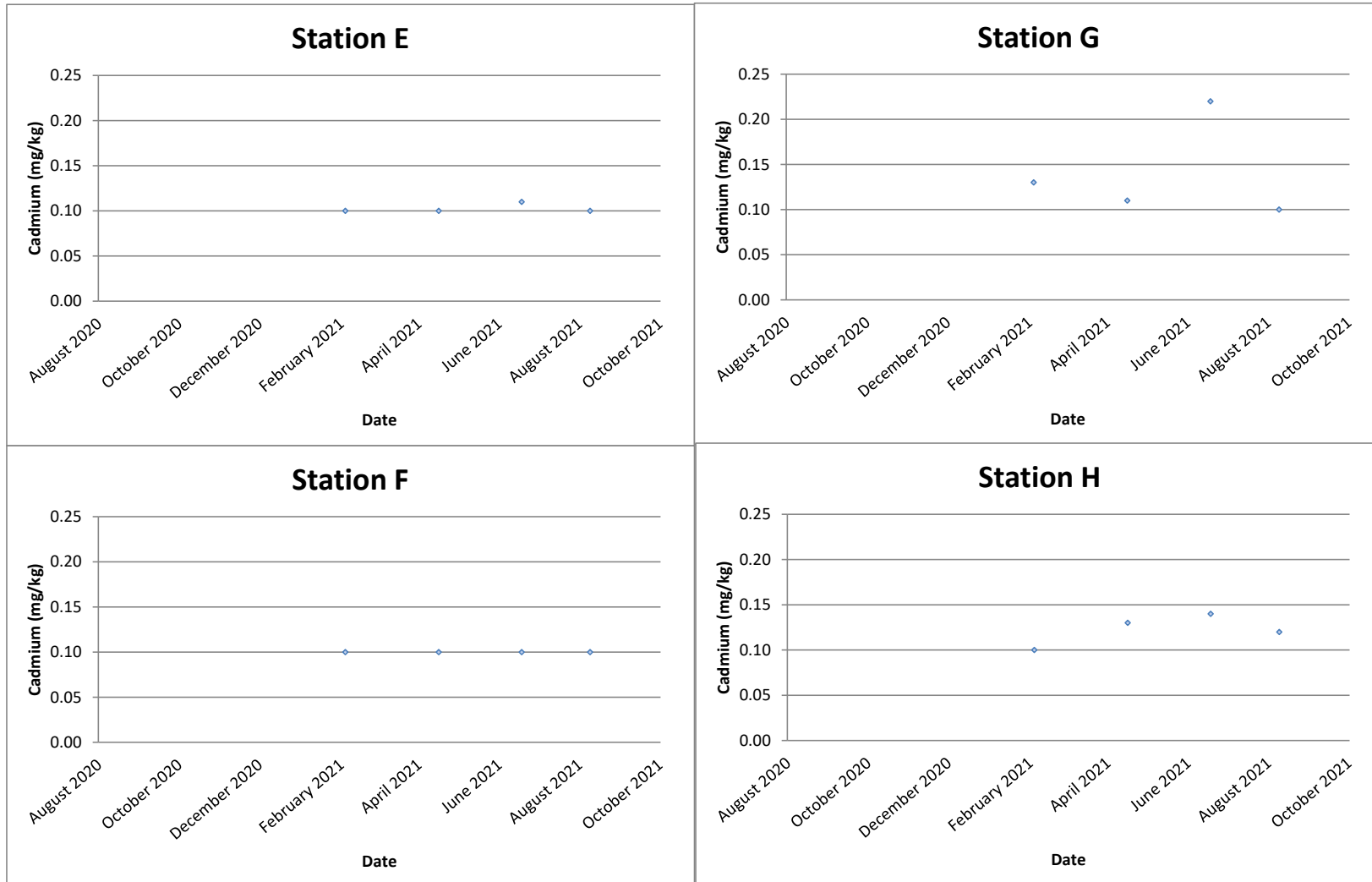


Cadmium (mg/kg)



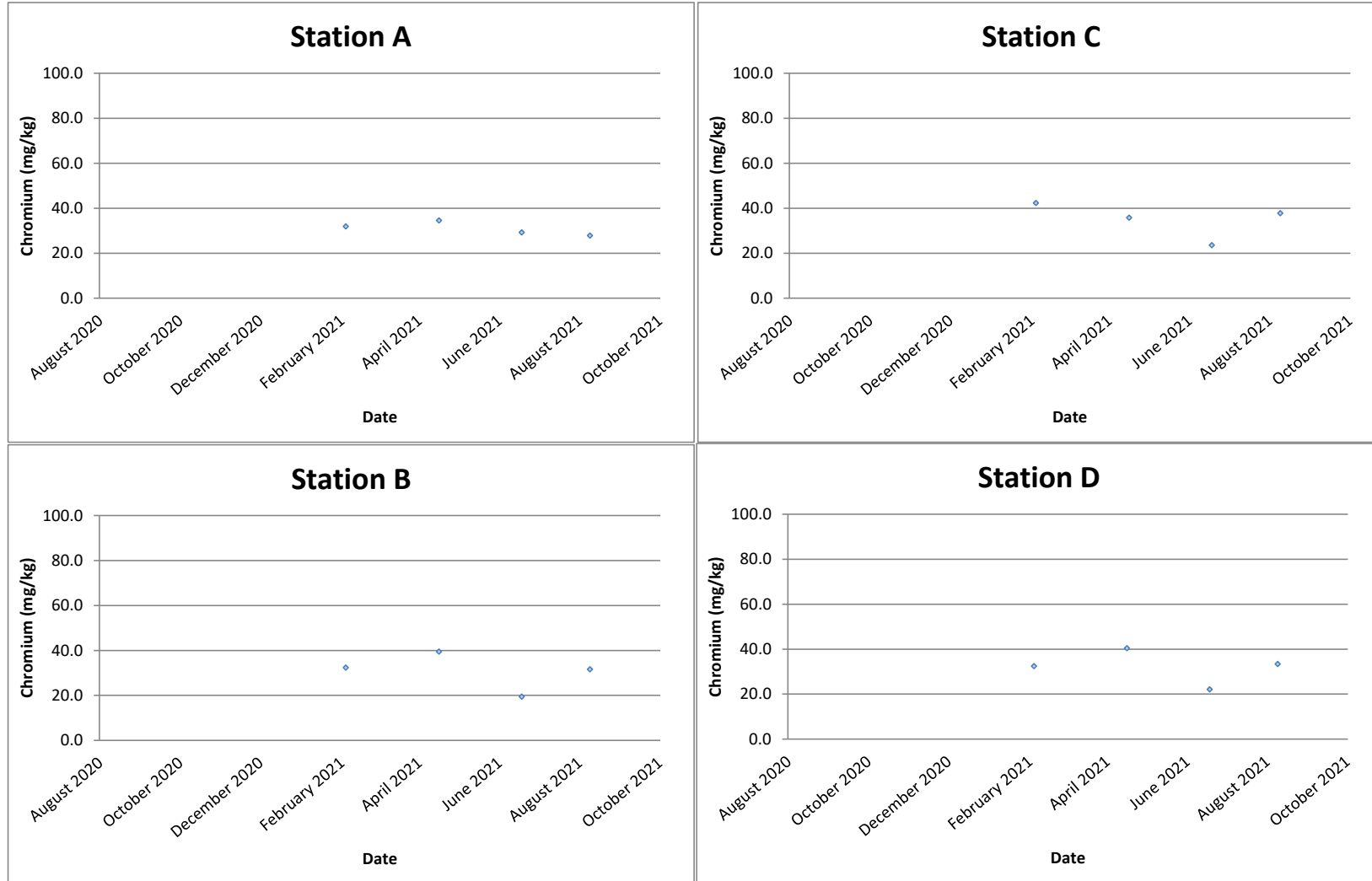
Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

Cadmium (mg/kg)

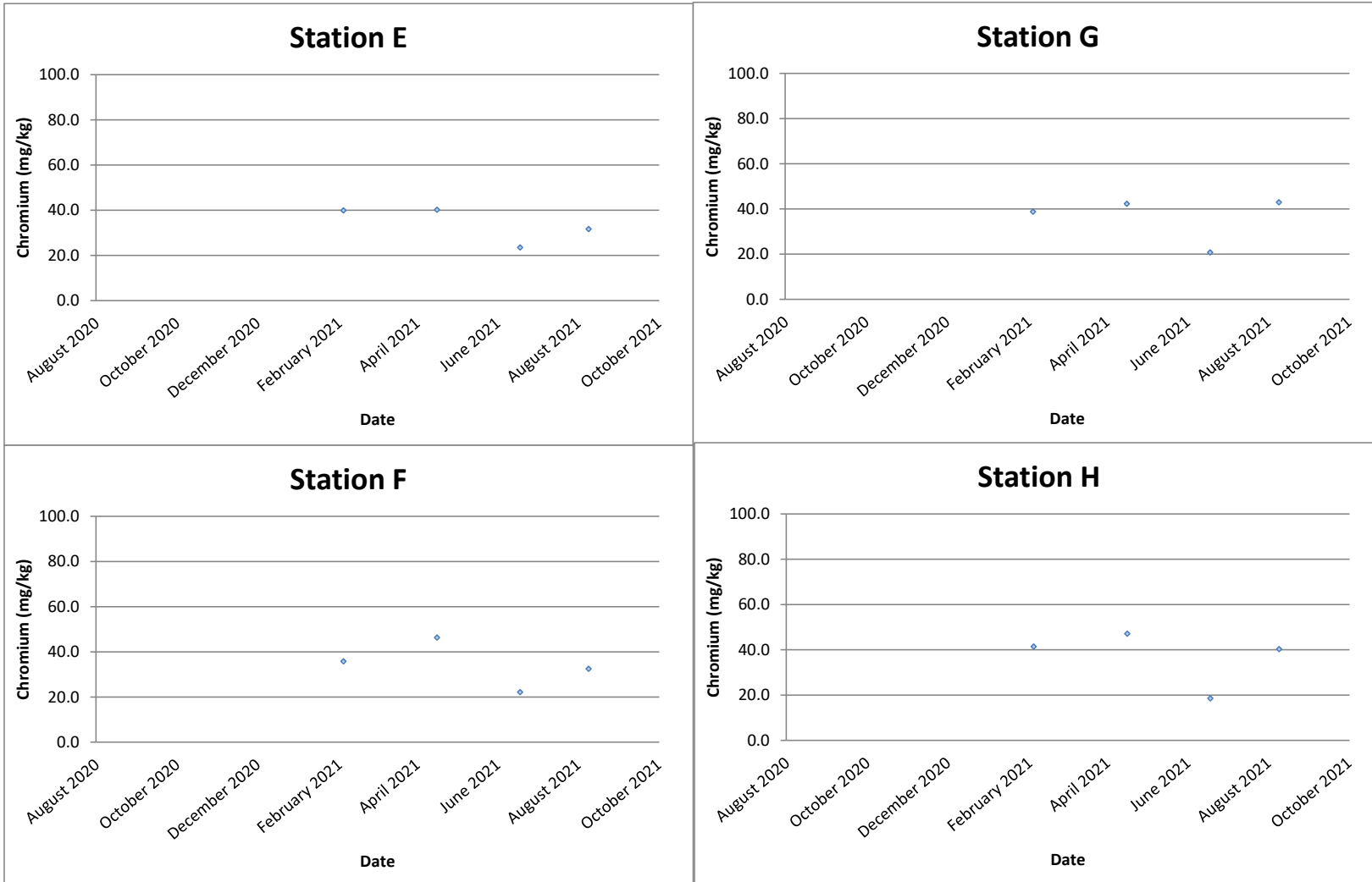


Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

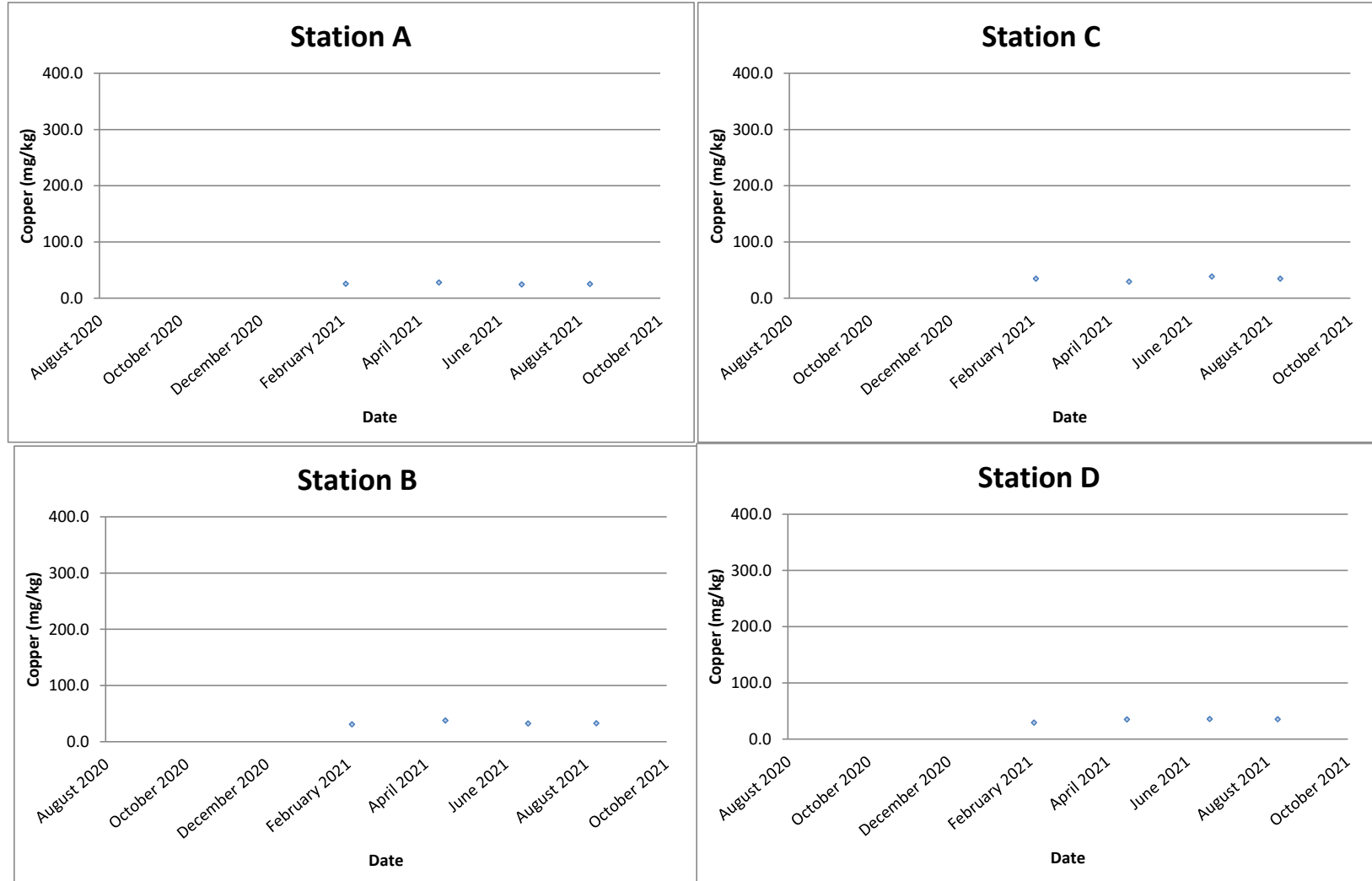
Chromium (mg/kg)



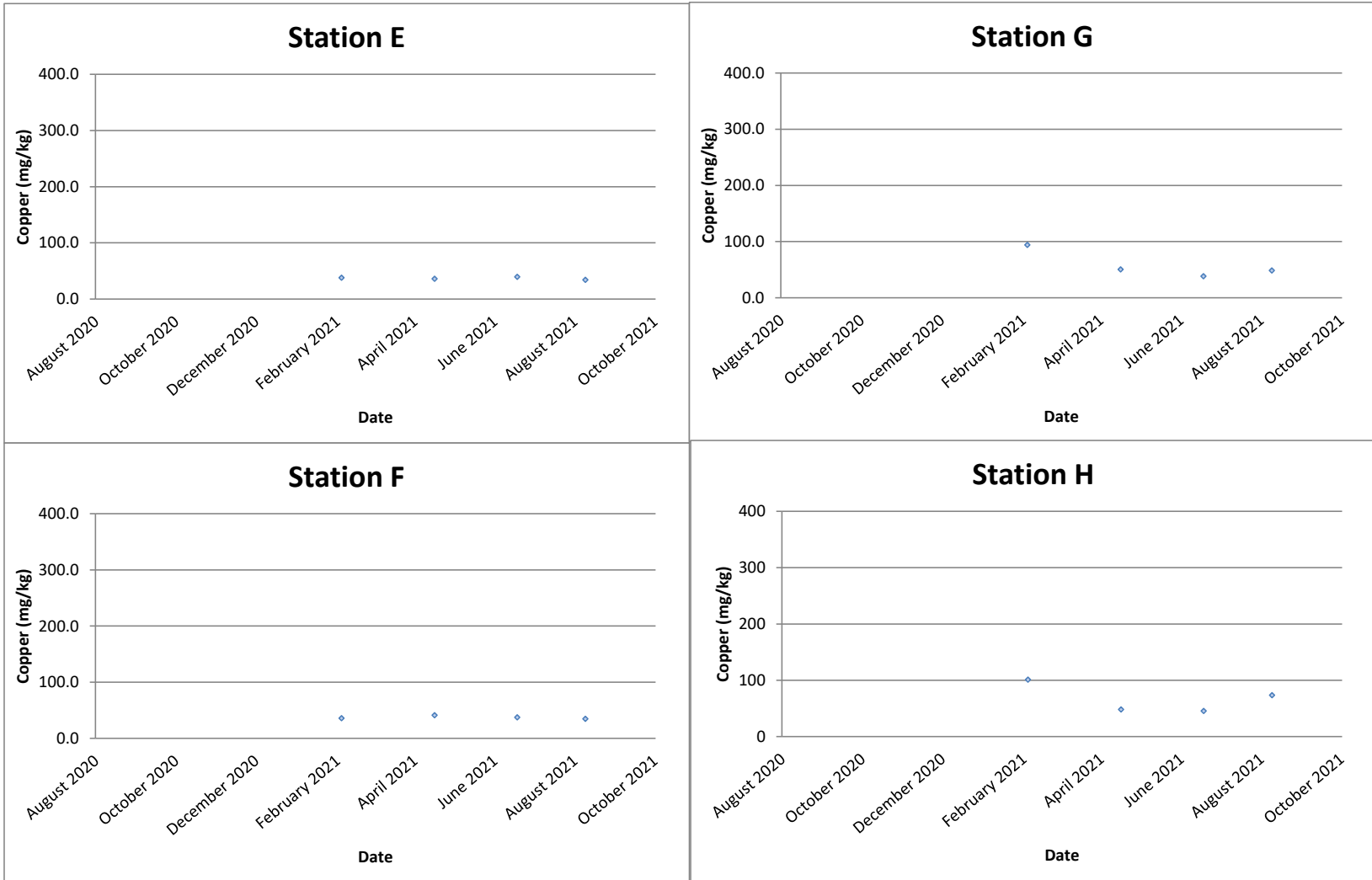
Chromium (mg/kg)



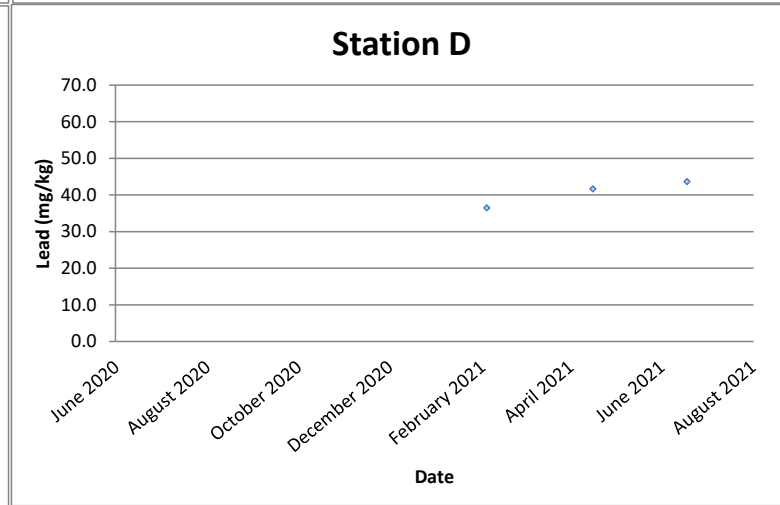
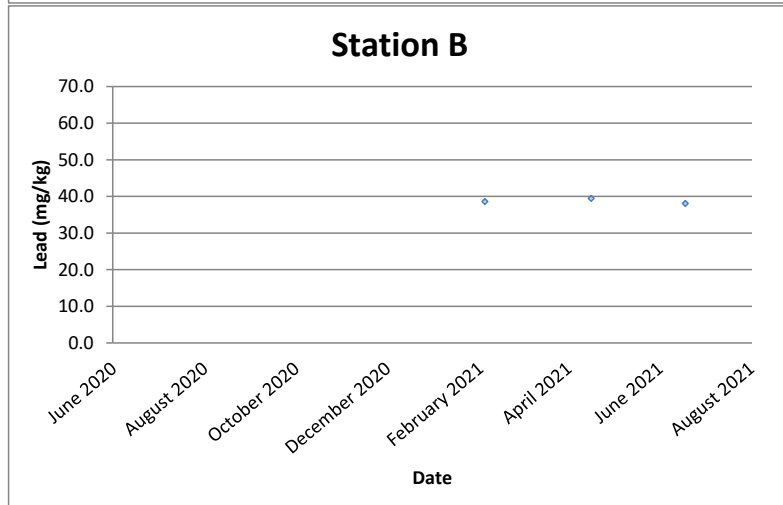
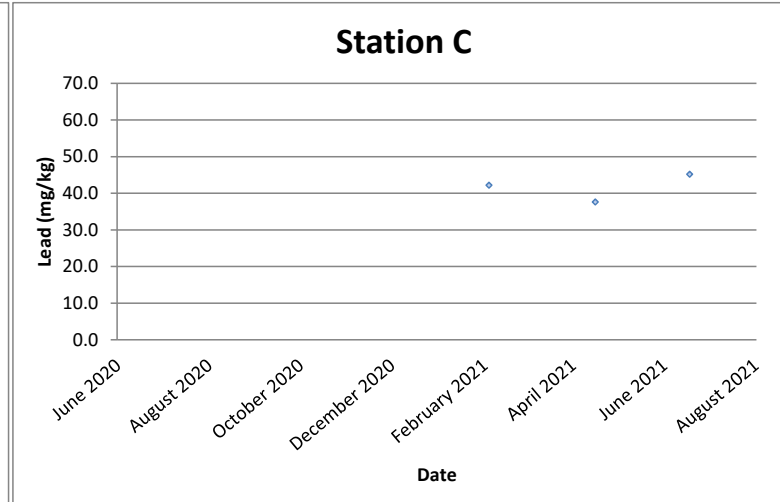
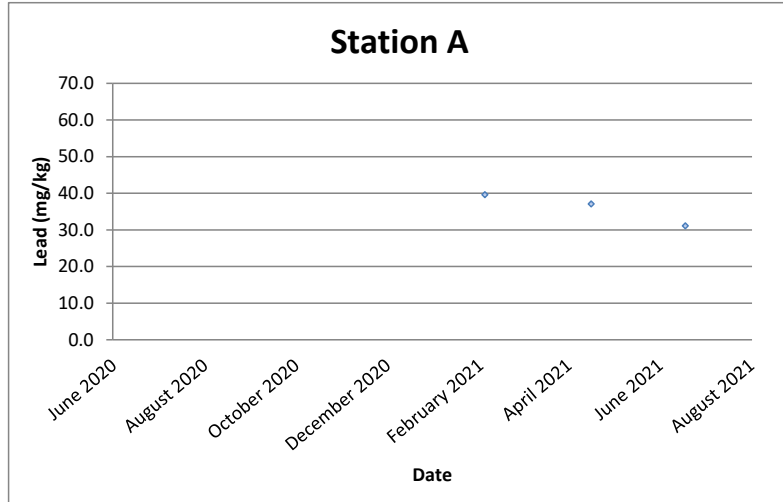
Copper (mg/kg)



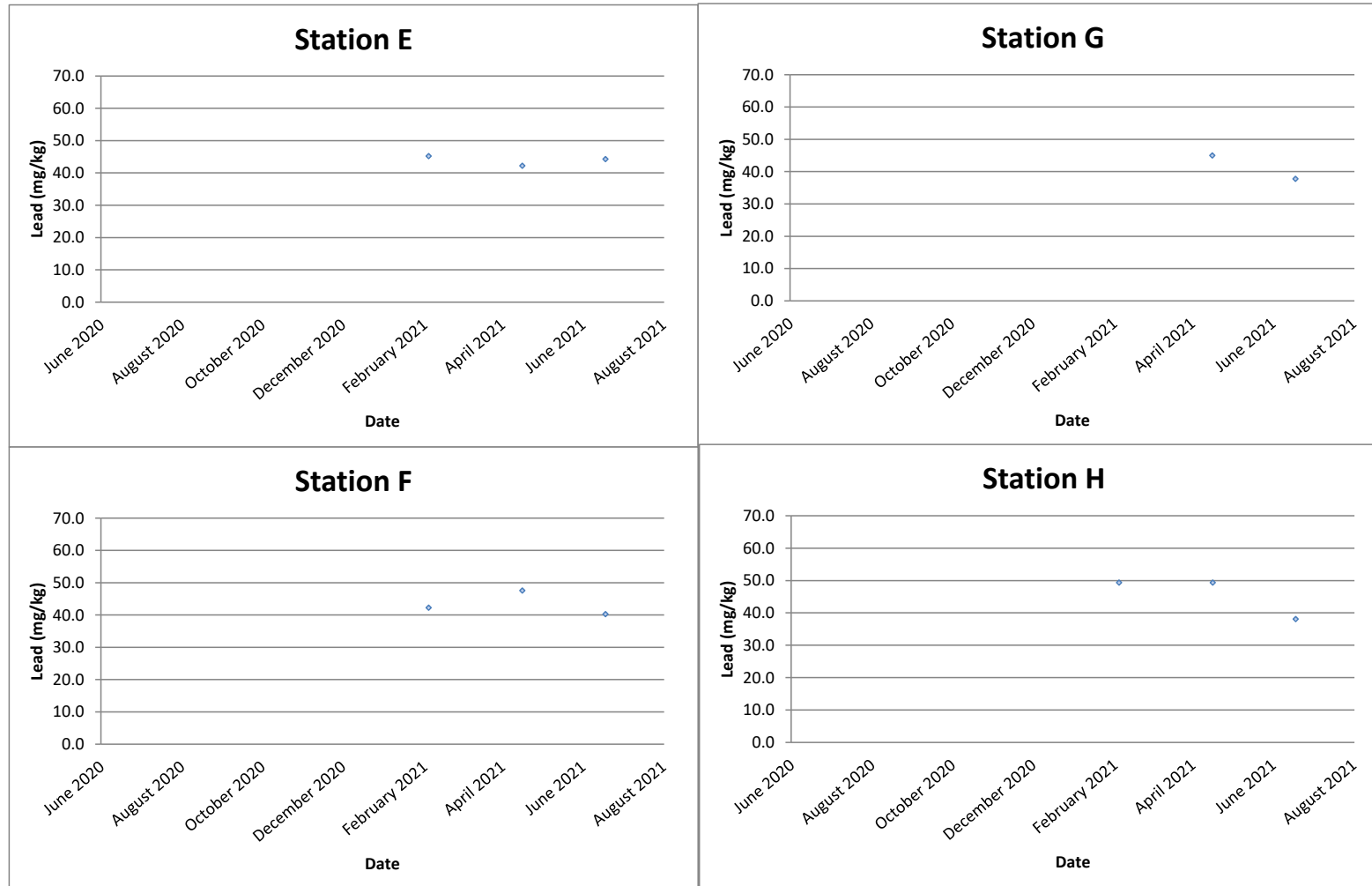
Copper (mg/kg)



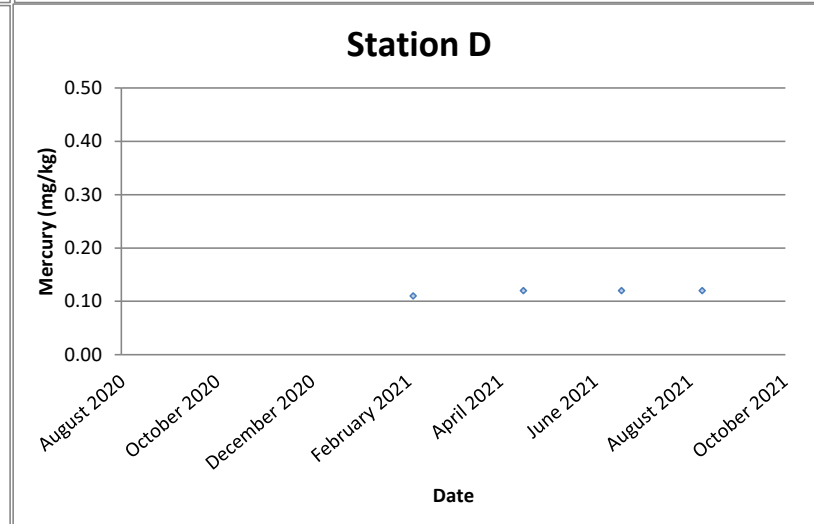
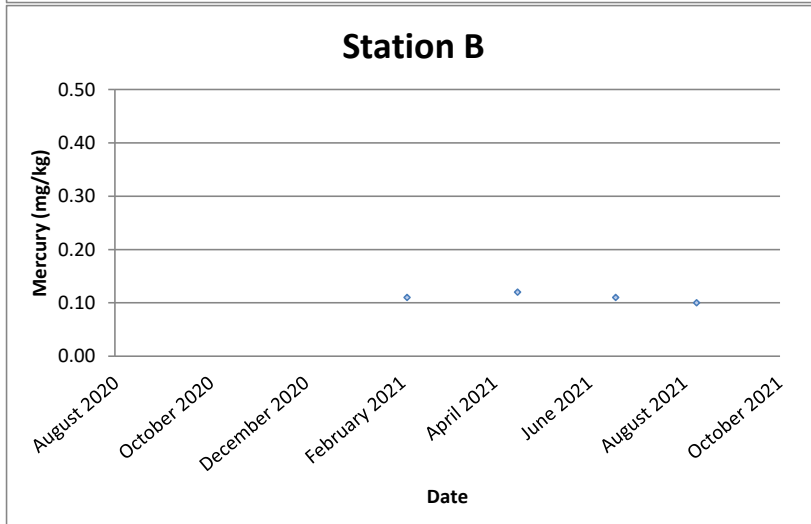
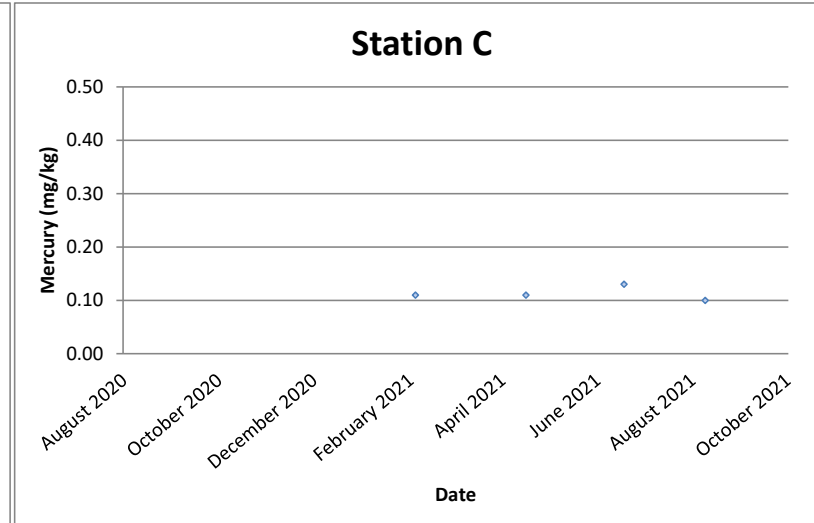
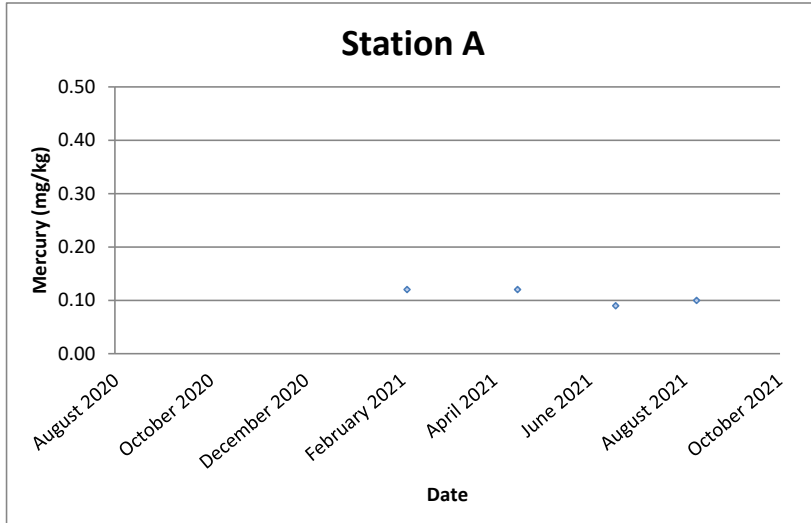
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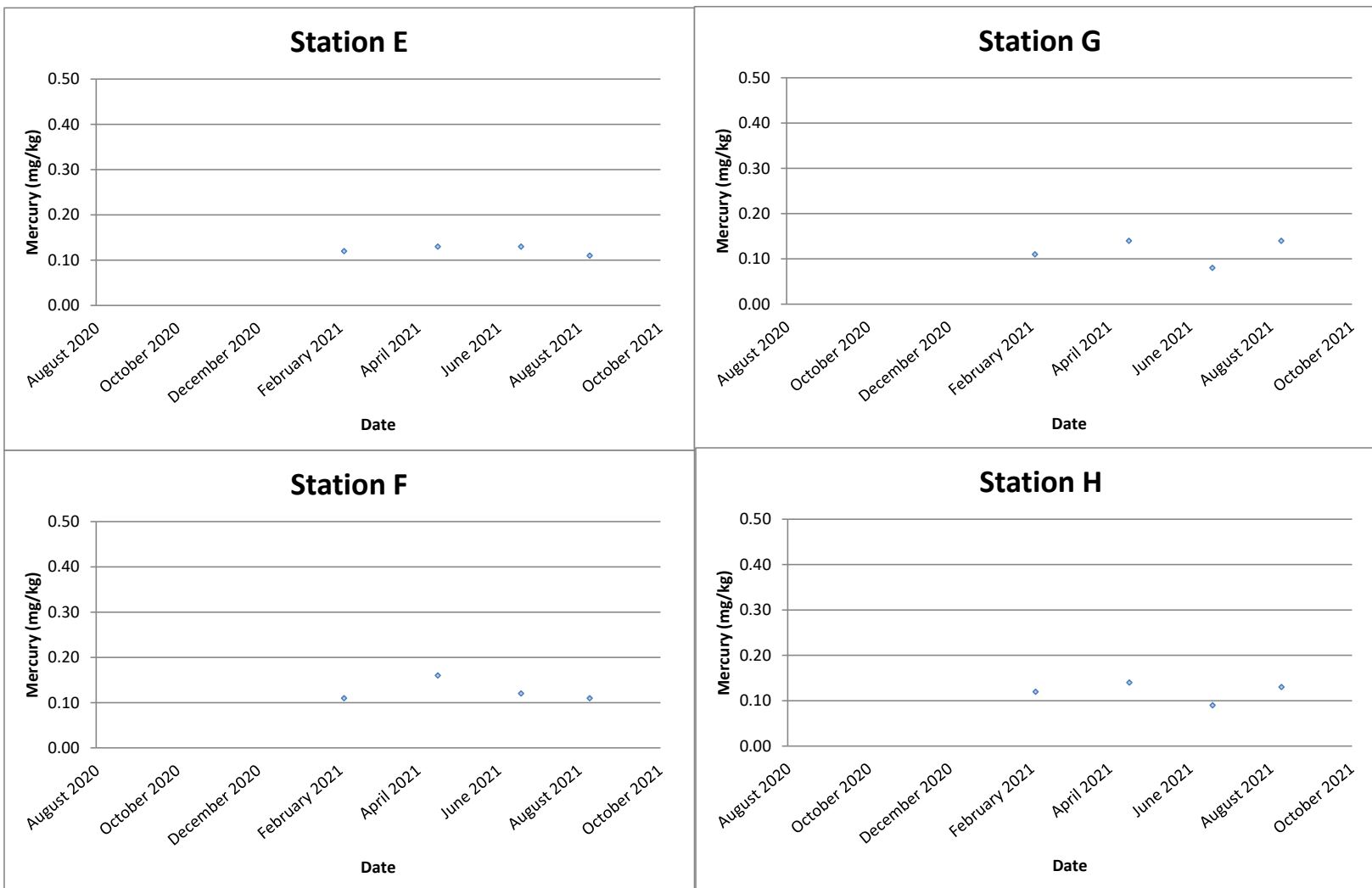
Lead (mg/kg)



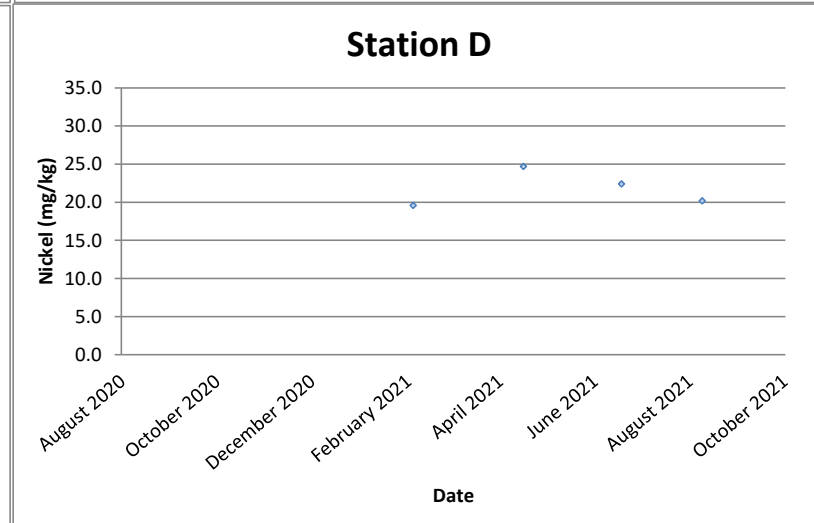
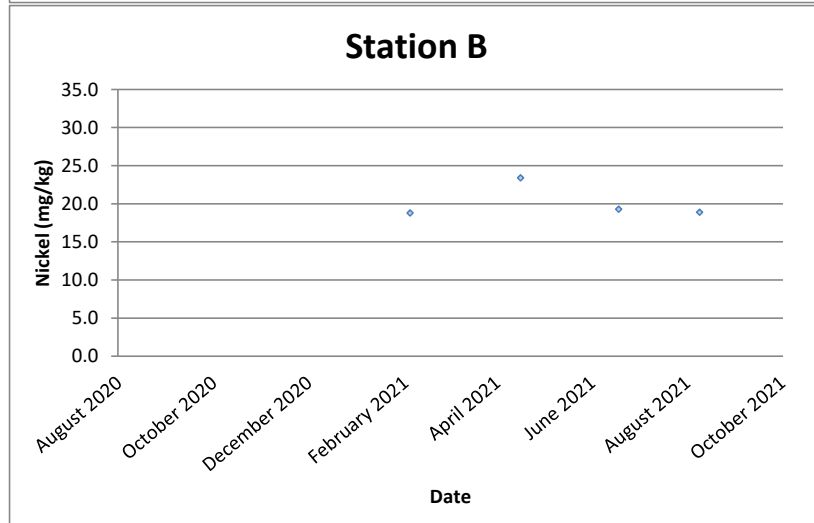
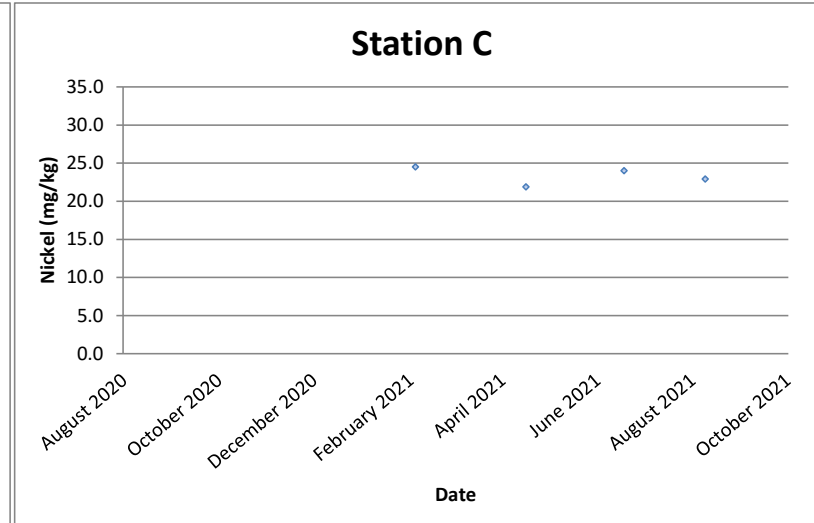
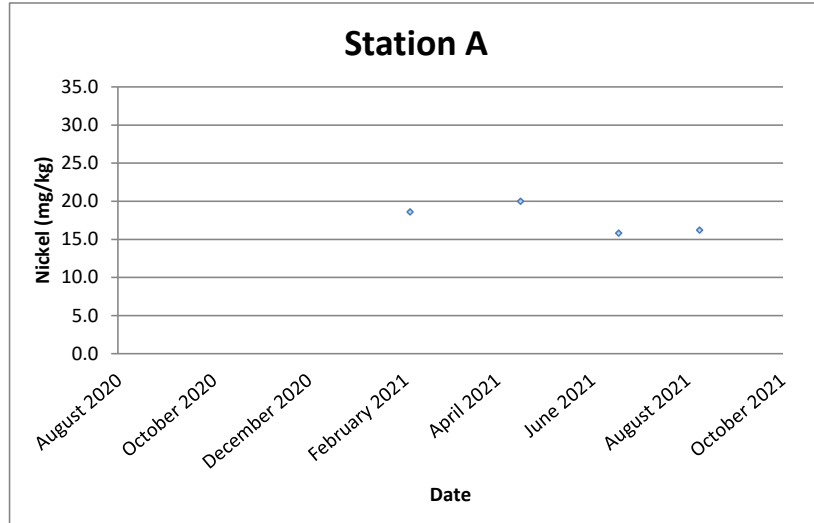
Mercury (mg/kg)



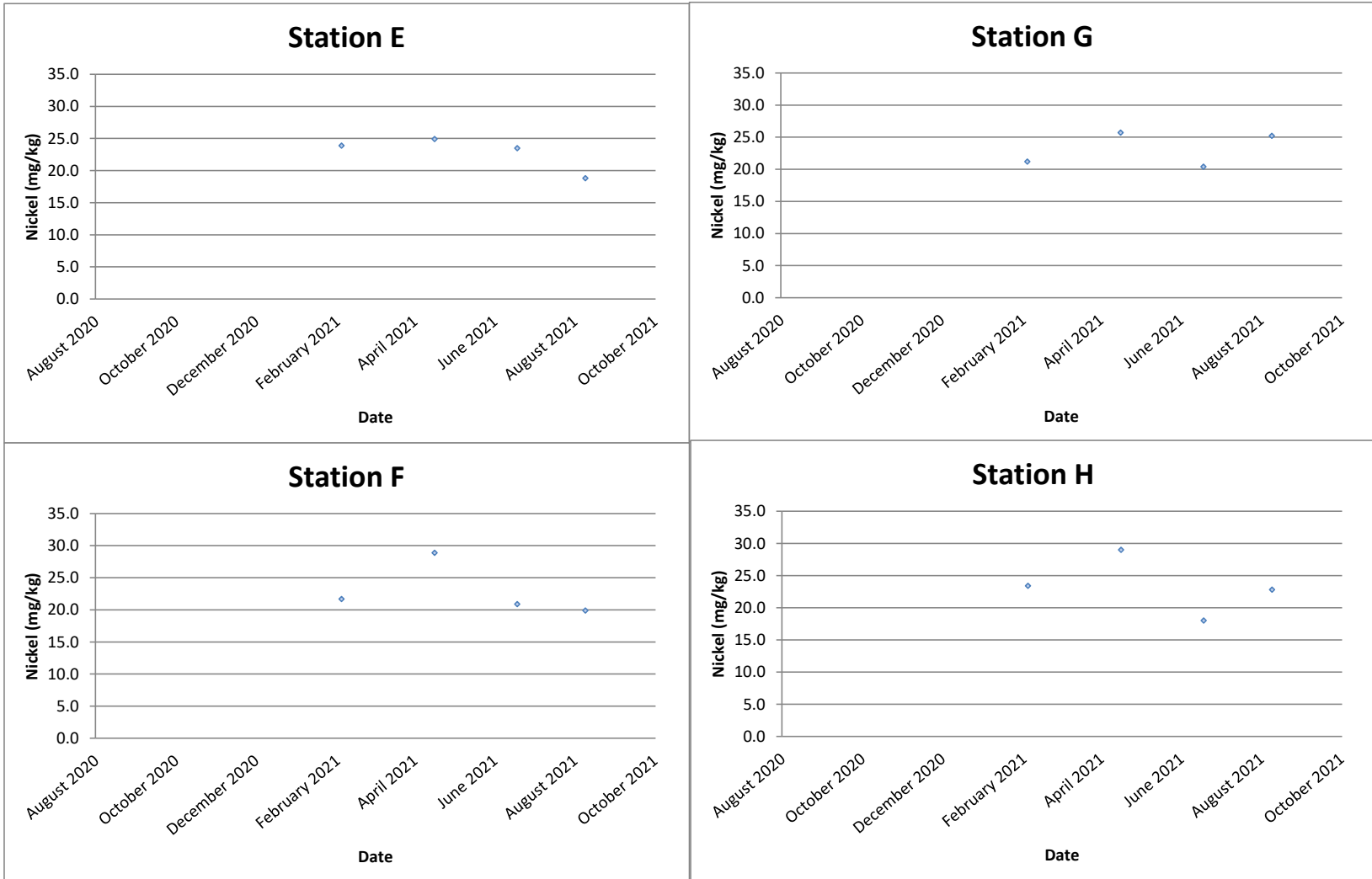
Mercury (mg/kg)



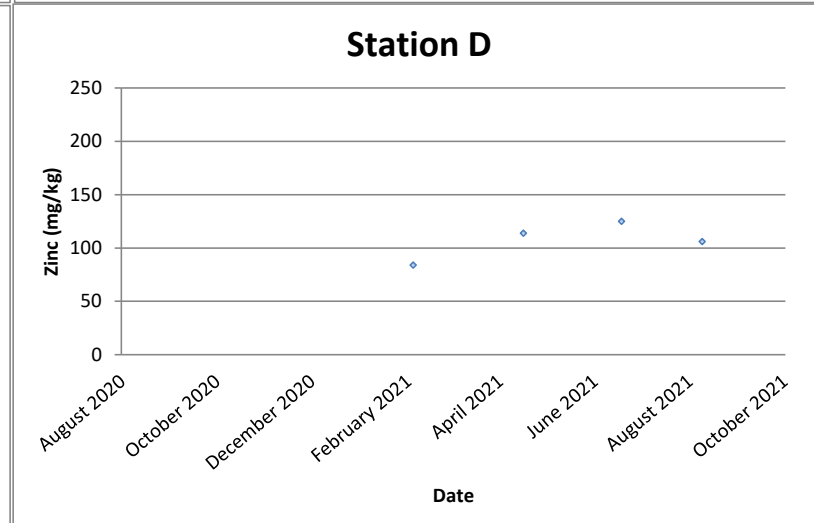
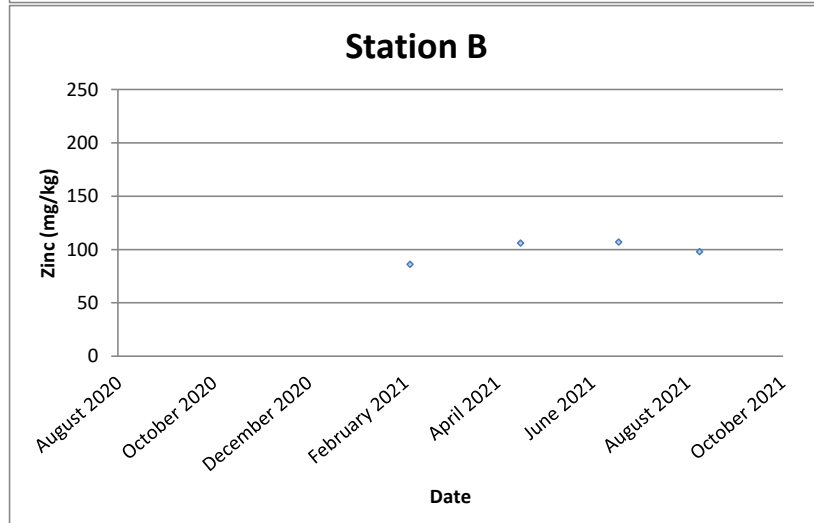
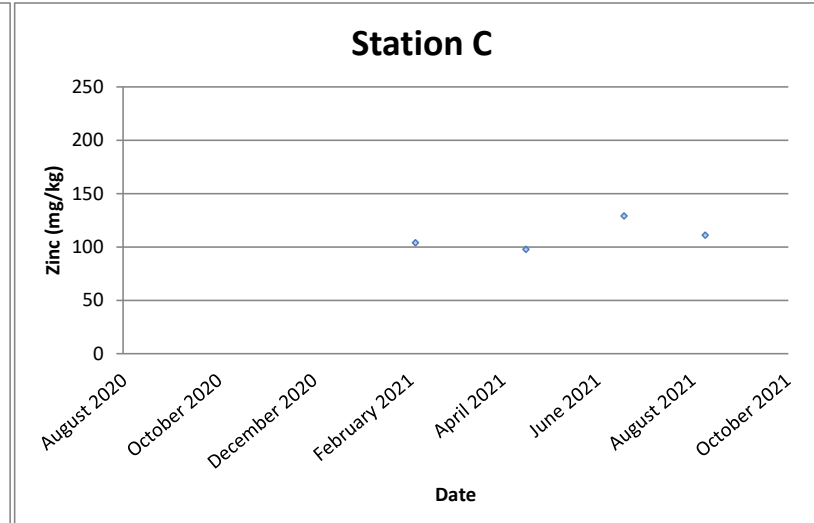
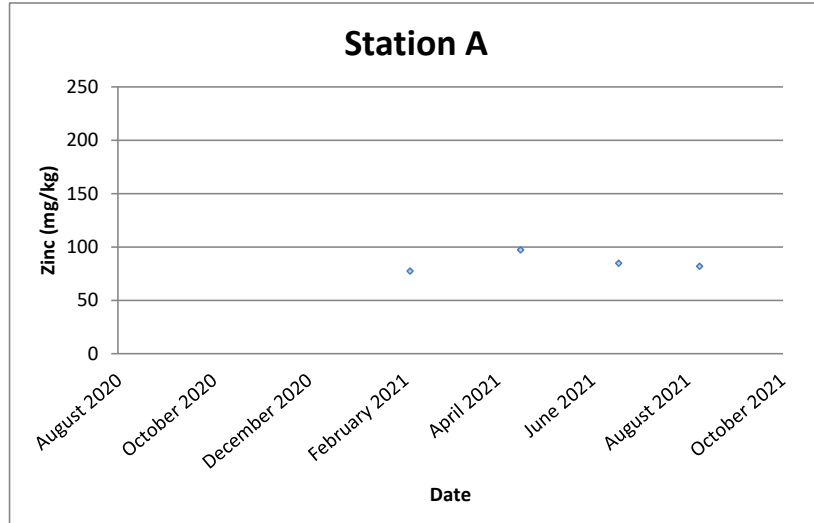
Nickel (mg/kg)



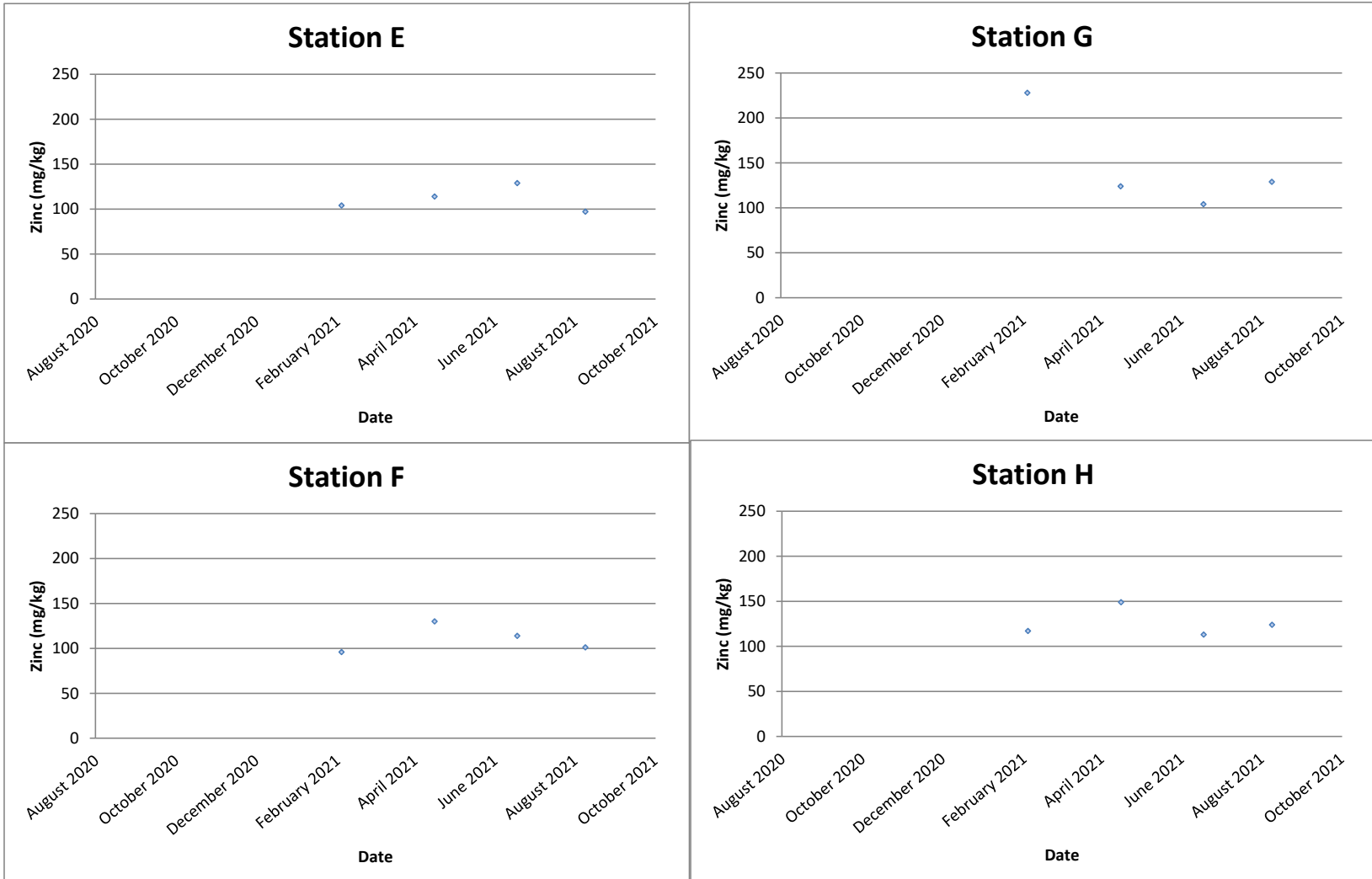
Nickel (mg/kg)



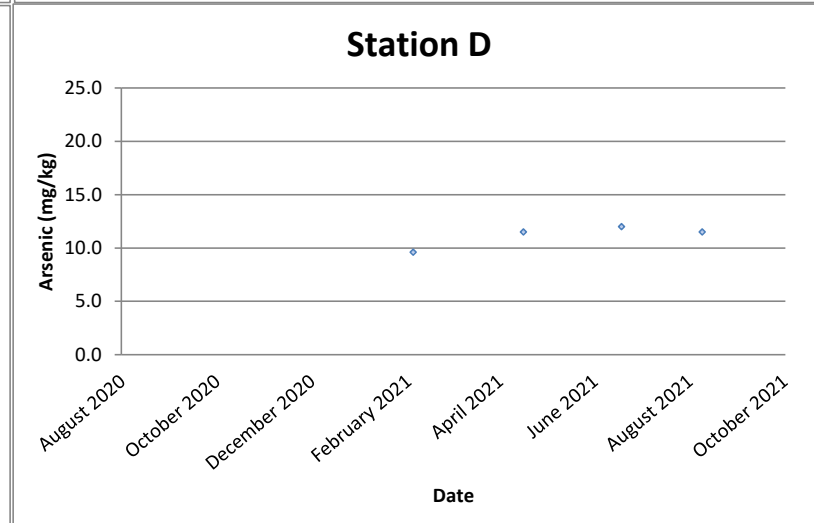
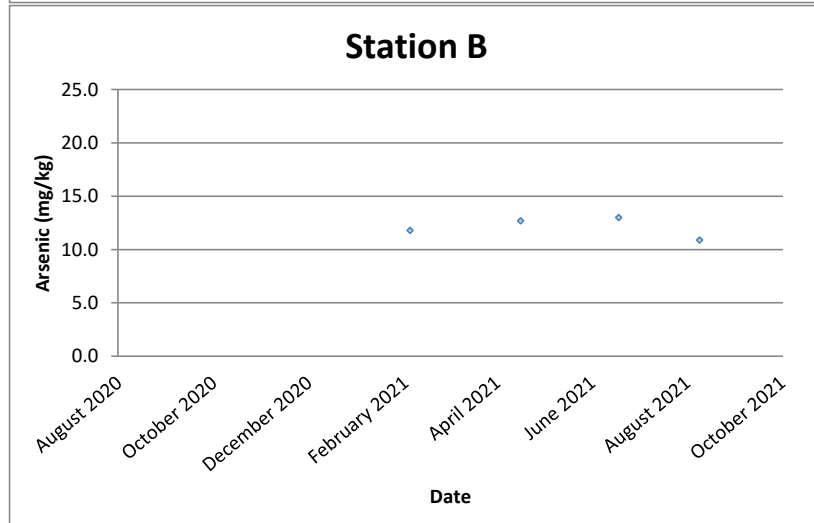
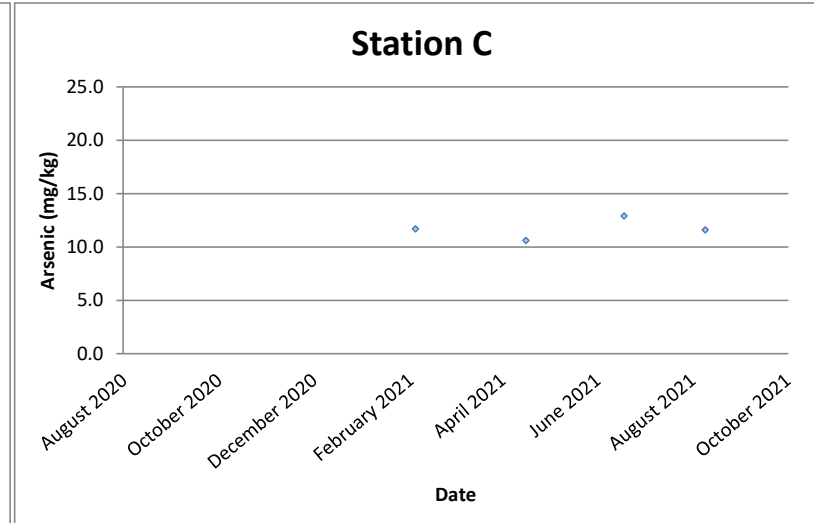
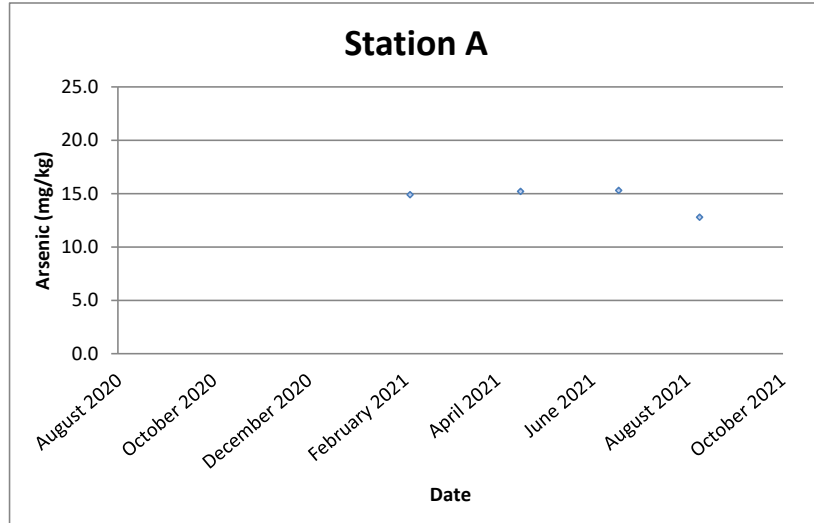
Zinc (mg/kg)



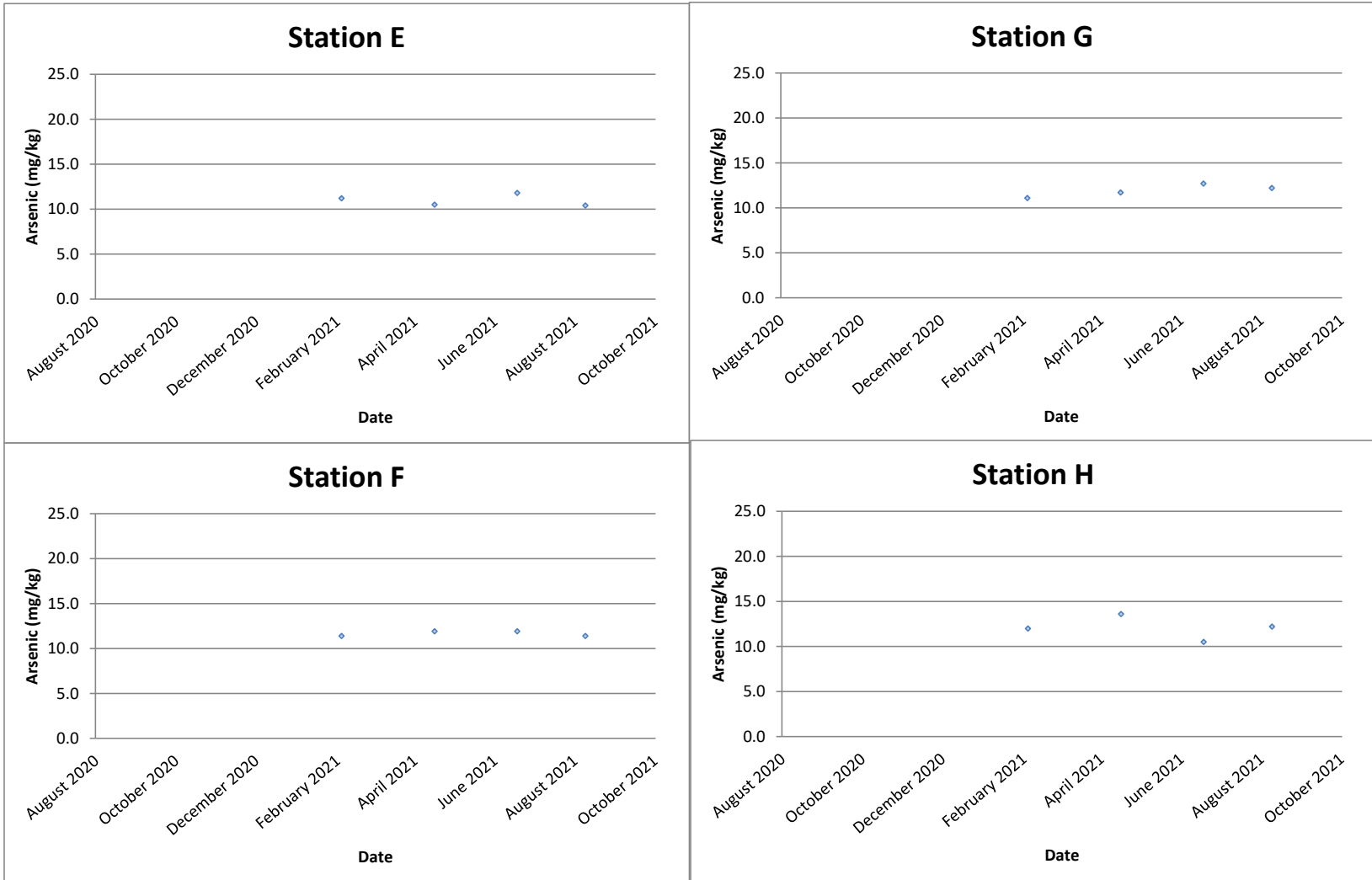
Zinc (mg/kg)



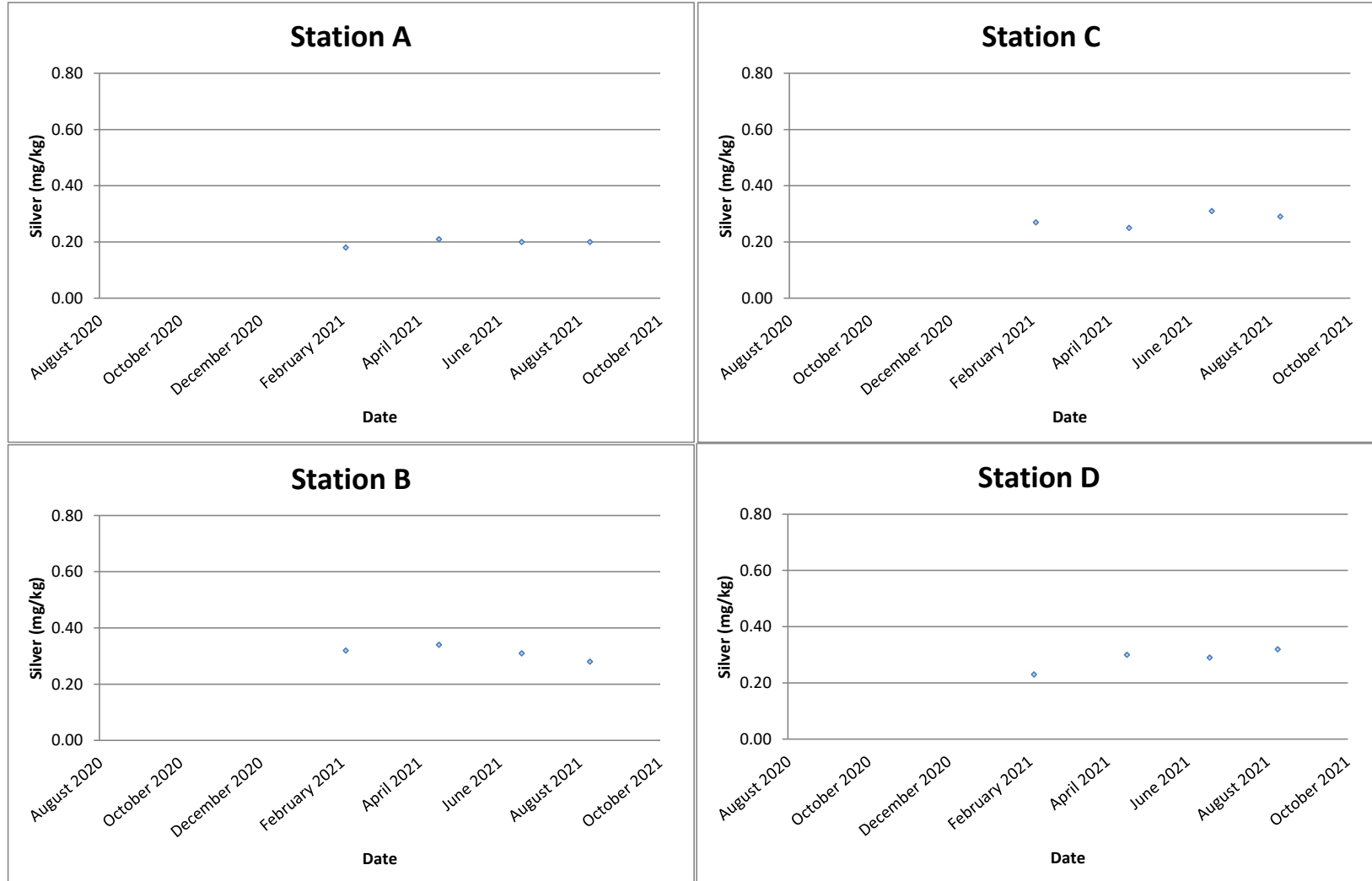
Arsenic (mg/kg)



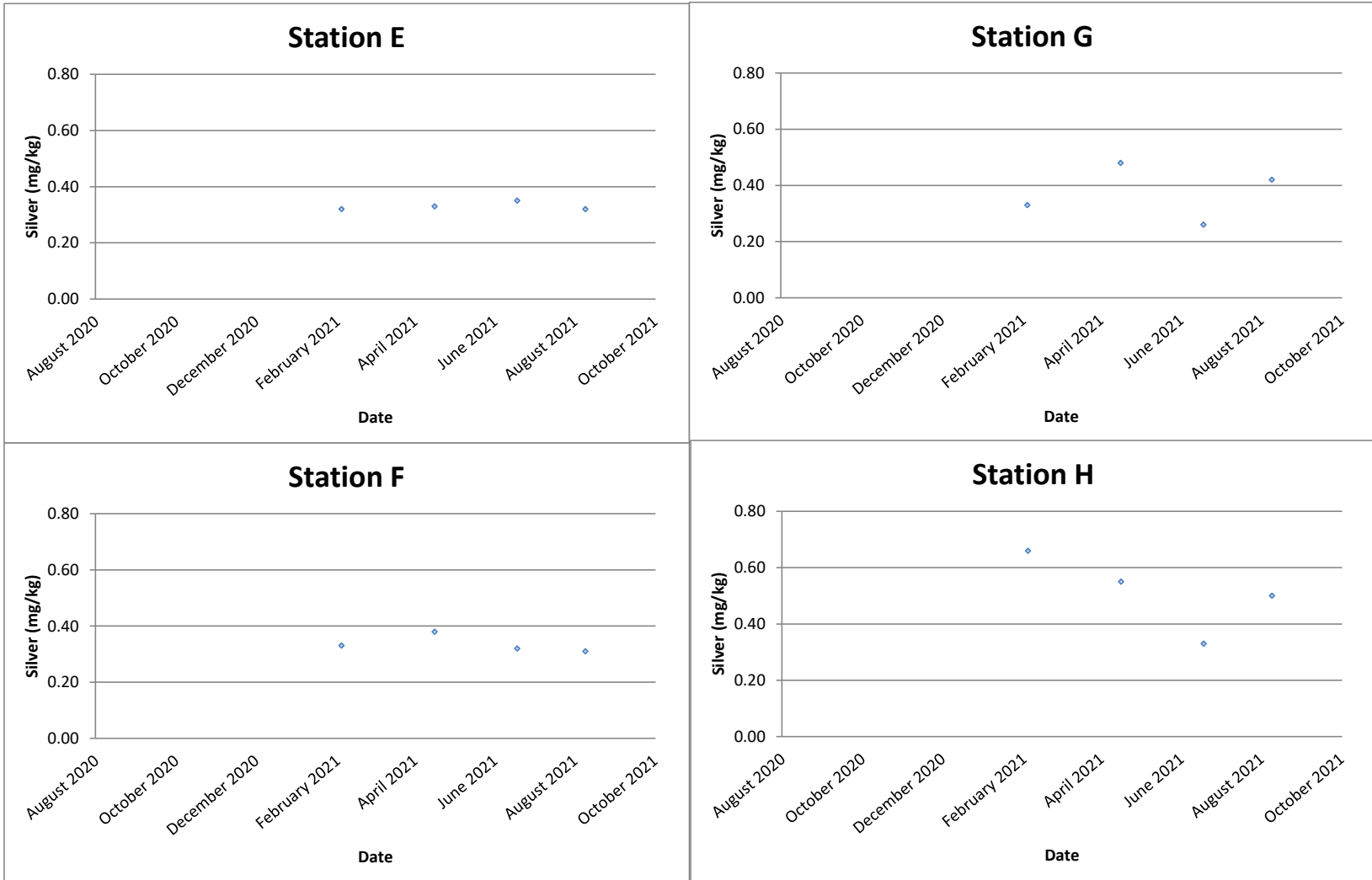
Arsenic (mg/kg)



Silver (mg/kg)



Silver (mg/kg)



FUGRO TECHNICAL SERVICES LIMITED

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5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
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Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com



Report No.: 0041/17/ED/0642A

Appendix I Benthic Survey Report

Benthic Survey Report (09 August 2021)

Abundance

A total of 717 benthic organisms was recorded from the eight monitoring stations during August 2021 monitoring period. Current monitoring results showed higher total monthly abundance compared to both dry (March 2004) and wet (August 2004) seasons baseline data; and to June 2021 results (**Figure 1**). The increase in overall abundance may be attributed to the significant increase in capitellid abundance, which may have been influenced by the concurrent increase in total organic carbon of the sediments. As shown in several studies, distribution of *Capitella* populations are restricted to organically enriched areas as a result of a physiological requirement for sediment with high levels of organic matter for their normal growth (Tutsumi, et al 1990). Same as previous monitoring periods, total monthly abundance of benthic organisms exhibits significant seasonal variation (F-value = 4.62; F-crit = 1.61; p-value = 4.27E-09; $\alpha = 0.05$).

In terms of spatial distribution, the lowest abundance of 58 ind. was recorded in the impact station, Station C, while the highest (135 ind.) was noted in the reference station, Station H (**Figure 2**). It should be noted, however, that the abundance of benthic organisms in all stations increased relative to June 2021 monitoring results. Total macrobenthic abundances, similar with the previous monitoring periods, showed statistically significant spatial distribution (F-value = 2.88; F-crit = 2.06; P-value = 0.007; $\alpha = 0.05$).

Biomass

The total wet biomass recorded in the eight monitoring stations was 9.95 g with the highest biomass recorded in the reference station, Station H (2.81 g) while the lowest biomass was observed in the reference station, Station A (0.37 g). Relative to the June 2021 period, a general decrease in biomass was observed during the current monitoring period (**Figure 3**). The decrease might be attributed to the continued dominance of smaller benthic organisms, i.e. capitellids.

Taxonomic Composition

A total of five phyla comprising of 22 families and about 25 genera were identified. During the current monitoring period, the annelids (78.52%) dominated the macrobenthic assemblage followed by the molluscs (10.04%), and arthropods (9.90%) while the group with the lowest dominance were the chordates (0.14%) (**Figure 4**). The decrease in arthropod abundance in June 2021 brought about a consequent change in community assemblage, a shift from arthropod-dominated community in April 2021 to annelid-dominated in June 2021 and August 2021. This shift in community assemblage with shift in season was also observed during the previous monitoring years.

Diversity

Benthic diversity index (H') in the impact stations ranged from 1.63 to 1.92. In the reference stations, H' values ranged from 0.96 to 2.34. Impact stations remained to have relatively higher diversity values

compared to reference stations. In terms of evenness index (J) values, current monitoring results showed that both the impact Stations C and D were able to maintain high evenness index. Current monitoring results indicated an overall increase in 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 and assemblages are shown in the last pages of this benthic survey report.

Figures

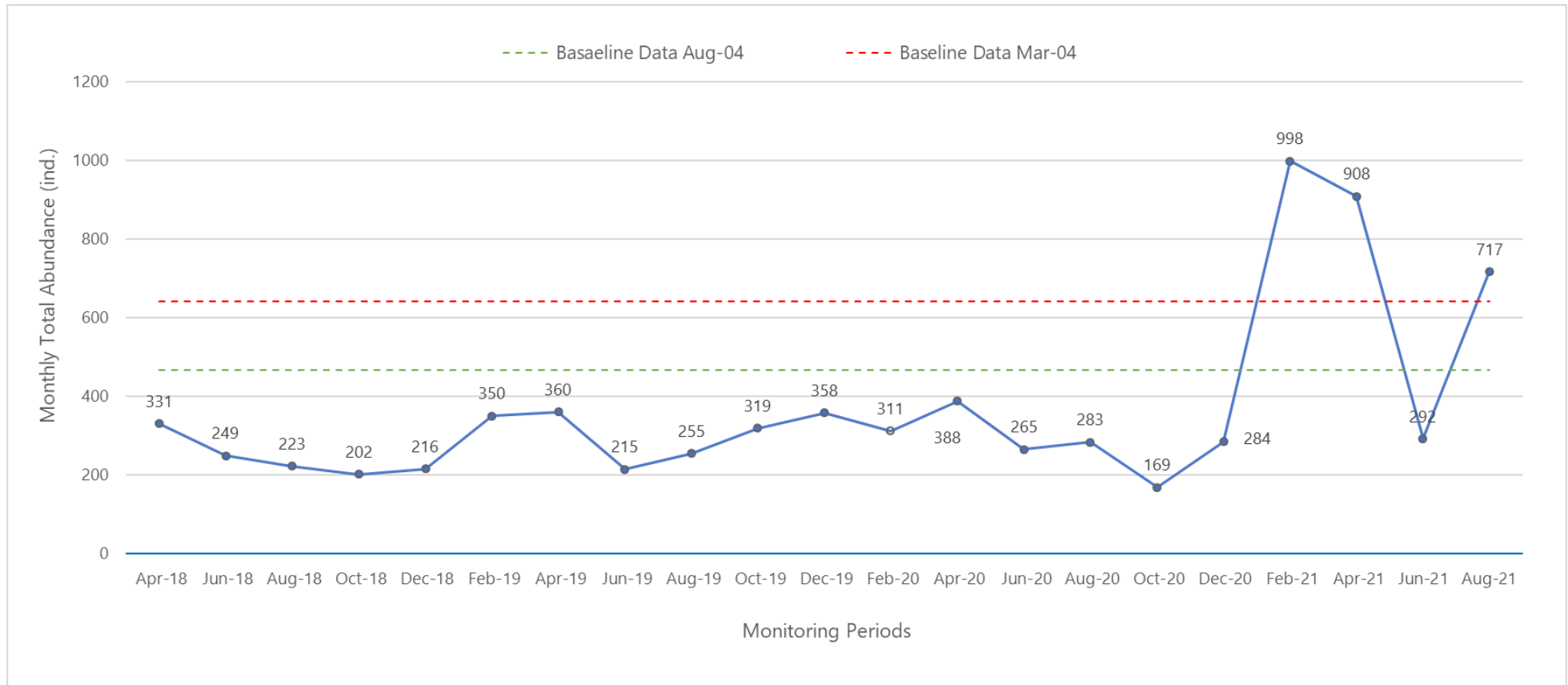


Figure 1: Monthly total abundance (ind.) of benthic organisms across monitoring periods

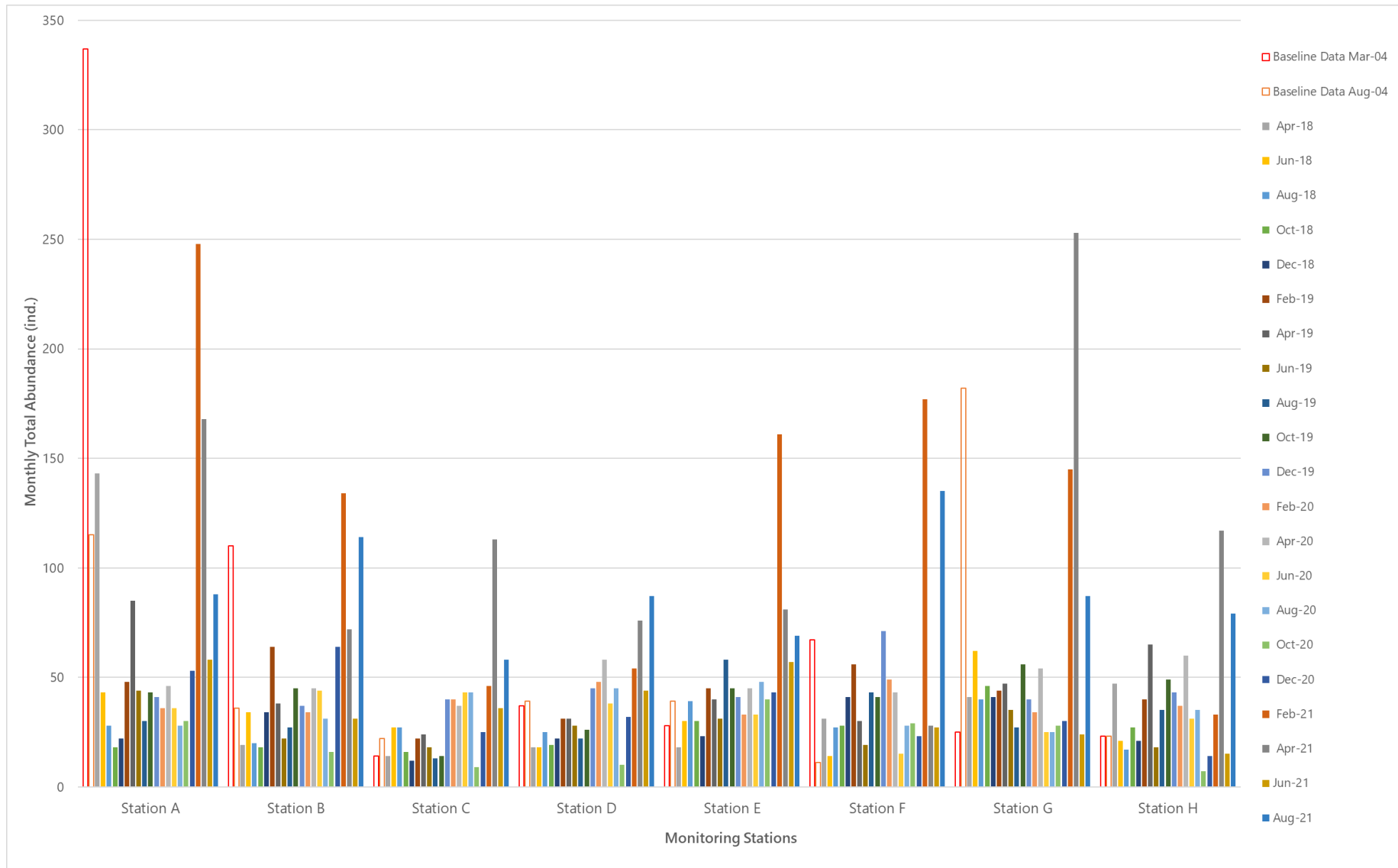


Figure 2: Monthly total abundance (ind.) of benthic organisms across monitoring stations

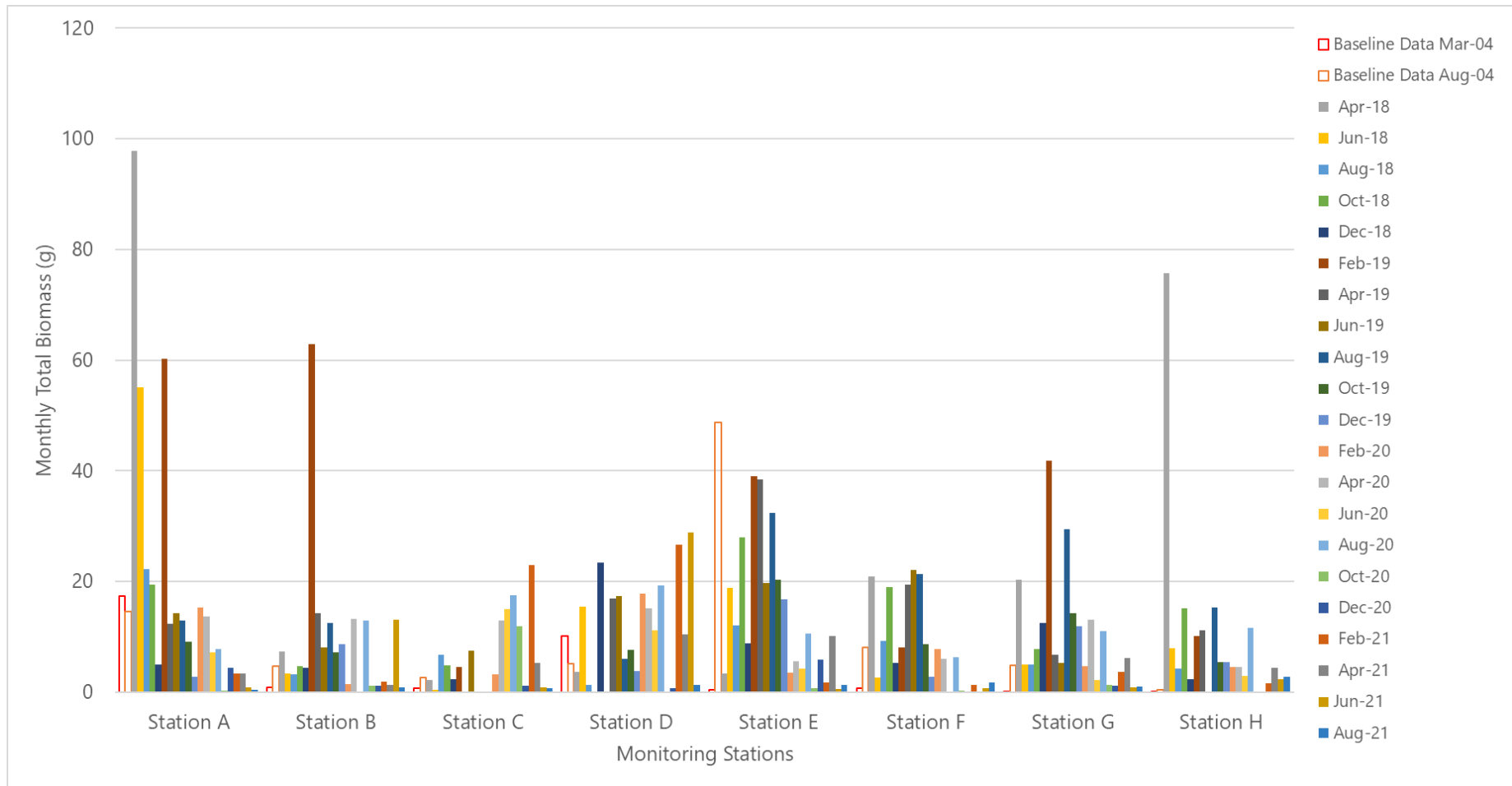


Figure 3: Monthly total biomass (g) of benthic organisms across monitoring stations

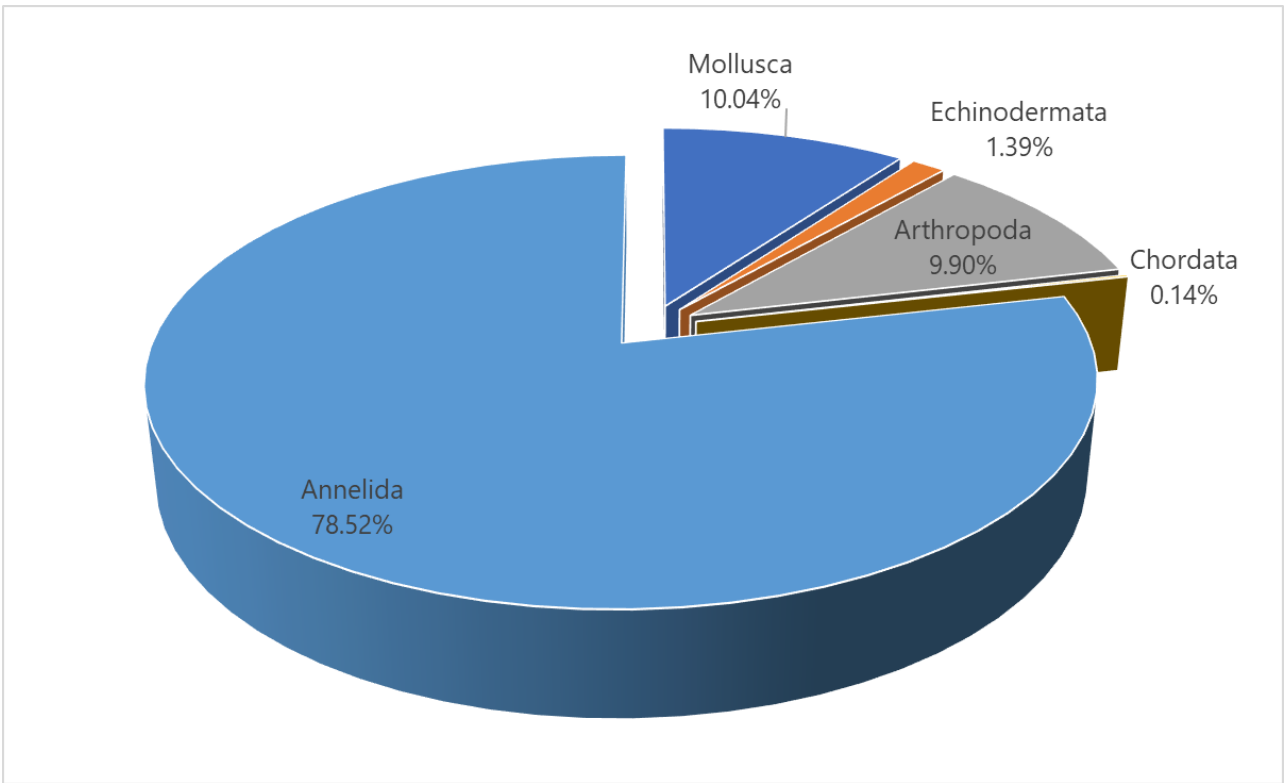


Figure 4: Percent composition of benthic organisms

Data Summaries

Table 1: Abundance (ind.) of macrobenthic communities in the eight monitoring stations, 09 August 2021

Phylum	Class	Order	Family	Genus	Monitoring Stations							
					A	B	C	D	E	F	G	H
Mollusca	Bivalvia	Veneroida	Tellinidae	<i>c.f. Angulus</i>	1	2	1	2	5	3	1	1
Mollusca	Bivalvia	Veneroida	Veneridae	<i>c.f. Meretrix (M. lusoria)</i>	5	2	1	0	0	1	0	1
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Paphia (P. undulata)</i>	2	4	1	3	8	5	10	2
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Timoclea scabra</i>	0	0	0	3	1	0	0	1
Mollusca	Bivalvia	Veneroida	Cardiidae	<i>Cardium</i>	0	1	0	0	0	0	0	0
Mollusca	Bivalvia	Adapedonta	Solenidae	<i>Solen</i>	0	0	2	1	0	0	0	2
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	<i>Amphioplus</i>	1	2	2	0	1	0	1	3
Arthropoda	Malacostraca	Amphipoda	Gammaridae	<i>Gammarus</i>	0	0	5	9	1	20	8	0
Arthropoda	Crustacea	Decapoda	Dotillidae	<i>Ilyoplax</i>	0	3	0	0	3	2	2	5
Arthropoda	Crustacea	Decapoda	Epialtidae	<i>Doclea</i>	0	0	1	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	0	7	1	1	0	1	2	0
Chordata	Actinopterygii	Perciformes	Gobiidae	<i>Parachaeturichthys polynema</i>	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Nephtys</i>	8	40	9	10	12	15	10	11
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella</i>	67	50	20	40	26	60	36	40
Annelida	Polychaeta	Spionida	Poecilochaetidae	<i>Poecilochaetus</i>	0	0	5	4	5	6	8	8
Annelida	Polychaeta	Aciculata	Nereididae	<i>Nereis</i>	1	0	0	1	0	6	1	0
Annelida	Polychaeta	Scolecida	Orbiniidae	<i>Naineris</i>	0	0	0	4	0	0	0	0
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Terebella</i>	1	0	2	4	0	2	1	2
Annelida	Polychaeta	Terebellida	Trichobranchidae	<i>Terebellides stroemii</i>	0	0	0	0	0	2	0	0
Annelida	Polychaeta	Terebellida	Pectiniariidae	<i>Pectinaria (Lagis)</i>	2	0	0	0	0	0	0	0
Annelida	Polychaeta	-	Maldanidae	<i>Maldanella</i>	0	0	8	1	0	2	0	1
Annelida	Polychaeta	-	Opheliidae	<i>Ophelia</i>	0	0	0	0	0	1	0	1
Annelida	Polychaeta	Phyllodocida	Aphroditidae	<i>Laetmonice</i>	0	0	0	0	7	6	7	0
Annelida	Polychaeta	Phyllodocida	Nereididae	<i>Ceratonereis</i>	0	0	0	0	0	3	0	0
Annelida	Polychaeta	Terebellida	Sternaspidae	<i>Sternaspis scutata</i>	0	3	0	4	0	0	0	0

Table 2: Biomass (g) of macrobenthic communities in the eight monitoring stations, 09 August 2021

Phylum	Class	Order	Family	Genus	Monitoring Stations							
					A	B	C	D	E	F	G	H
Mollusca	Bivalvia	Veneroida	Tellinidae	<i>c.f. Angulus</i>	0.0083	0.049	0.0061	0.0218	0.1155	0.0155	0.0084	0.0329
Mollusca	Bivalvia	Veneroida	Veneridae	<i>c.f. Meretrix (M. lusoria)</i>	0.1178	0.0479	0.0205	0	0	0.0097	0	1.1679
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Paphia (P. undulata)</i>	0.0321	0.2483	0.0332	0.6948	0.7109	0.0867	0.5905	0.1402
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Timoclea scabra</i>	0	0	0	0.0467	0.0048	0	0	0.0506
Mollusca	Bivalvia	Veneroida	Cardiidae	<i>Cardium</i>	0	0.1301	0	0	0	0	0	0
Mollusca	Bivalvia	Adapedonta	Solenidae	<i>Solen</i>	0	0	0.0856	0.1081	0	0	0	0.0261
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	<i>Amphioplus</i>	0.0011	0.0245	0.1648	0	0.0016	0	0.0053	0.0087
Arthropoda	Malacostraca	Amphipoda	Gammaridae	<i>Gammarus</i>	0	0	0.0001	0.0001	0.0001	0.0001	0.0001	0
Arthropoda	Crustacea	Decapoda	Dotillidae	<i>Ilyoplax</i>	0	0.0181	0	0	0.2235	0.8582	0.0245	0.2228
Arthropoda	Crustacea	Decapoda	Epialtidae	<i>Doclea</i>	0	0	0.0403	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	0	0.0959	0.1452	0.0882	0	0.1035	0.1228	0
Chordata	Actinopterygii	Perciformes	Gobiidae	<i>Parachaeturichthys polynema</i>	0	0	0	0	0	0	0	0.9038
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Nephtys</i>	0.0529	0.1437	0.0392	0.0494	0.0594	0.0698	0.0561	0.0499
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella</i>	0.1354	0.1086	0.1032	0.1101	0.1015	0.1596	0.1215	0.1448
Annelida	Polychaeta	Spionida	Poecilochaetidae	<i>Poecilochaetus</i>	0	0	0.0036	0.0028	0.0048	0.0079	0.0047	0.0045
Annelida	Polychaeta	Aciculata	Nereididae	<i>Nereis</i>	0.01	0	0	0.0108	0	0.1684	0.0298	0
Annelida	Polychaeta	Scolecida	Orbiniidae	<i>Naineris</i>	0	0	0	0.0122	0	0	0	0
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Terebella</i>	0.0088	0	0.0026	0.0644	0	0.0291	0.0065	0.031
Annelida	Polychaeta	Terebellida	Trichobranchidae	<i>Terebellides stroemii</i>	0	0	0	0	0	0.1166	0	0
Annelida	Polychaeta	Terebellida	Pectinariidae	<i>Pectinaria (Lagis)</i>	0.0011	0	0	0	0	0	0	0
Annelida	Polychaeta	-	Maldanidae	<i>Maldanella</i>	0	0	0.0325	0.0002	0	0.0008	0	0.0005
Annelida	Polychaeta	-	Opheliidae	<i>Ophelia</i>	0	0	0	0	0	0.0308	0	0.0298
Annelida	Polychaeta	Phyllodocida	Aphroditidae	<i>Laetmonice</i>	0	0	0	0	0.0523	0.0136	0.0225	0
Annelida	Polychaeta	Phyllodocida	Nereididae	<i>Ceratonereis</i>	0	0	0	0	0	0.0038	0	0
Annelida	Polychaeta	Terebellida	Sternaspidae	<i>Sternaspis scutata</i>	0	0.0287	0	0.0514	0	0	0	0

Table 3: Summary of Benthic Survey Data, August 2021

Stations	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	88	0.37	9	0.96	0.44
B	114	0.89	10	1.56	0.68
C*	58	0.68	13	1.63	0.63
D*	87	1.26	14	1.92	0.73
E	69	1.27	10	1.64	0.71
F	135	1.67	16	2.34	0.84
G	87	0.99	12	1.87	0.75
H	79	2.81	14	1.68	0.64

*impact sites

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

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

*impact sites

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

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

*impact sites

Table 6: Taxonomic Composition (%) of Benthic Survey

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

Taxa	Feb-21	Apr-21	Jun-21	Aug-21
Annelida	22.75	31.72	73.63	78.52
Sipuncula	0.70	0.00	0.34	0.00
Arthropoda	70.14	55.95	10.27	9.90
Echinodermata	0.30	1.43	4.11	1.39
Cnidaria	0.00	0.00	0.00	0.00
Mollusca	5.81	10.90	11.64	10.04
Chordata	0.10	0.00	0.00	0.14
Nemertea	0.00	0.00	0.00	0.00

Table 7: Taxonomic Composition (%) of Benthic Survey

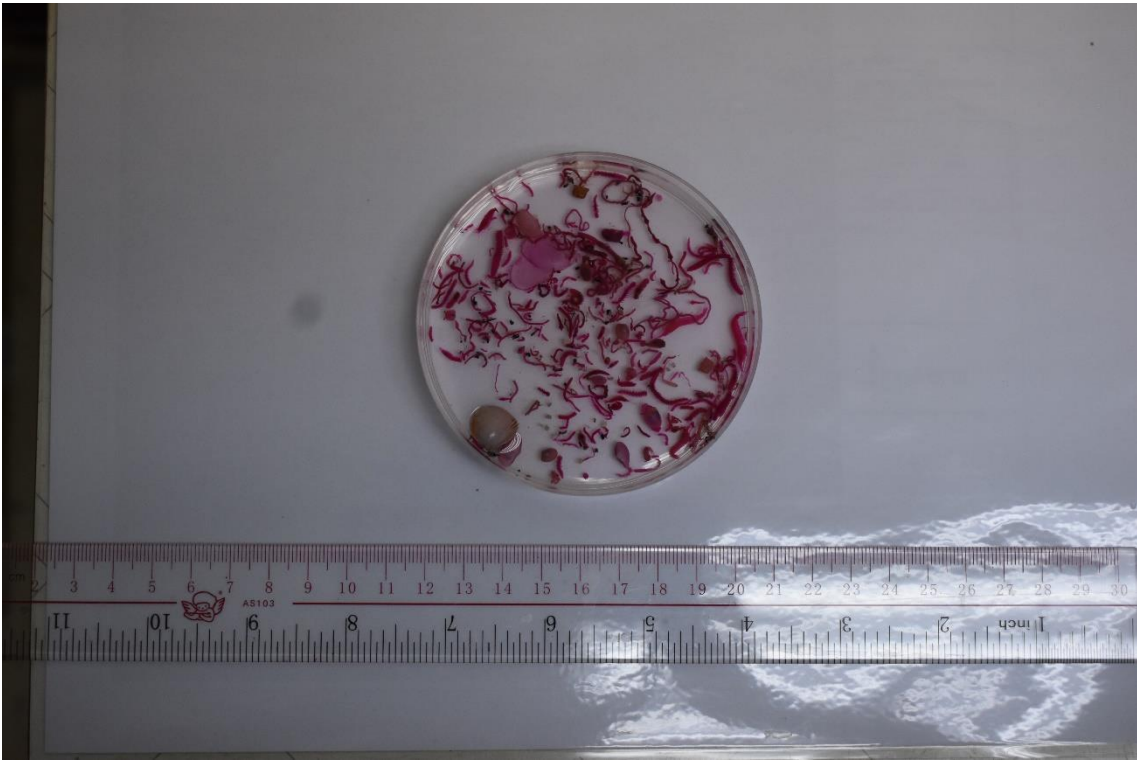
Taxa	Mar-04	Aug-04	Feb-19	Apr-19	Jun-19	Aug-19	Oct-19	Dec-19	Feb-20	Apr-20	Jun-20	Aug-20	Oct-20	Dec-20
Annelida	514	343	193	253	124	164	211	214	189	219	183	179	87	143
Sipuncula	5	1	0	0	0	4	4	0	4	2	3	1	3	3
Arthropoda	72	88	71	39	17	25	63	52	43	112	22	38	32	59
Echinodermata	4	17	12	17	10	13	10	6	5	3	6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

Taxa	Feb-21	Apr-21	Jun-21	Aug-21
Annelida	227	288	215	563
Sipuncula	7	0	1	0
Arthropoda	700	508	30	71
Echinodermata	3	13	12	10
Cnidaria	0	0	0	0
Mollusca	58	99	34	72
Chordata	1	0	0	1
Nemertea	2	0	0	0

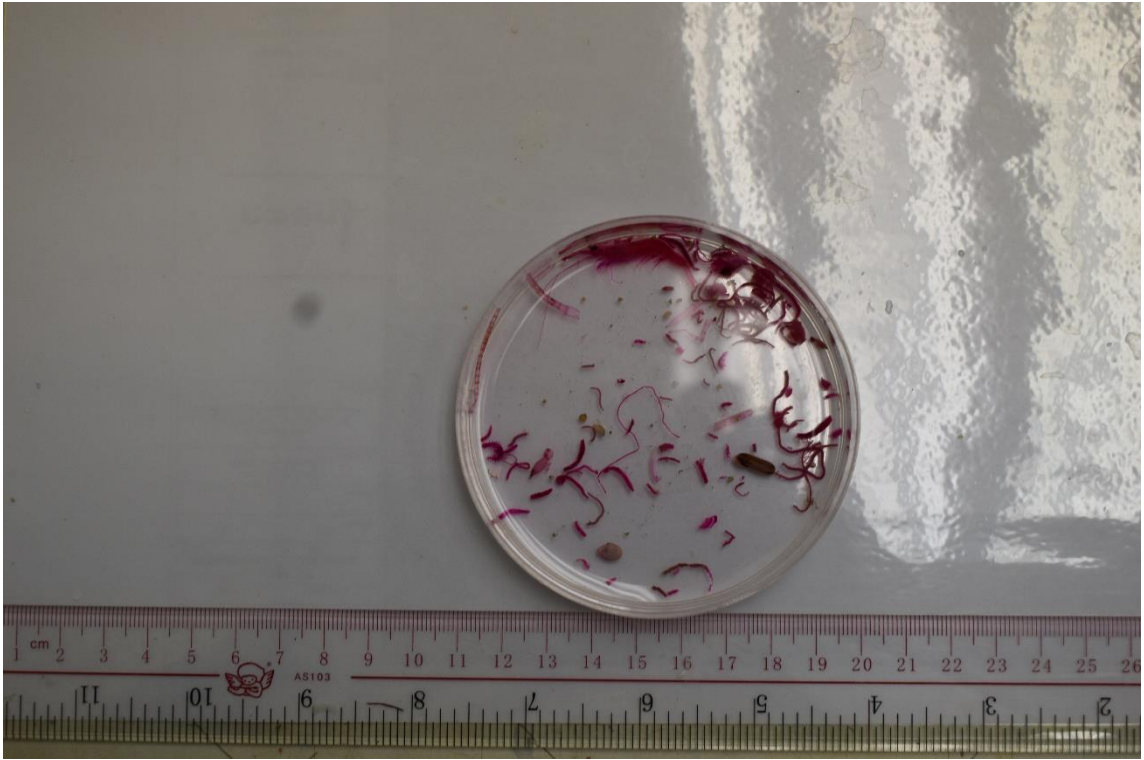
Photos of Macrobenthic Assemblages



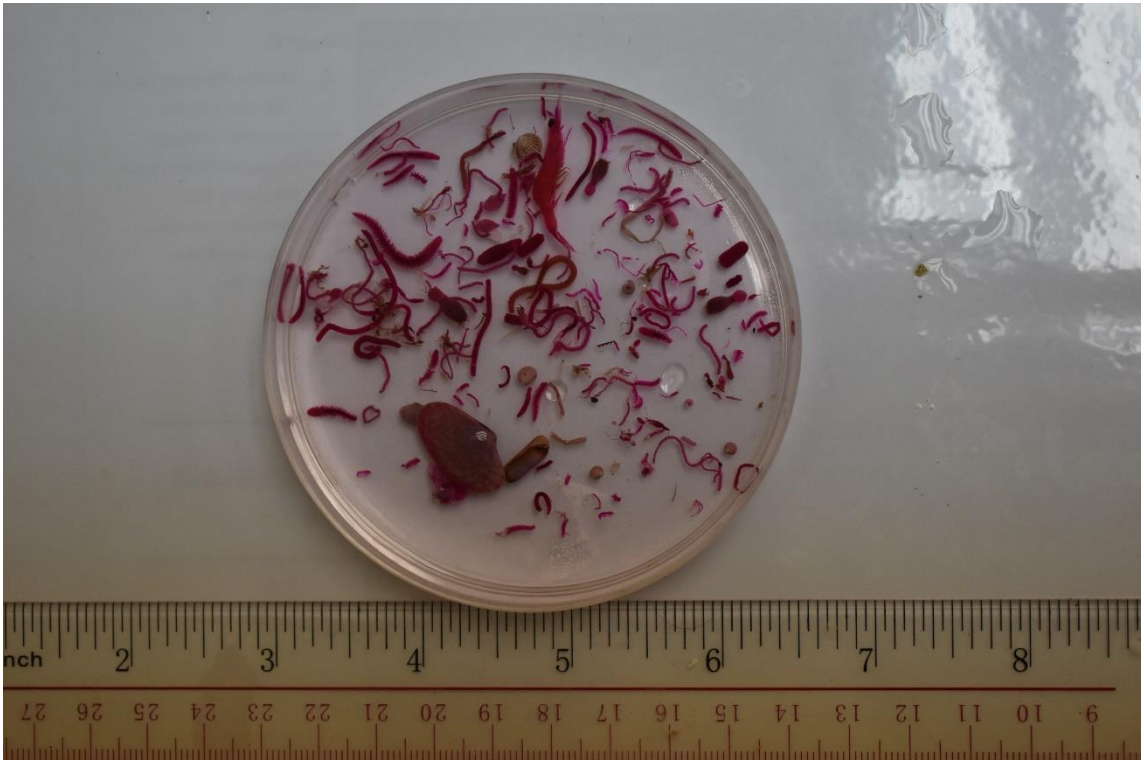
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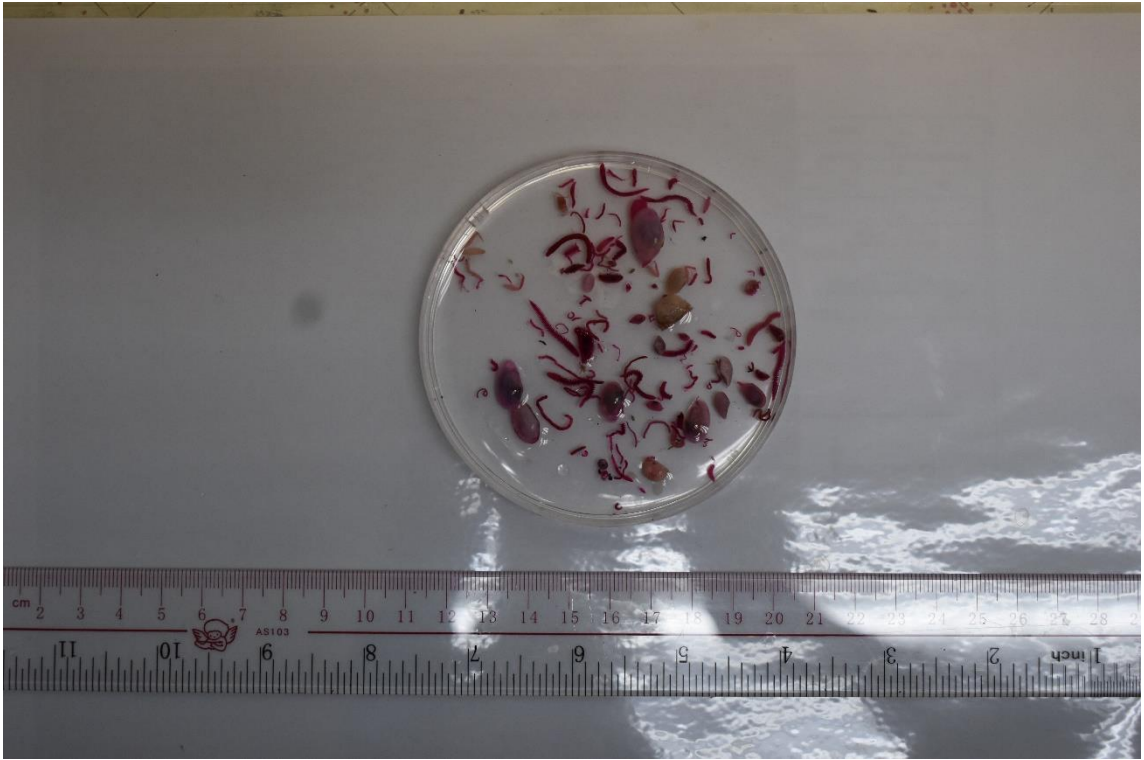
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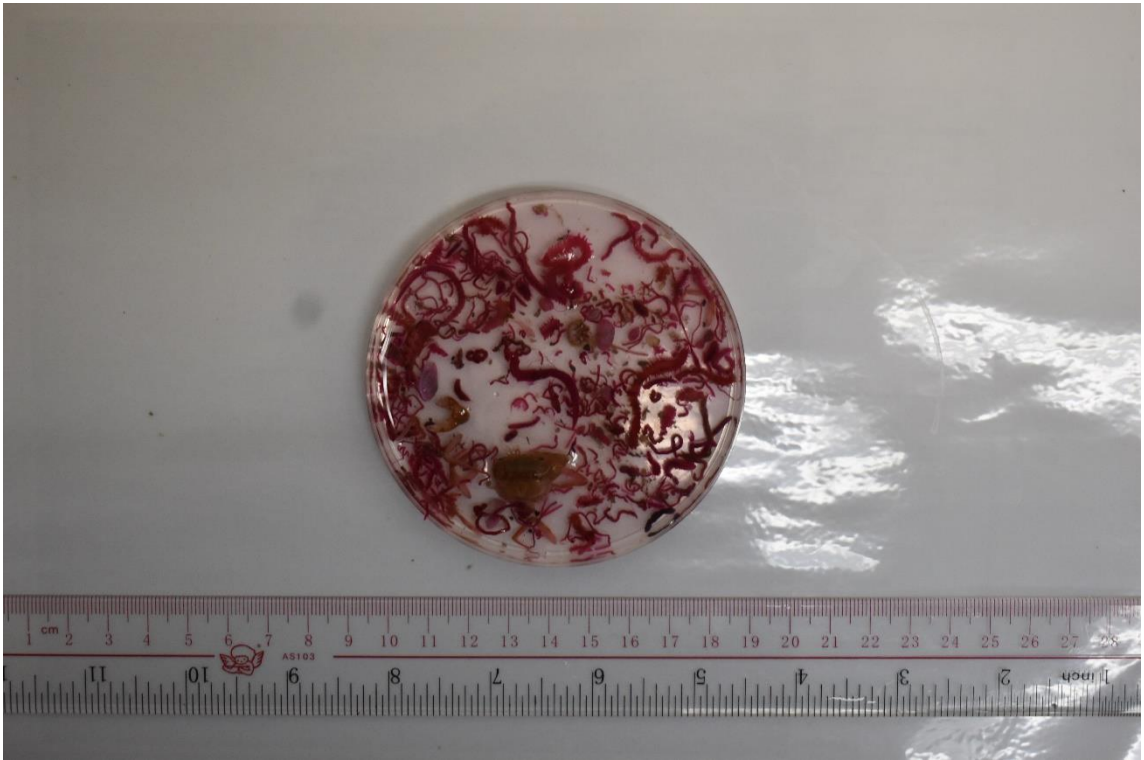
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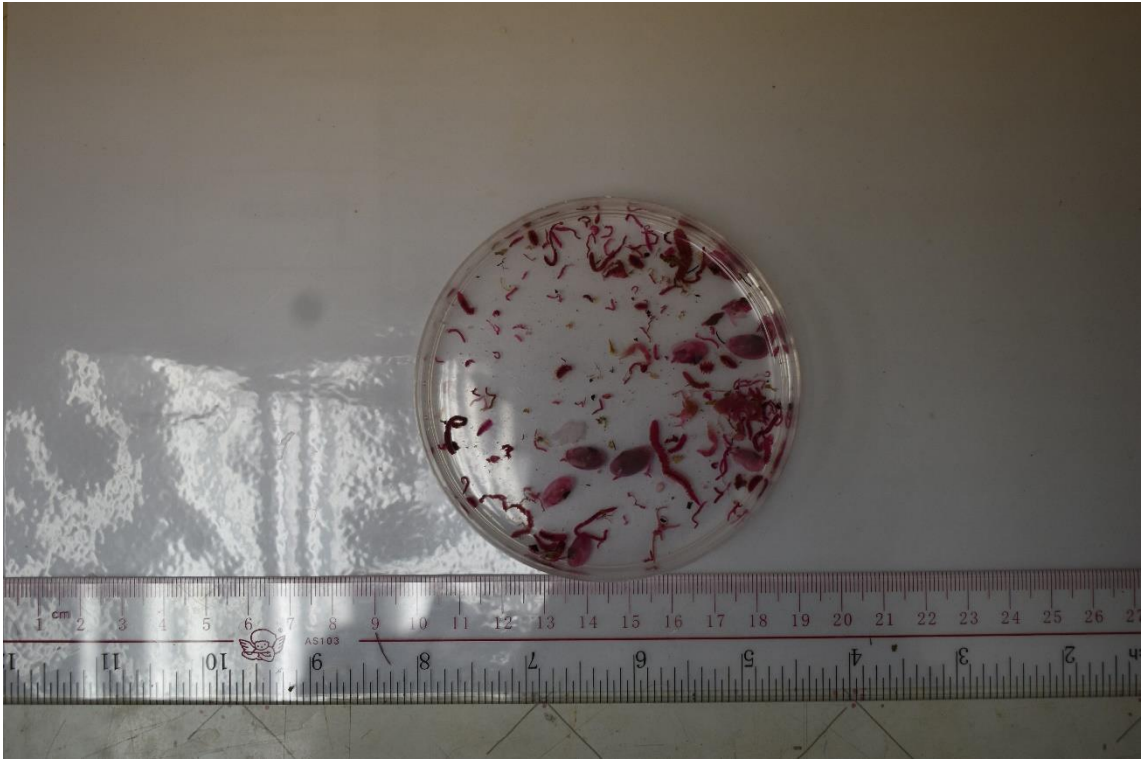
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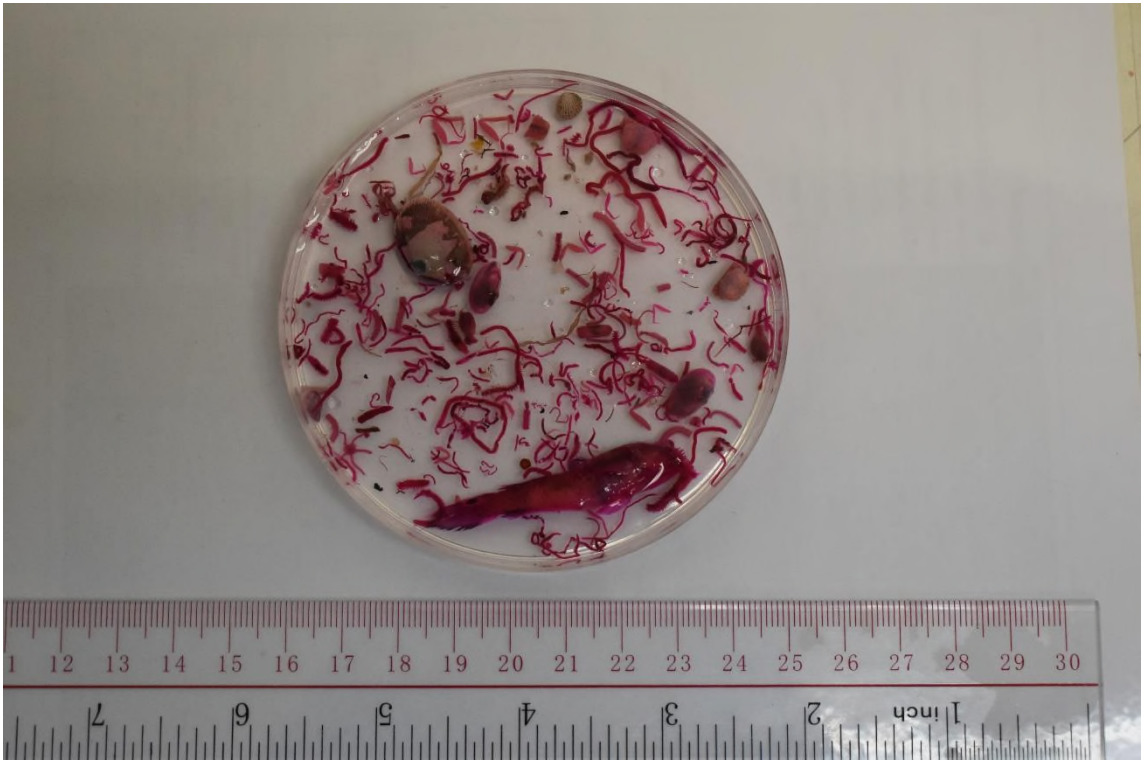
Station E



Station F

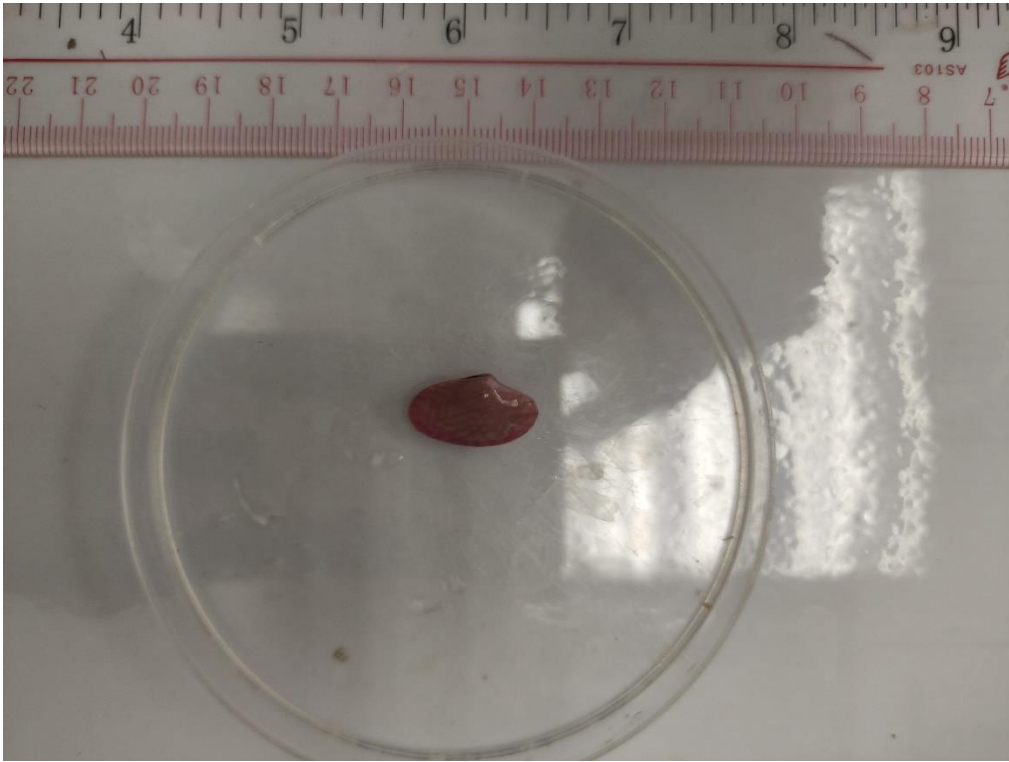


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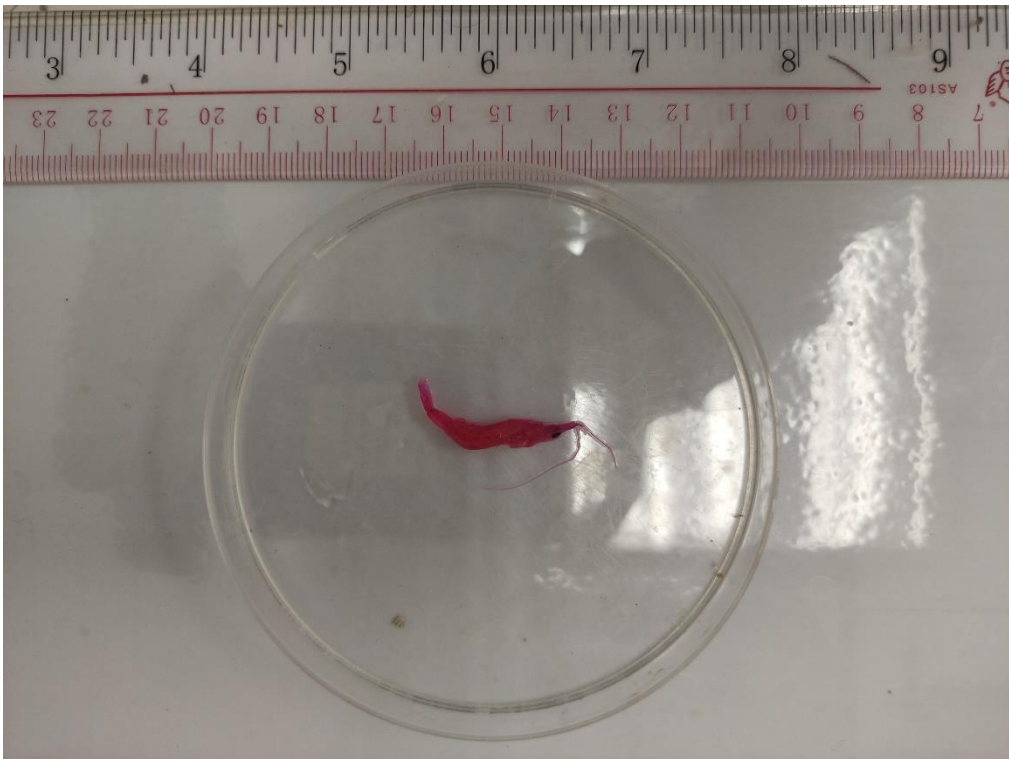


Station H

Photos of Representative Taxa Identified



Paphia undulata



Juvenile shrimp



Parachaeturichthys polynema

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Appendix J

Photos of Grab Samplers

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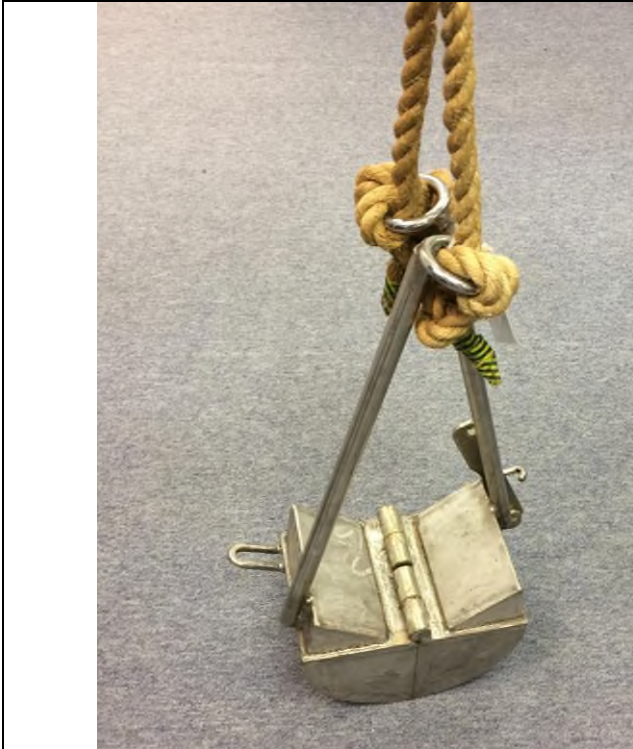


Photo 1. A ponar grab sampler

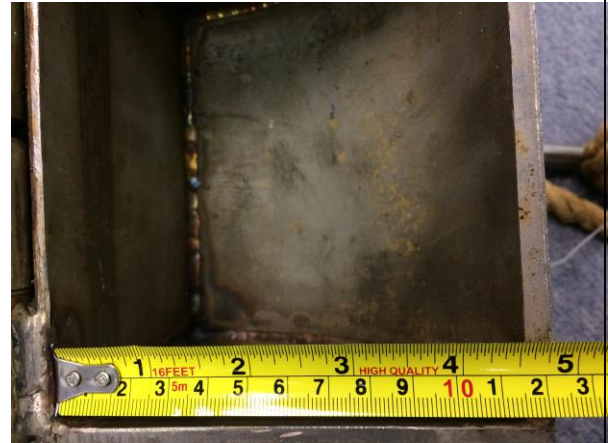


Photo 2. Grab dimension 1



Photo3. Grab dimension 2



Photo4. Grab dimension 3

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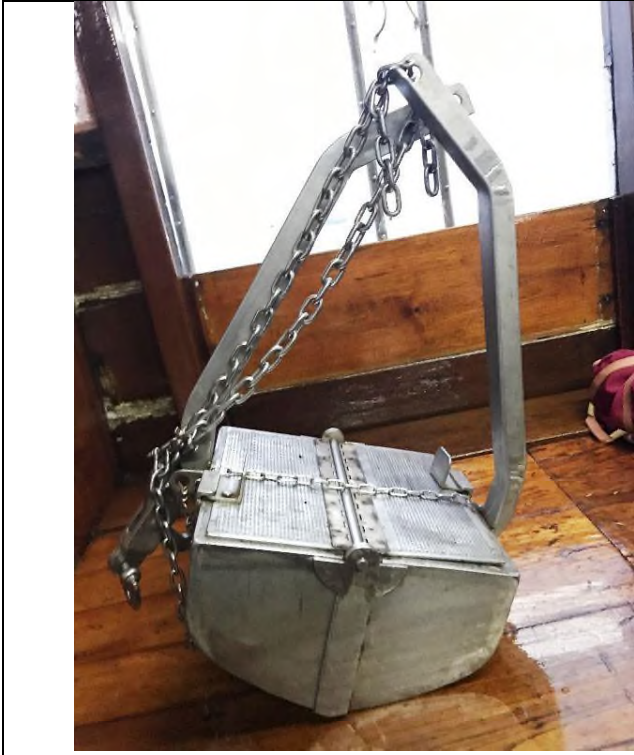


Photo 1. A modified Van Veen grab sampler



Photo 2. Grab dimension 1



Photo3. Grab dimension 2



Photo4. Grab dimension 3

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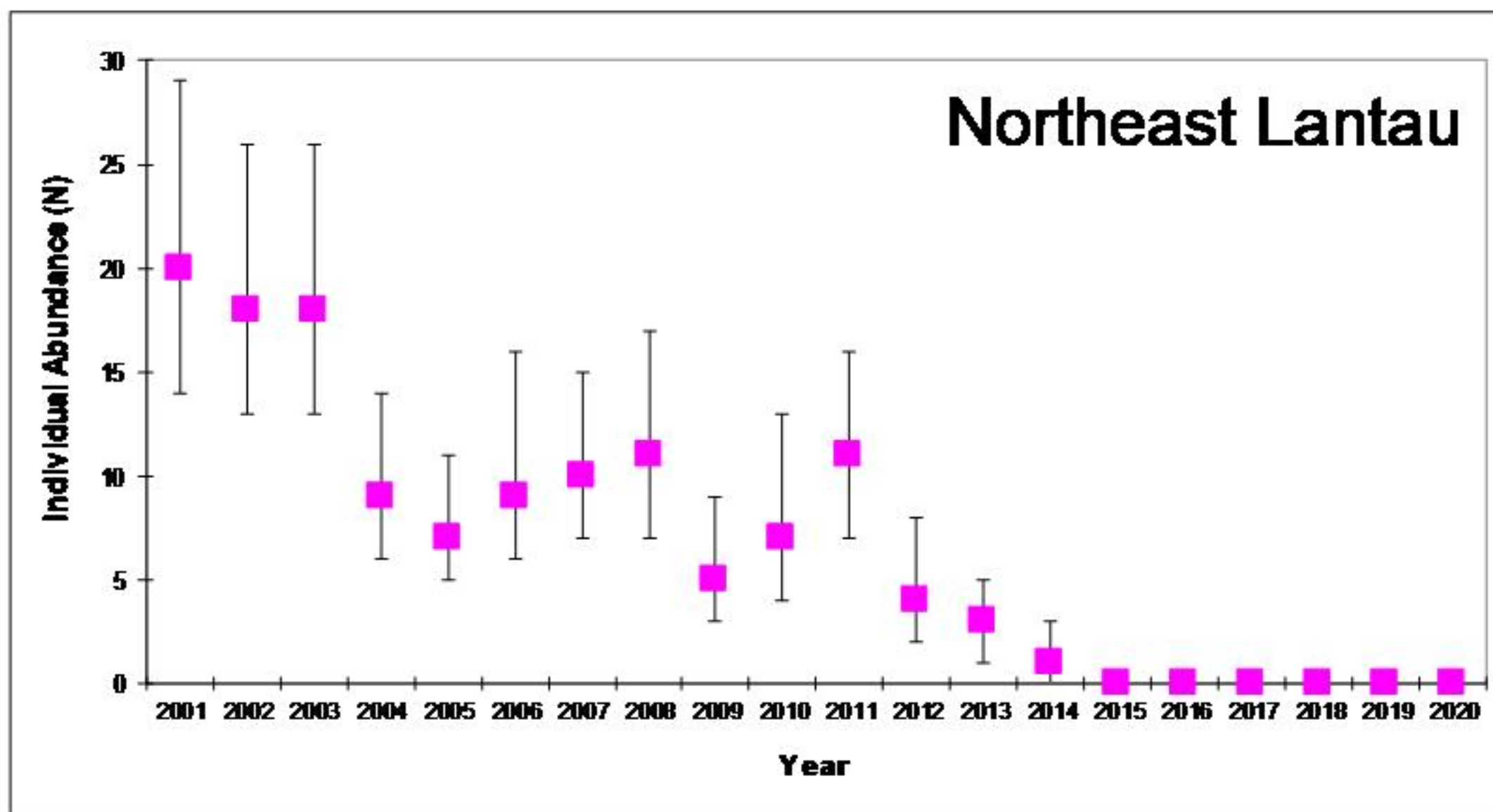
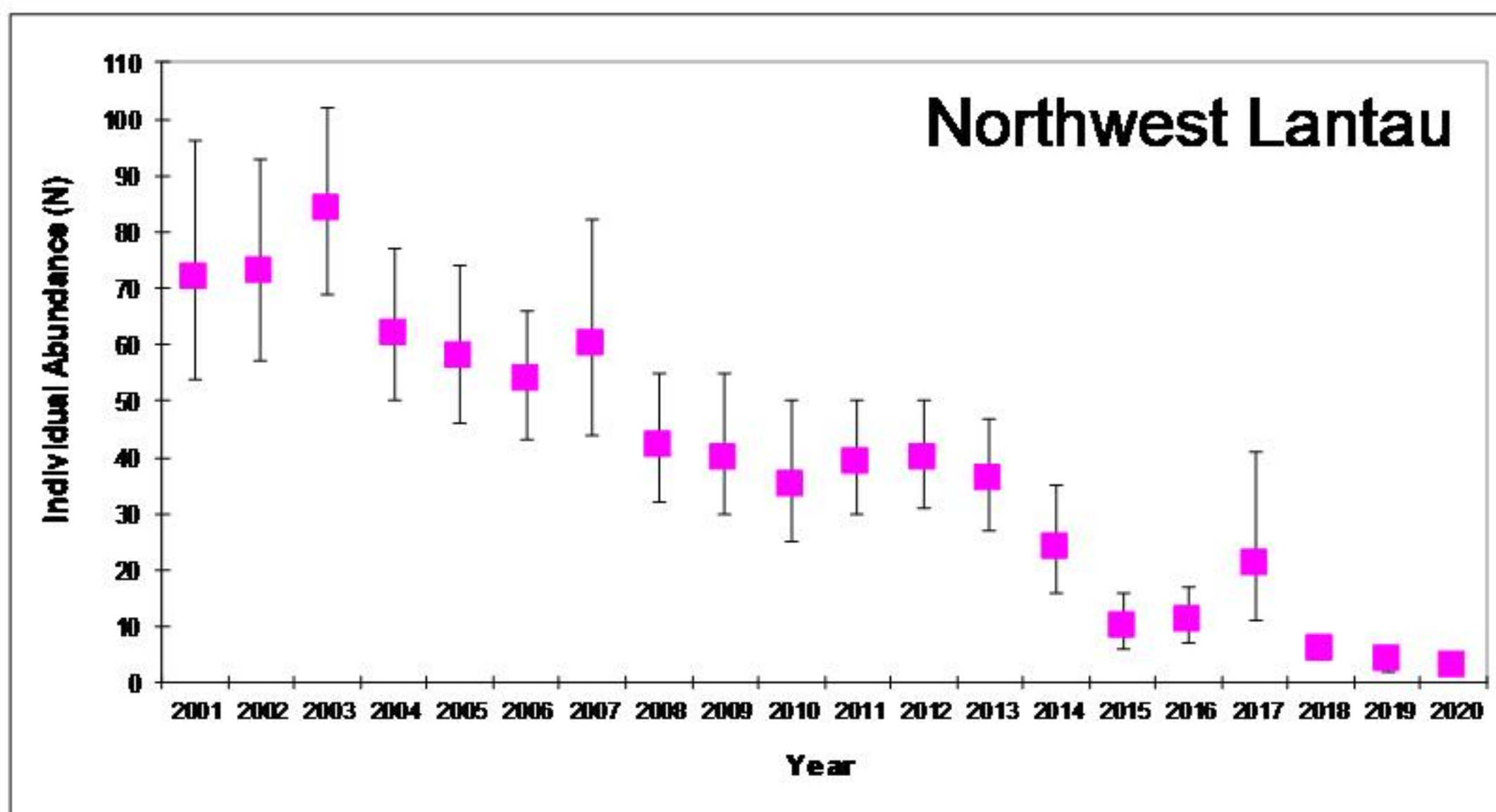
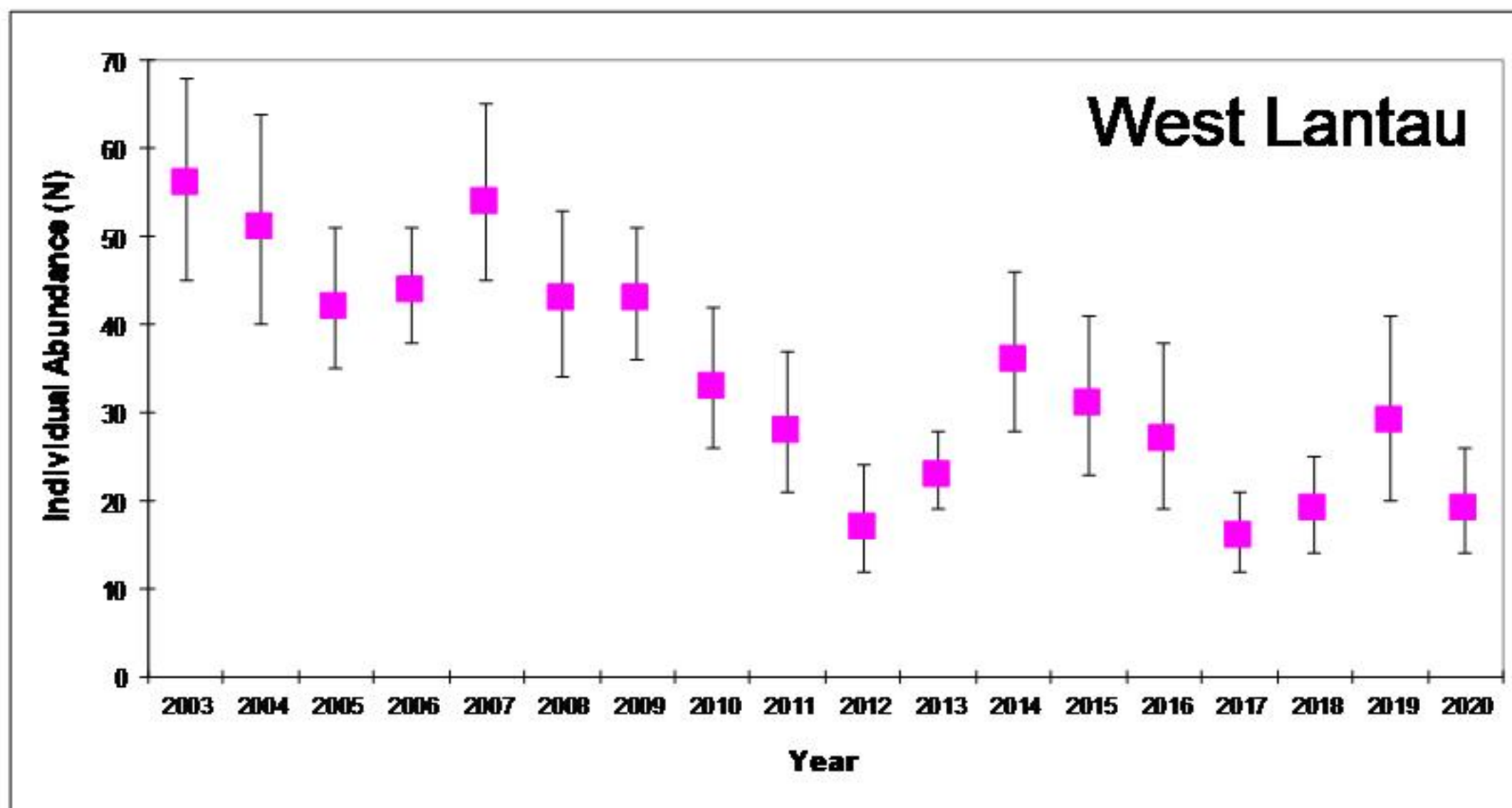
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Appendix K

Annual Abundance of Chinese White Dolphins from 2001 - 2019



Temporal trends in annual abundance estimates of Chinese White Dolphins in WL, NWL & NEL from 2001-20 (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 28 th 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 should be followed, i.e. solid content of sludge waste should be more than 30%.	SHWSTW	Implemented
NA	NA	5.02	The disposal of grit & debris (if any) generated during primary screening works should follow the requirement set in the WMP Section 4.05.	SHWSTW	Implemented
NA	NA	5.03	The wet sludge should be temporarily stored at the sludge buffer tank. It should then be transported to the centrifuge building for dewatering and discharged to the container for disposal. The whole process should be managed by the automatic electronic electronic system and monitored by the operators during operation.	SHWSTW	Implemented
NA	NA	5.04	The other solid waste material such as sediment and grit, refuse containers or collection bags should be temporarily stored in slips at designated area. Operators should ensure sufficient space is identified and provided for temporary storage of waste materials to facilitate collection. Storage of waste material on site will be kept to a minimum to avoid nuisance to local residents.	SHWSTW	Implemented
NA	NA	5.05	Chemical wastes which likely to be generated by activities arise from the maintenance, shall followed the Waste Disposal (Chemical Waste) (General) Regulation, includes Schedule 1 of the Regulation.	SHWSTW	Implemented
NA	NA	5.06	In case of unlikely occurred chemical spillage, procedures should be followed as according to the WMP Section 5.06.	SHWSTW	Implemented
NA	NA	5.07	Temporary storage areas should be identify and provided for the temporary storage of general	SHWSTW	Implemented

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

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

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