

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

Final Review Report For Water, Sediment and Benthic Monitoring

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/0707

Prepared by: Andy K. H. Choi

Reviewed by: Cyrus C. Y. Lai

Certified by:

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

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

Our Ref. 1458/23-0006



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

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

www.asecg.com

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

11 May 2023

By E-mail & Post

Dear Sir,

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

Reference is made to the submission of the Final Environmental Monitoring and Audit (EM&A) Report (Report No.: 0041/17/ED/0707) from the Environmental Team (ET), Fugro Technical Services Ltd., received on 24 April 2023 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 Clause 10.10 of the EM&A Manual for the captioned Project (Permit No.: EP-076/2000).

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

Yours faithfully,

For and on behalf of
Allied Environmental Consultants Ltd.

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/tw

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

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

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

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	1
1. INTRODUCTION	2
2. WATER QUALITY MONITORING.....	4
3. SEDIMENT QUALITY MONITORING AND BENTHIC SURVEY	9
4. ENVIRONMENTAL AUDIT.....	14
5. COMMENTS, CONCLUSIONS AND RECOMMENDATIONS	15

FIGURE

Figure 1 Monitoring Stations of Water Quality Monitoring, Sediment Quality Monitoring and Benthic Survey

Figure 2 Location of the Tide Gauge

APPENDICES

Appendix A Project Organization Chart

Appendix B Graphical Presentation of Water Quality Monitoring

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

Appendix D Environmental Mitigation Implementation Schedule (EMIS)

**EXECUTIVE SUMMARY**

This Final Reviewing Report for Water, Sediment and Benthic Monitoring 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, water quality monitoring, sediment quality monitoring, benthic survey for 5-year operational monitoring are the key environmental concern of the Project.

This is the Final Reviewing Report for the Project which summarizes findings of the Water, Sediment and Benthic Monitoring during the 5-year operational monitoring from March 2018 to February 2023 (the “reporting period”).

Breaches of Action and Limit Levels

Water quality monitoring, sediment quality monitoring and benthic survey were carried out bi-monthly in the reporting period. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

Implementation of Mitigation Measures

Total 30 water quality monitoring, sediment quality monitoring and benthic survey were carried out in the reporting period. No non-compliance was found during the reporting period. A summary of mitigation measures implementation schedule is provided in **Appendix D**.

Complaint Log, Notifications of Summons and Successful Prosecutions

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

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.

1. INTRODUCTION**1.1 Background**

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

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

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

1.2 Project Description

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

1.3 Project Organization

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

Table 1.1 Contact Persons and Telephone Numbers of Key Personnel

Organization	Role	Contact Person	Telephone No.	Fax No.
DSD	Project Proponent Representative	Mr. Marcus Lau	2594 7218	3104 6426
AECOM	Engineer Representative (ER)	Ms. Joanne Tsoi	3922 9423	3922 9797
AEC	Independent Environmental Checker (IEC)	Ms. Grace Kwok	2815 7028	2815 5399
FTS	ET Leader (ETL)	Mr. Colin Yung	3565 4114	2450 8032

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.

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

Page 3

- Alleviate as far as practicable the impact that the facilities and sewage systems imposed on the environment of Hong Kong.



2. WATER QUALITY MONITORING

2.1 Monitoring Station

2.1.1 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

2.2 Monitoring Parameter

2.2.1 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)



2.2.2 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.

2.2.3 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**.

2.3 Monitoring Equipment

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

Table 3.3 Water Quality Monitoring and Sampling Equipment

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



Table 3.4 Equipment used for Water Quality Monitoring

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

2.3.2 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.

2.3.3 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).

2.4 Laboratory Measurement and Analysis

2.4.1 ALS Technichem (HK) Pty Ltd (HOKLAS Reg. No. 066), is the appointed laboratory for analysis of water samples from March 2018 to January 2022. With reference to EPD’s letter (Ref: Ax(7) to EP 2/No/F/50 Pt.7) dated 8 February 2022, Change of Laboratory on Water Quality Monitoring, Sediment Quality Monitoring and Benthic Survey (0041_17_ED_0632A) is approved. Fugro Technical Services Limited (HOKLAS Reg. No. 015), is the appointed laboratory for analysis of water samples from February 2022. 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>	ALS & FTS: 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	ALS: APHA 5210B FTS: APHA 23rd edition 5210B	1 mg/L
Total Suspended Solid	ALS: APHA 2540D FTS: APHA 23rd edition 2540D	0.5 mg/L
Ammonia as N	ALS: APHA 4500 NH3: G	0.005 mg/L



Analysis Description	Method	Reporting limits
	FTS: APHA 23rd edition 4500 - NH ₃ H	
Nitrate as N	ALS: APHA 4500 NO ₃ : I FTS: APHA 23rd edition 4500 - NO ₃ ⁻ I	0.005 mg/L
Nitrite as N	ALS: APHA 4500 NO ₂ B&H FTS: APHA 23rd edition 4500 - NO ₂ ⁻ A & NO ₃ ⁻ I	0.005 mg/L
Total Inorganic Nitrogen	ALS & FTS: By Calculation	0.01 mg/L
Total phosphorus (soluble and particulate)	ALS: APHA 4500 P: J FTS: APHA 17th edition 4500-PB5 (digestion) and In-house method E-T-056 (determination)	0.01 mg/L

2.5 Monitoring Frequency and Duration

- 2.5.1 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.
- 2.5.2 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.

2.6 Quality Assurance / Quality Control

- 2.6.1 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.
- 2.6.2 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.
- 2.6.3 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.



2.7 Event and Action Plan

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

2.8 Monitoring Results and Observations

2.8.1 The Methodology for Water Quality Monitoring (report no.: 0041/17/ED/0117H) was approved by EPD's memo dated 14 March 2018. The first Water quality monitoring was carried out on 12 April 2018. The graphical presentation of the in-situ water quality monitoring results is given in **Appendix B**.

2.8.2 No Action Level and Limit Level exceedance is recorded in the reporting period as the purpose of the water quality monitoring is to collect data for future reference.

2.8.3 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**.



3. SEDIMENT QUALITY MONITORING AND BENTHIC SURVEY

3.1 Monitoring Station

3.1.1 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

3.2 Monitoring Parameter

3.2.1 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)	

- 3.2.2 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.
- 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 Sampling Equipment

- 3.3.1 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.
- 3.3.2 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.
- 3.3.3 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.

3.4 Sampling Procedure

Benthic Survey, Particle Size Distribution and TOC Analysis

- 3.4.1 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)

3.4.2 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.

3.4.3 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.

3.5 Laboratory Measurement and Analysis

3.5.1 ALS Technichem (HK) Pty Ltd (HOKLAS Reg. No. 066), is the appointed laboratory for analysis of water samples from March 2018 to January 2022. With reference to EPD’s letter (Ref: Ax(7) to EP 2/No/F/50 Pt.7) dated 8 February 2022, Change of Laboratory on Water Quality Monitoring, Sediment Quality Monitoring and Benthic Survey (0041_17_ED_0632A) is approved. Fugro Technical Services Limited (HOKLAS Reg. No. 015), is the appointed laboratory for analysis of sediment samples From February 2022. 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	ALS: Geospec 3: 2001 Test method 8.1, 8.5 and 8,7 (Wet Sieve and Hydrometer Method) FTS: Geospec 3 : 2001 Test 8.1, 8.5 and 8.7	1%
Total Organic Carbon	ALS: APHA 5310B FTS: APHA 23rd edition 5310B	0.05%
pH value	ALS: APHA 4500H: B FTS: APHA 23rd edition 4500-H+B	0.1 pH unit
Ammonia as N	ALS: APHA 4500 NH3: B&G FTS: APHA 23rd edition 4500 NH3: B & C / In house method E-T-039	0.5 mg/kg
Total Nitrogen	ALS: APHA 4500 Norg: D & APHA 4500 NO3: I FTS: APHA 23rd edition 4500 Norg: D (digestion), In-house method E-T-036, E-T-037 & APHA 23rd edition 4500 - NO ₃ ⁻ I	10 mg/kg



Analysis Description	Method	Reporting limits
Total Phosphorus	ALS: APHA 4500P: B&H FTS: APHA 17th edition 4500 – PB.5 (digestion) & In house method E-T-056 (determination)	10 mg/kg
Cadmium	ALS: USEPA 6020A Digestion method: 3051A FTS: USEPA method 3050B (digestion) and 6020A (determination)	0.1 mg/kg
Chromium		0.5 mg/kg
Copper		0.2 mg/kg
Lead		0.2 mg/kg
Mercury		0.05 mg/kg
Nickel		0.2 mg/kg
Zinc		0.5 mg/kg
Arsenic		0.5 mg/kg
Silver		0.1 mg/kg

3.6 Taxonomic Identification of Benthic Organism

3.6.1 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.

3.6.2 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.

3.7 Monitoring Frequency and Duration

3.7.1 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.

3.8 Quality Assurance / Quality Control

3.8.1 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.

3.8.2 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.

3.9 Event and Action Plan

3.9.1 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.

3.10 Monitoring Results and Observations

3.10.1 The Methodology for Sediment Quality Monitoring and Benthic Survey (report no.: 0041/17/ED/0116H) was approved by EPD's memo dated 14 March 2018. The first Sediment quality monitoring and benthic survey was carried out on 12 April 2018. The graphical presentation of the sediment quality monitoring results and benthic survey results is given in **Appendix C**.

3.10.2 No Action Level and Limit Level exceedance is recorded in the reporting period as the purpose of the sediment quality monitoring and benthic survey is to collect data for future reference.

3.10.3 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**.

4. ENVIRONMENTAL AUDIT**4.1 Review of Environmental Monitoring Procedures**

4.1.1 The monitoring works conducted by the monitoring team were inspected regularly. The below observations have been recorded for the monitoring works:

Water Quality Monitoring

- Observations around the monitoring stations were recorded.
- Observations for construction works from nearby construction site were recorded.
- Temperature and weather conditions on the monitoring days were recorded.

Sediment Quality Monitoring and Benthic Survey

- Observations around the monitoring stations were recorded.
- Observations for construction works from nearby construction site were recorded.
- Temperature and weather conditions on the monitoring days were recorded.

4.2 Implementation Status of Environmental Mitigation Measures

4.2.1 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 D**.

4.3 Environmental Exceedance

4.3.1 Water quality monitoring, sediment quality monitoring and benthic survey were carried out bi-monthly in the reporting period. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

4.4 Complaints, Notification of Summons and Prosecution

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

4.5 Comparison with EIA predictions

4.5.1 The environmental impacts caused by this project during the operation phase were generally in line with the predictions in EIA report. 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.

5. COMMENTS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Comments on Overall EM&A Programme

5.1.1 The EM&A programme requires operational phase monitoring for water quality, sediment quality and benthic survey. Timely implementation of mitigation measures was carried out according to the environmental monitoring data obtained during this project.

5.1.2 According to the operational EM&A plan, the 5-year operational monitoring for water quality, sediment quality and benthic survey is required. The monitoring period was started from March 2018 to February 2023.

5.1.3 Therefore, the overall performance of the monitoring methodology adopted and environmental management system in the project was effective.

5.2 Overall EM&A Data

5.2.1 Water quality monitoring, sediment quality monitoring and benthic survey were conducted at the designated monitoring stations in accordance with the Manual.

5.2.2 The overall trends of the monitored parameters at the monitoring period were presented in **Appendix B and C**.

5.2.3 No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

5.2.4 No non-compliance for water quality, sediment quality and benthic survey was found during the reporting period.

5.3 Conclusions and Recommendations

5.3.1 The recommended environmental mitigation measures, as proposed in the EIA reports and EM&A Manuals shall be effectively implemented to minimize the potential environmental impacts from the Project. The EM&A programme would effectively monitor the environmental impacts generated from the operation of SHWSTW and ensure the proper implementation of mitigation measures.

5.3.2 With the success of the overall EM&A programme, the deterioration of the environment caused by the Project was cost-effectively identified and necessary prompt effective mitigation measures were implemented to avoid any unacceptable impacts. In conclusion, the Project was environmentally acceptable.

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

Figure 1

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



816000E

818000E

820000E

822000E

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

822000N

820000N

大小灣刀
BROTHERS

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

圖例
LEGEND :

IMPACT STATION



CONTROL STATION



SUBMARINE OUTFALL

圖則編號 drawing no.

DCM/2004/002

比例 scale

N.T.S.

保留版權

COPYRIGHT RESERVED

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

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

Figure 2
Location of the Tide Gauge

FUGRO TECHNICAL SERVICES LIMITED

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

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



Location of the Tide Gauge

Source: Google Maps

The copyright of this document is owned by Fugro Technical Services Limited. It may not be reproduced except with prior written approval from the Company.

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

Appendix A Project Organization Chart

FUGRO TECHNICAL SERVICES LIMITED

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

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

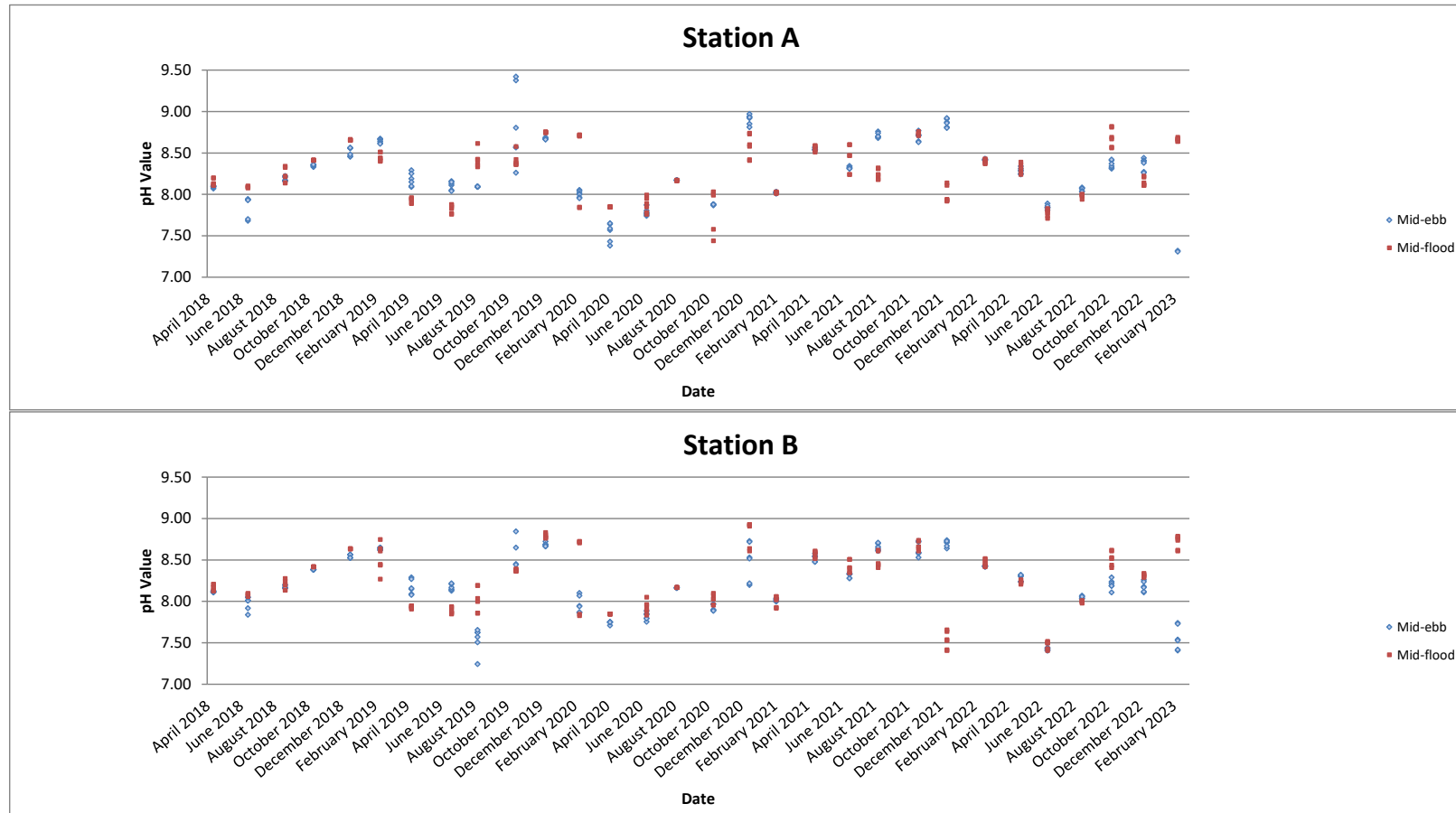


Report No.: 0041/17/ED/0707

Appendix B

Graphical Presentation of Water Quality Monitoring

pH value



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

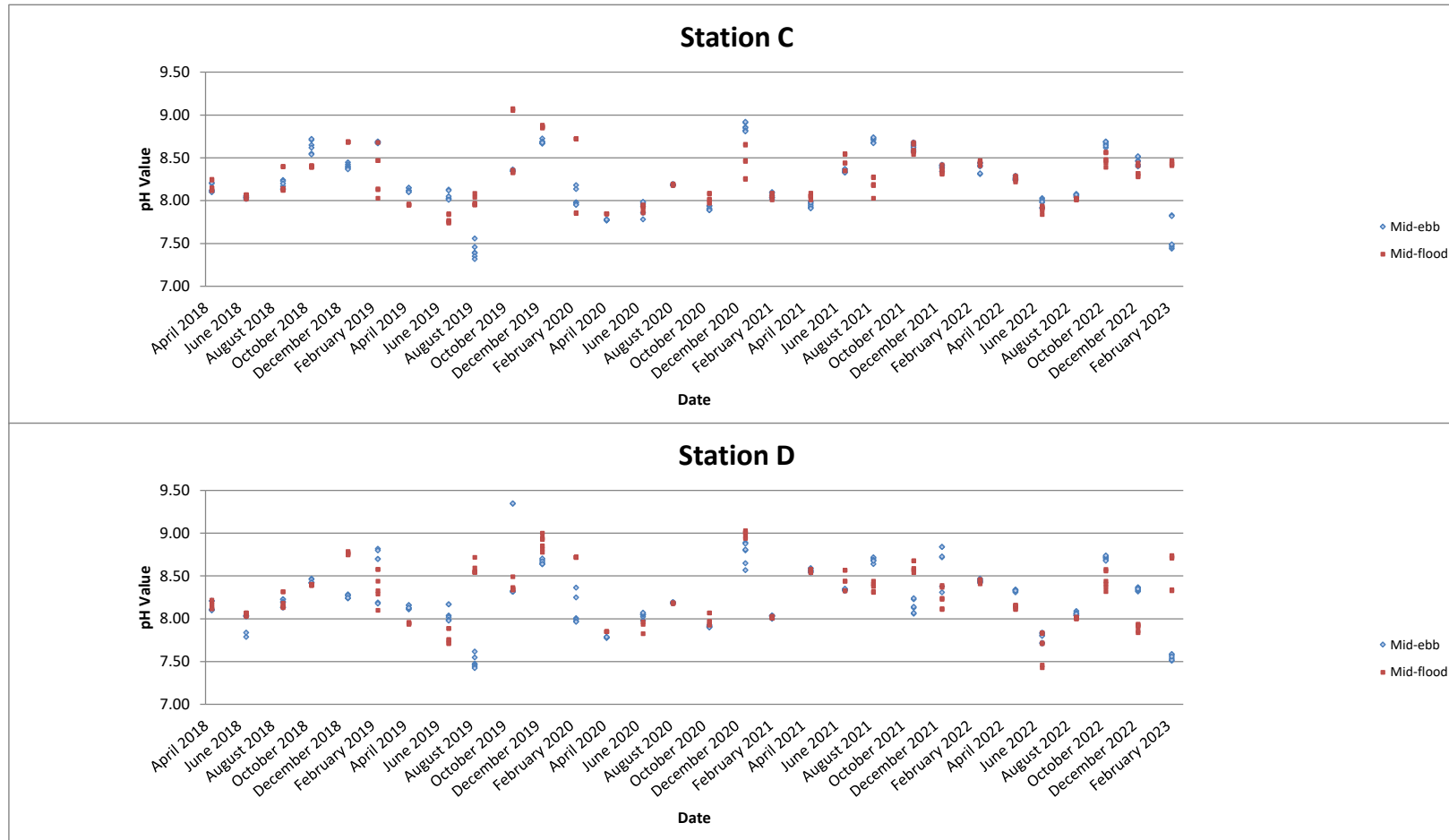
Weather Range:

Fine

Major activities in the reporting period:

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

pH value



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Construction works nearby the project site

Notes:

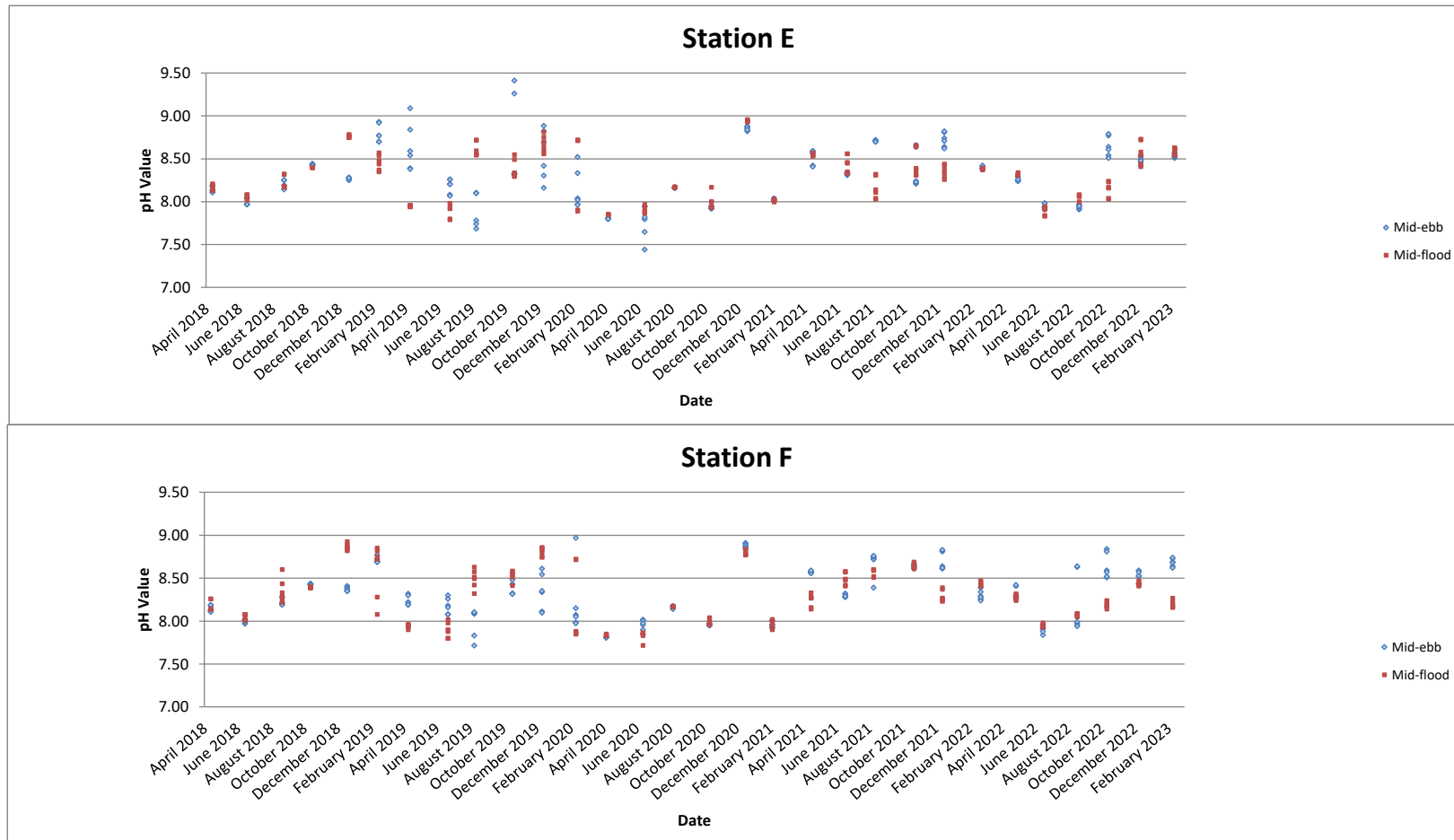
Weather Range:

Fine

Major activities in the reporting period:

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

pH value



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

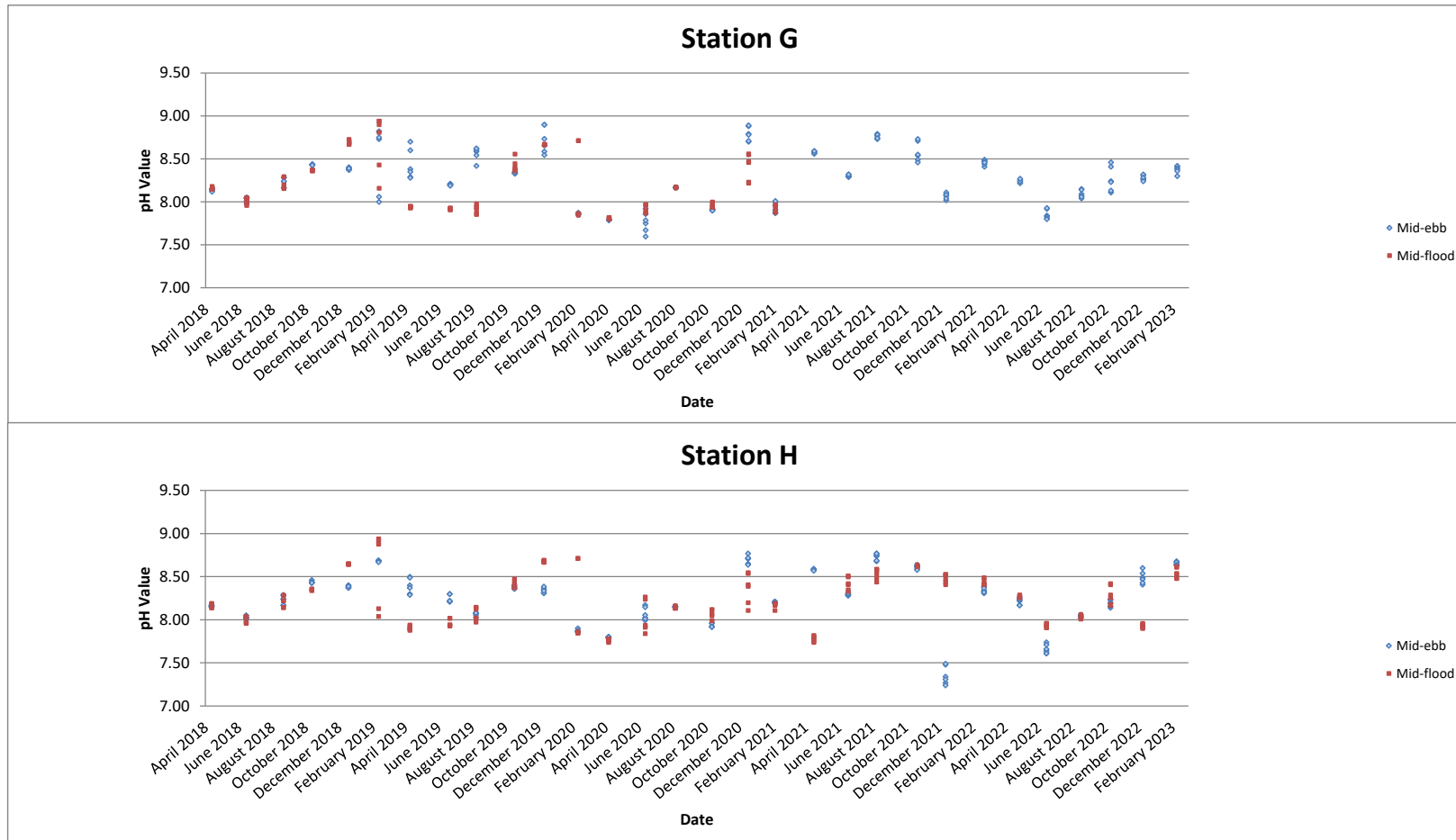
Weather Range:

Fine

Major activities in the reporting period:

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

pH value



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Contractions works nearby the project site

Notes:

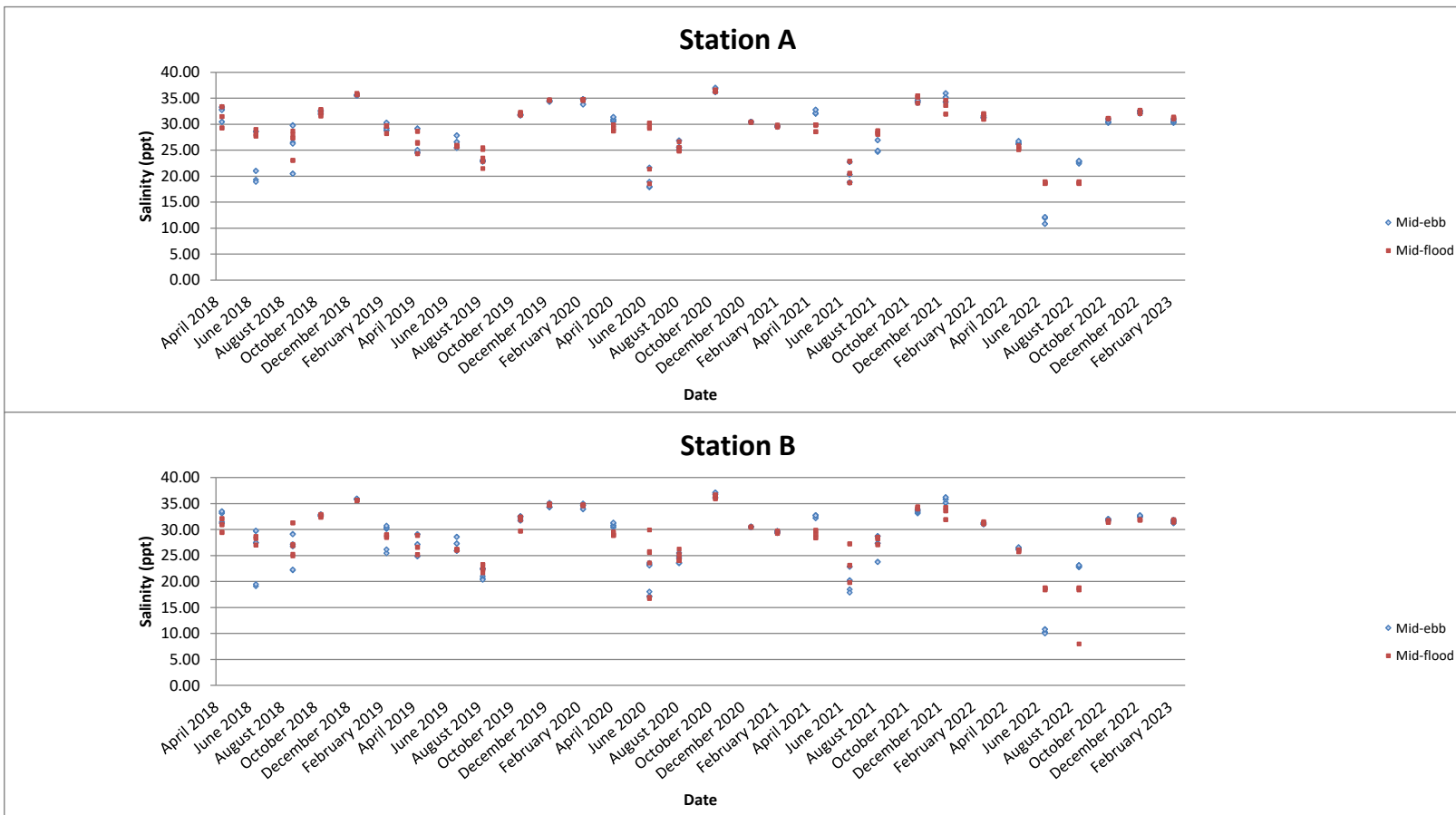
Weather Range:

Fine

Major activities in the reporting period:

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

Salinity (ppt)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

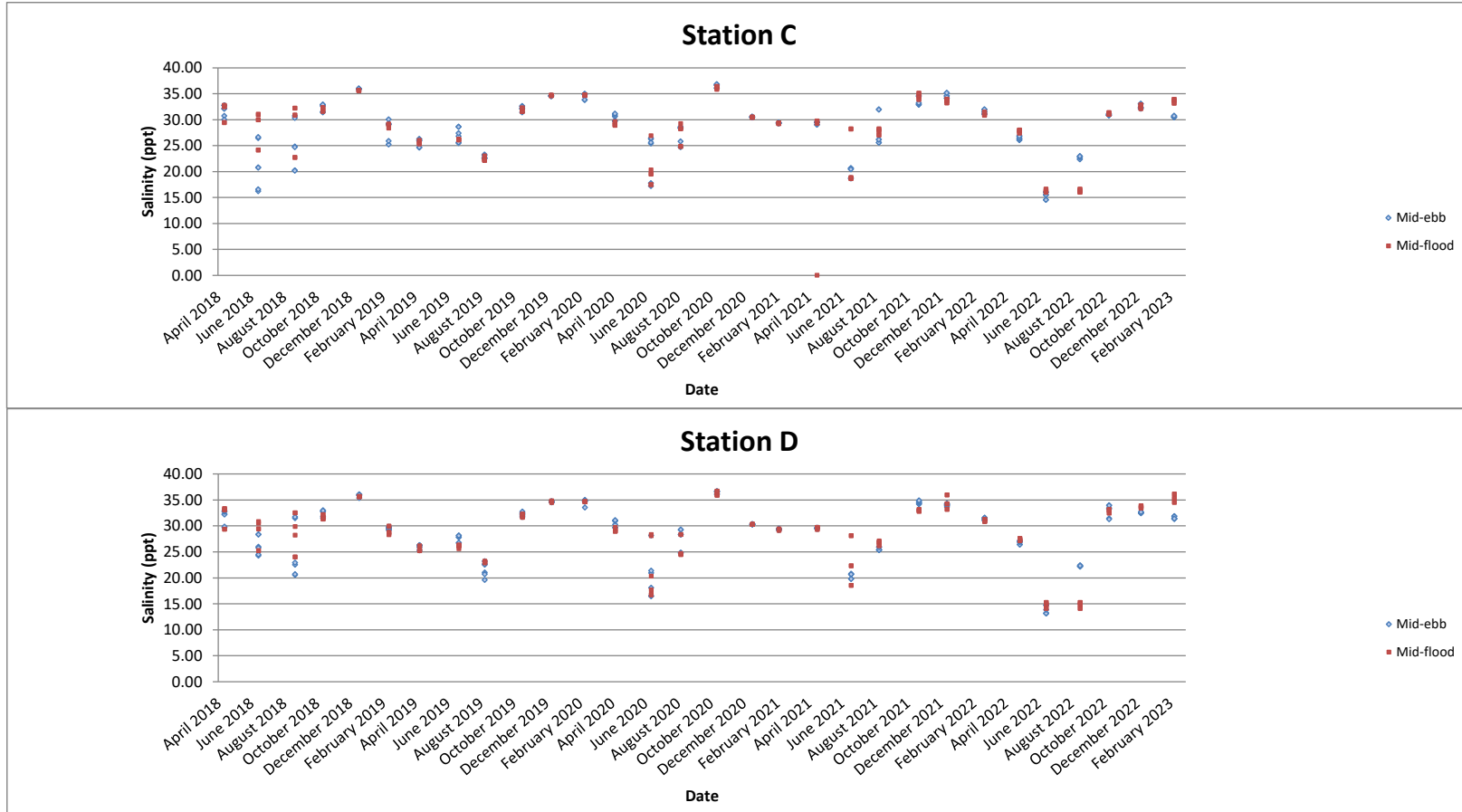
Weather Range:

Fine

Major activities in the reporting period:

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

Salinity (ppt)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

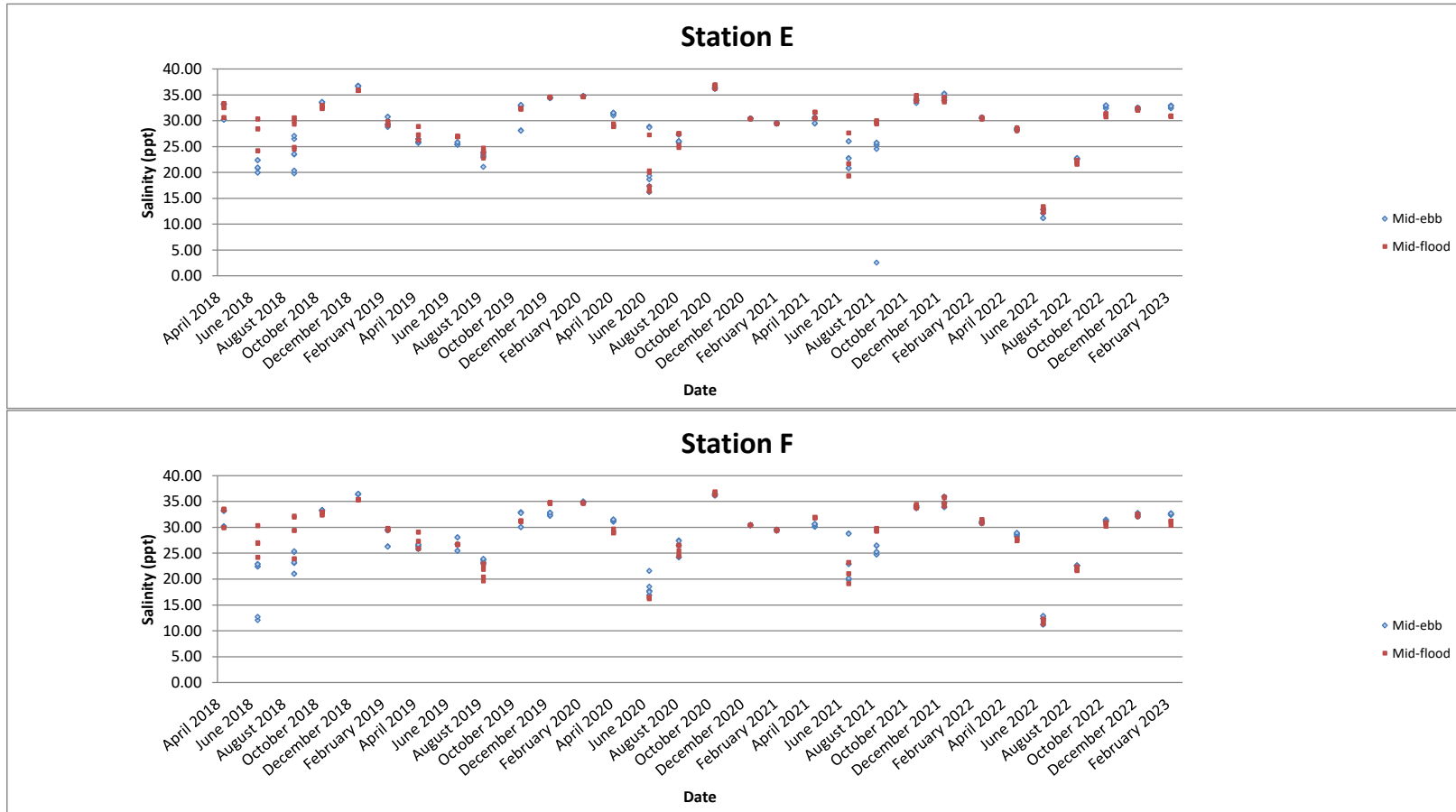
Weather Range:

Fine

Major activities in the reporting period:

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

Salinity (ppt)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

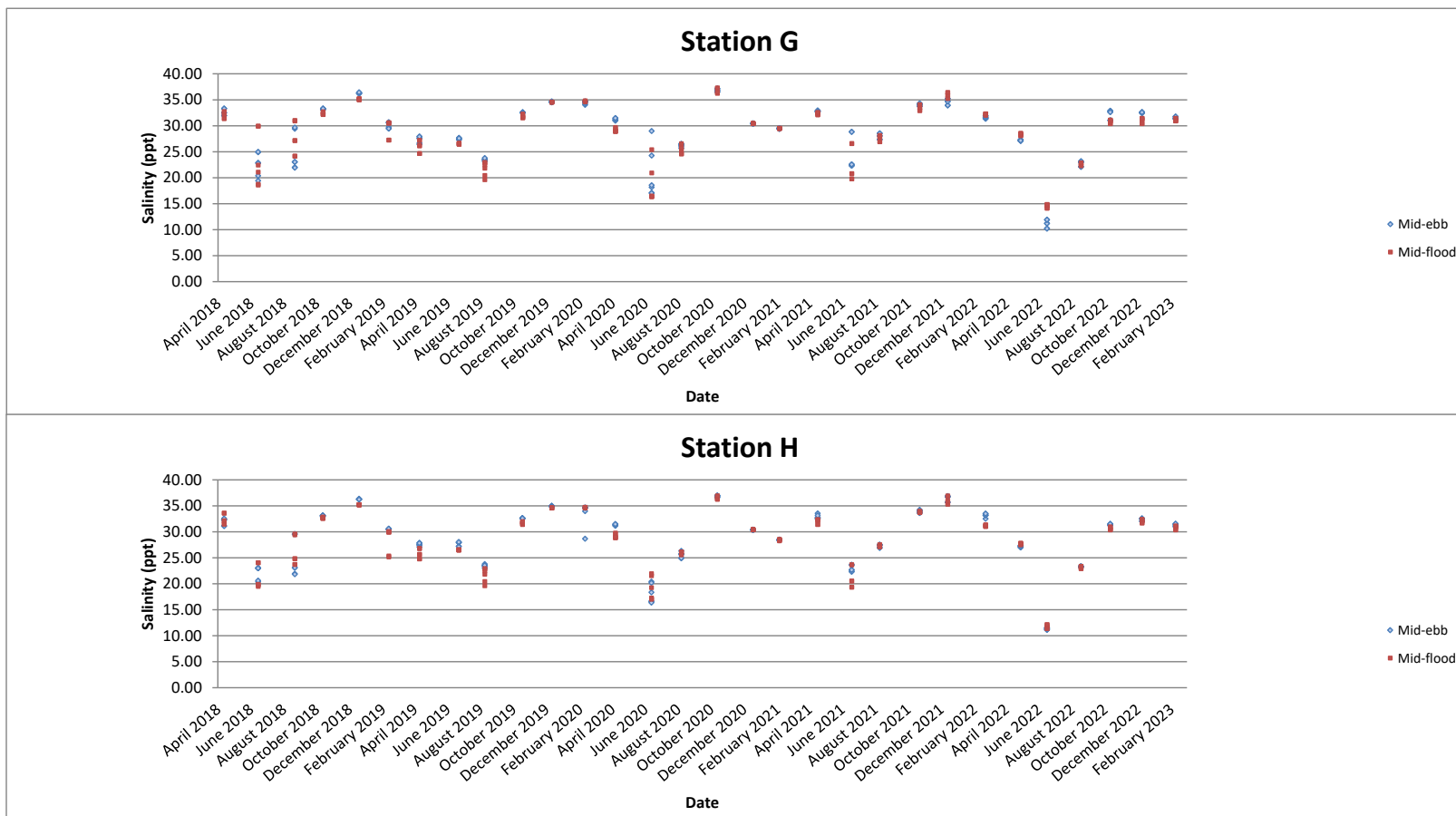
Weather Range:

Fine

Major activities in the reporting period:

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

Salinity (ppt)



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Contractions works nearby the project site

Notes:

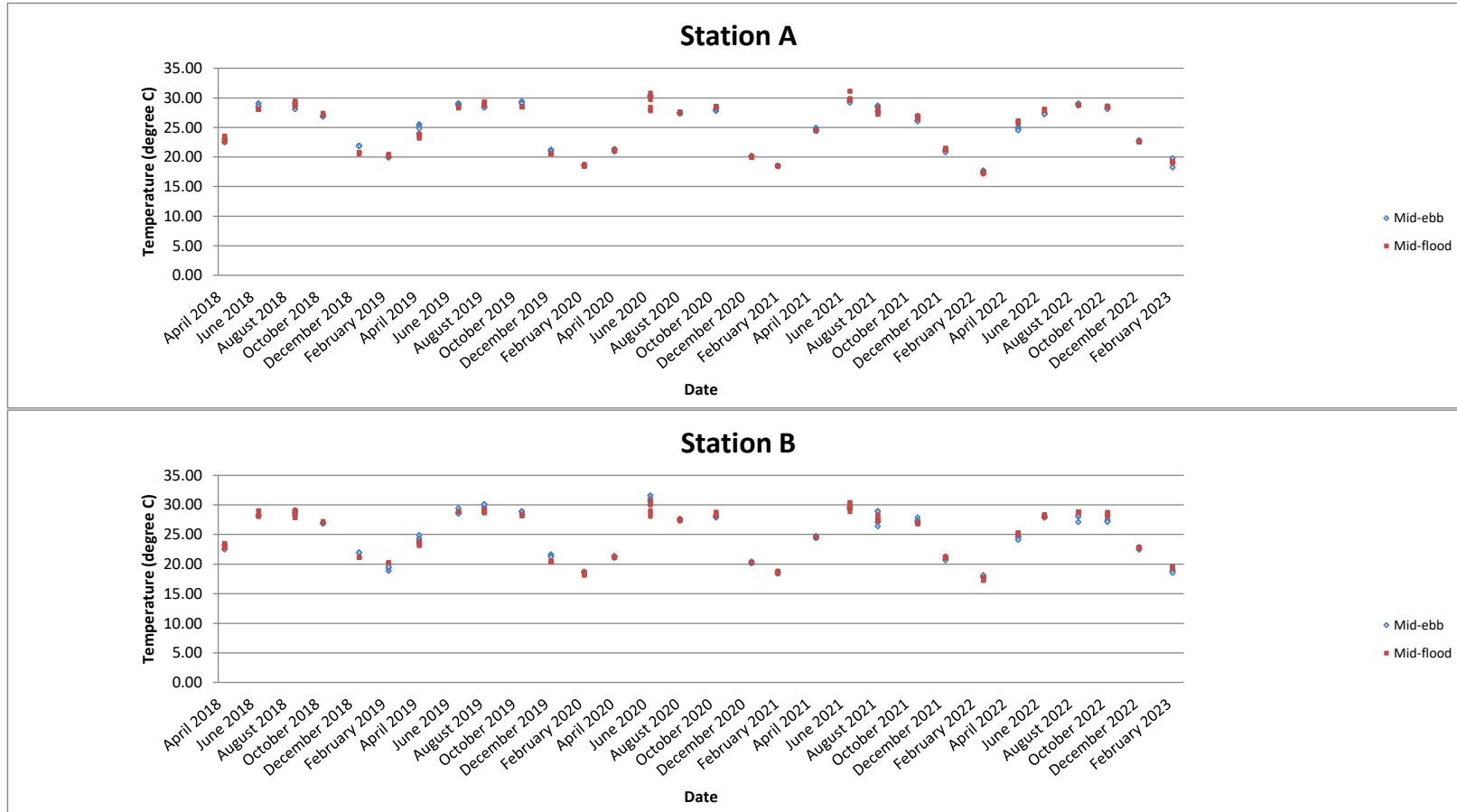
Weather Range:

Fine

Major activities in the reporting period:

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

Temperature



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

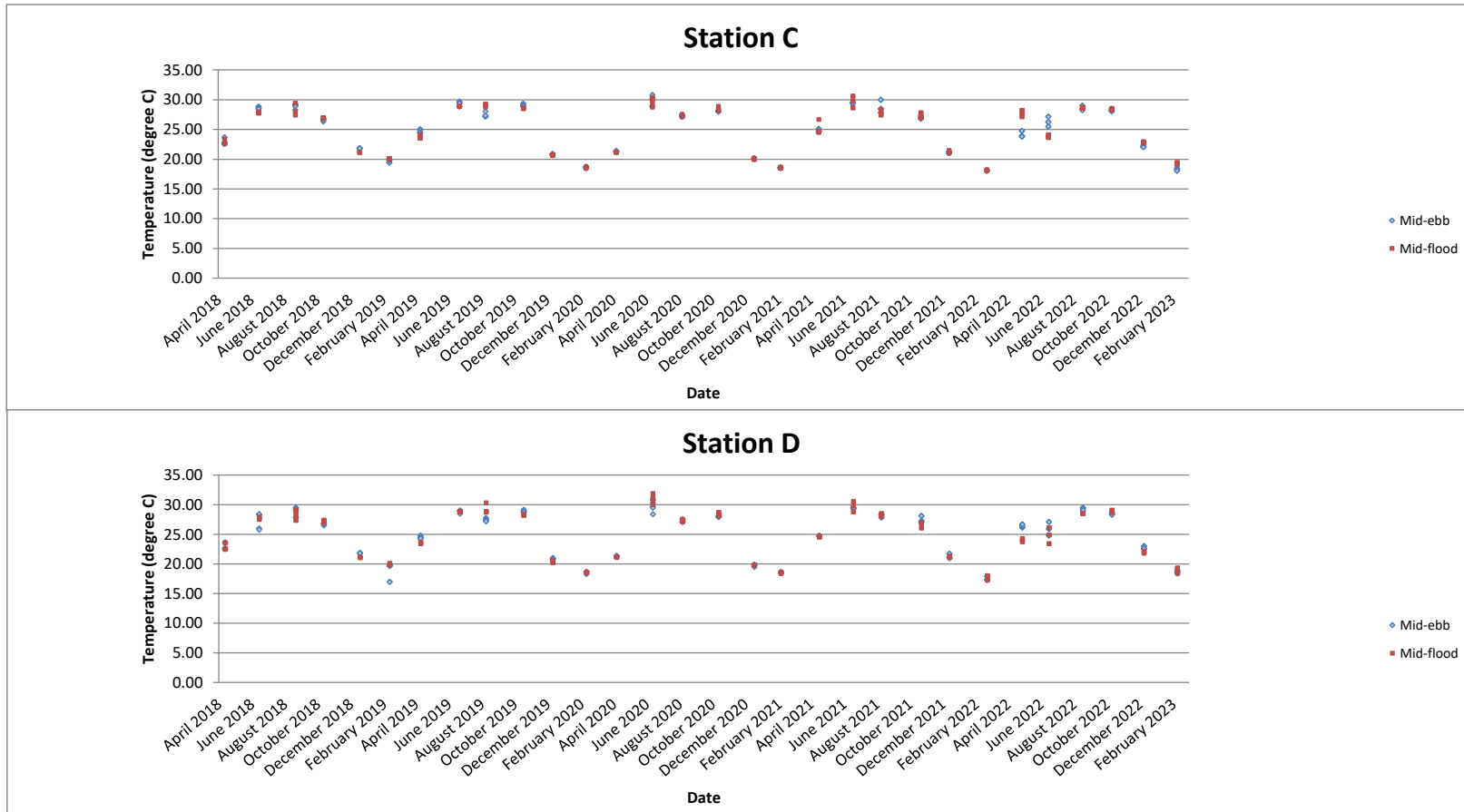
Weather Range:

Fine

Major activities in the reporting period:

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

Temperature



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

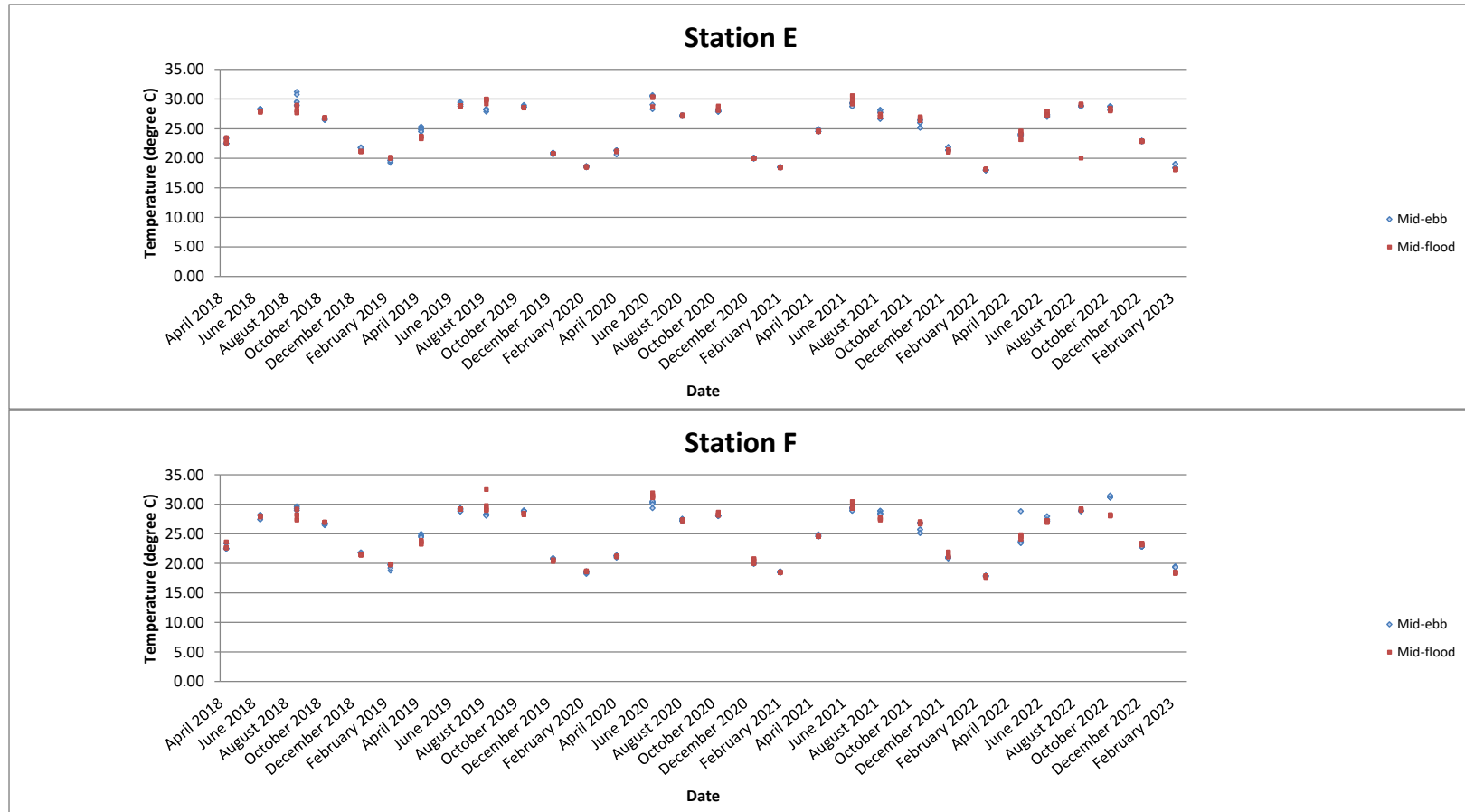
Weather Range:

Fine

Major activities in the reporting period:

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

Temperature



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

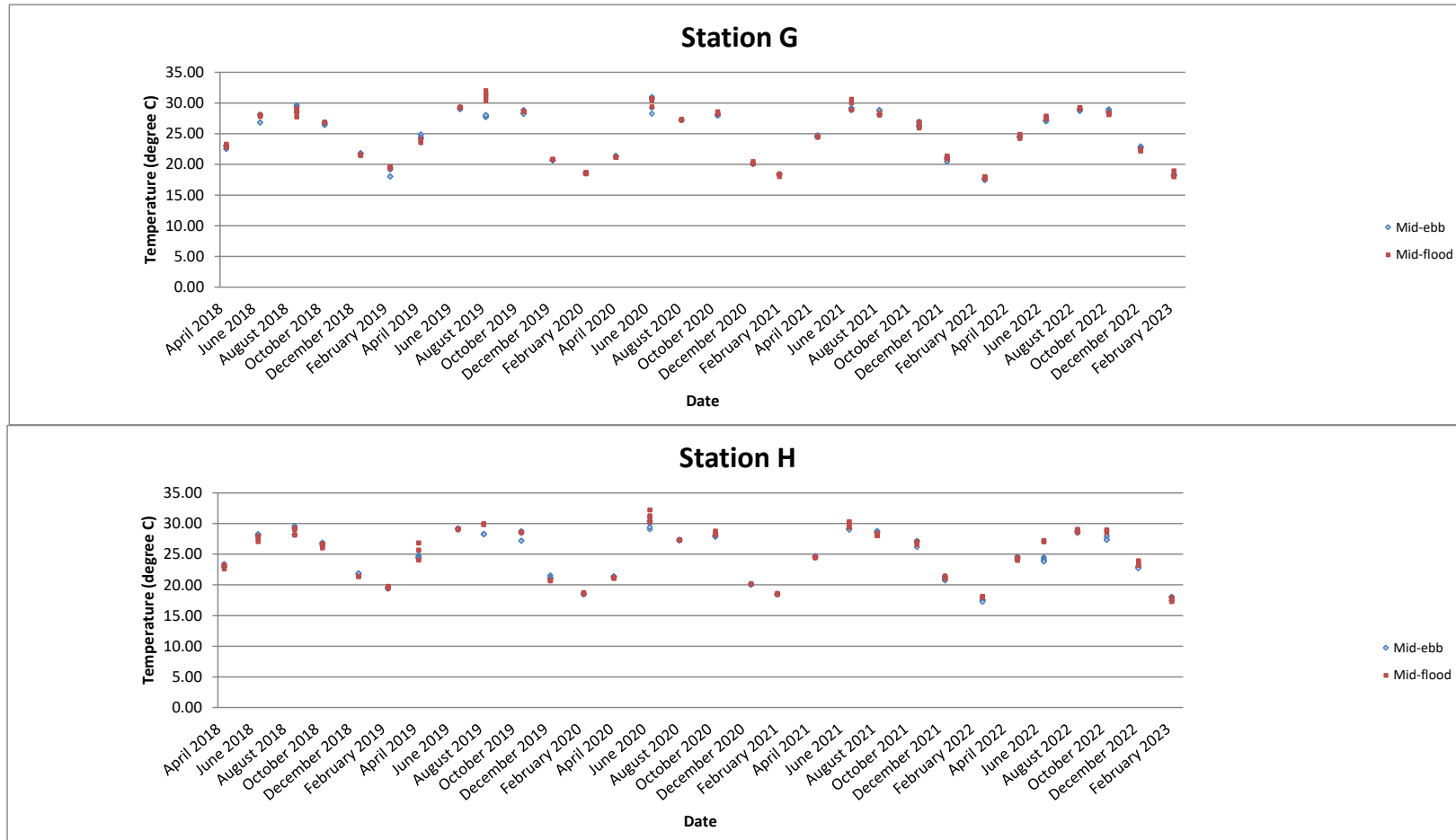
Weather Range:

Fine

Major activities in the reporting period:

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

Temperature



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

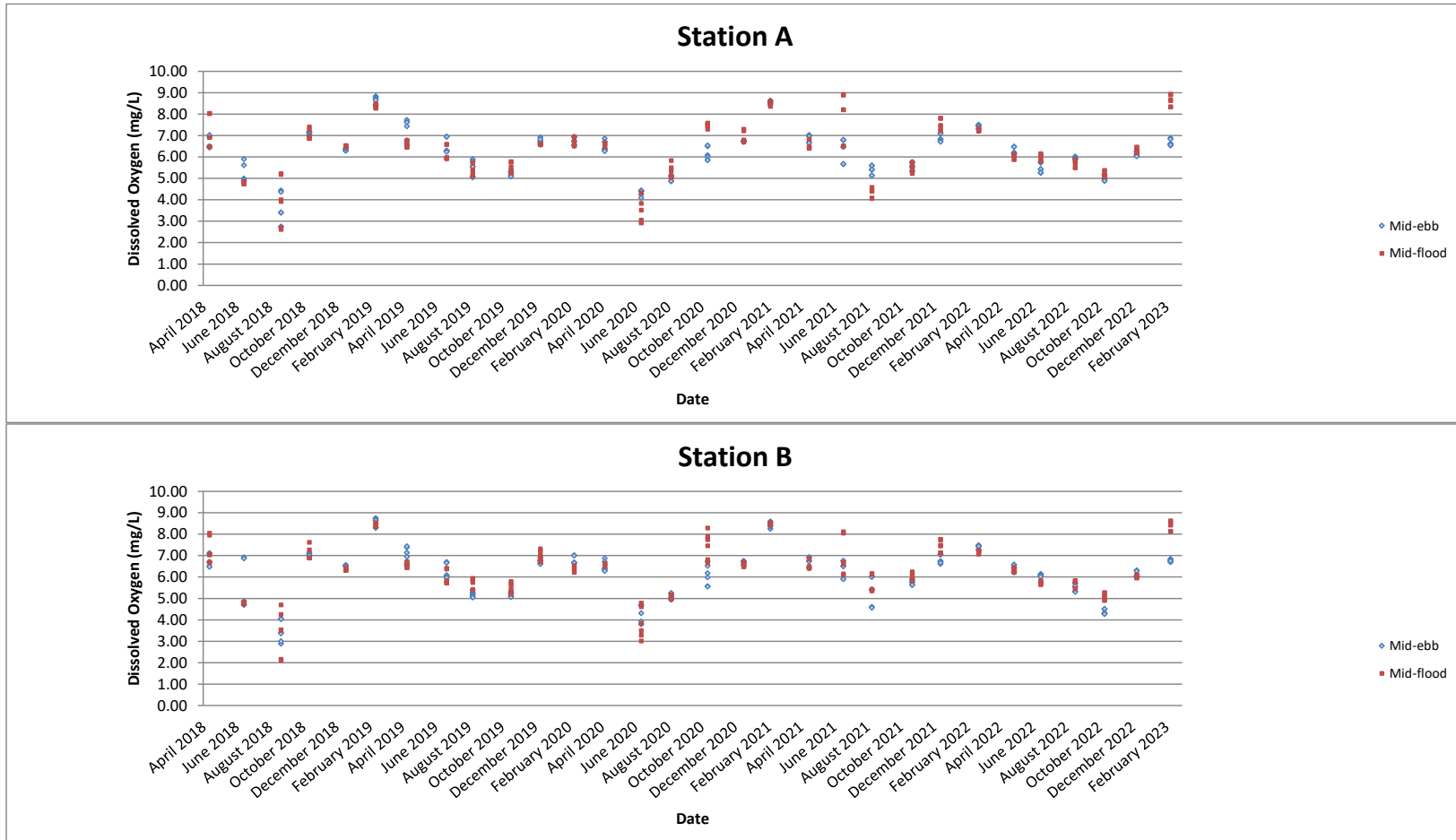
Weather Range:

Fine

Major activities in the reporting period:

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

Dissolved Oxygen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

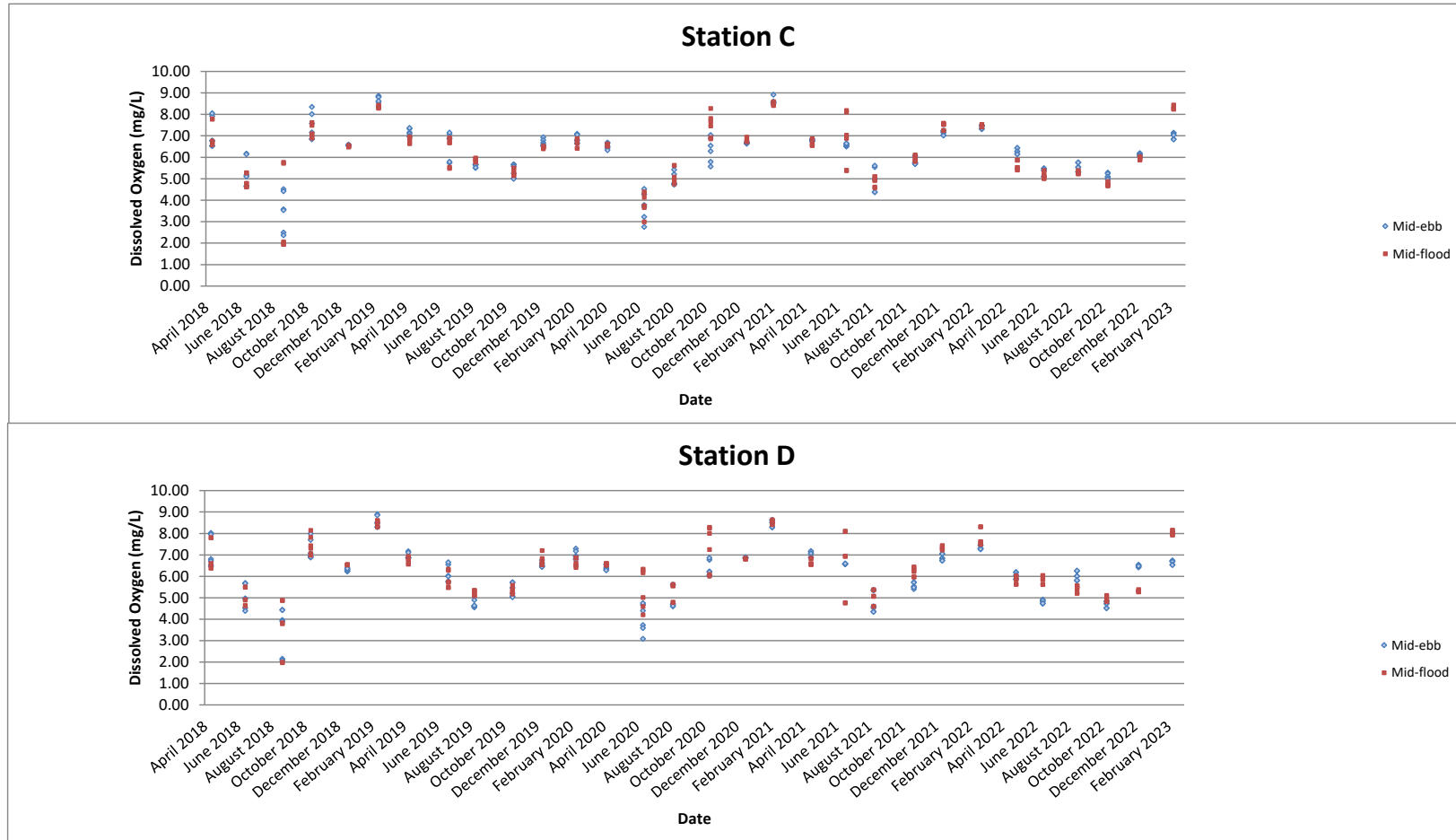
Weather Range:

Fine

Major activities in the reporting period:

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

Dissolved Oxygen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

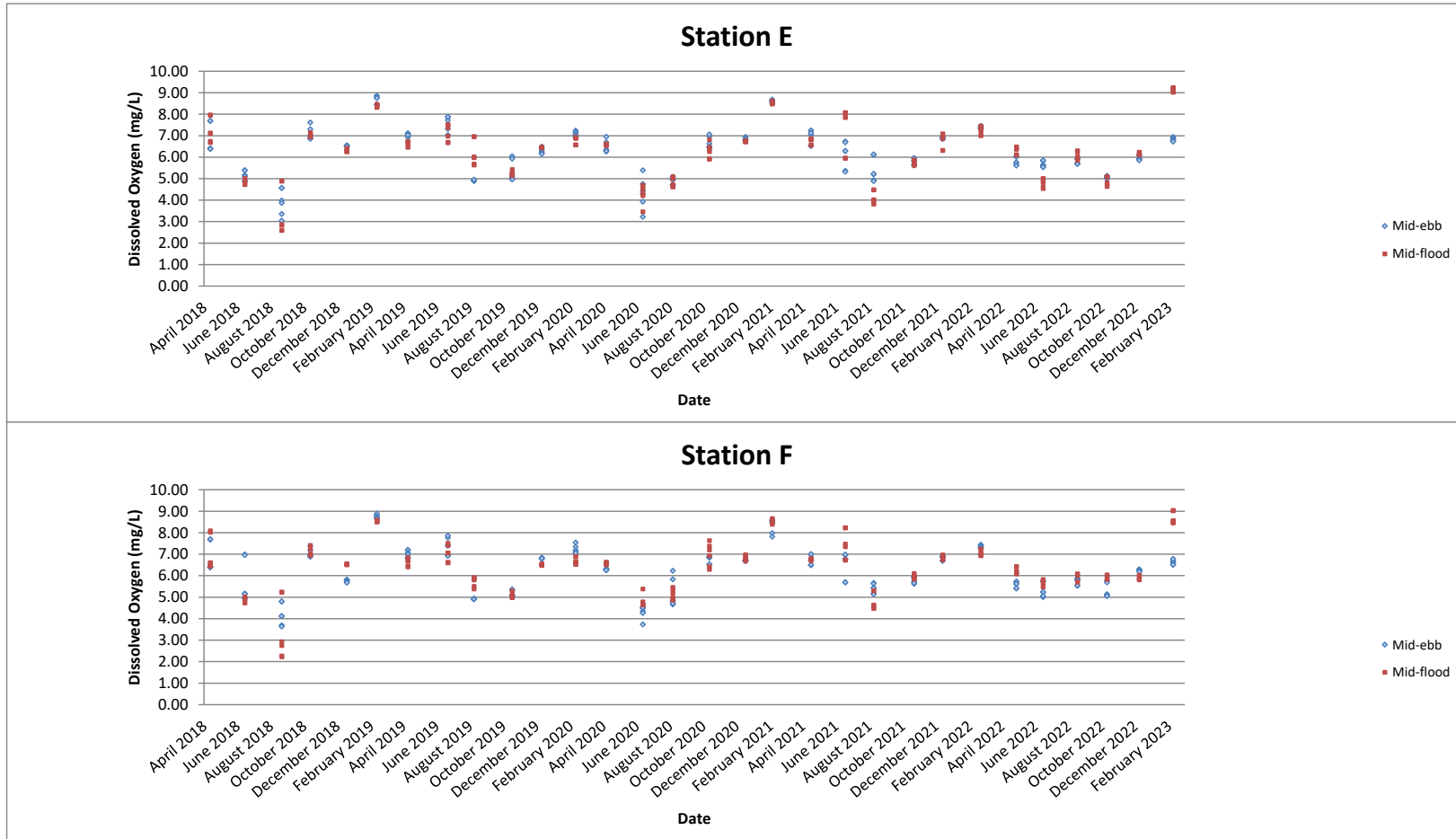
Weather Range:

Fine

Major activities in the reporting period:

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

Dissolved Oxygen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

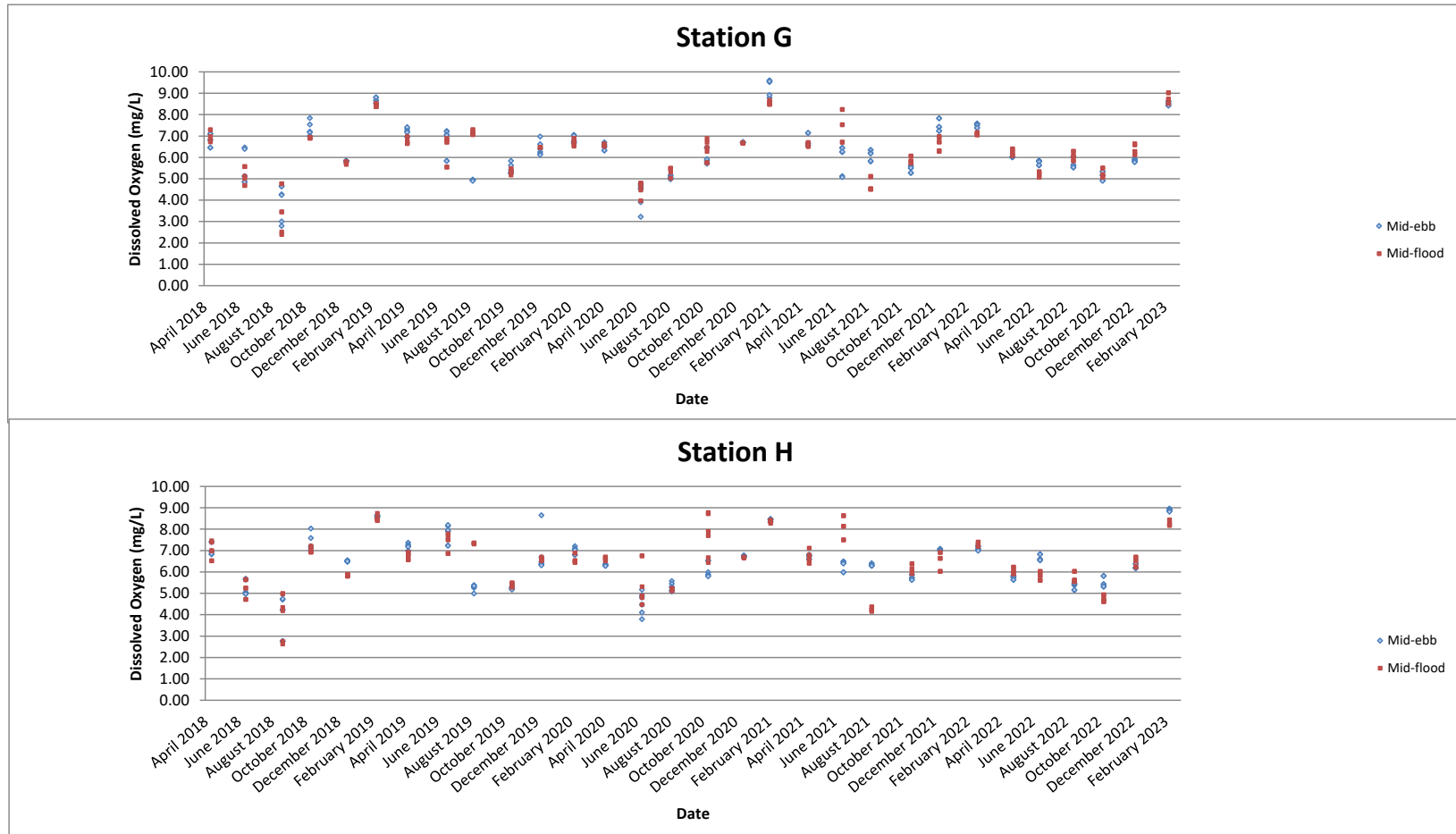
Weather Range:

Fine

Major activities in the reporting period:

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

Dissolved Oxygen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

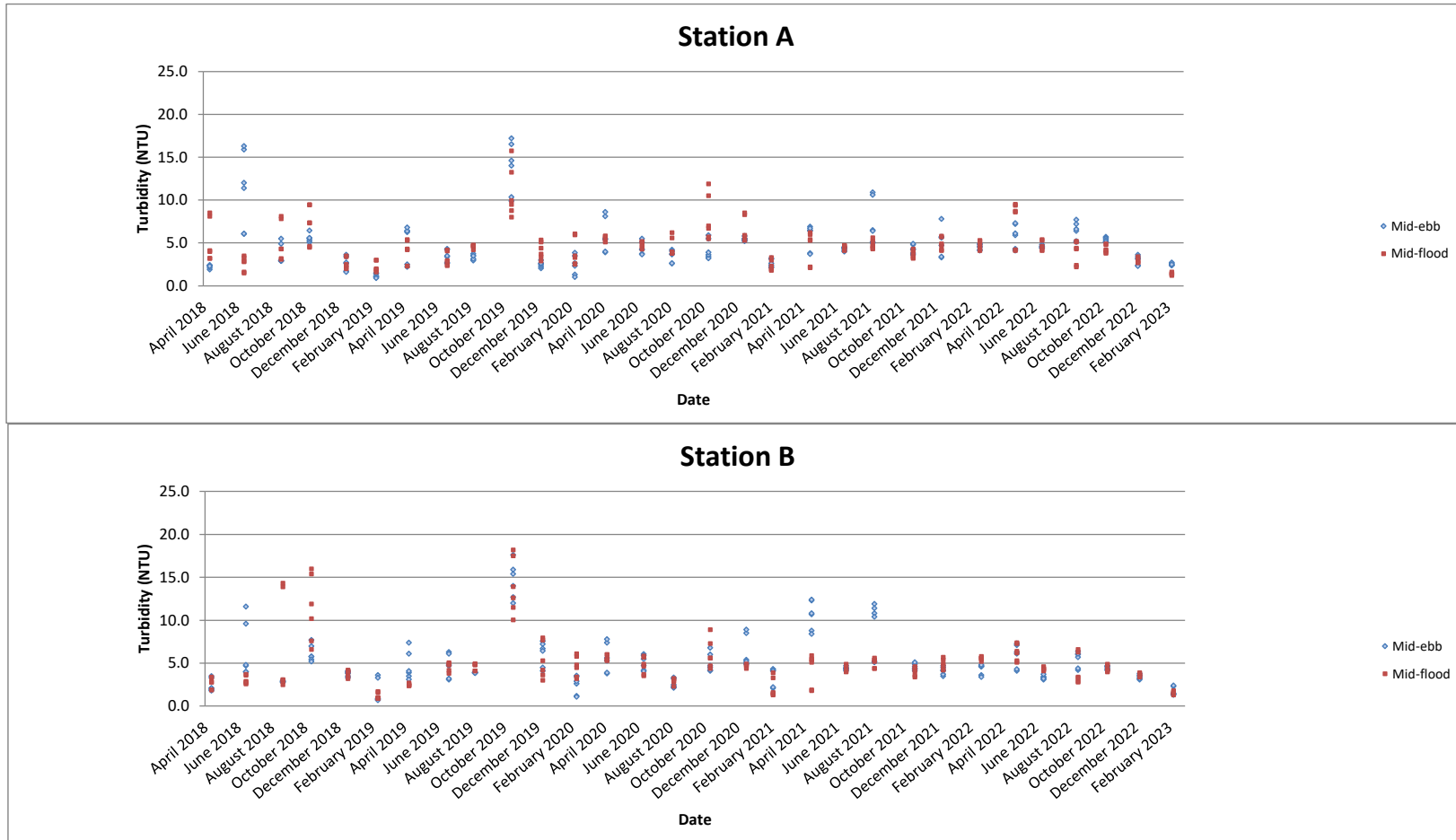
Weather Range:

Fine

Major activities in the reporting period:

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

Turbidity



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

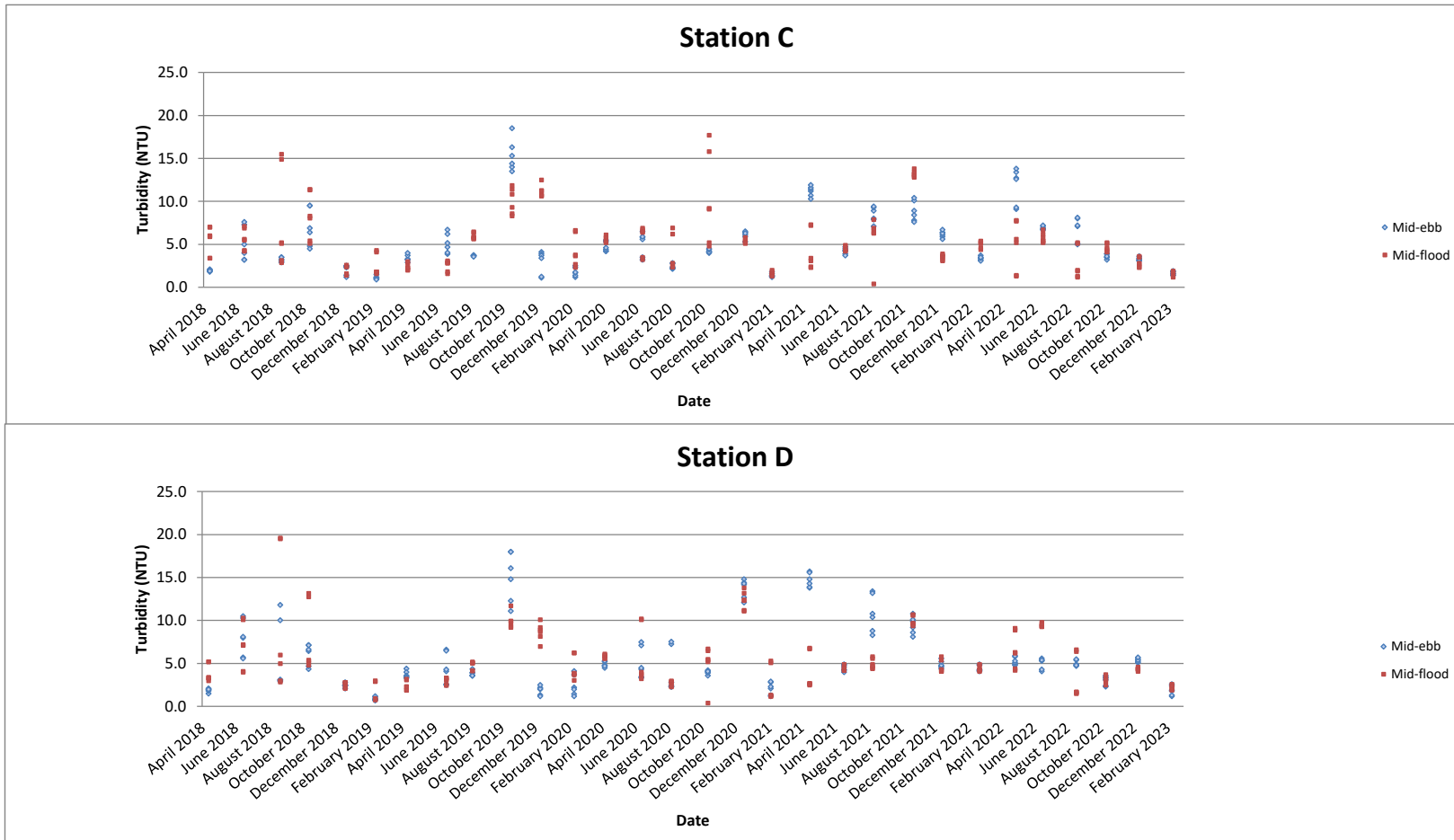
Weather Range:

Fine

Major activities in the reporting period:

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

Turbidity



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Construction works nearby the project site

Notes:

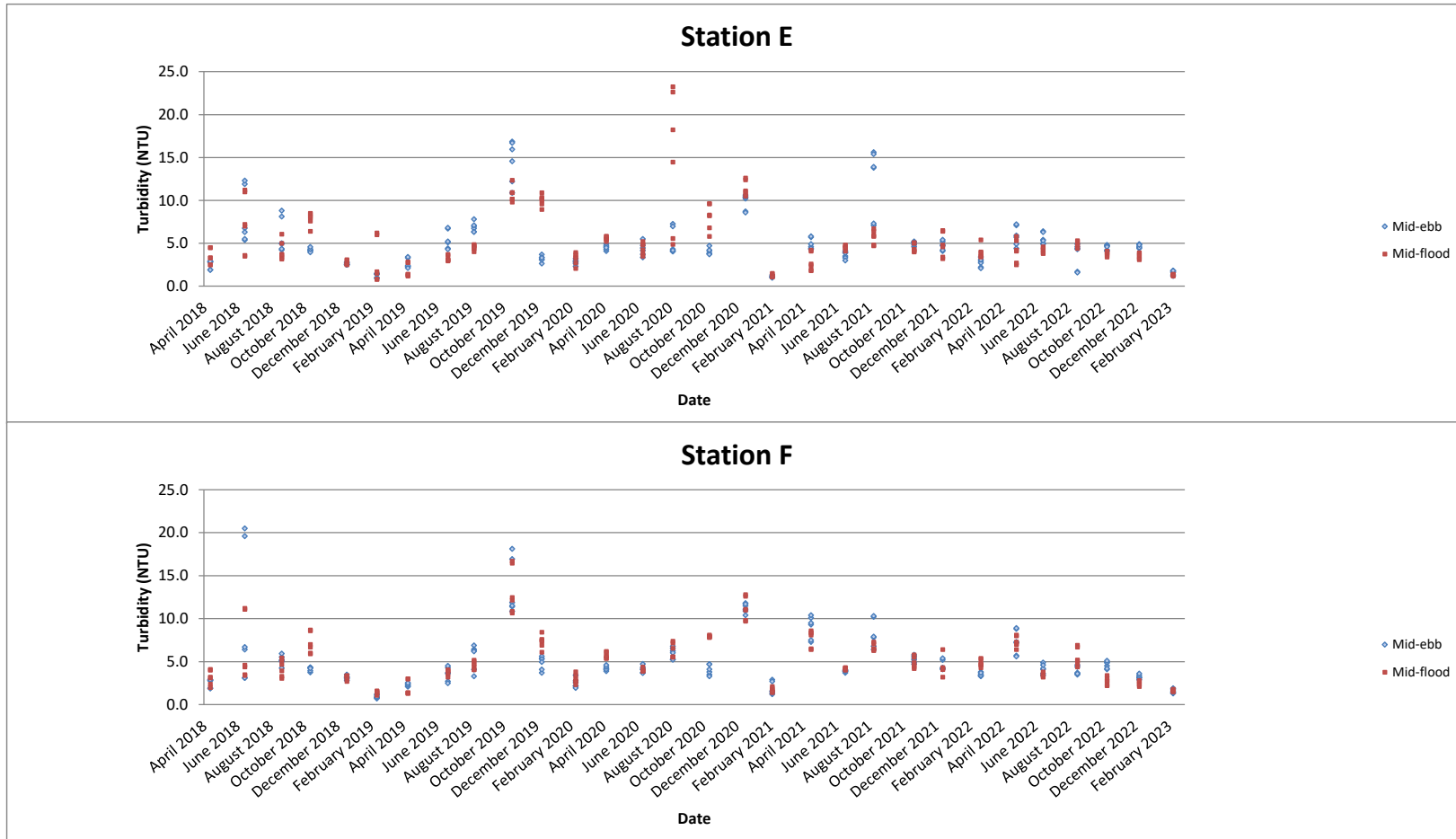
Weather Range:

Fine

Major activities in the reporting period:

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

Turbidity



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Construction works nearby the project site

Notes:

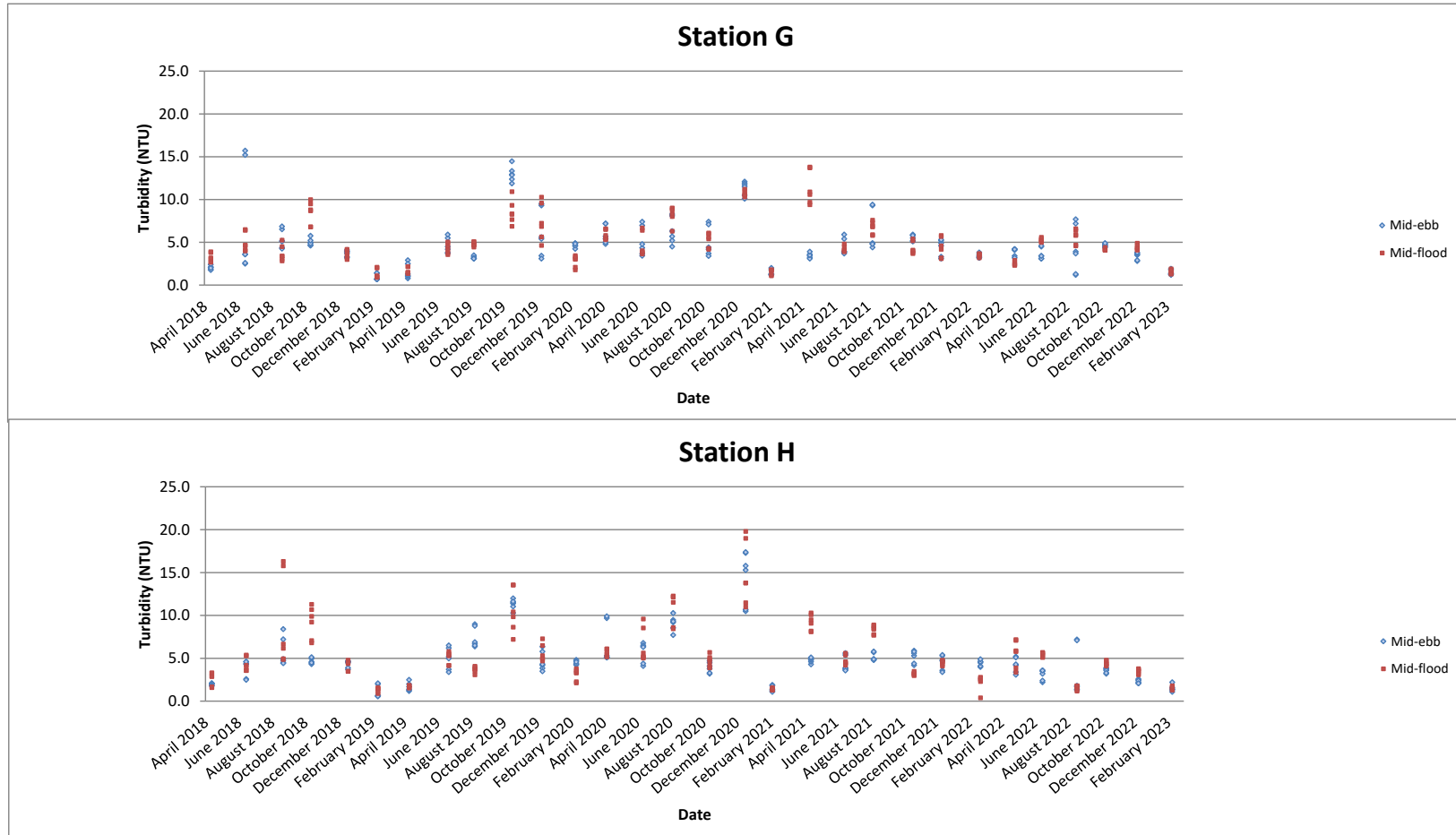
Weather Range:

Fine

Major activities in the reporting period:

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

Turbidity



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

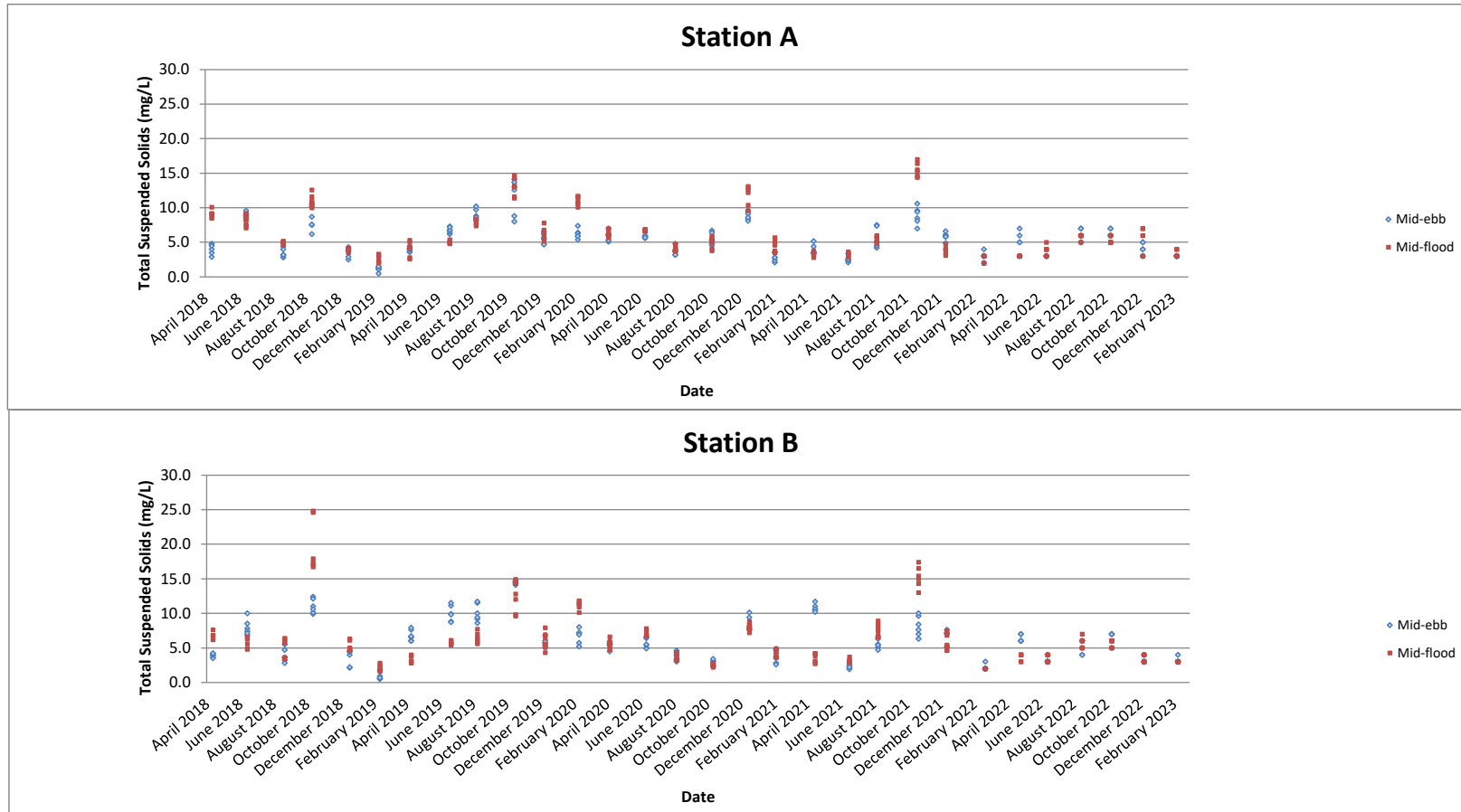
Weather Range:

Fine

Major activities in the reporting period:

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

Total Suspended Solids



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

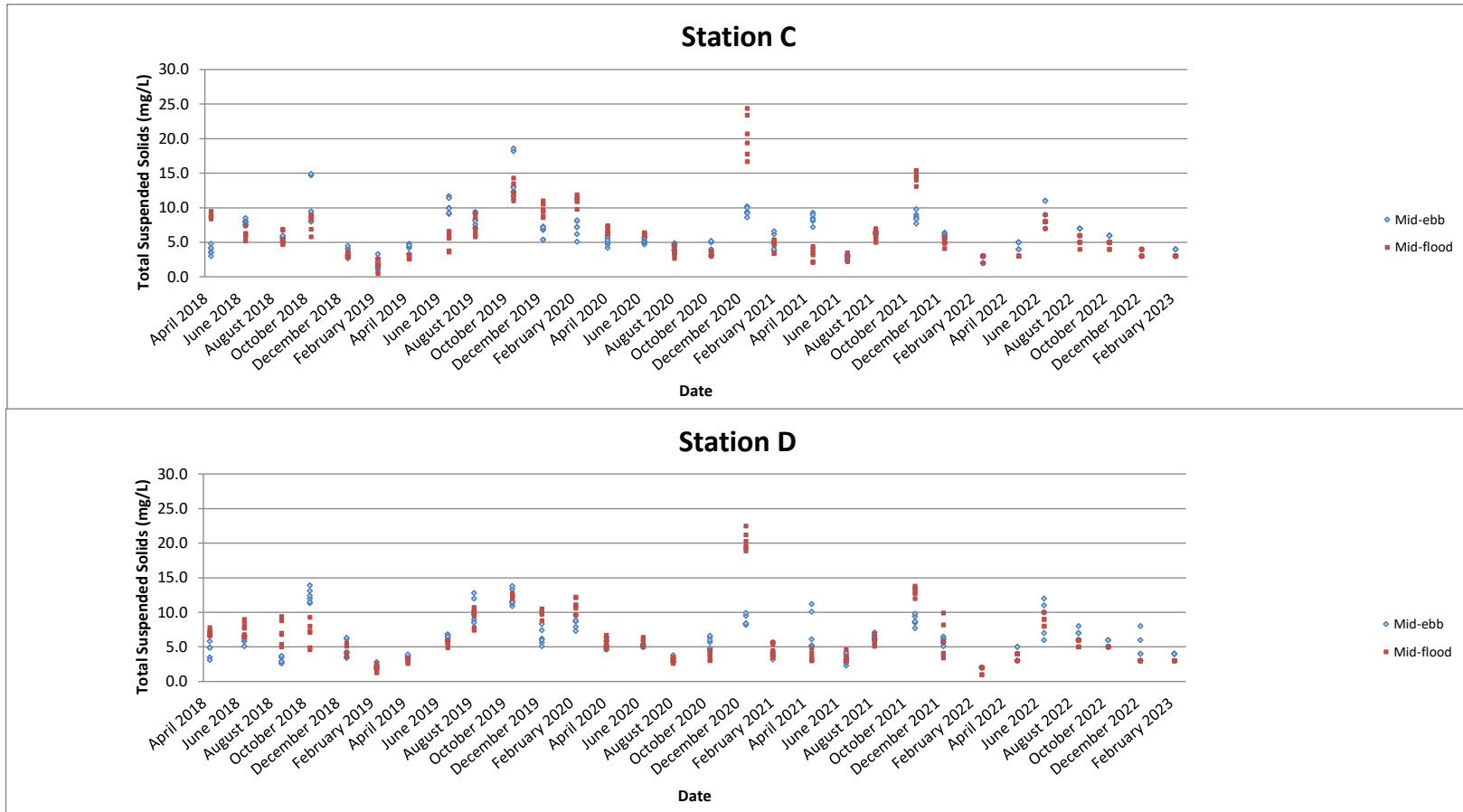
Weather Range:

Fine

Major activities in the reporting period:

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

Total Suspended Solids



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

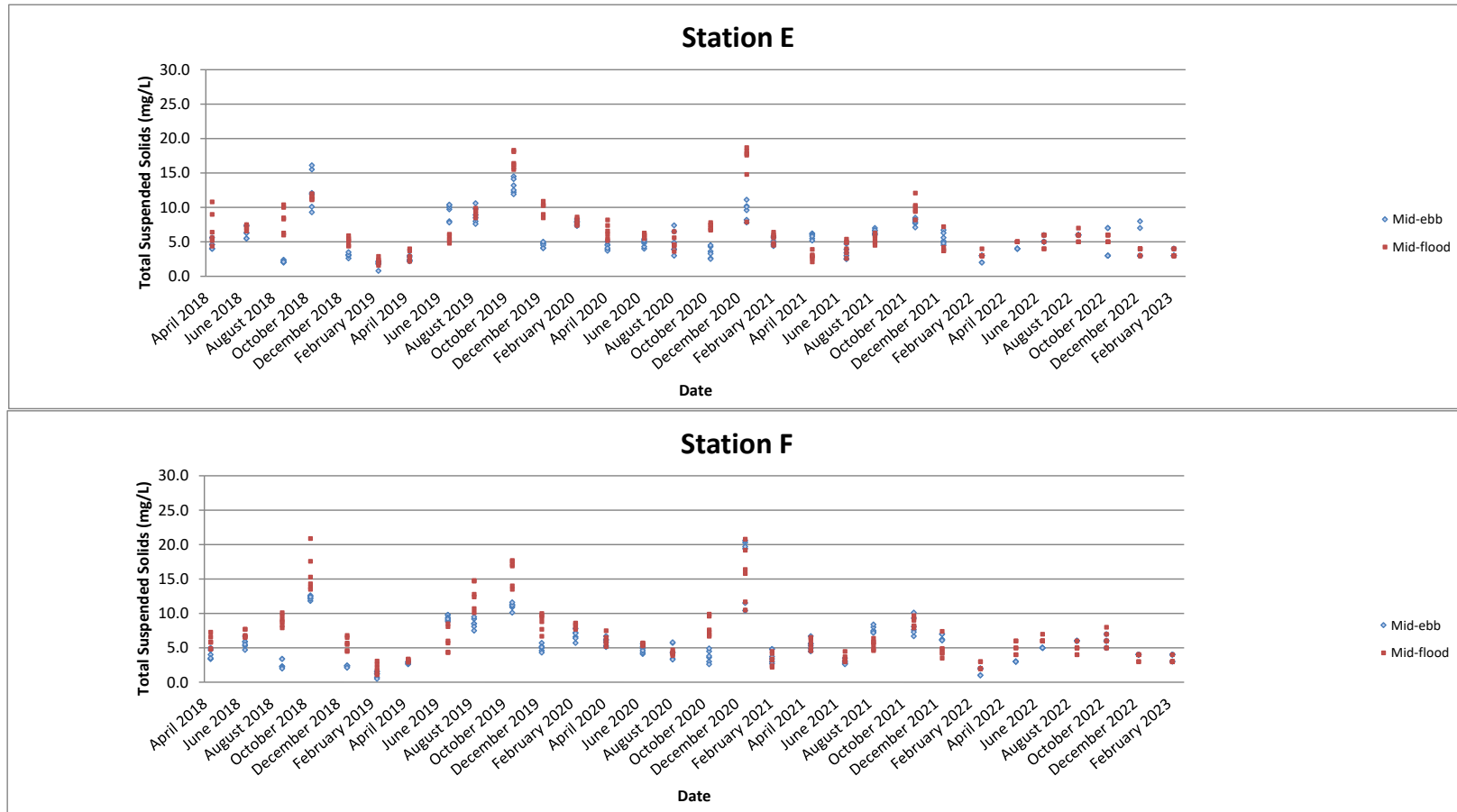
Weather Range:

Fine

Major activities in the reporting period:

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

Total Suspended Solids



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

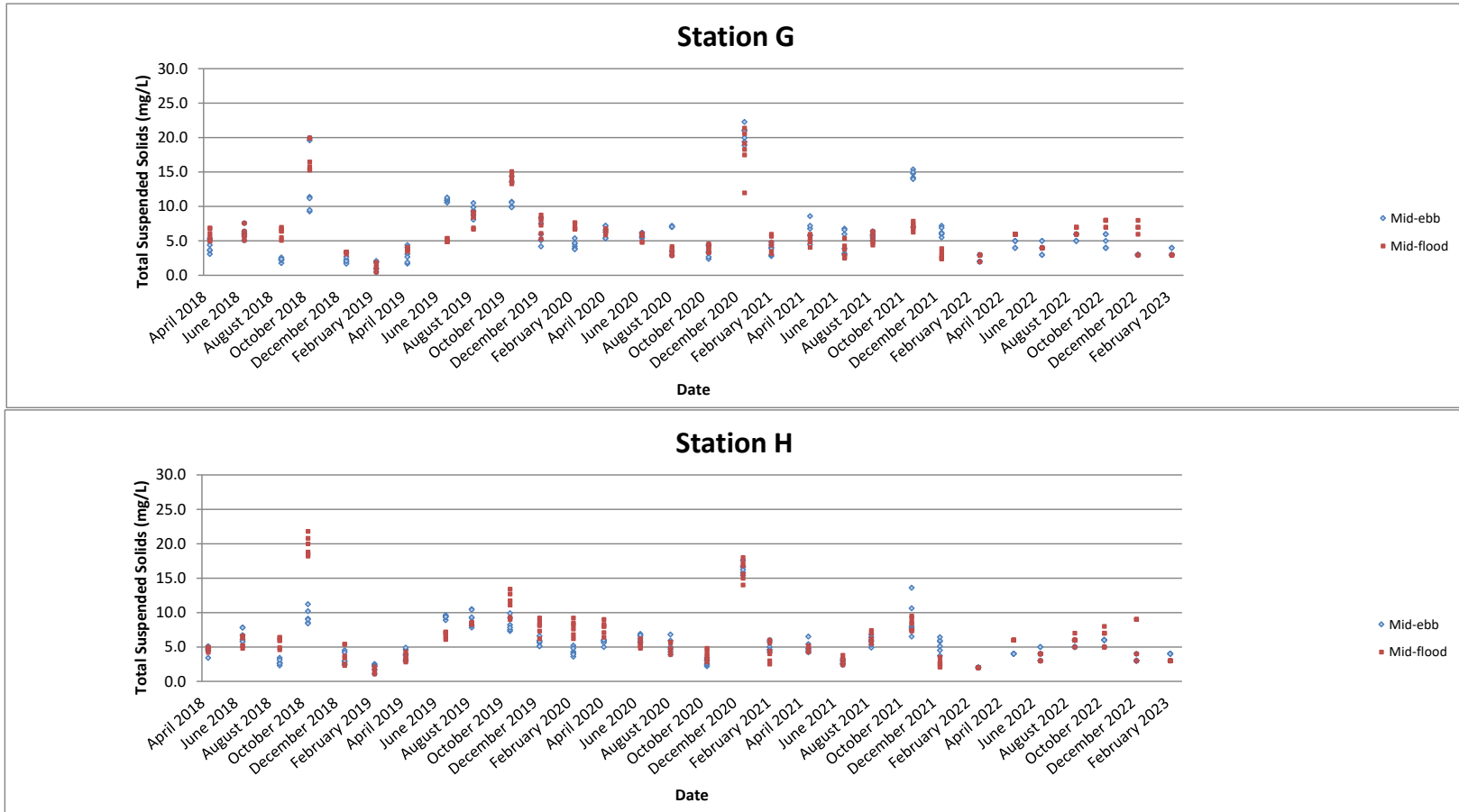
Weather Range:

Fine

Major activities in the reporting period:

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

Total Suspended Solids



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

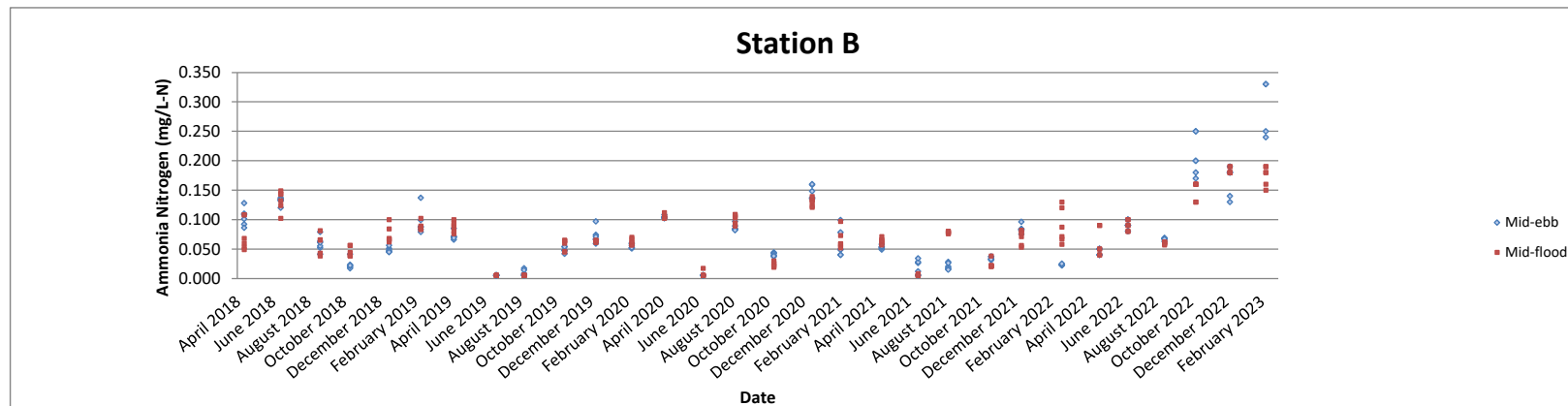
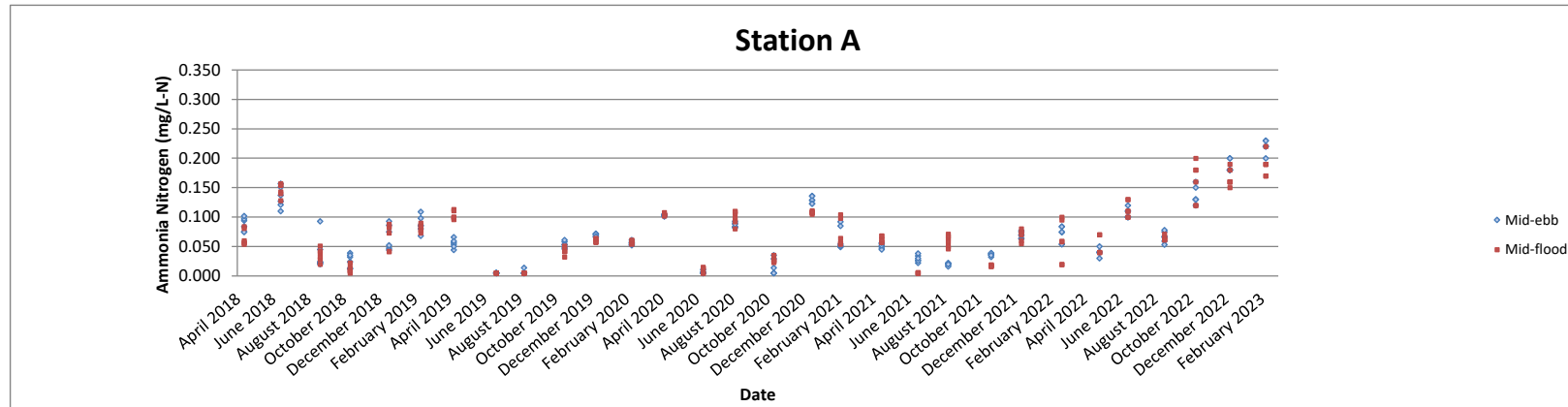
Weather Range:

Fine

Major activities in the reporting period:

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

Ammonia Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

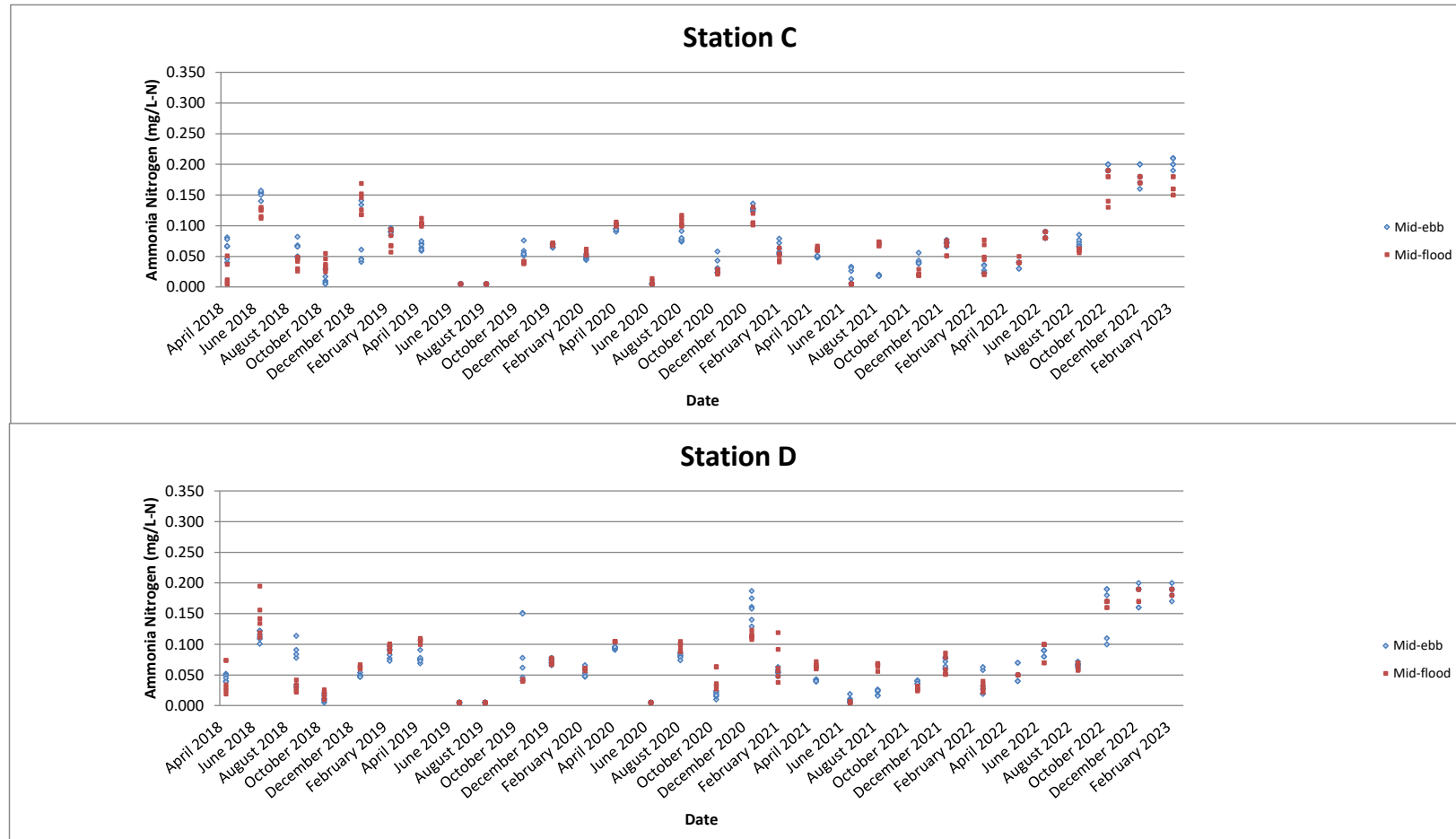
Weather Range:

Fine

Major activities in the reporting period:

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

Ammonia Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

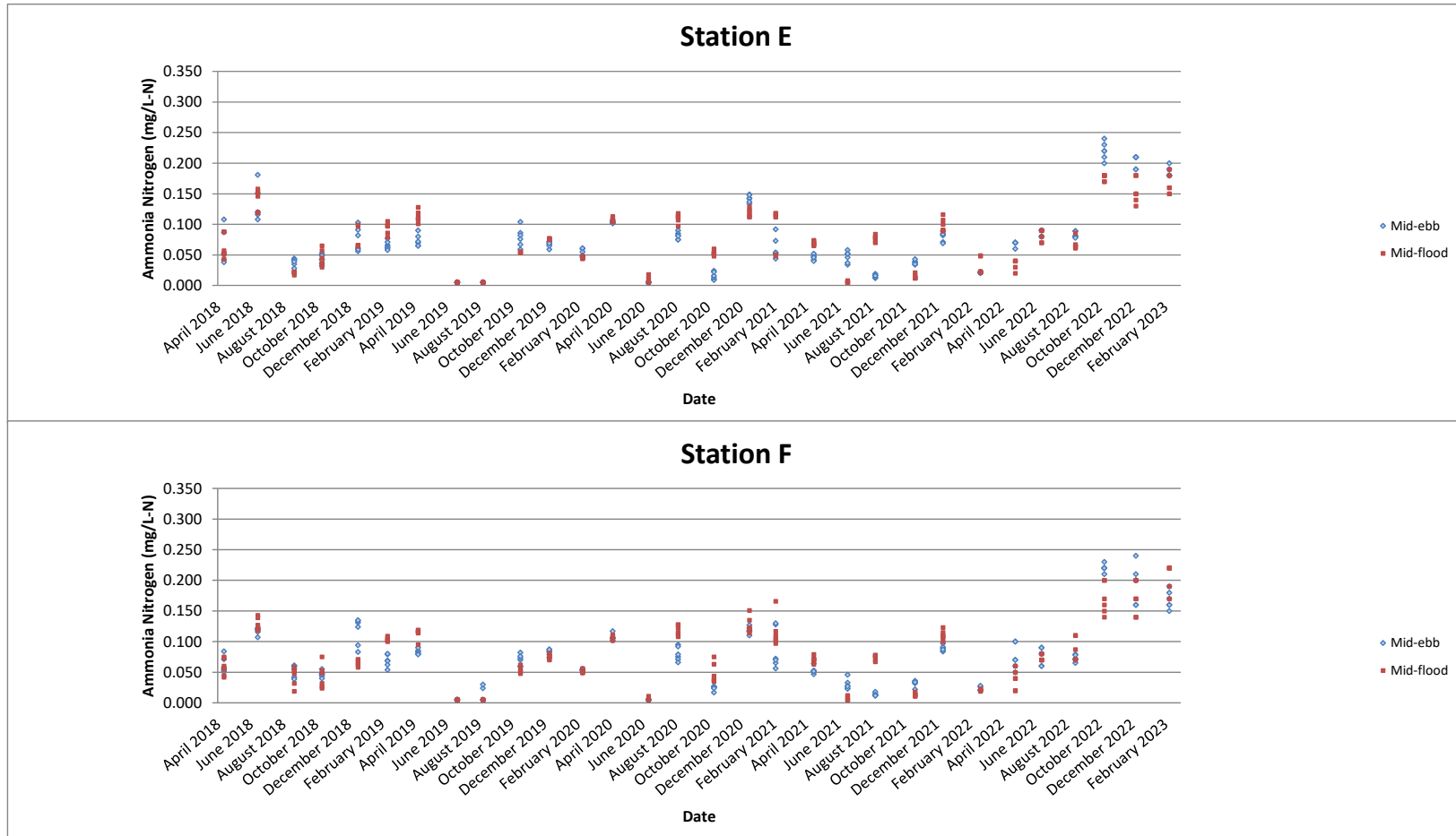
Weather Range:

Fine

Major activities in the reporting period:

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

Ammonia Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

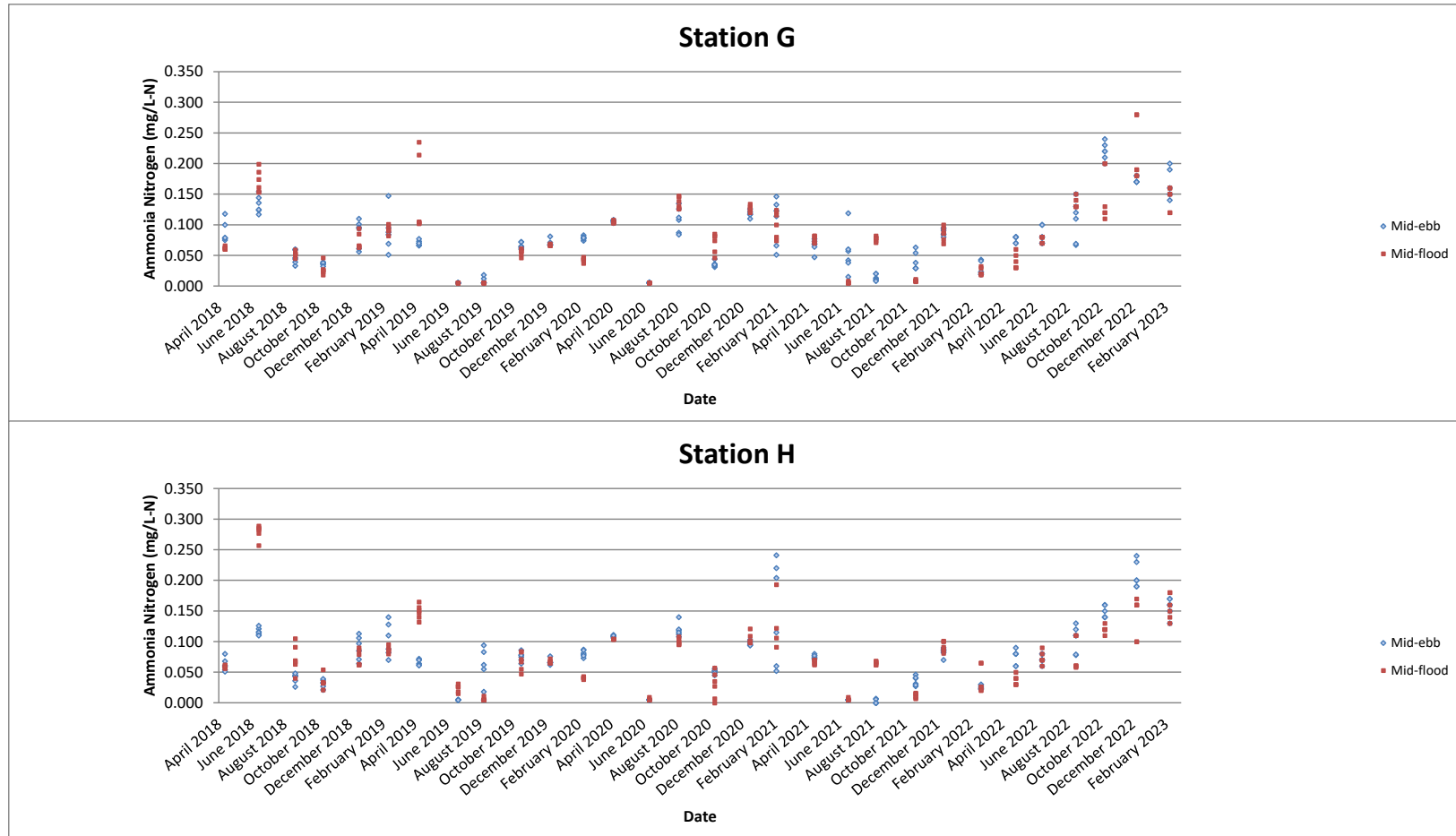
Weather Range:

Fine

Major activities in the reporting period:

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

Ammonia Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

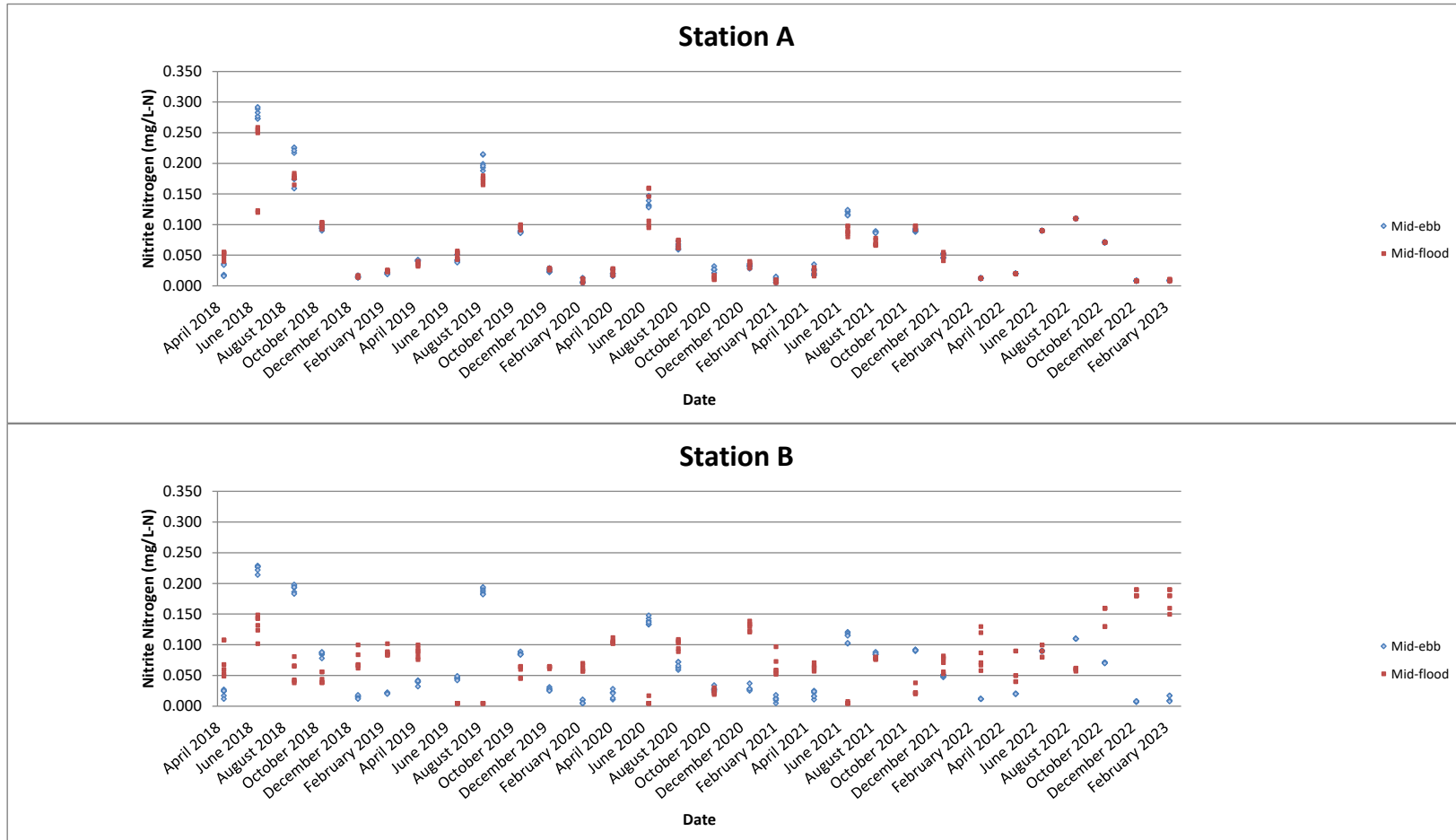
Weather Range:

Fine

Major activities in the reporting period:

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

Nitrite Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

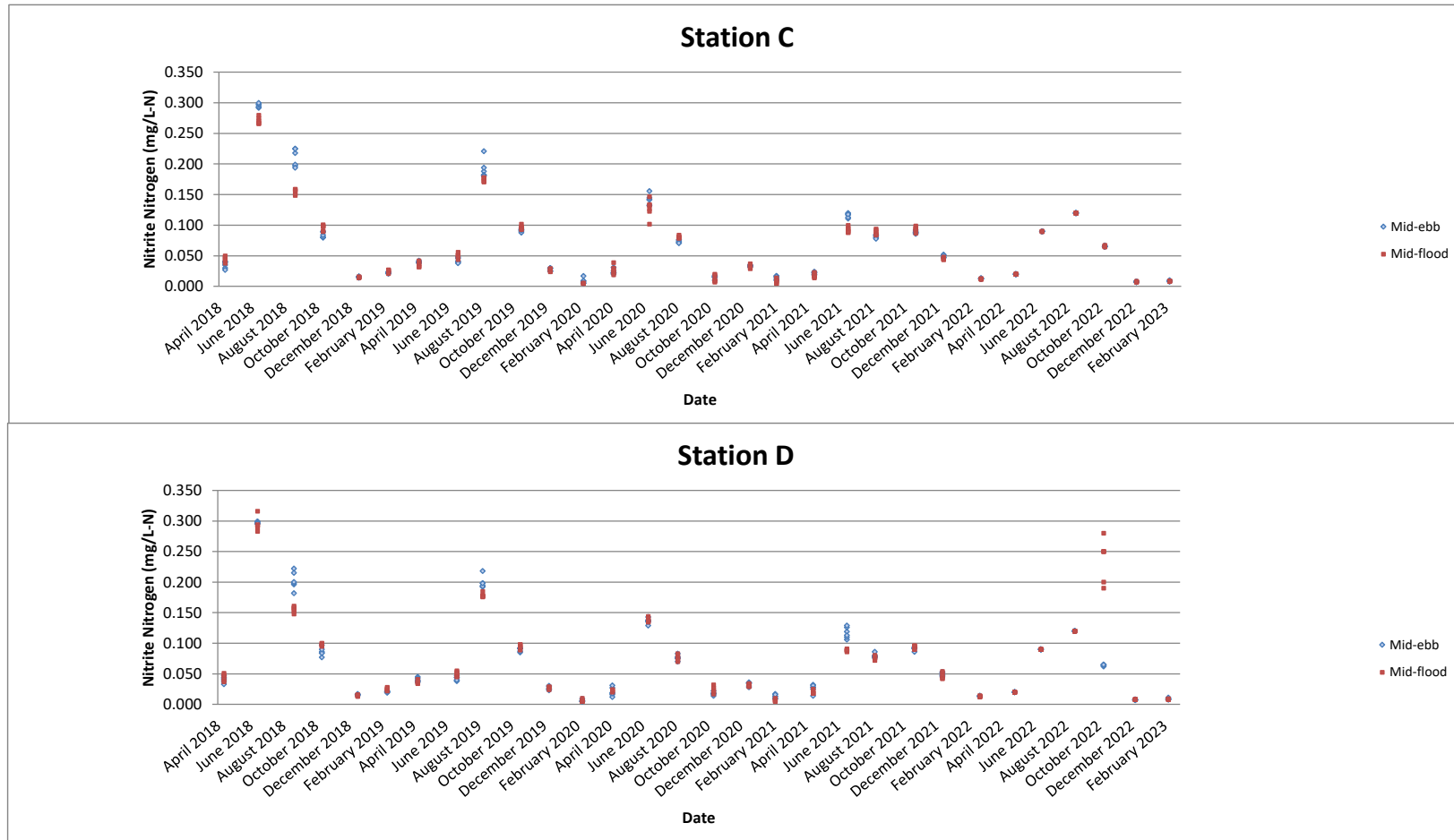
Weather Range:

Fine

Major activities in the reporting period:

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

Nitrite Nitrogen



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Construction works nearby the project site

Notes:

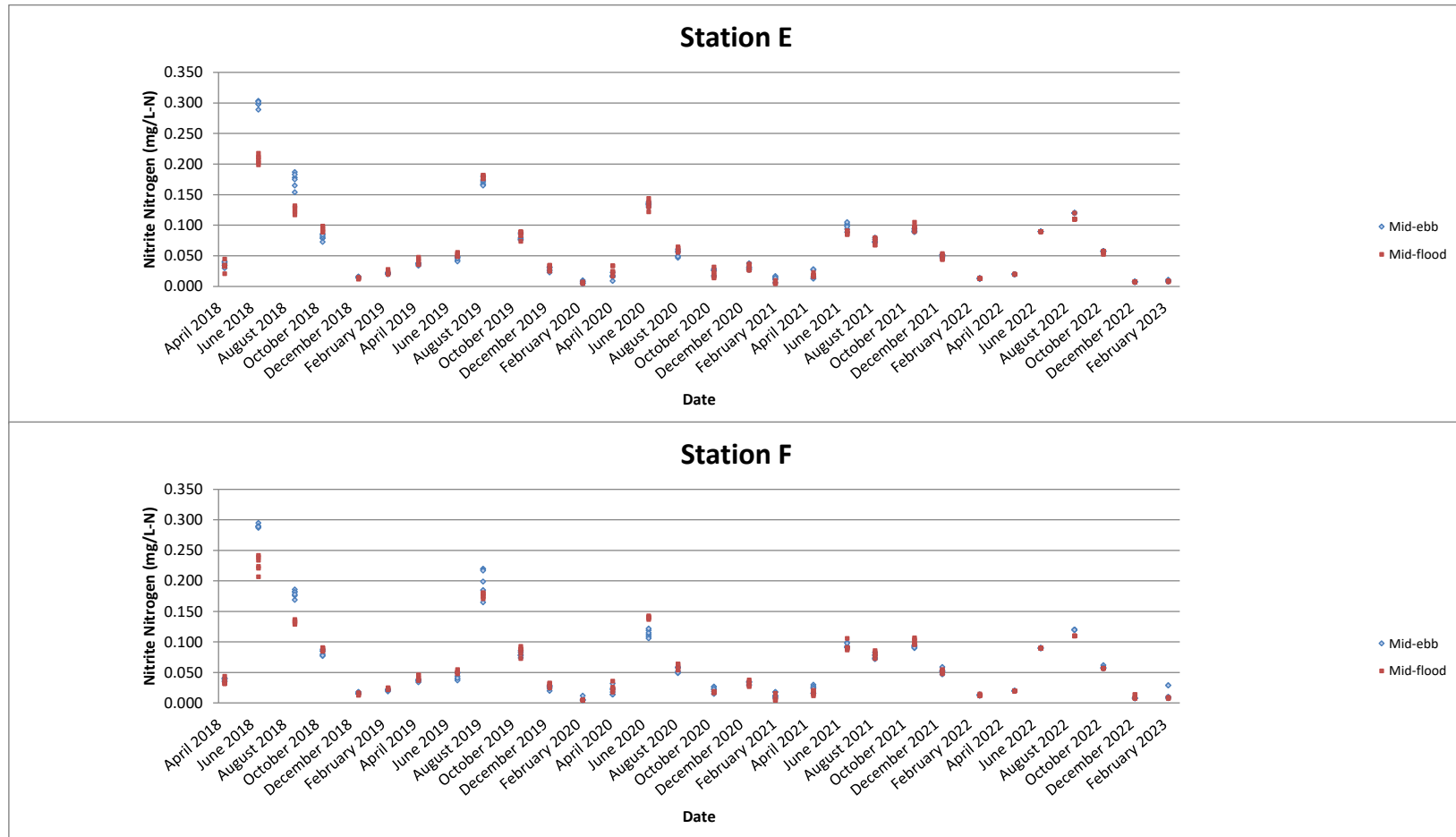
Weather Range:

Fine

Major activities in the reporting period:

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

Nitrite Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

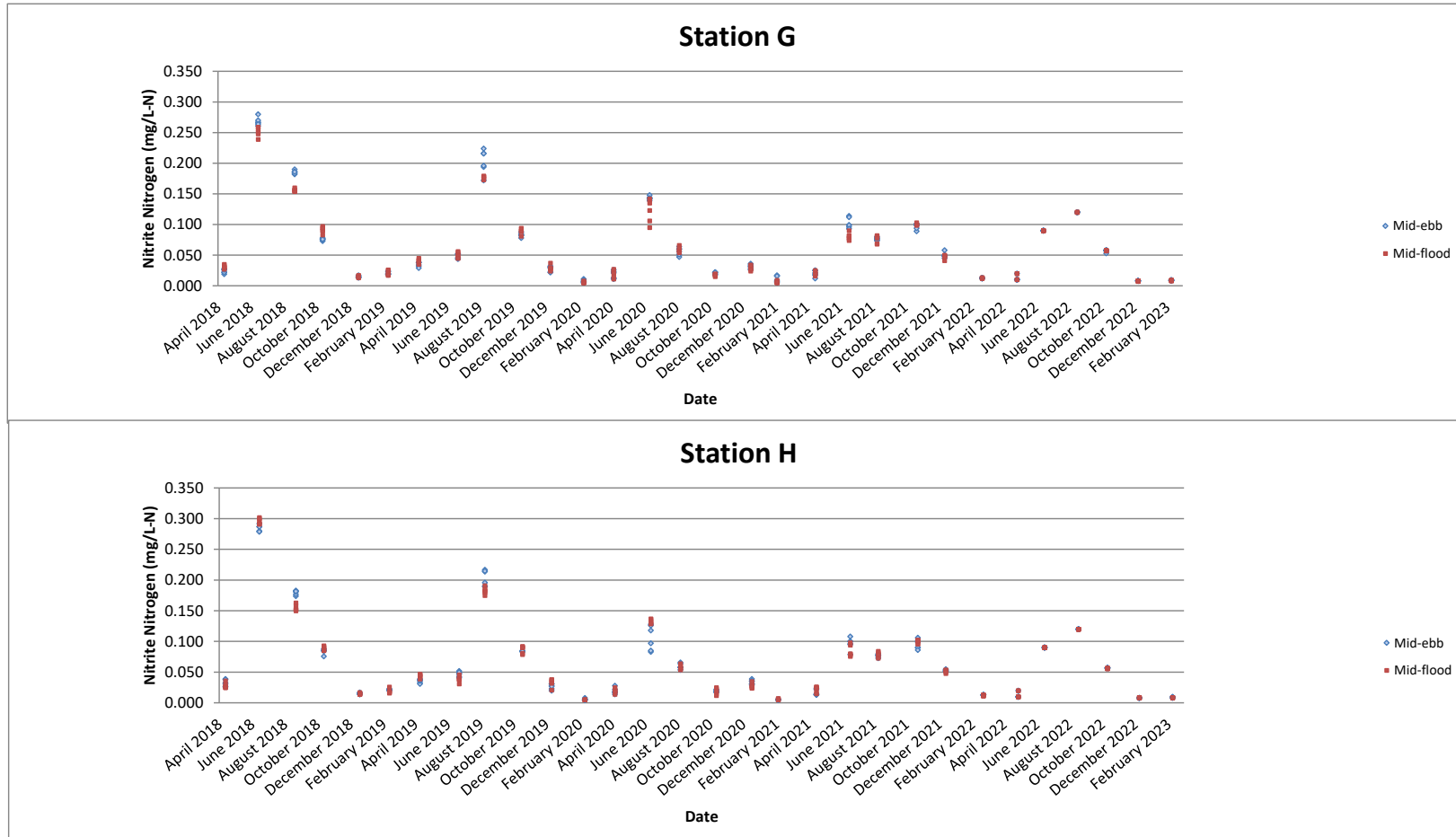
Weather Range:

Fine

Major activities in the reporting period:

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

Nitrite Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

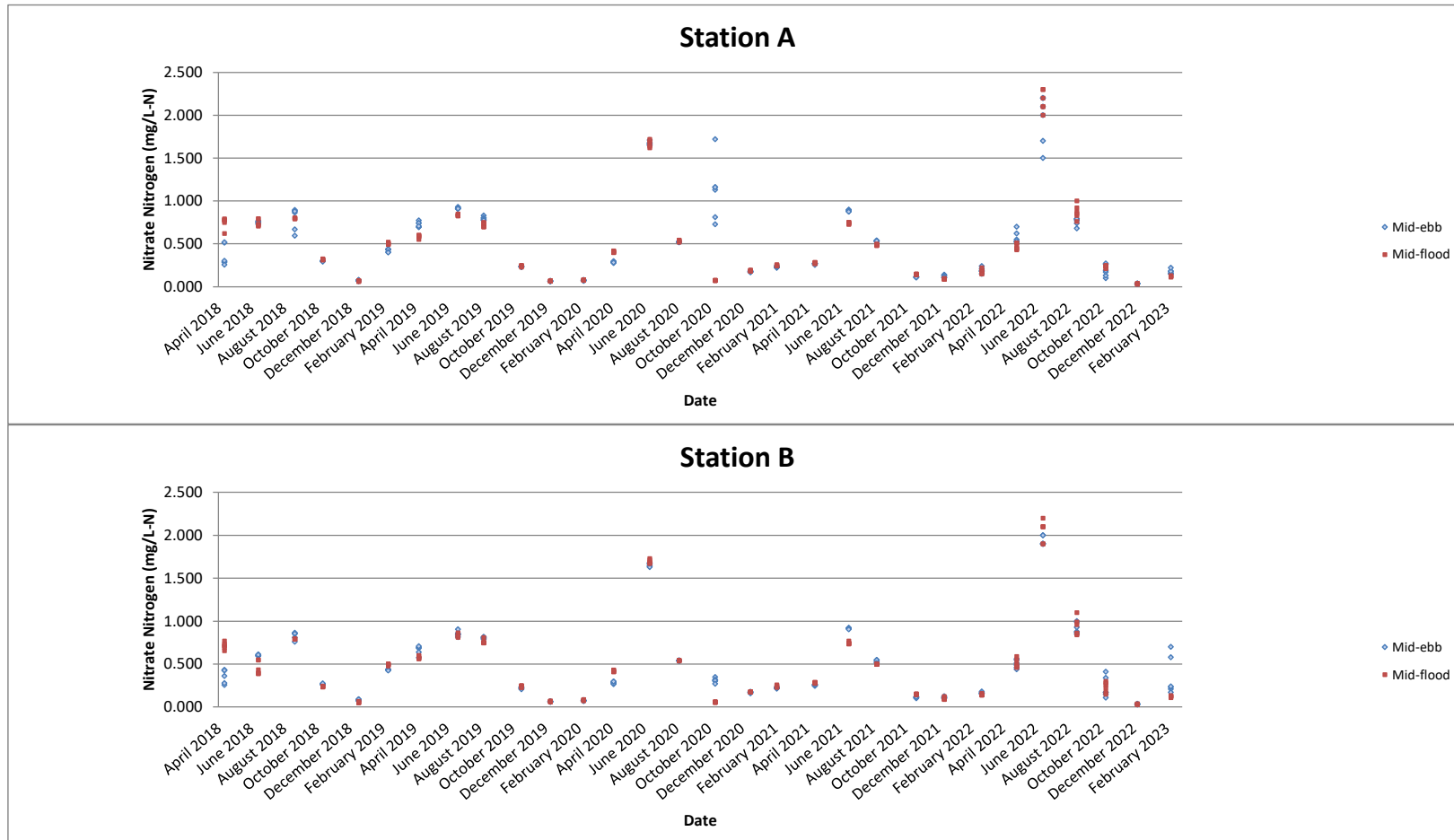
Weather Range:

Fine

Major activities in the reporting period:

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

Nitrate Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

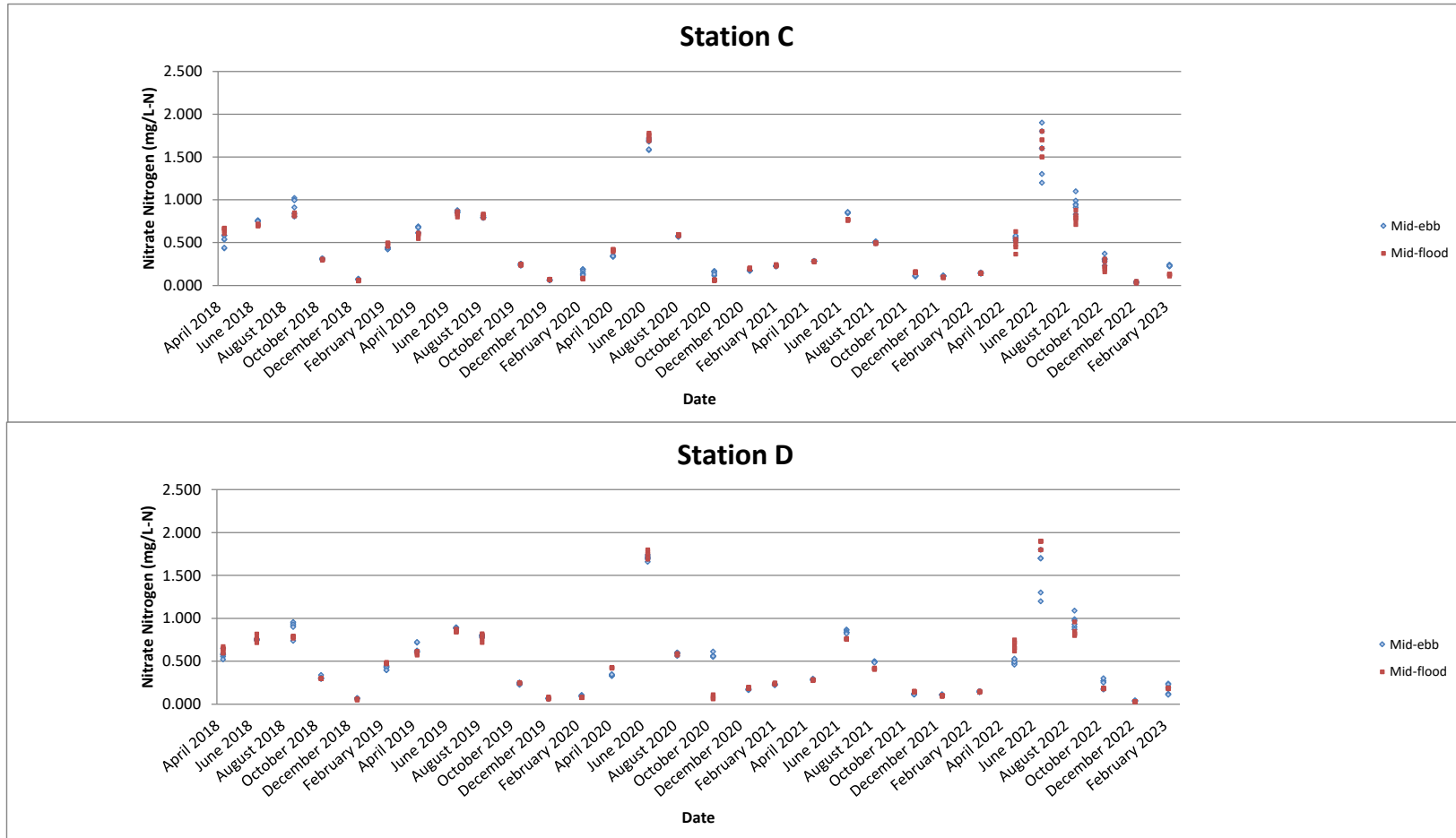
Weather Range:

Fine

Major activities in the reporting period:

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

Nitrate Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

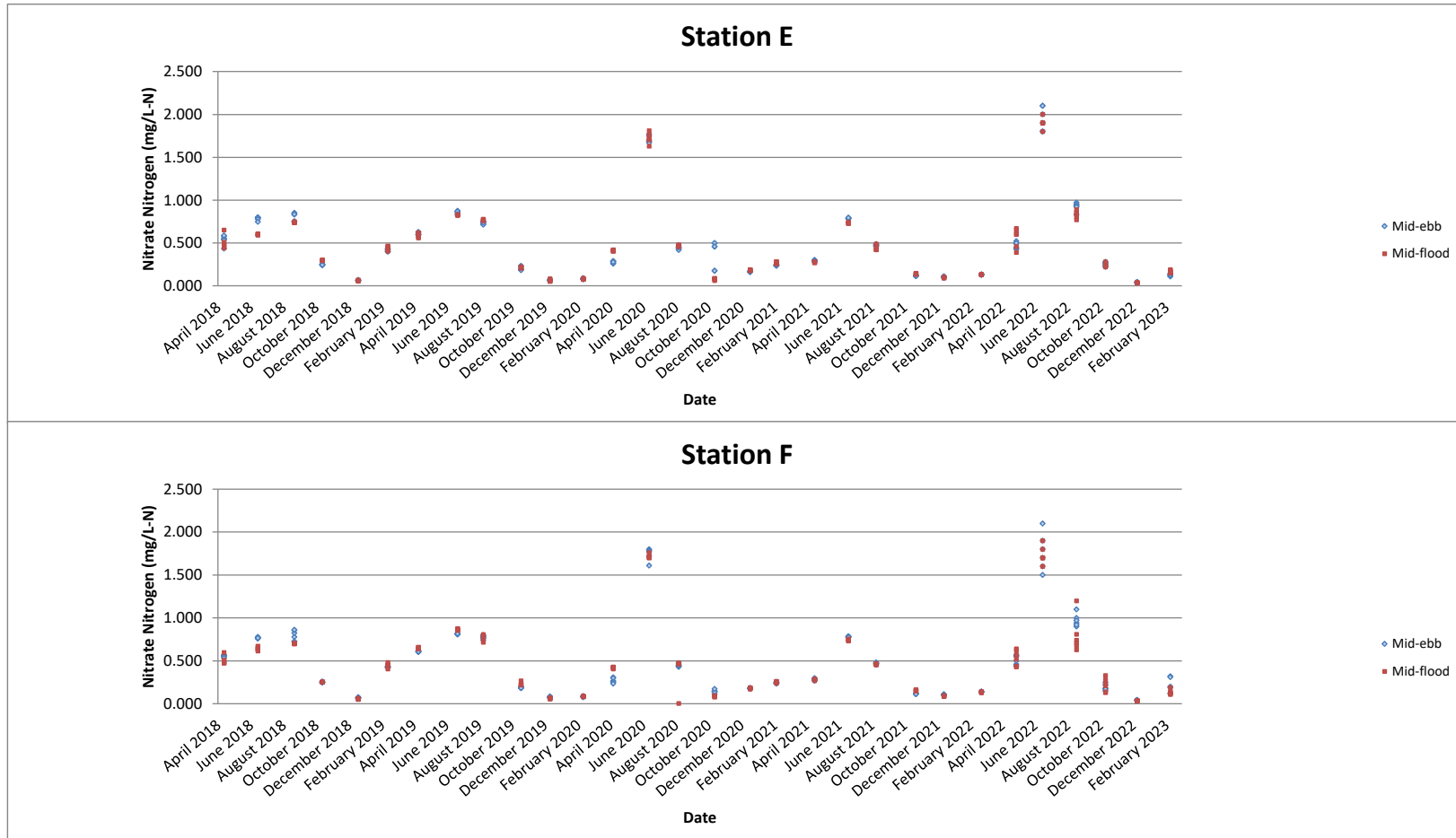
Weather Range:

Fine

Major activities in the reporting period:

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

Nitrate Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

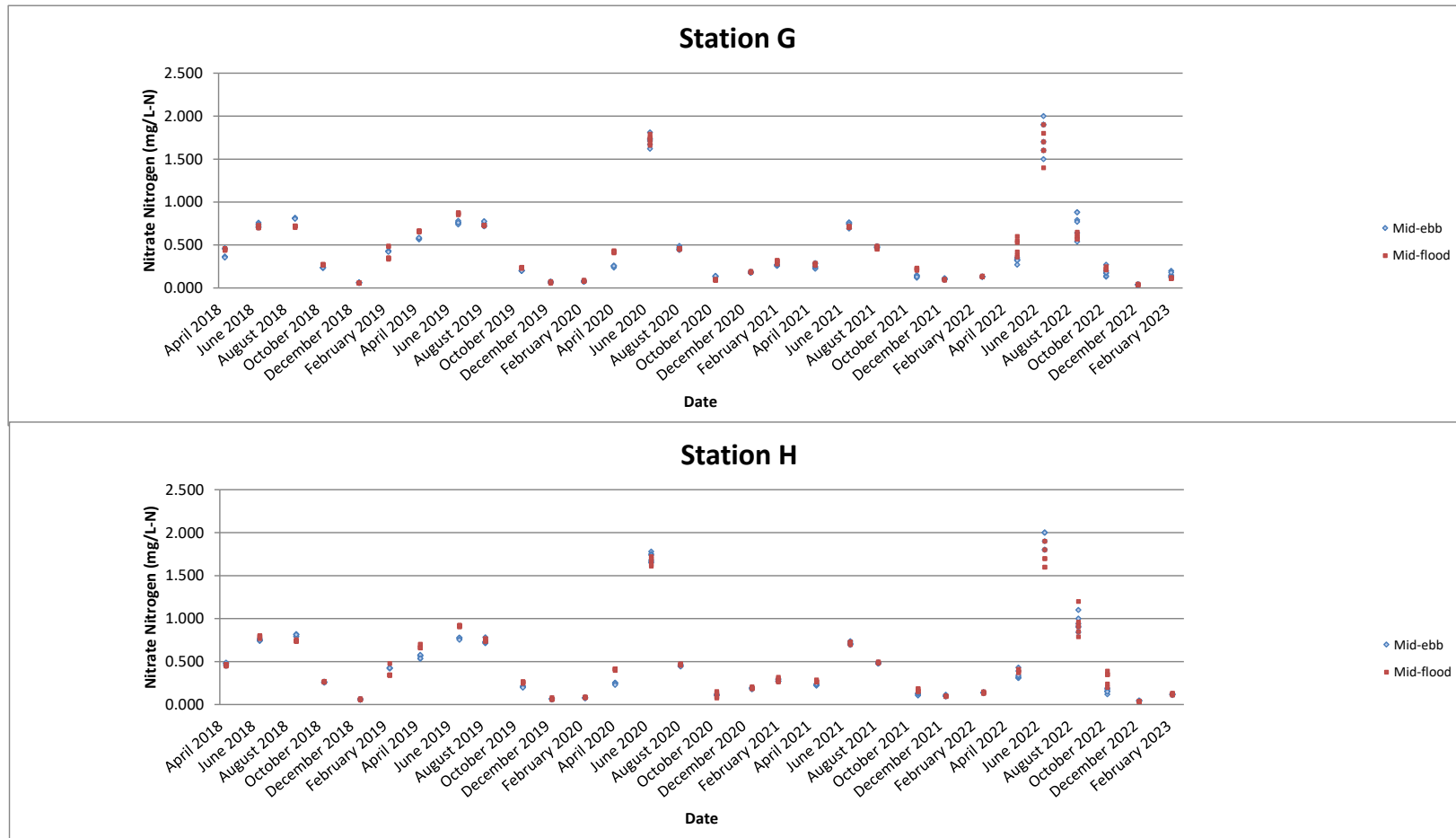
Weather Range:

Fine

Major activities in the reporting period:

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

Nitrate Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

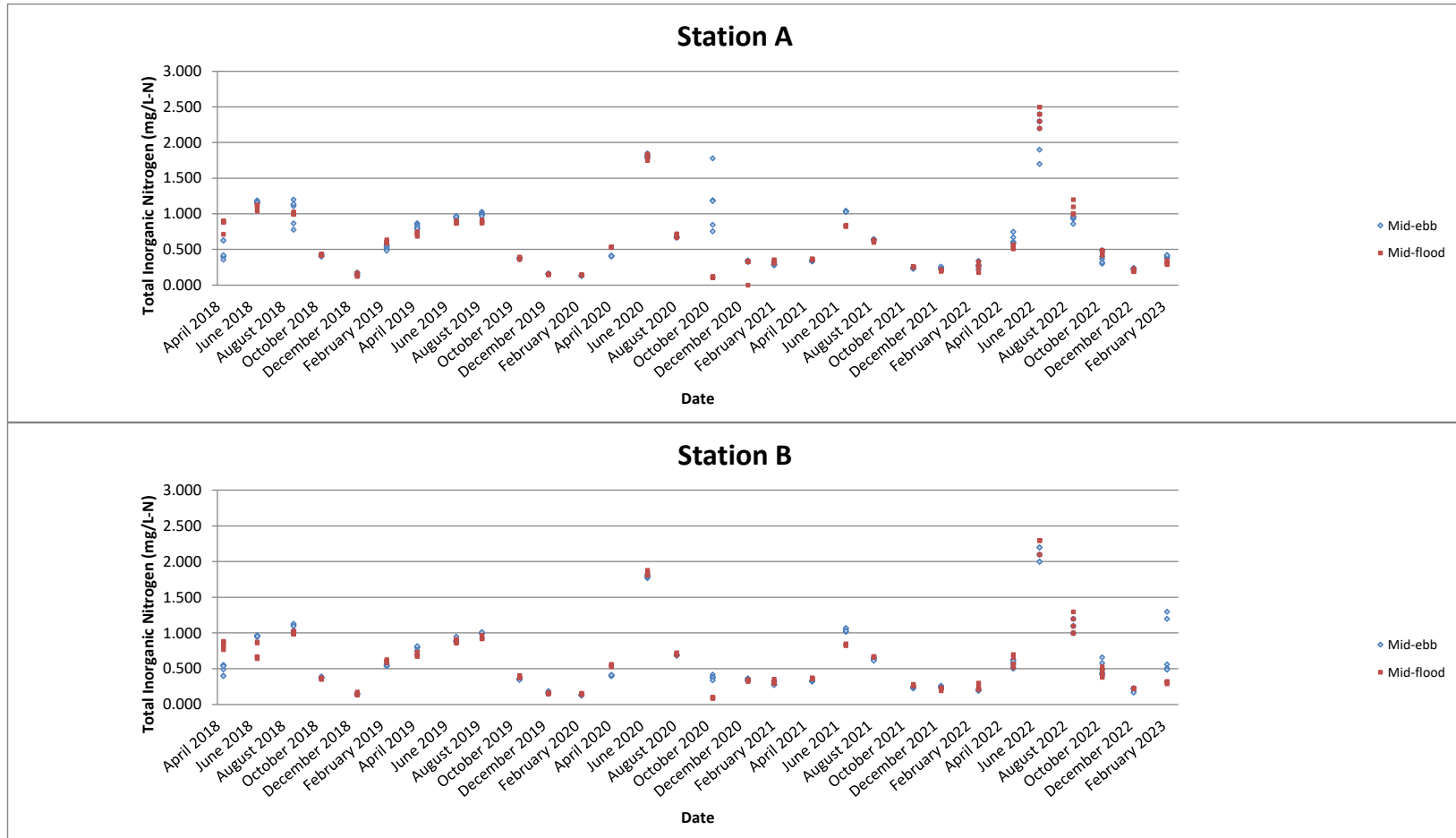
Weather Range:

Fine

Major activities in the reporting period:

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

Total Inorganic Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

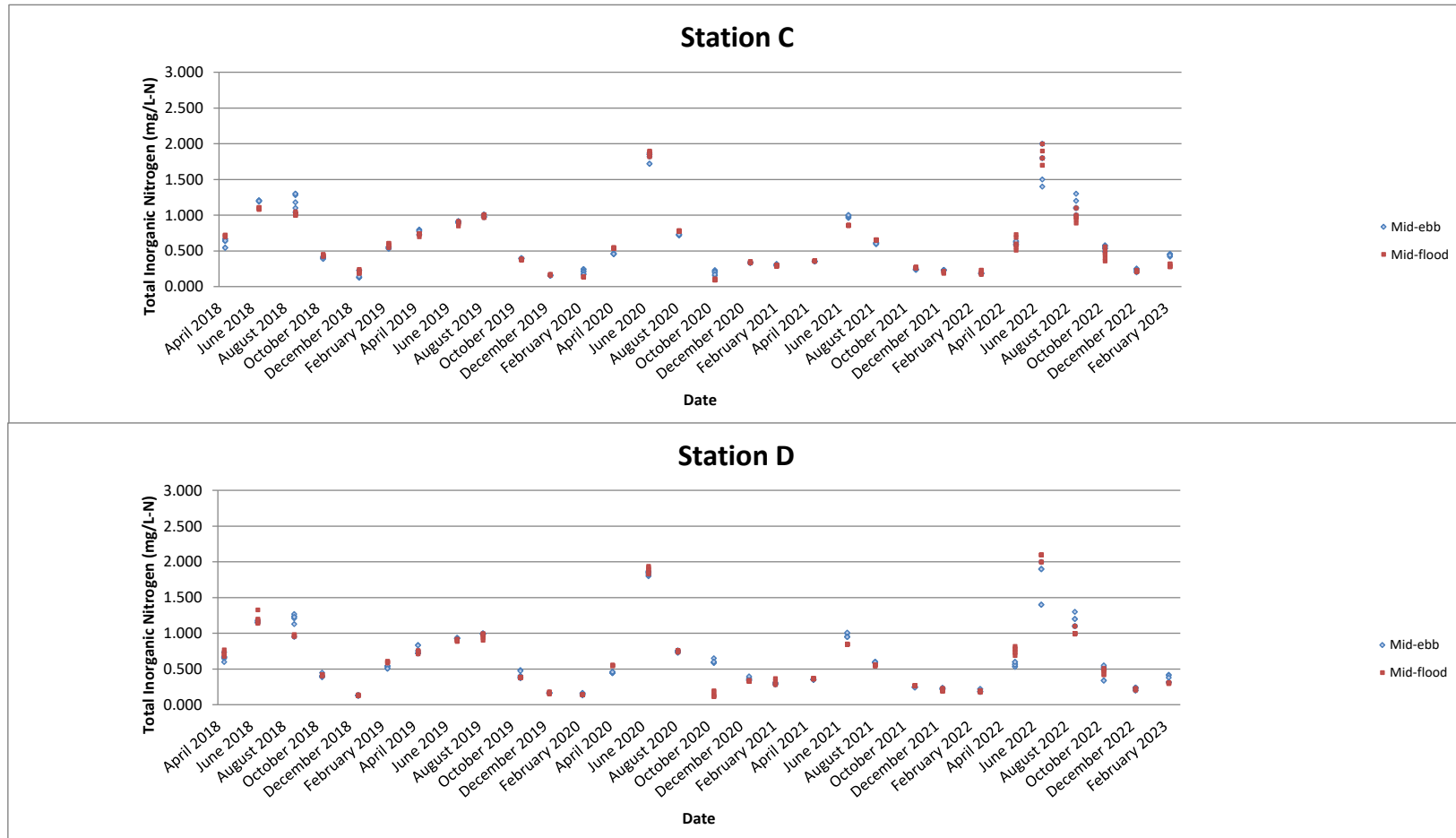
Weather Range:

Fine

Major activities in the reporting period:

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

Total Inorganic Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

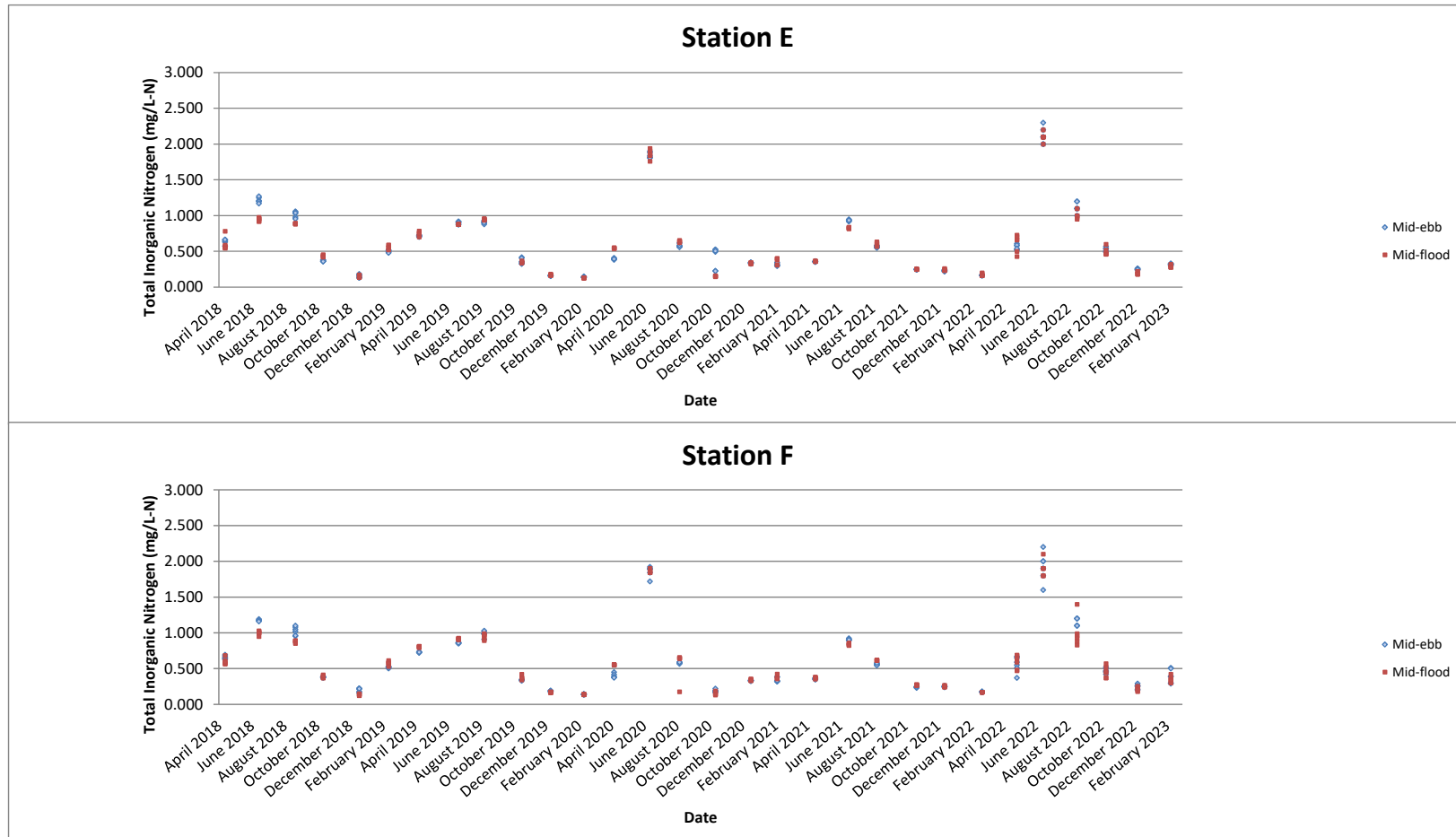
Weather Range:

Fine

Major activities in the reporting period:

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

Total Inorganic Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

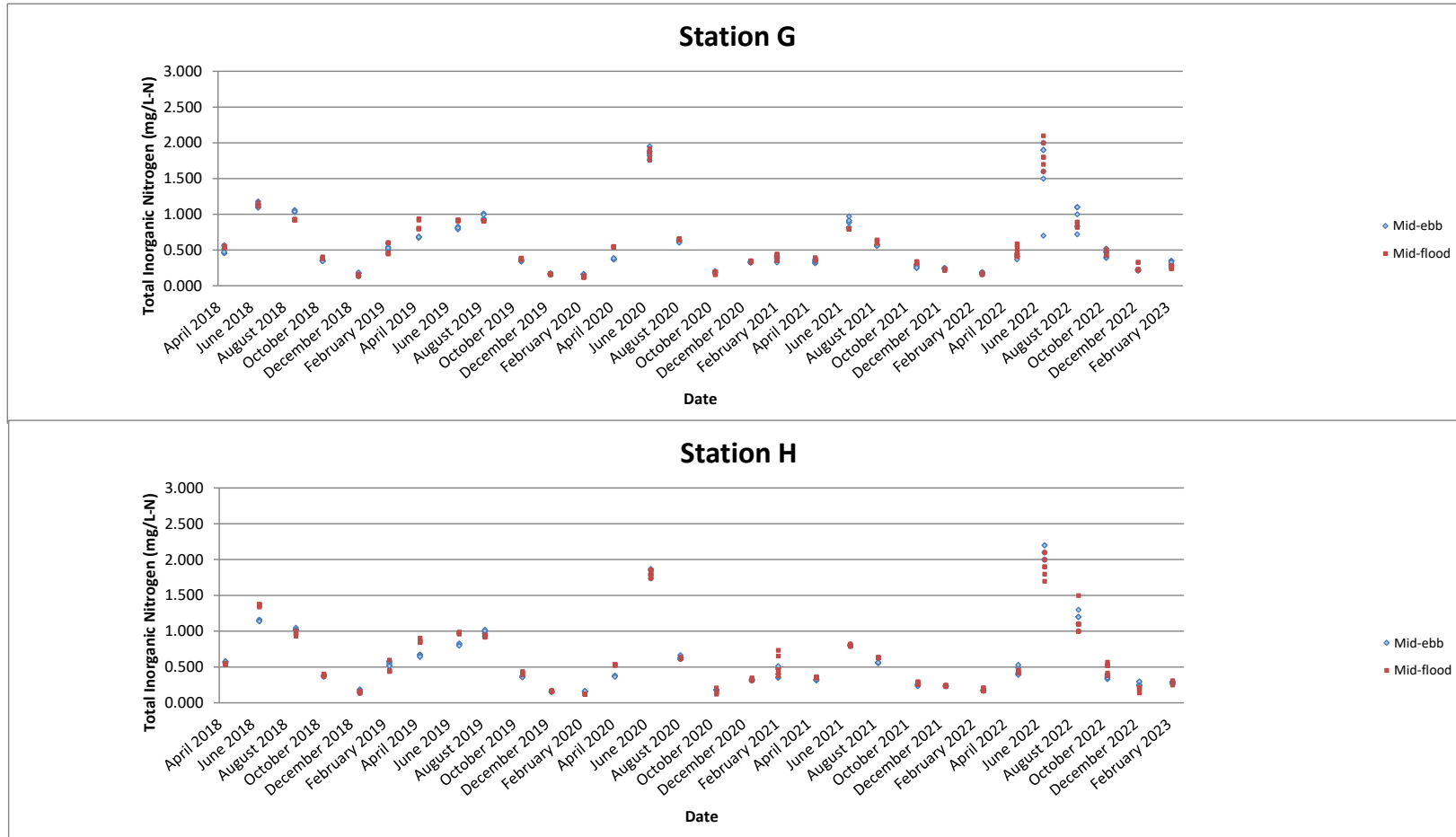
Weather Range:

Fine

Major activities in the reporting period:

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

Total Inorganic Nitrogen



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

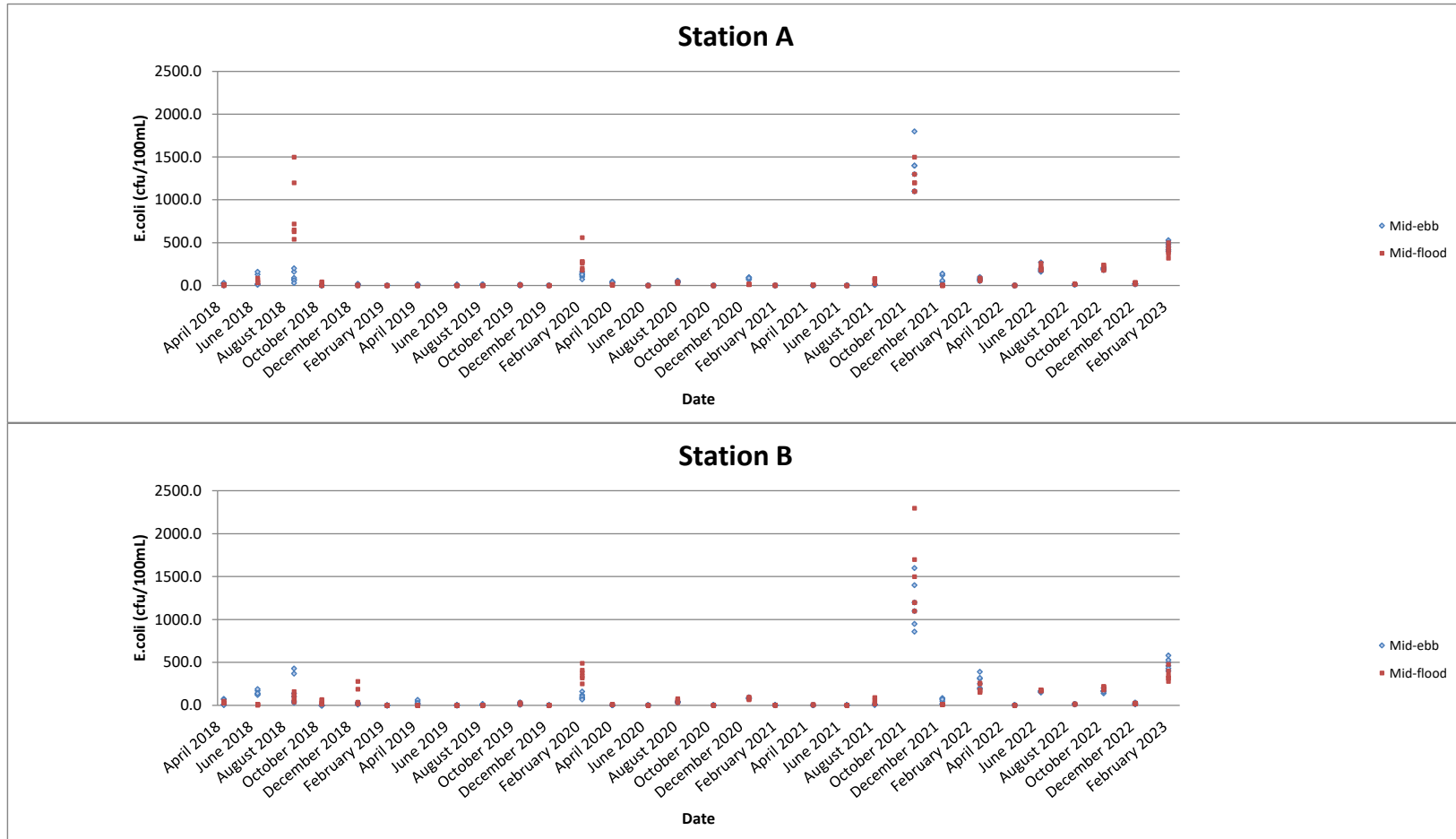
Weather Range:

Fine

Major activities in the reporting period:

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

E.coli



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

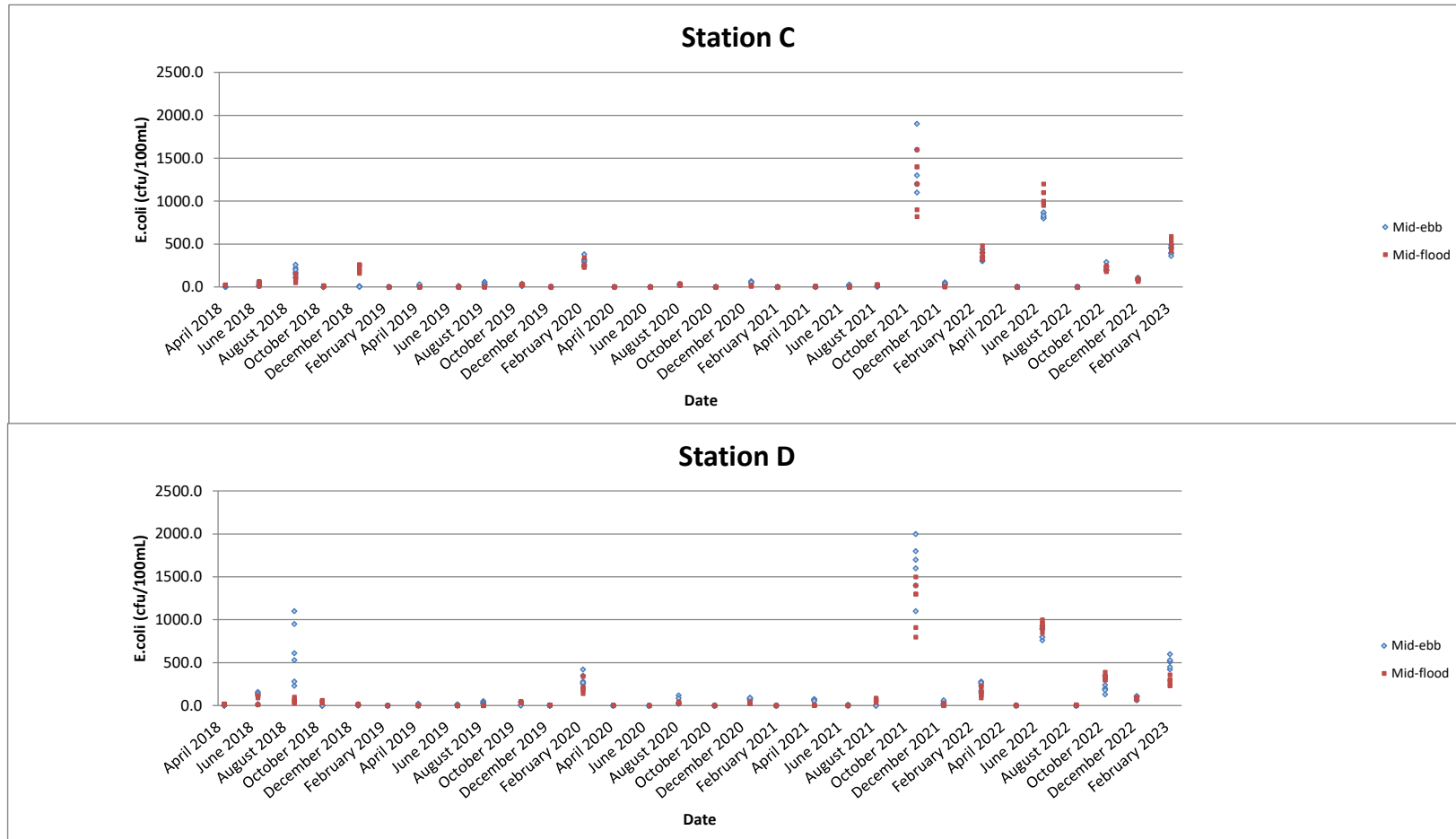
Weather Range:

Fine

Major activities in the reporting period:

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

E.coli



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

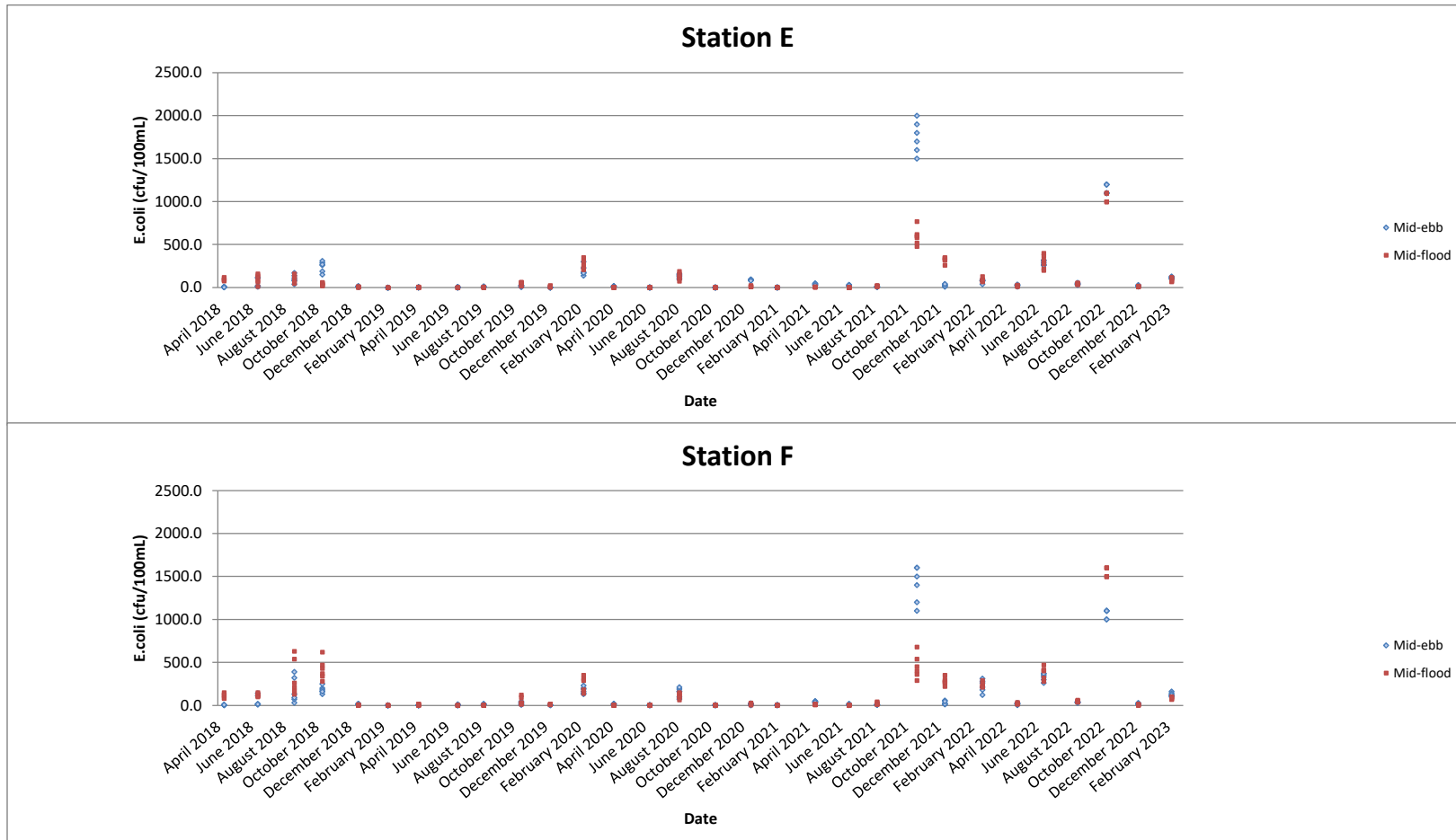
Weather Range:

Fine

Major activities in the reporting period:

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

E.coli



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Contraction works nearby the project site

Notes:

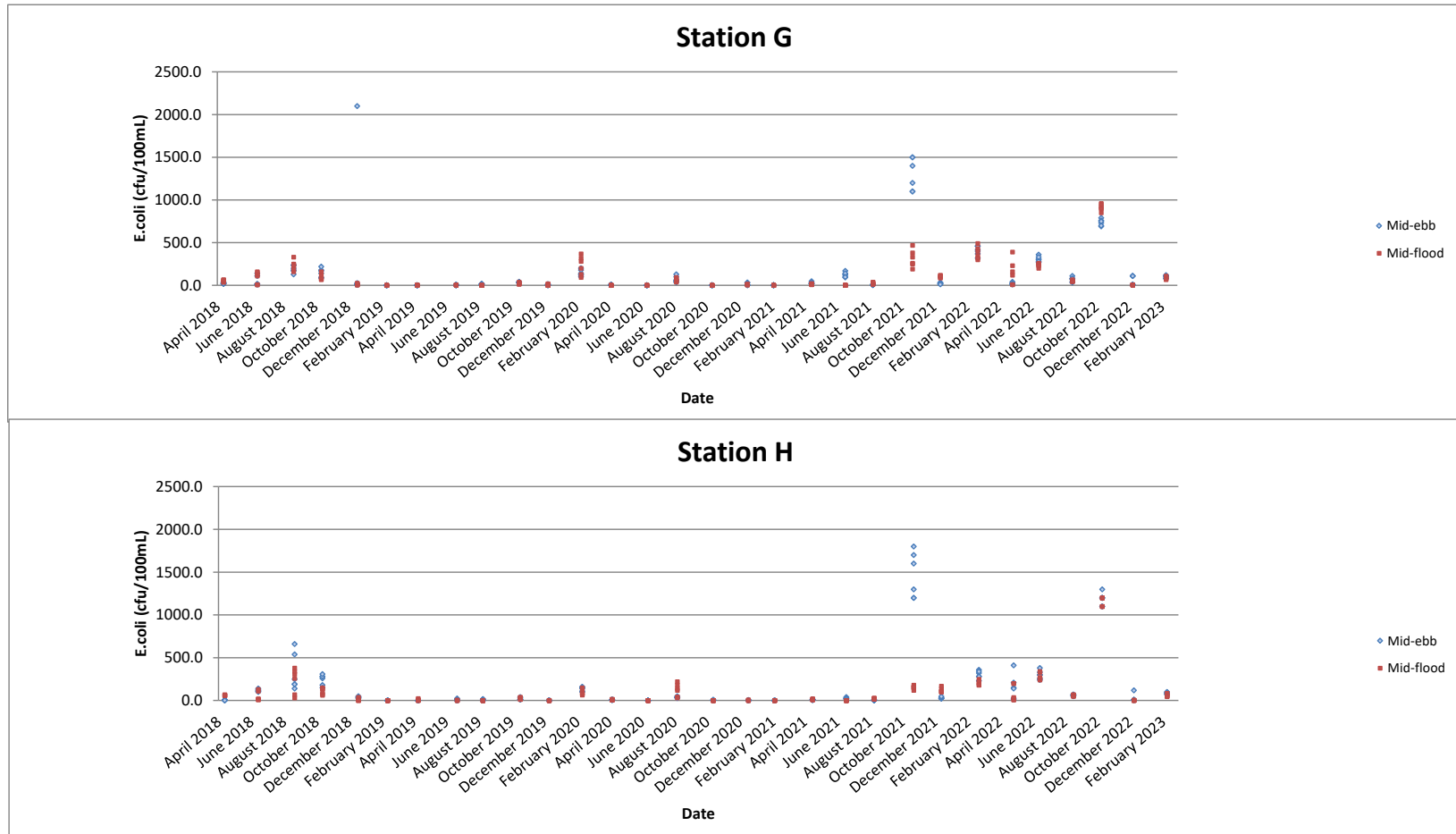
Weather Range:

Fine

Major activities in the reporting period:

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

E.coli



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Contraction works nearby the project site

Notes:

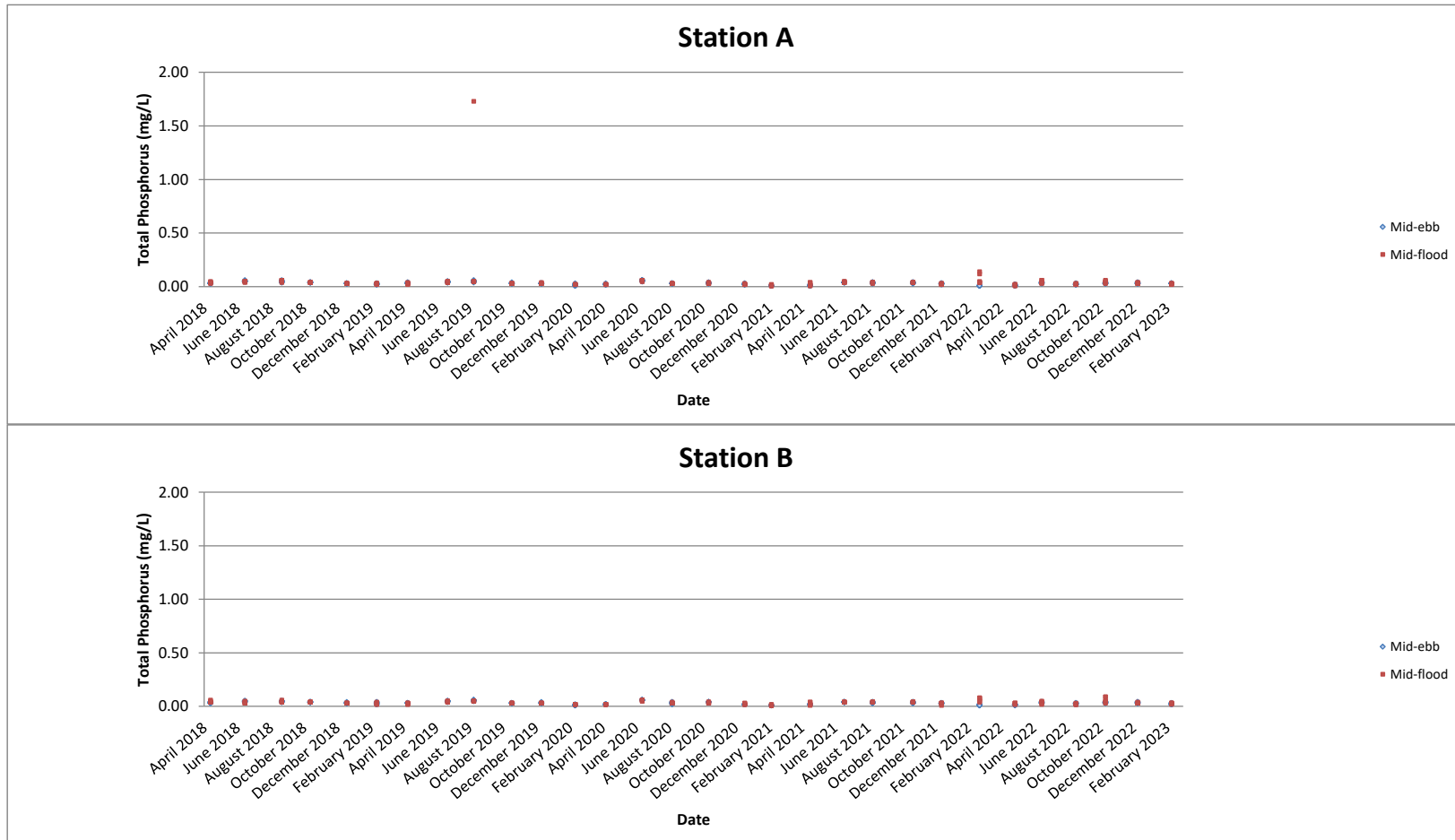
Weather Range:

Fine

Major activities in the reporting period:

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

Total Phosphorus



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

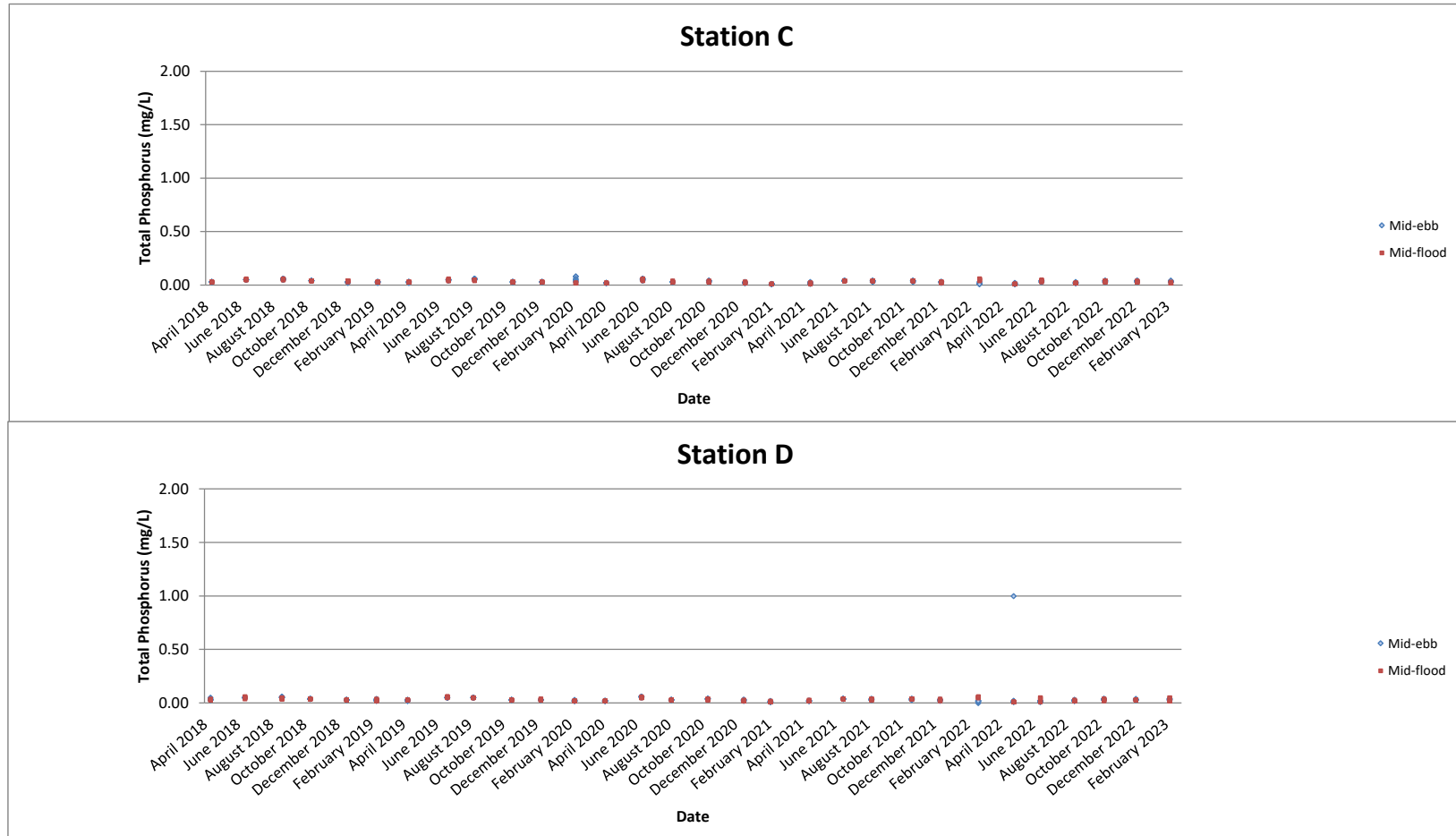
Weather Range:

Fine

Major activities in the reporting period:

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

Total Phosphorus



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby by the project site

Notes:

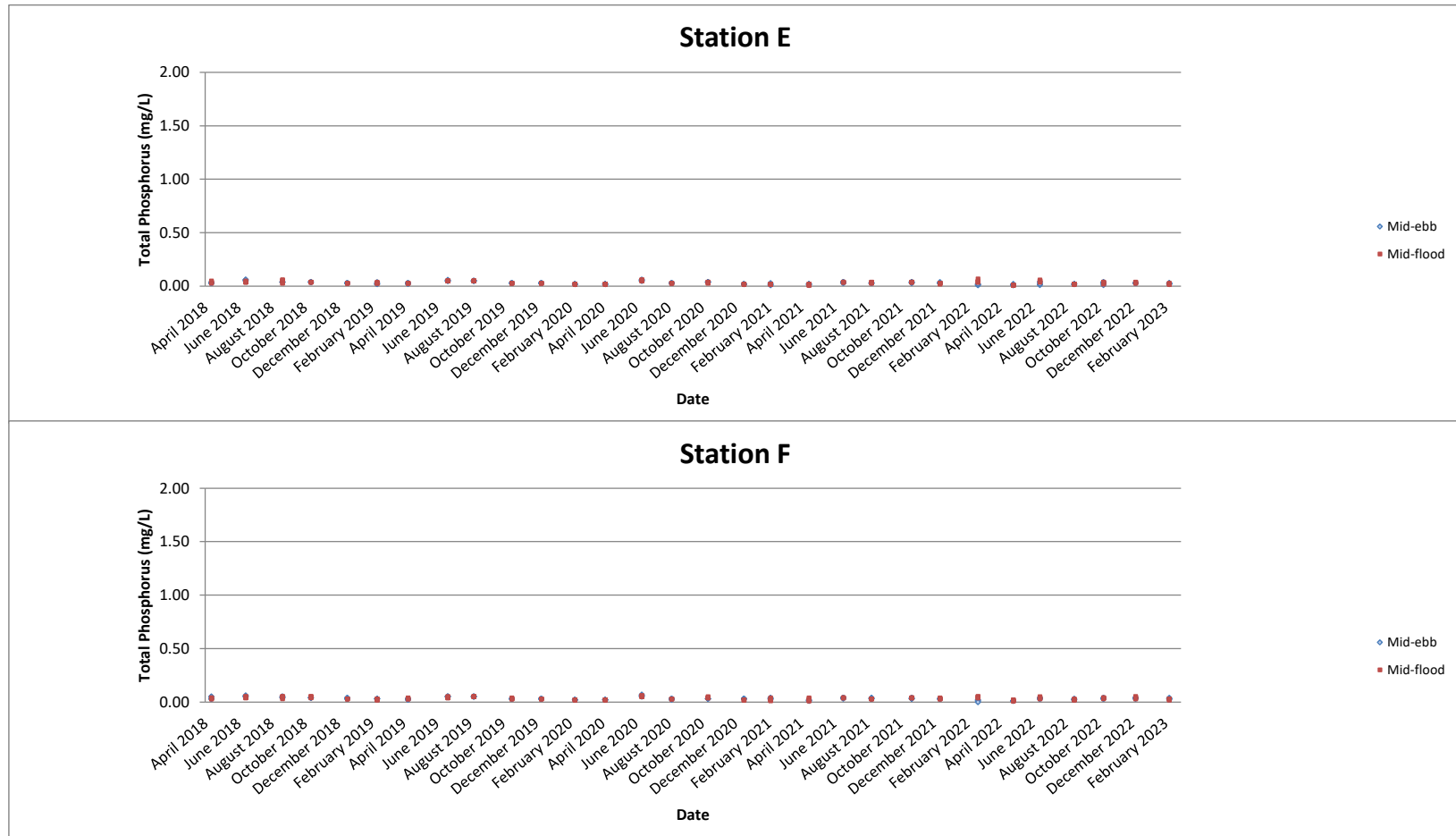
Weather Range:

Fine

Major activities in the reporting period:

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

Total Phosphorus



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

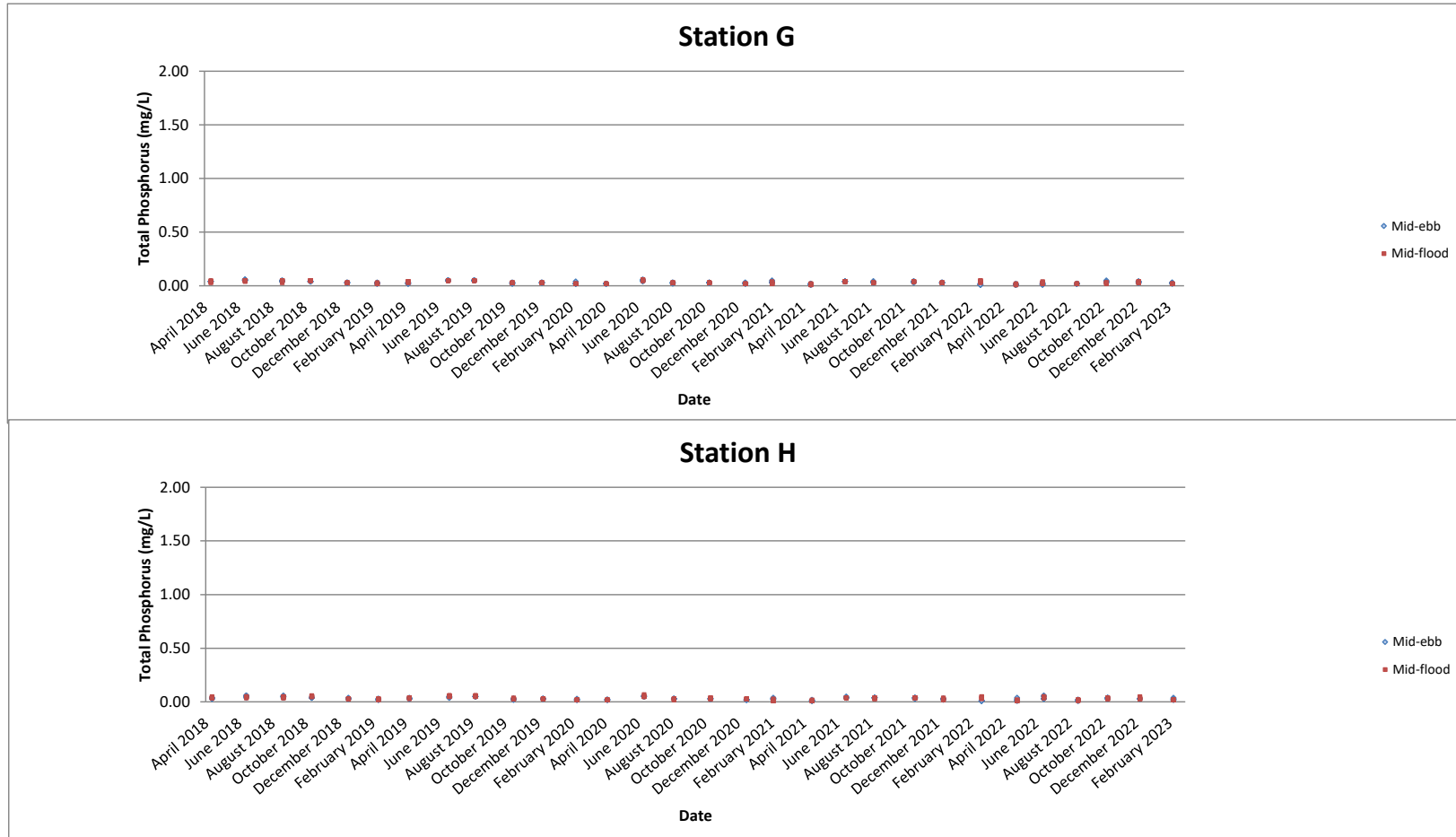
Weather Range:

Fine

Major activities in the reporting period:

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

Total Phosphorus



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

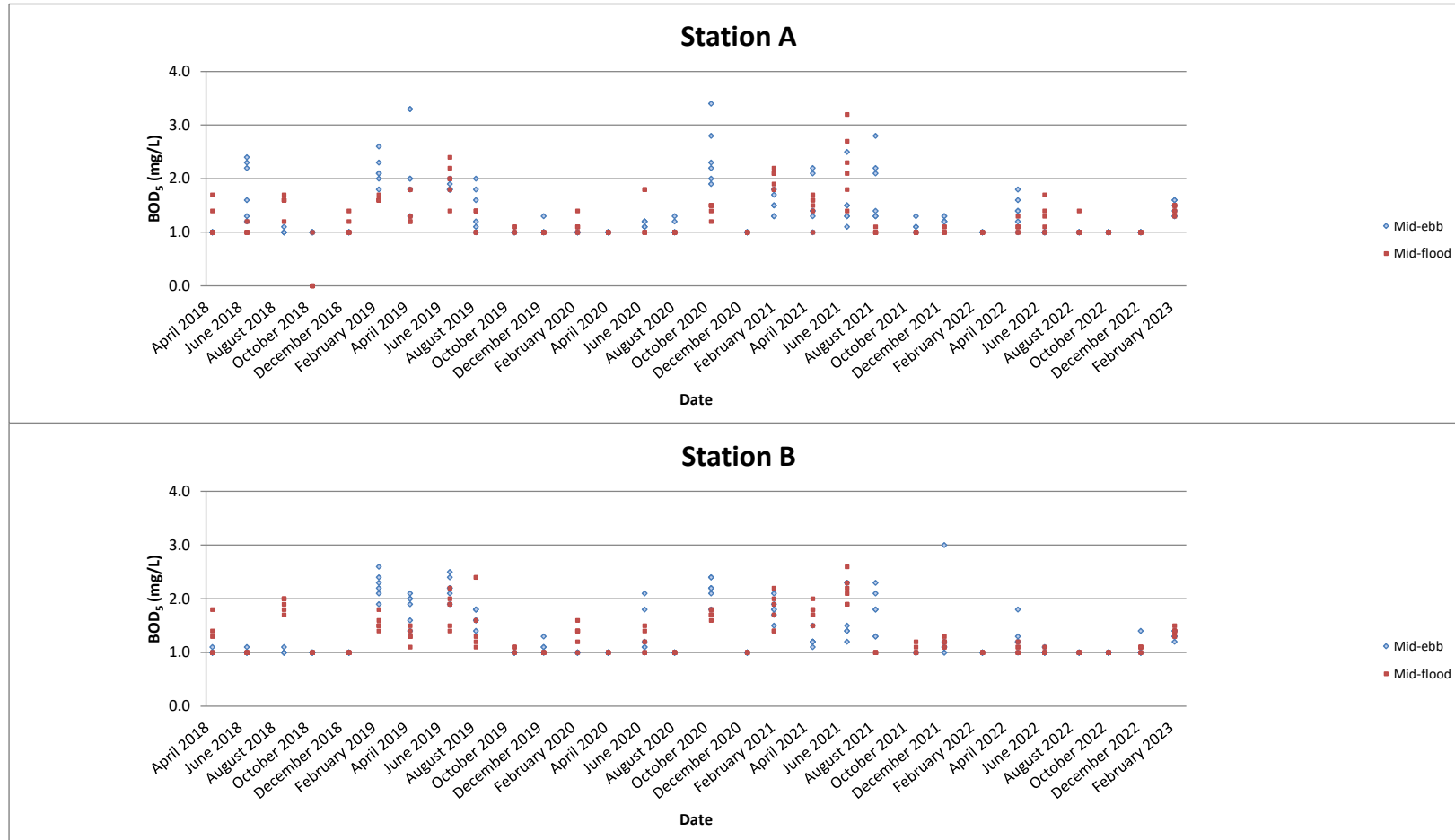
Weather Range:

Fine

Major activities in the reporting period:

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

BOD₅



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

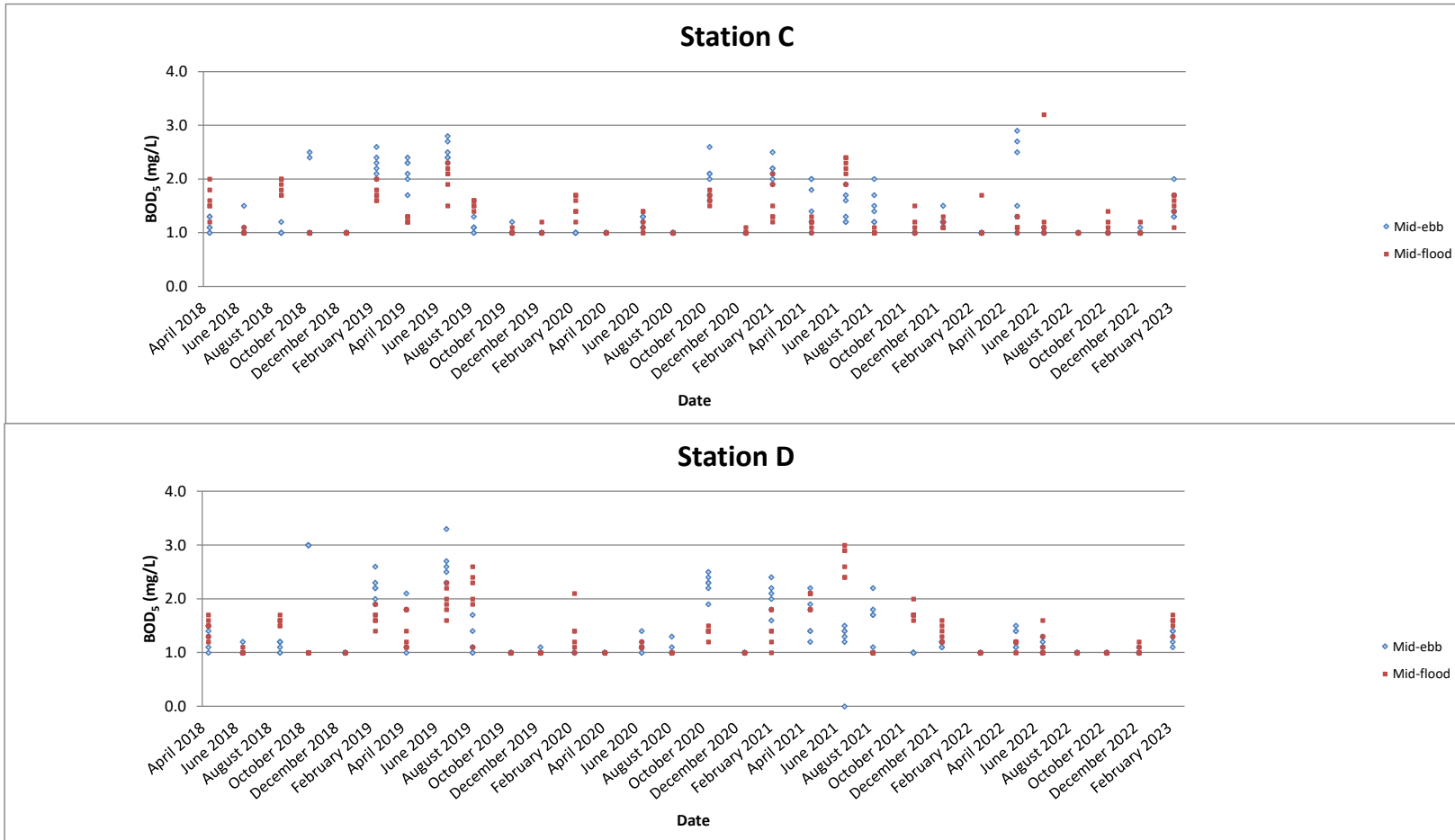
Weather Range:

Fine

Major activities in the reporting period:

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

BOD₅



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

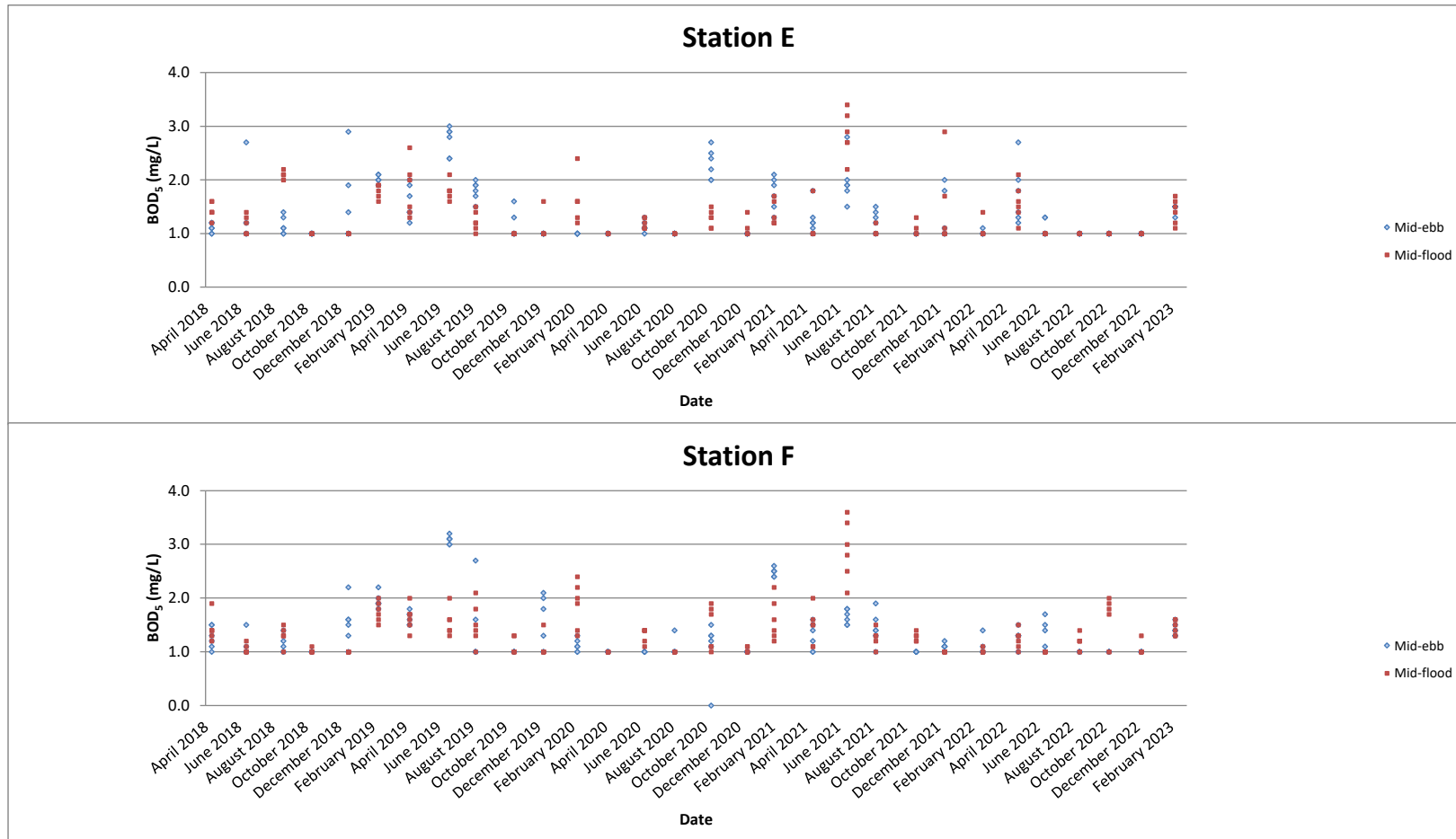
Weather Range:

Fine

Major activities in the reporting period:

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

BOD₅



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

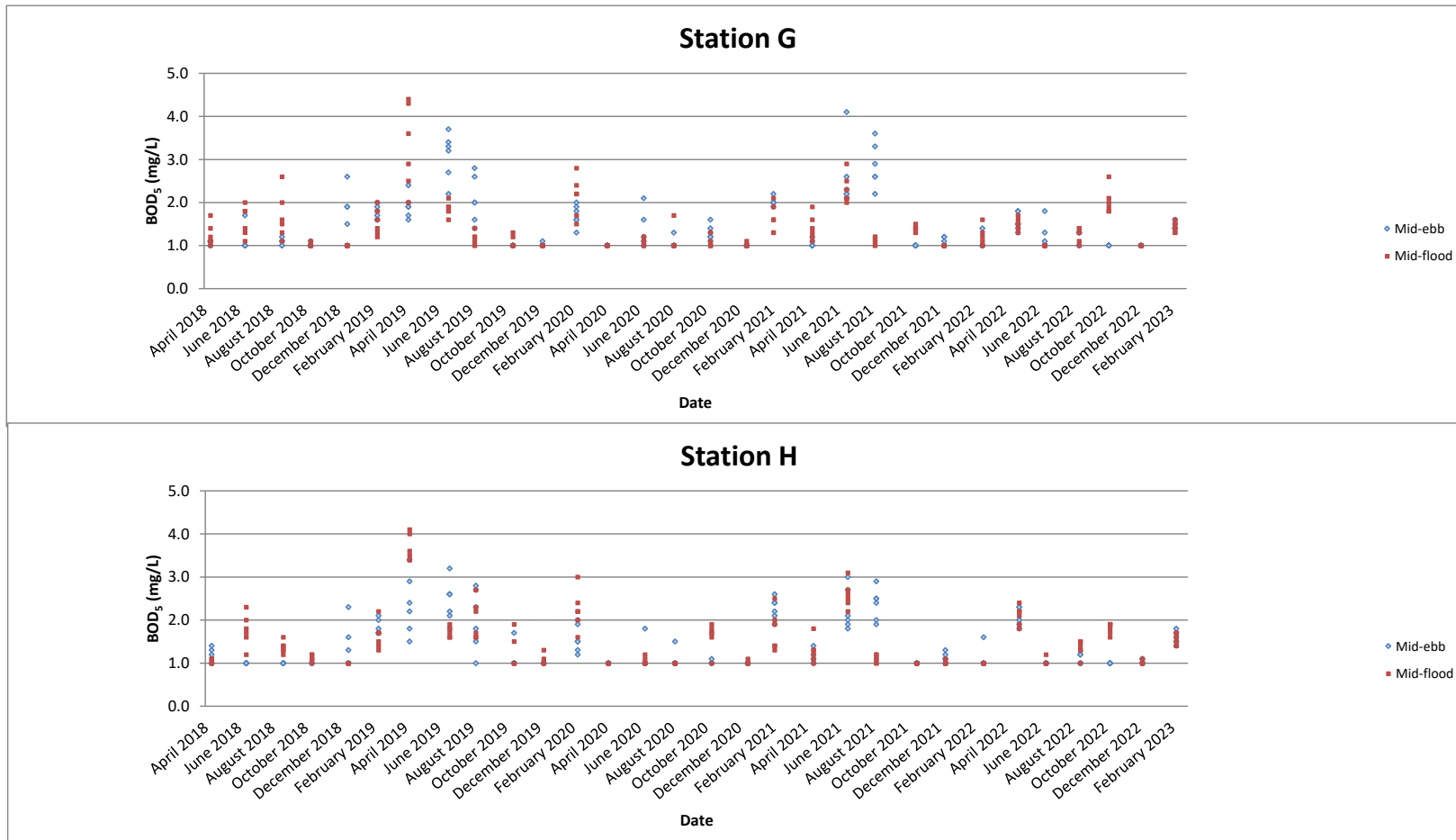
Weather Range:

Fine

Major activities in the reporting period:

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

BOD₅



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

Weather Range:

Fine

Major activities in the reporting period:

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

FUGRO TECHNICAL SERVICES LIMITED

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

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

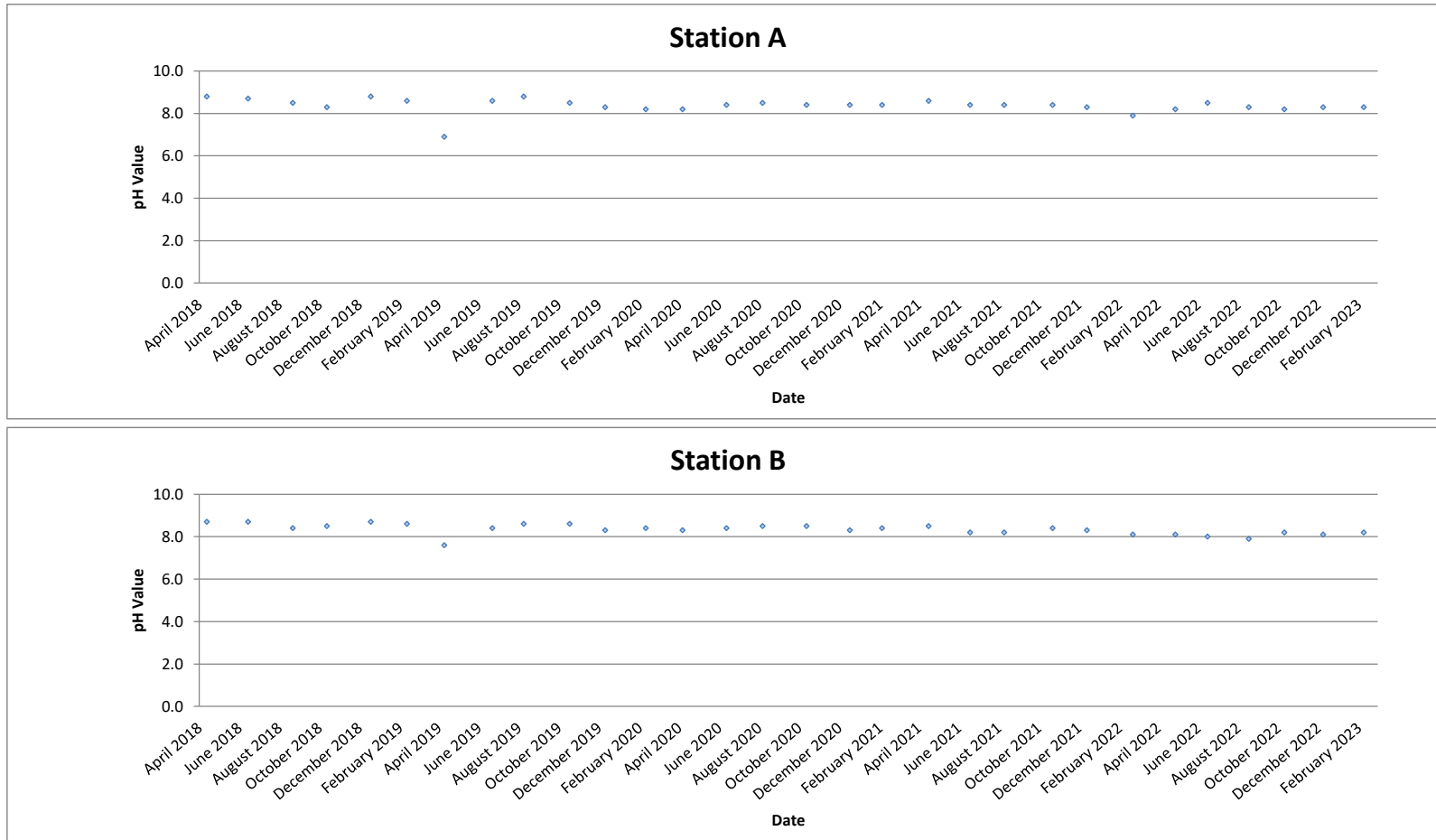


Report No.: 0041/17/ED/0707

Appendix C

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

pH value



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

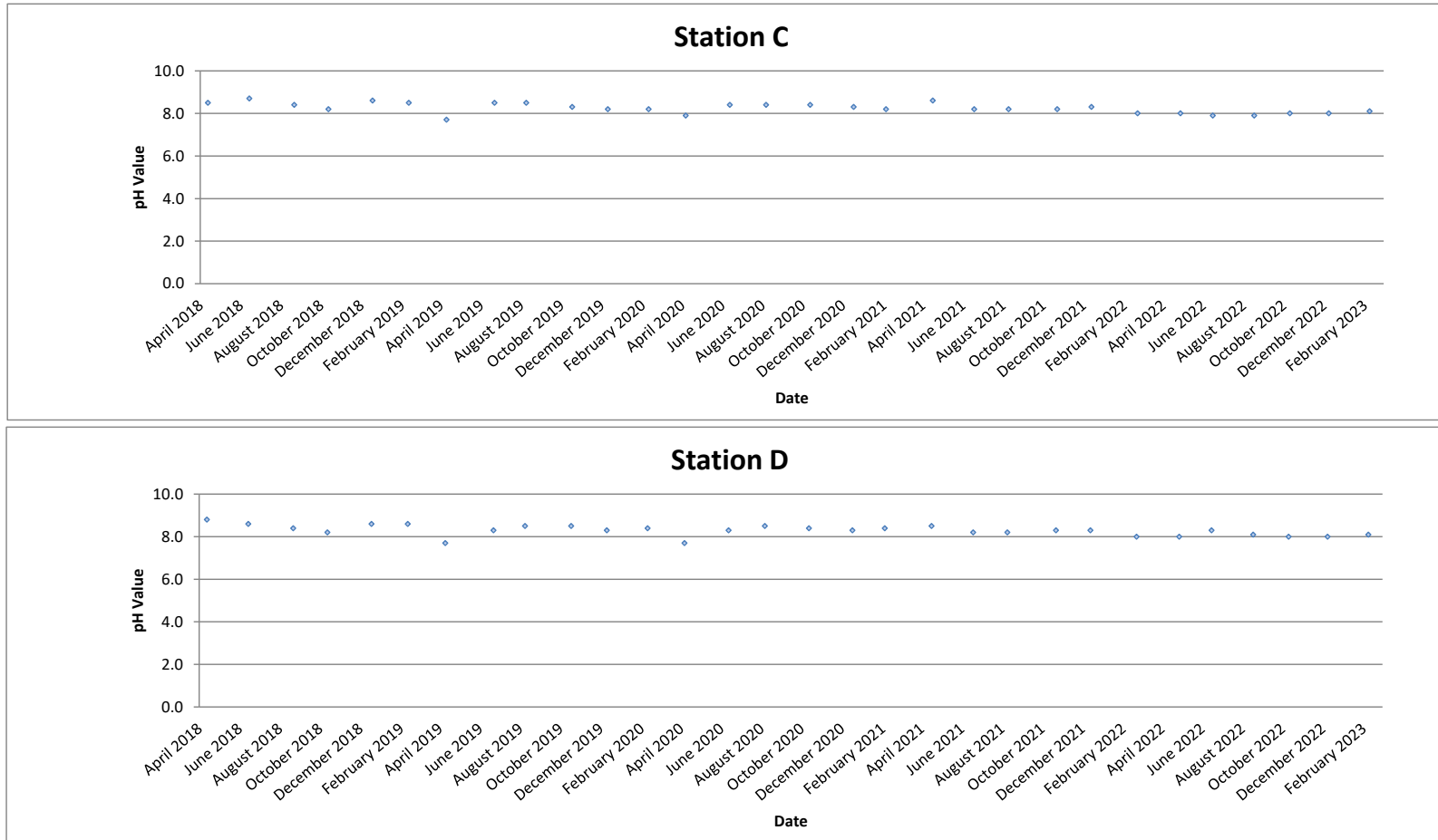
Weather Range:

Fine

Major activities in the reporting period:

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

pH value



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

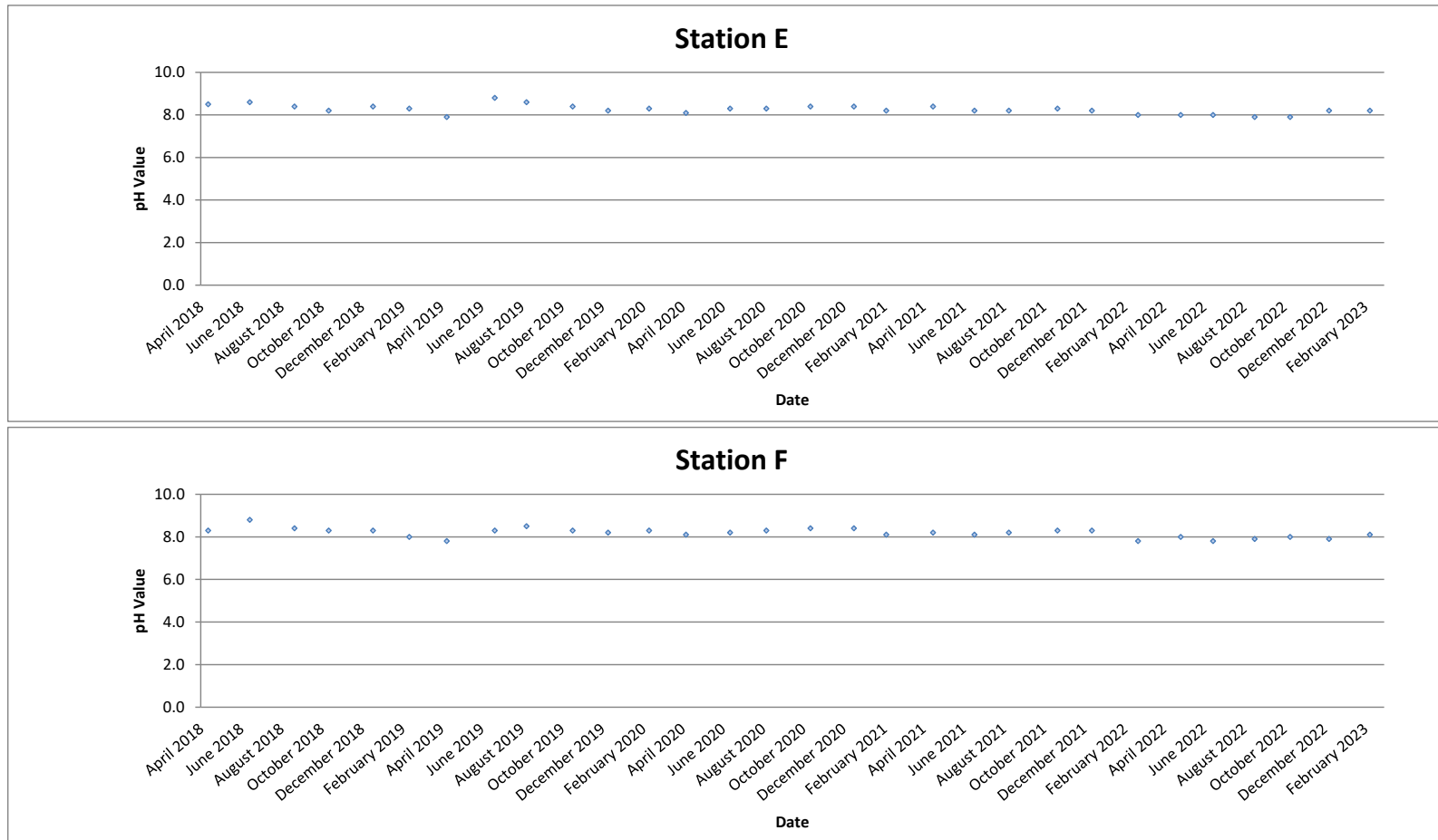
Weather Range:

Fine

Major activities in the reporting period:

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

pH value



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

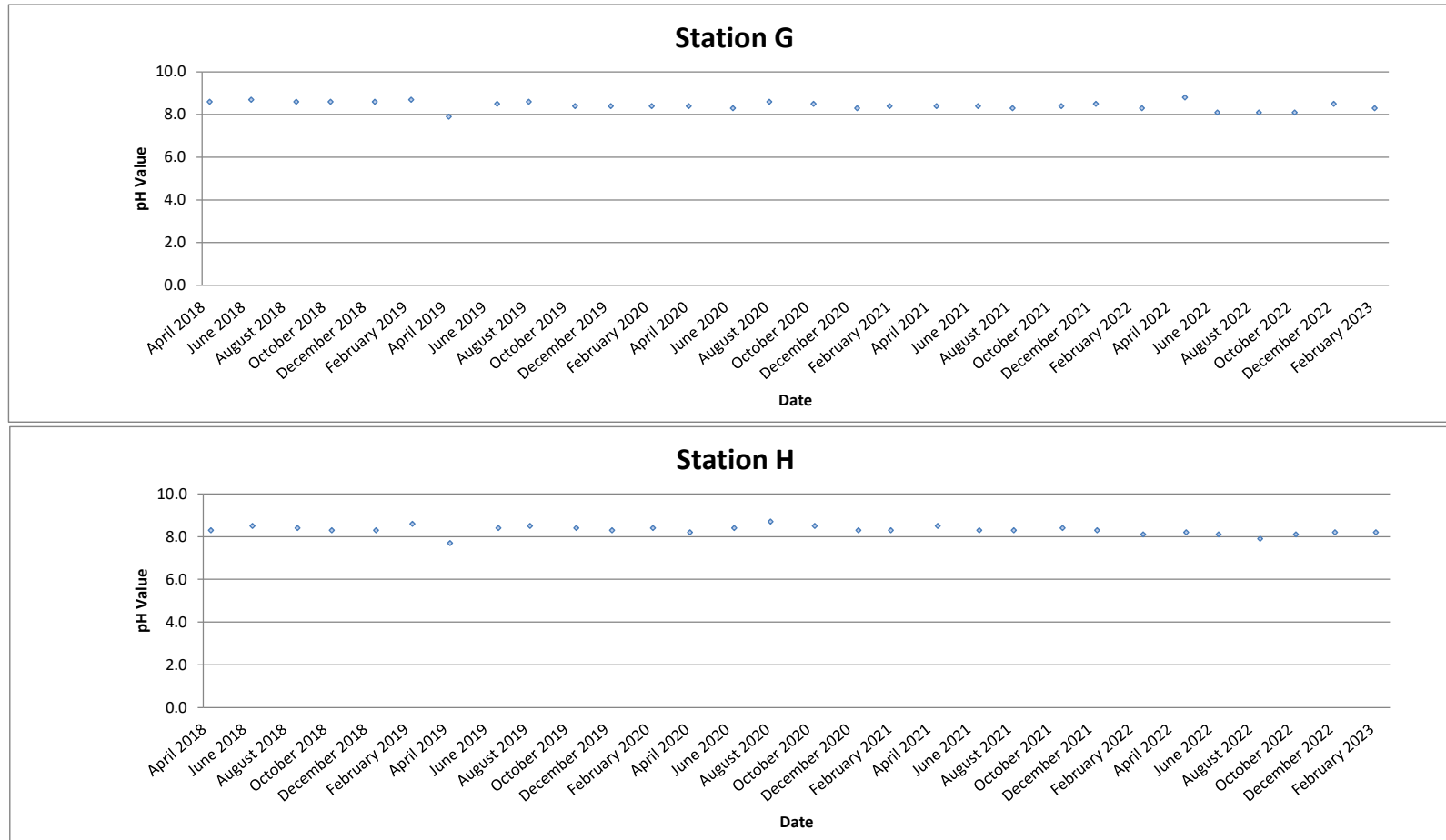
Weather Range:

Fine

Major activities in the reporting period:

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

pH value



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

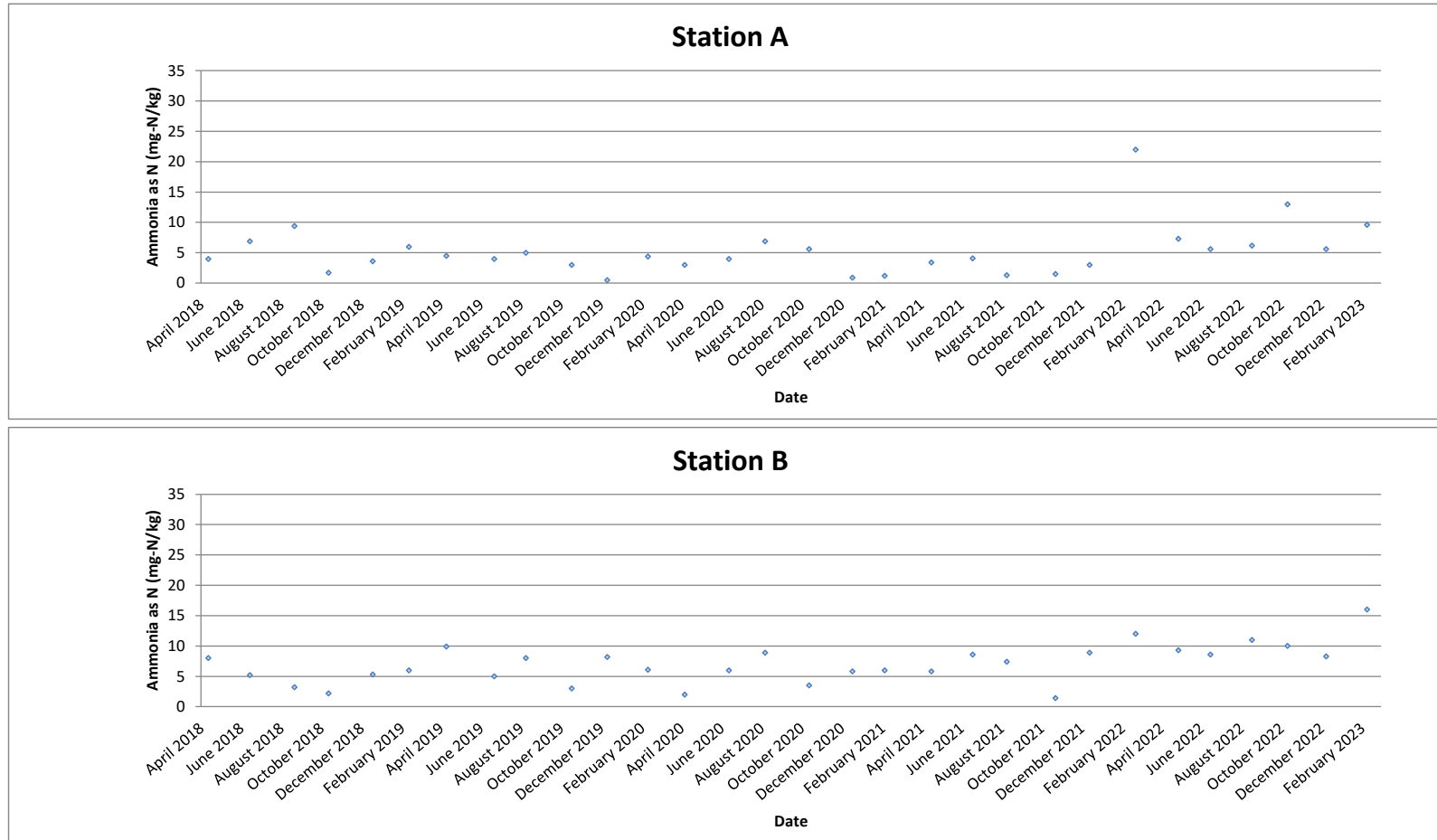
Weather Range:

Fine

Major activities in the reporting period:

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

Ammonia Nitrogen (mg-N/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

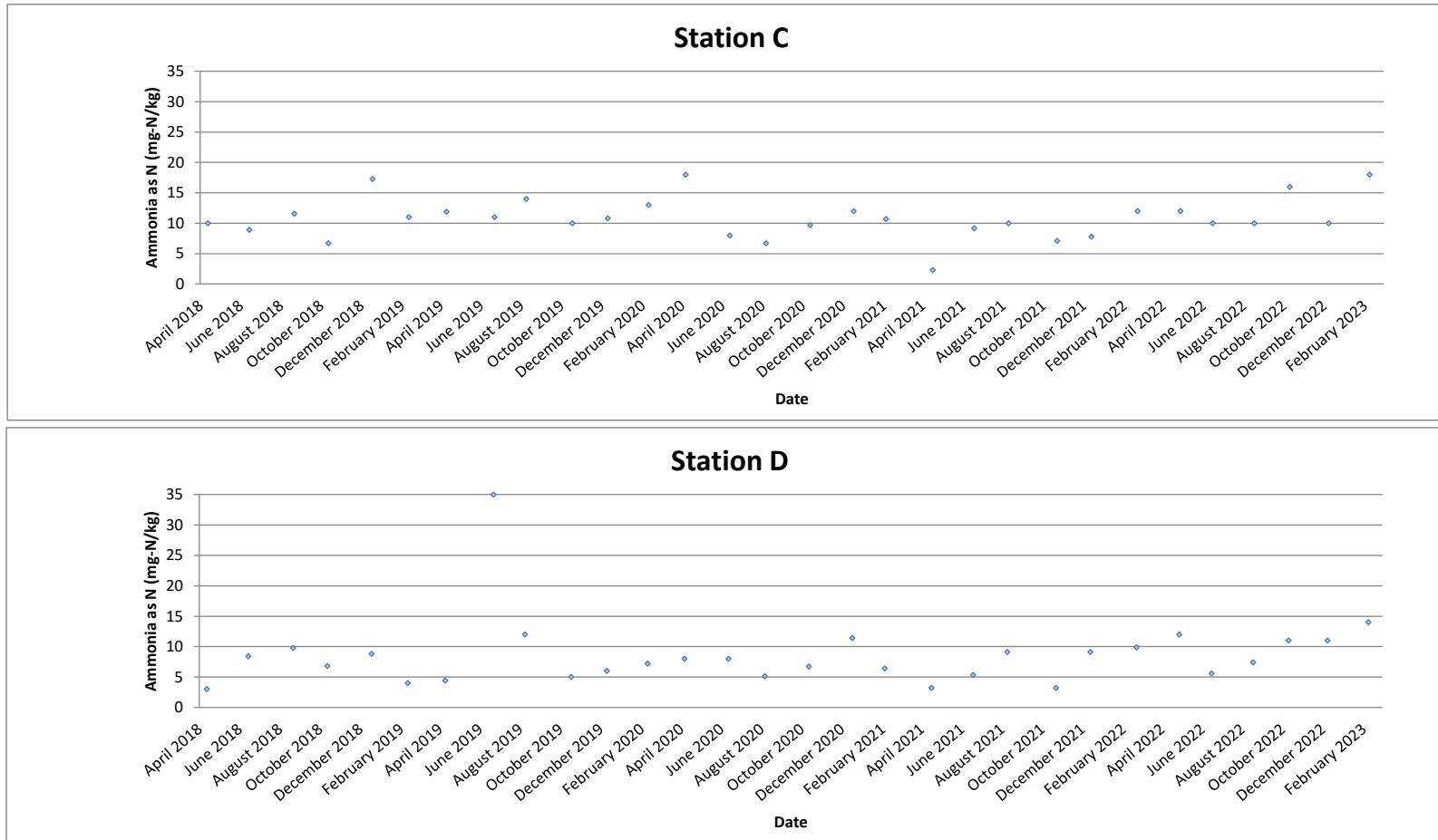
Weather Range:

Fine

Major activities in the reporting period:

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

Ammonia Nitrogen (mg-N/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

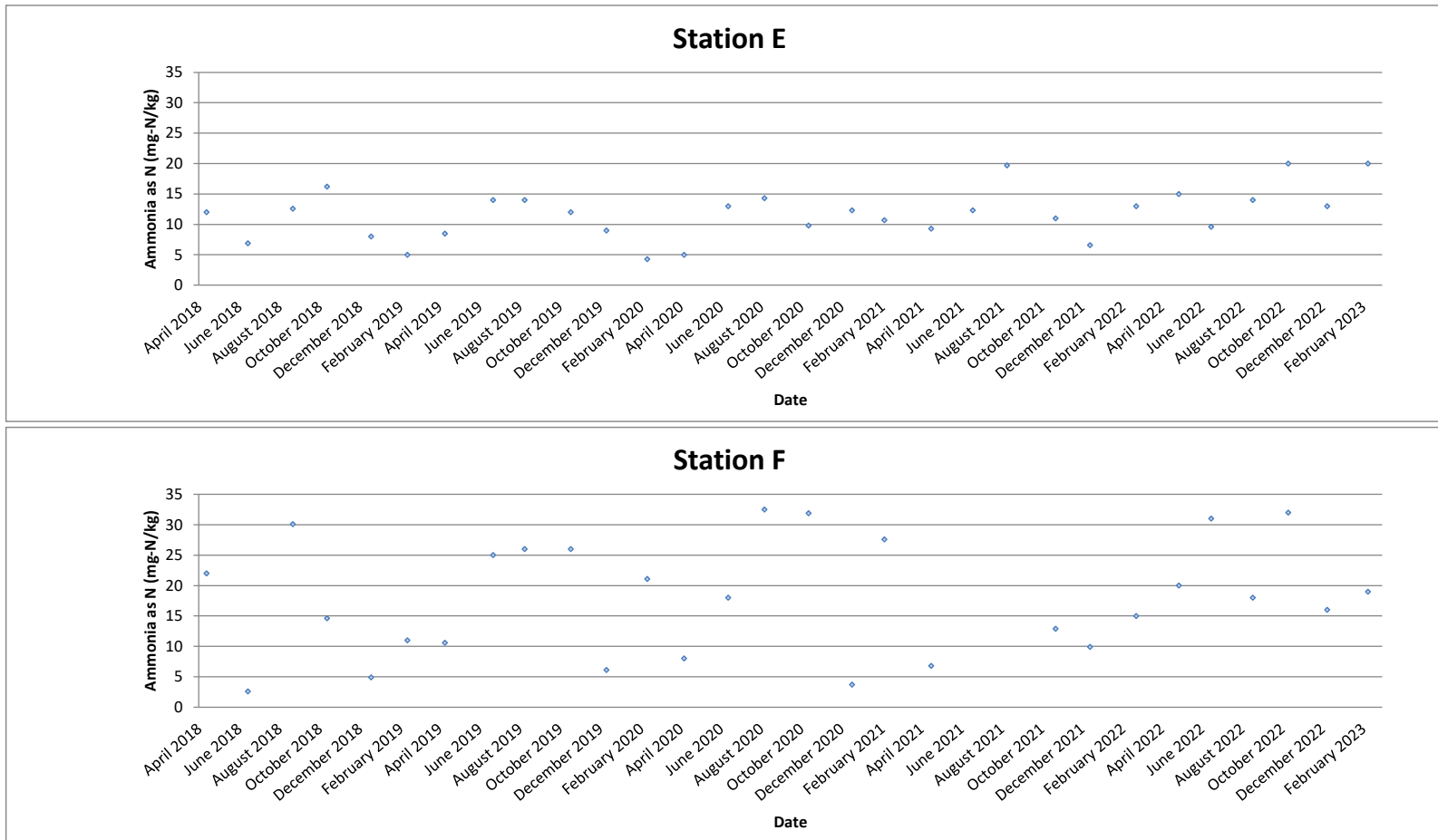
Weather Range:

Fine

Major activities in the reporting period:

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

Ammonia Nitrogen (mg-N/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

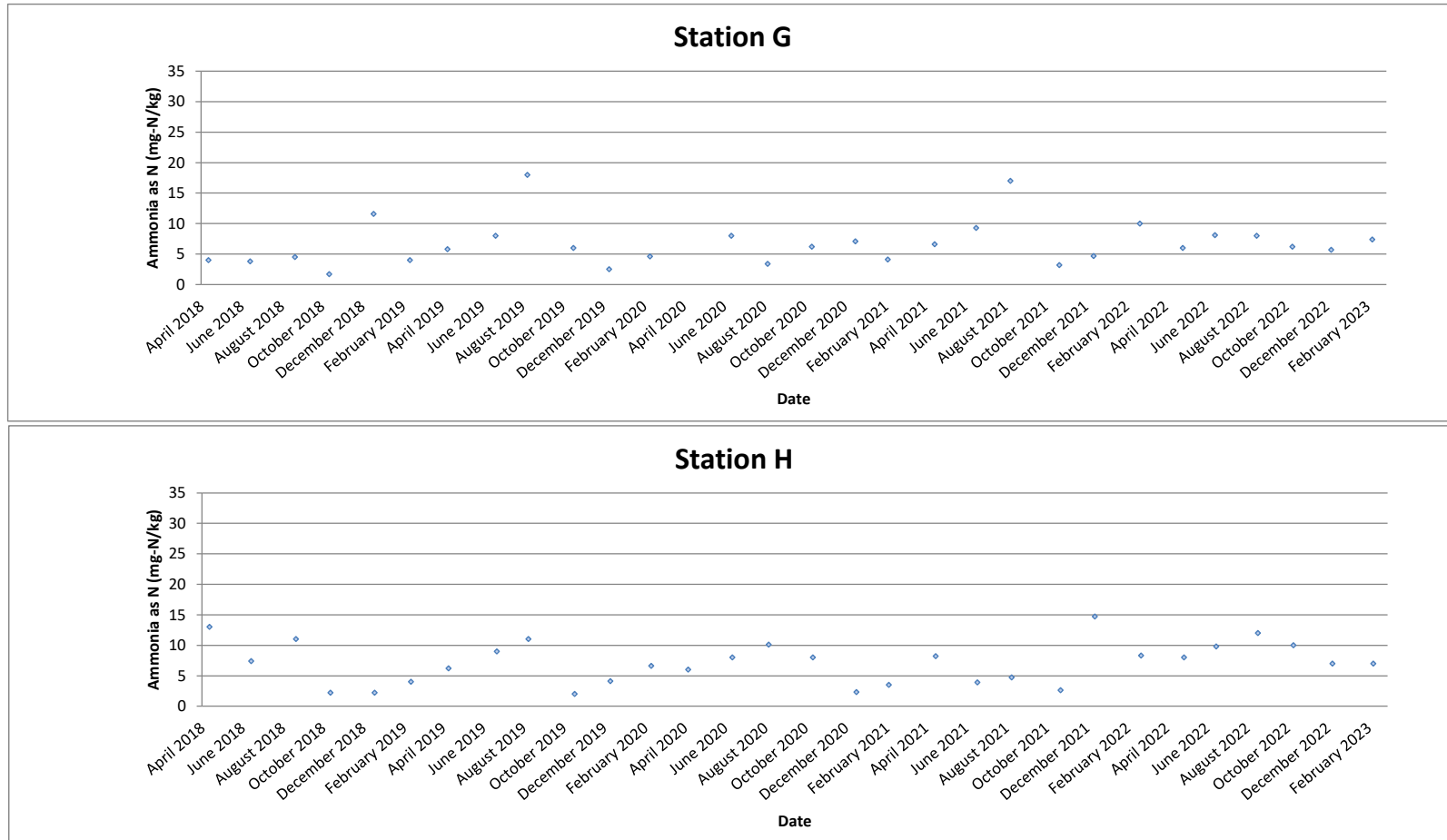
Weather Range:

Fine

Major activities in the reporting period:

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

Ammonia Nitrogen (mg-N/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

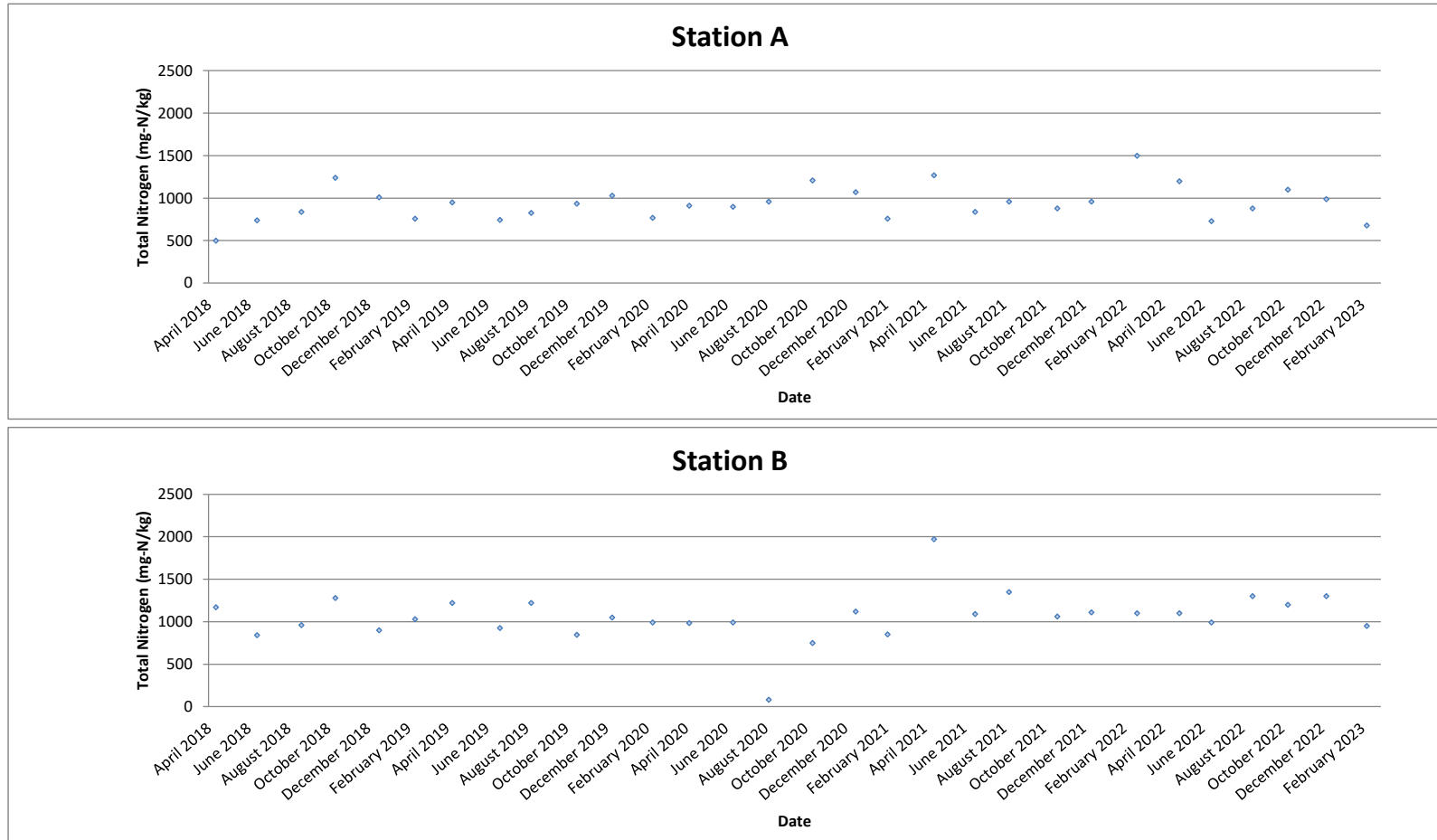
Weather Range:

Fine

Major activities in the reporting period:

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

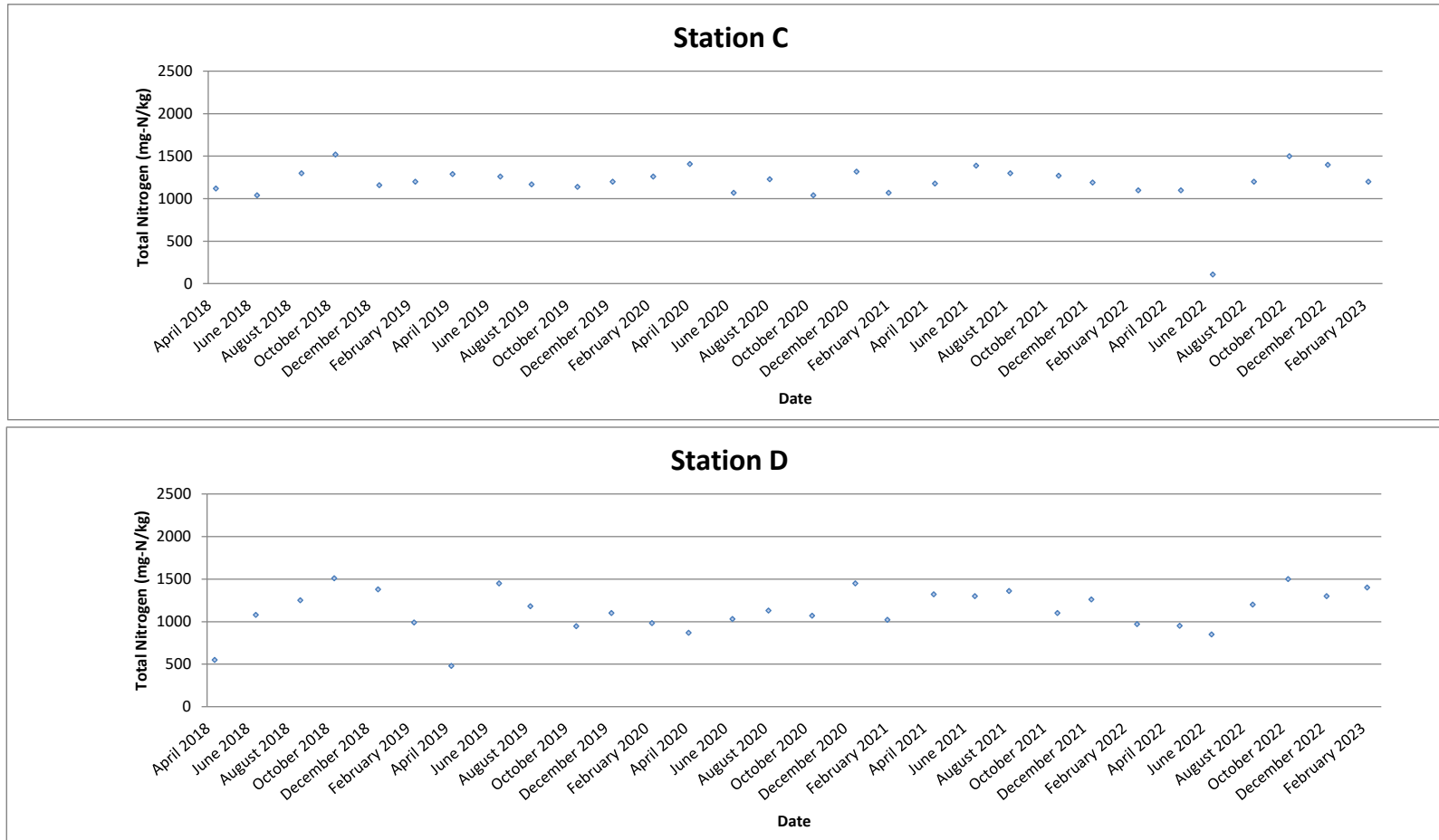
Total Nitrogen (mg-N/kg)



- Major sources for monitoring stations**
- Project related:**
1. Treated effluent discharge
- Non-project related:**
1. Heavy marine traffic
 2. Contraction works nearby the project site

- Notes:**
- Weather Range:**
- Fine
- Major activities in the reporting period:**
1. Perform comprehensive operation and maintenance services for the electrical, mechanical and electronic systems/equipment at SHWSTW.
 2. Alleviate as far as practicable the impact that the facilities and sewage systems imposed on the environment of Hong Kong.

Total Nitrogen (mg-N/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

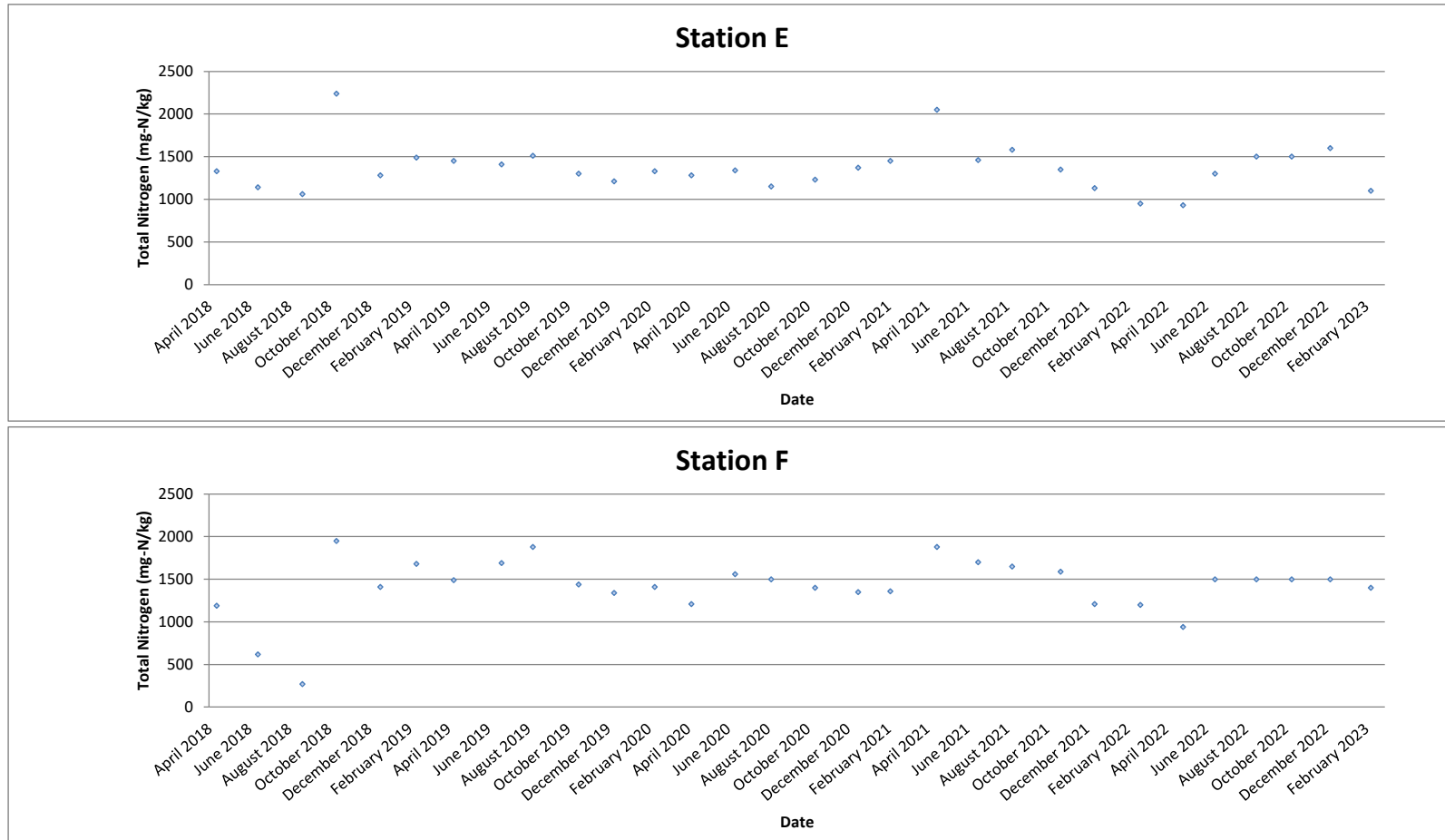
Weather Range:

Fine

Major activities in the reporting period:

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

Total Nitrogen (mg-N/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

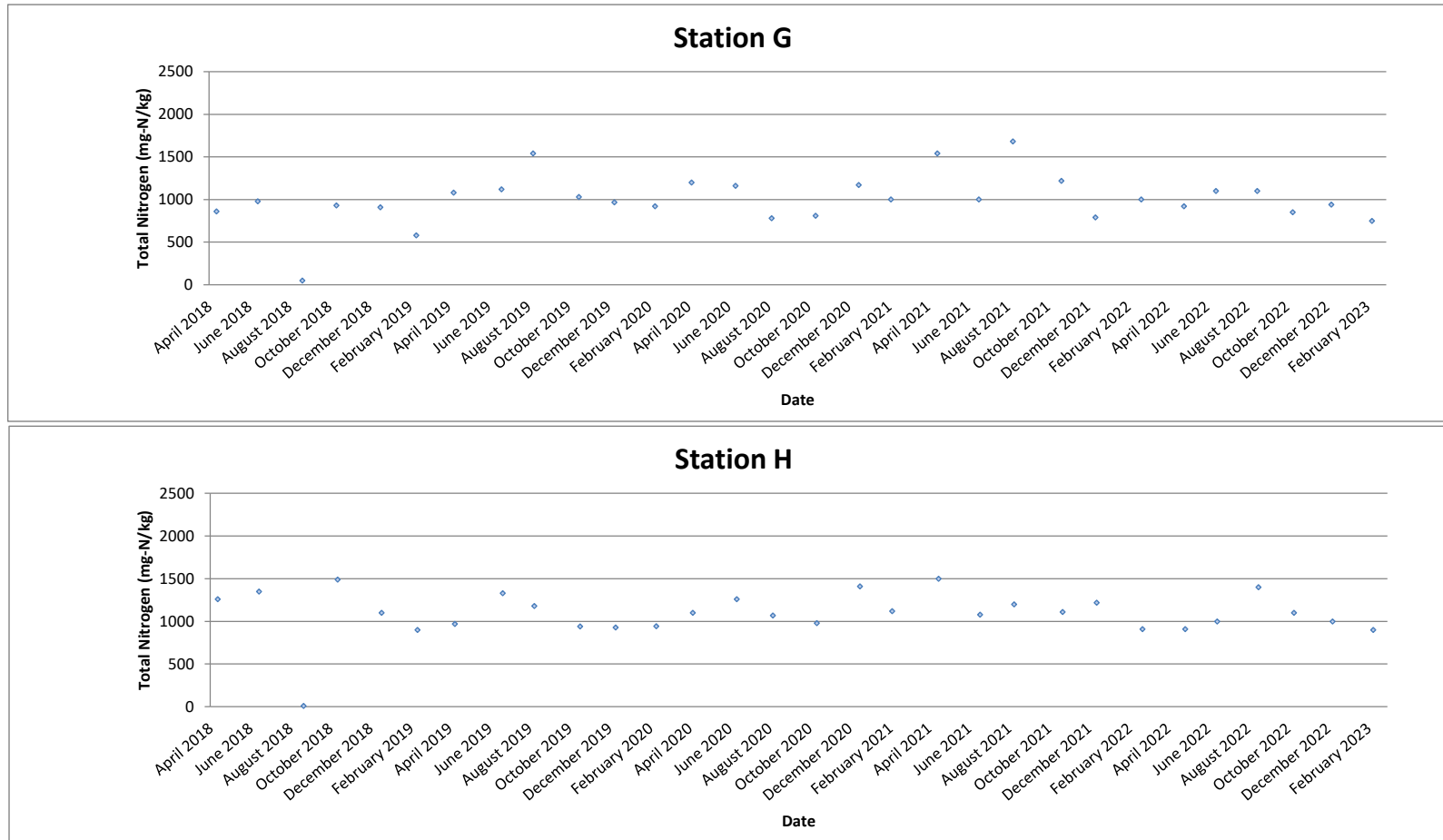
Weather Range:

Fine

Major activities in the reporting period:

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

Total Nitrogen (mg-N/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

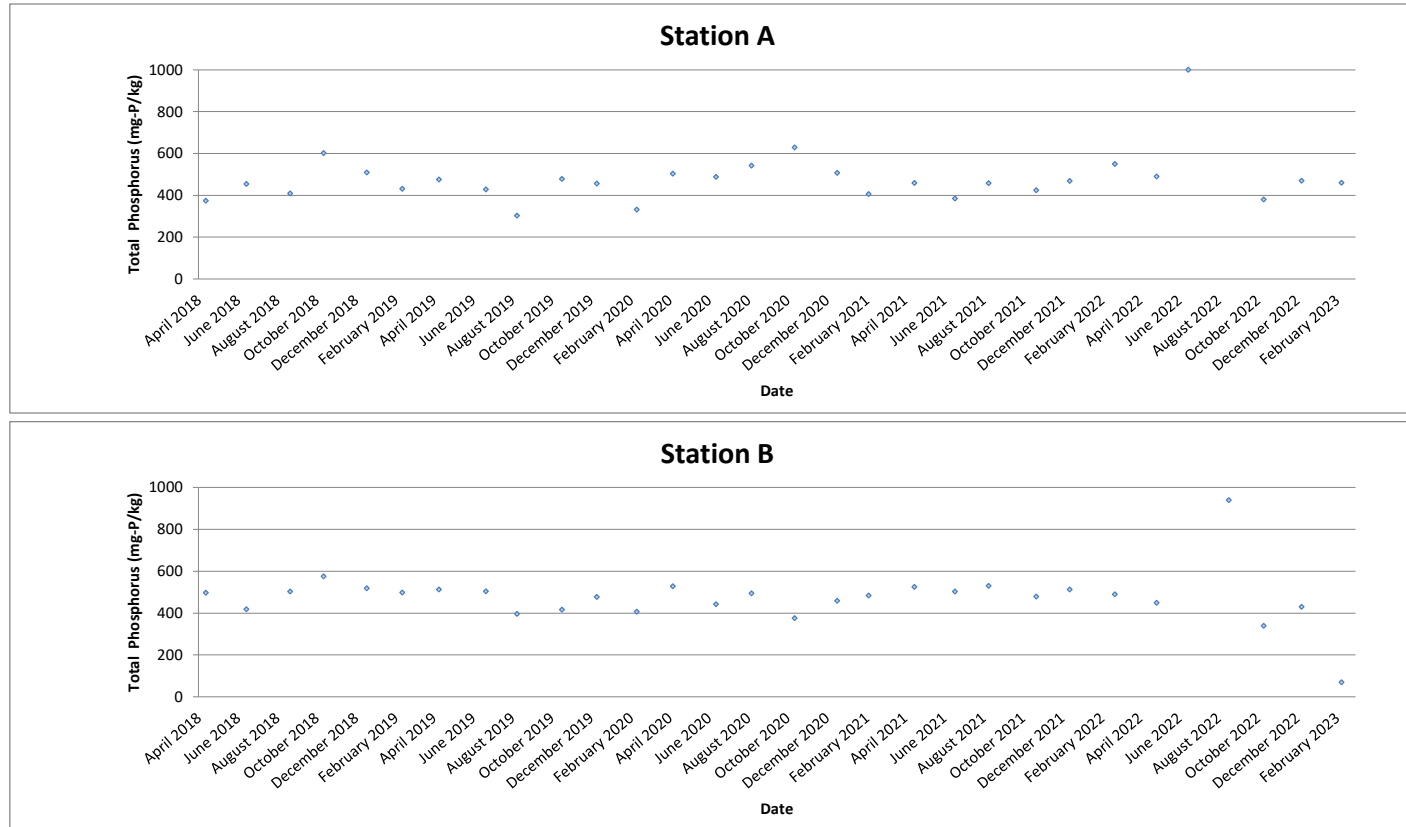
Weather Range:

Fine

Major activities in the reporting period:

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

Total Phosphorus (mg-P/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

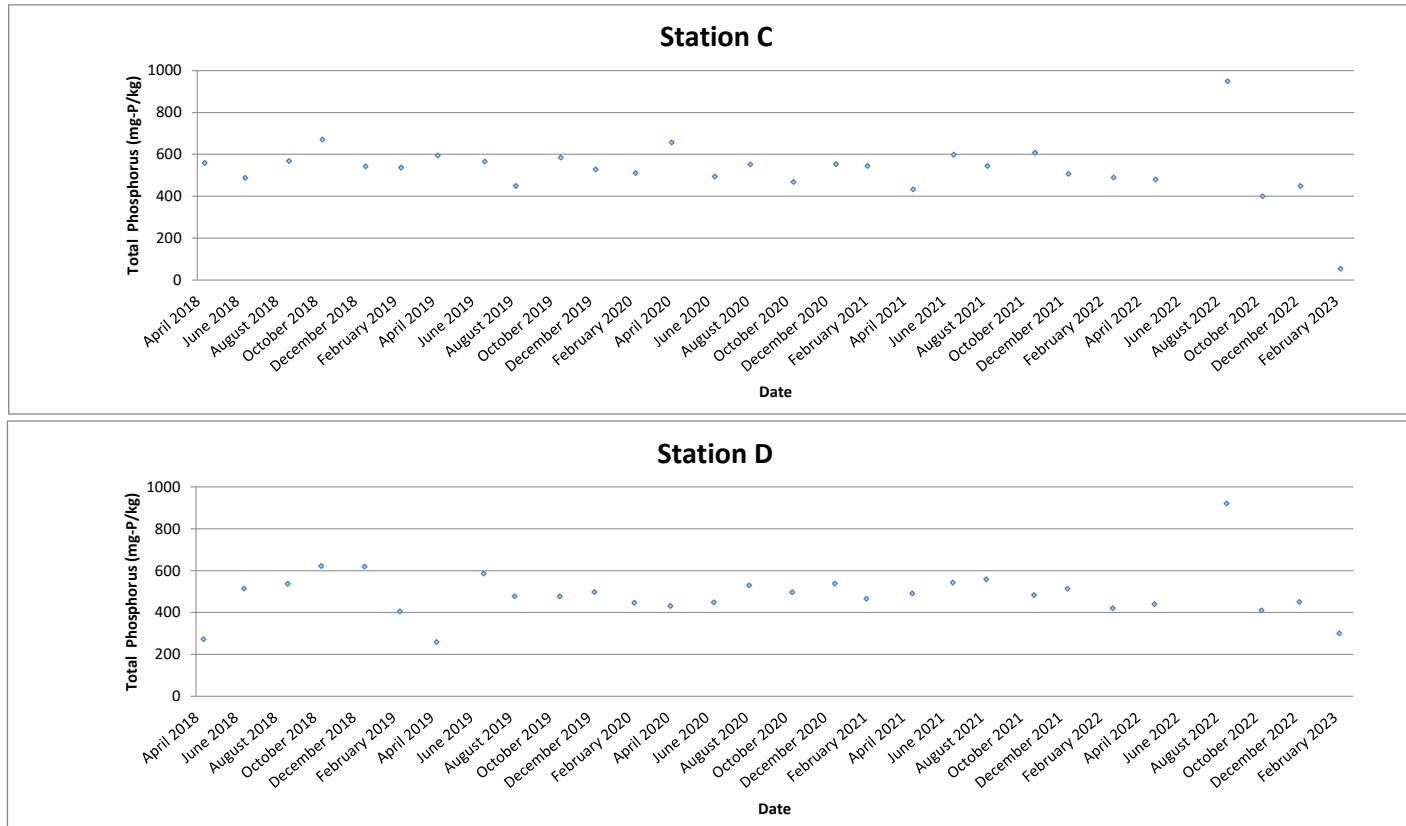
Weather Range:

Fine

Major activities in the reporting period:

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

Total Phosphorus (mg-P/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

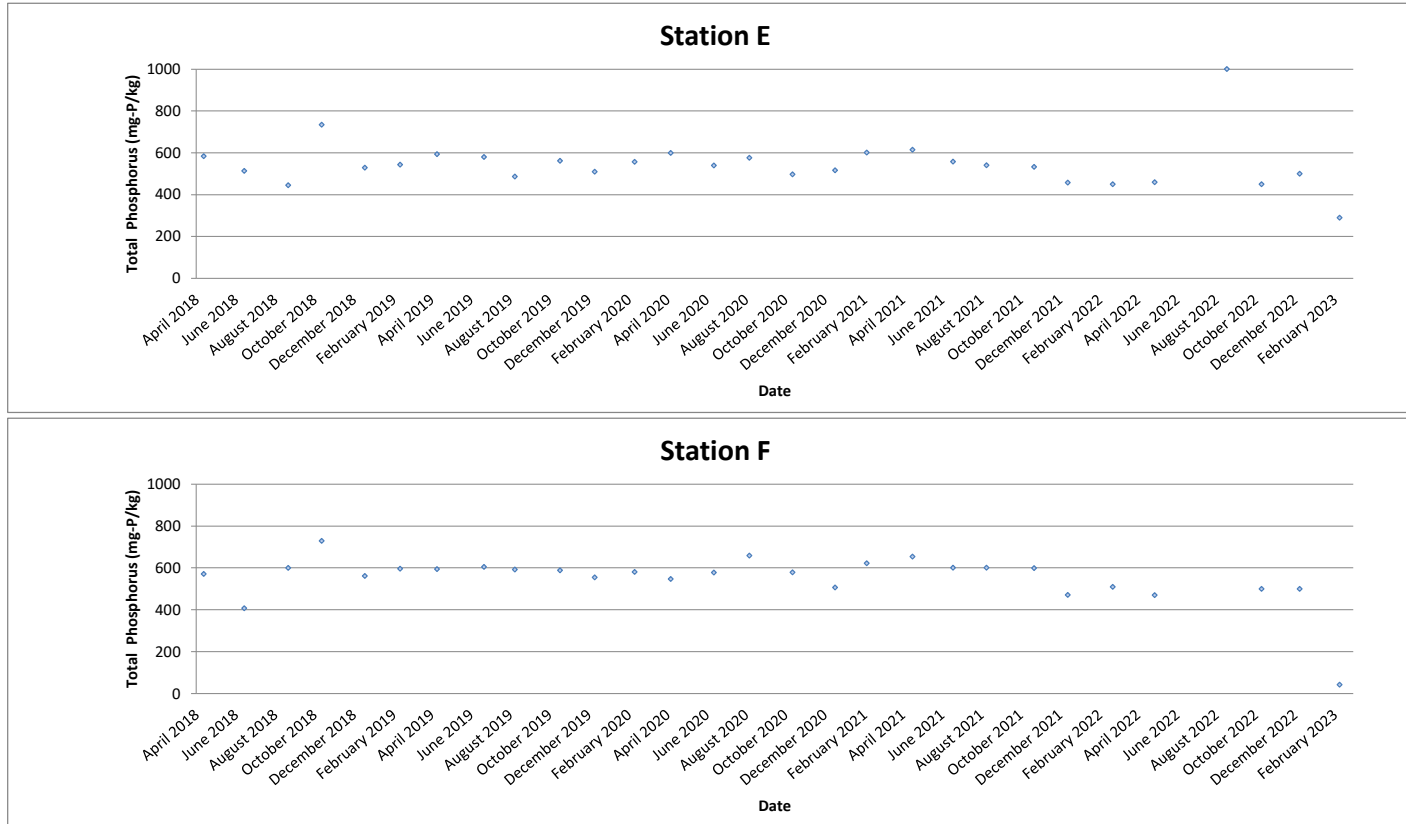
Weather Range:

Fine

Major activities in the reporting period:

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

Total Phosphorus (mg-P/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

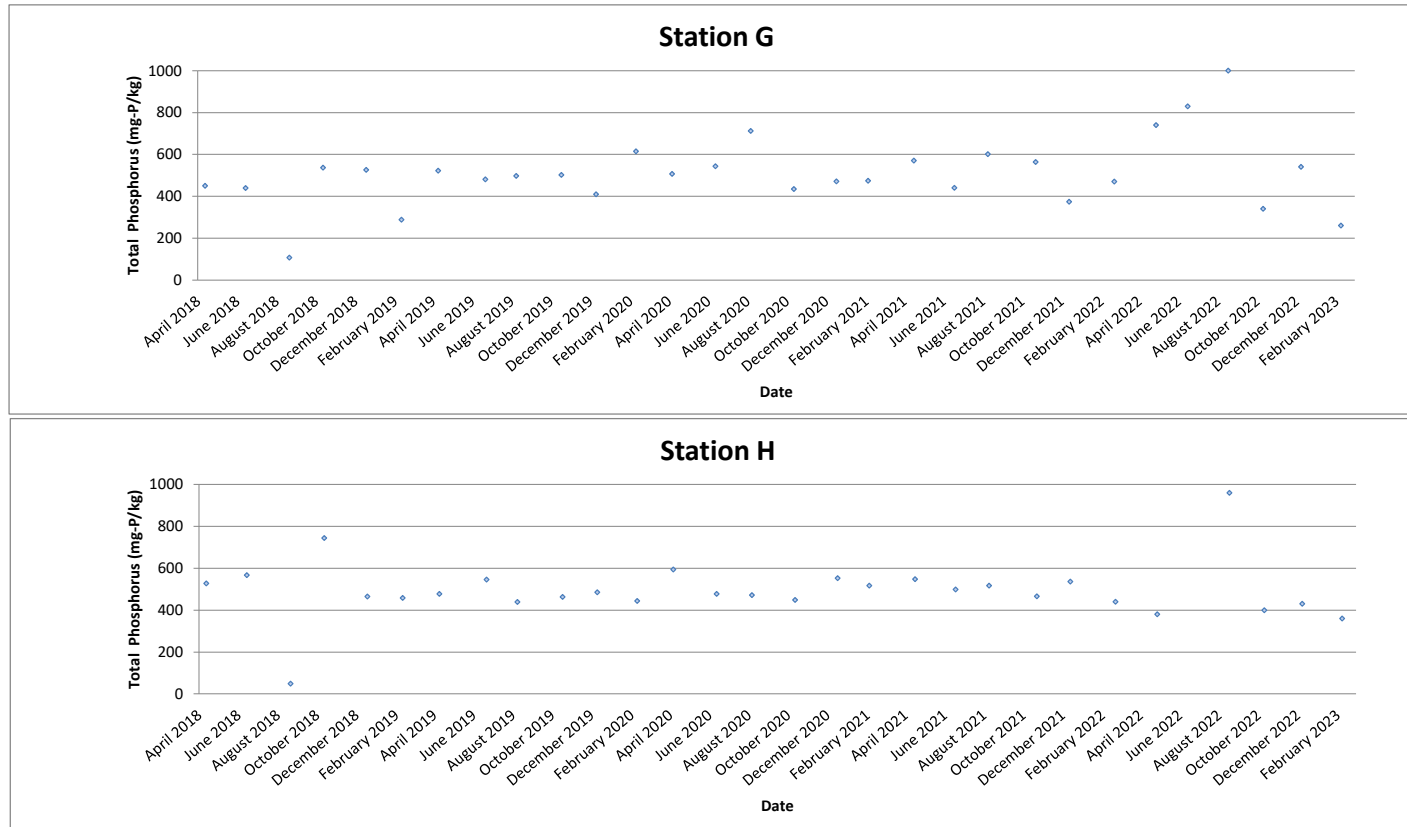
Weather Range:

Fine

Major activities in the reporting period:

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

Total Phosphorus (mg-P/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

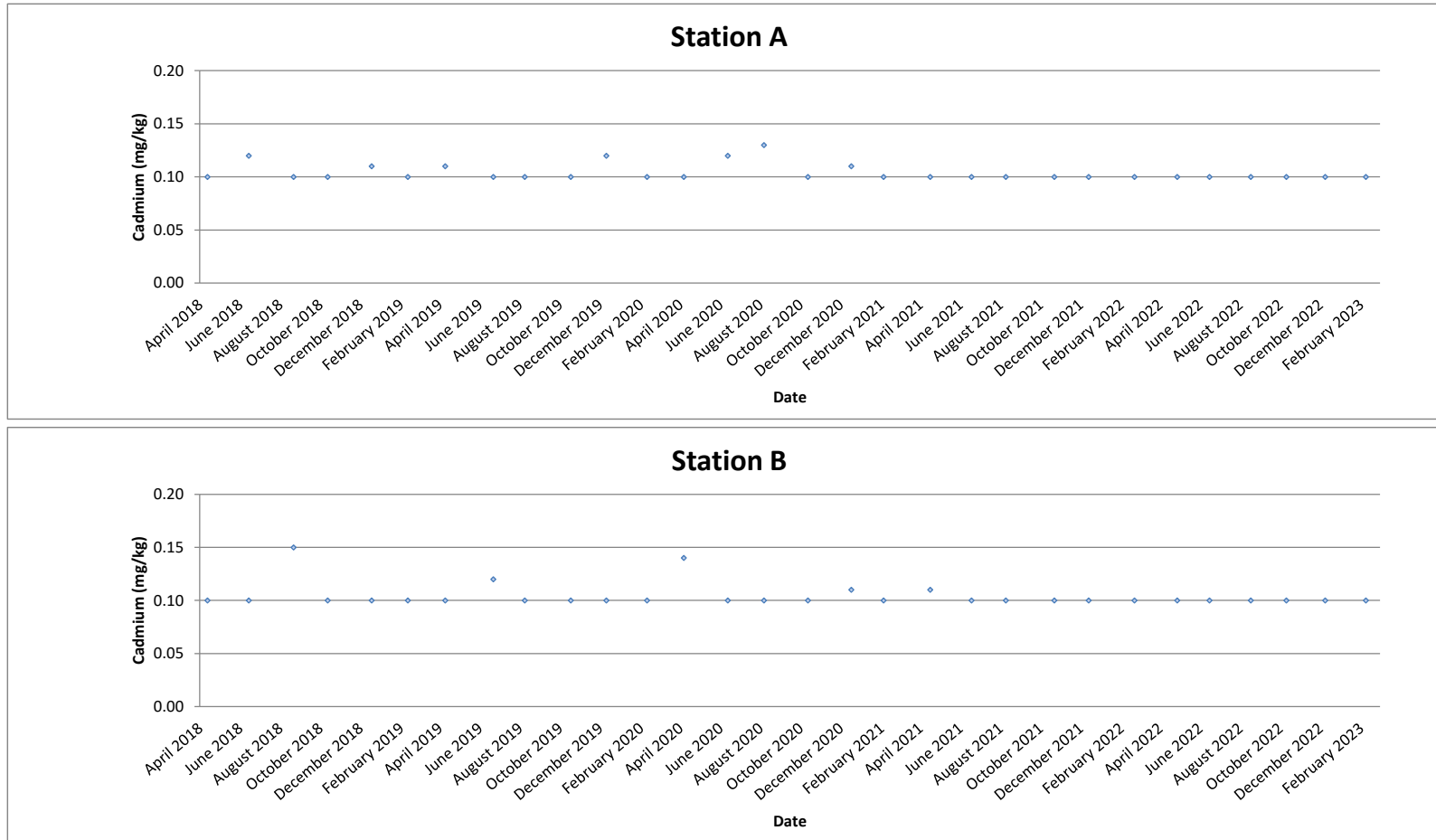
Weather Range:

Fine

Major activities in the reporting period:

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

Cadmium (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

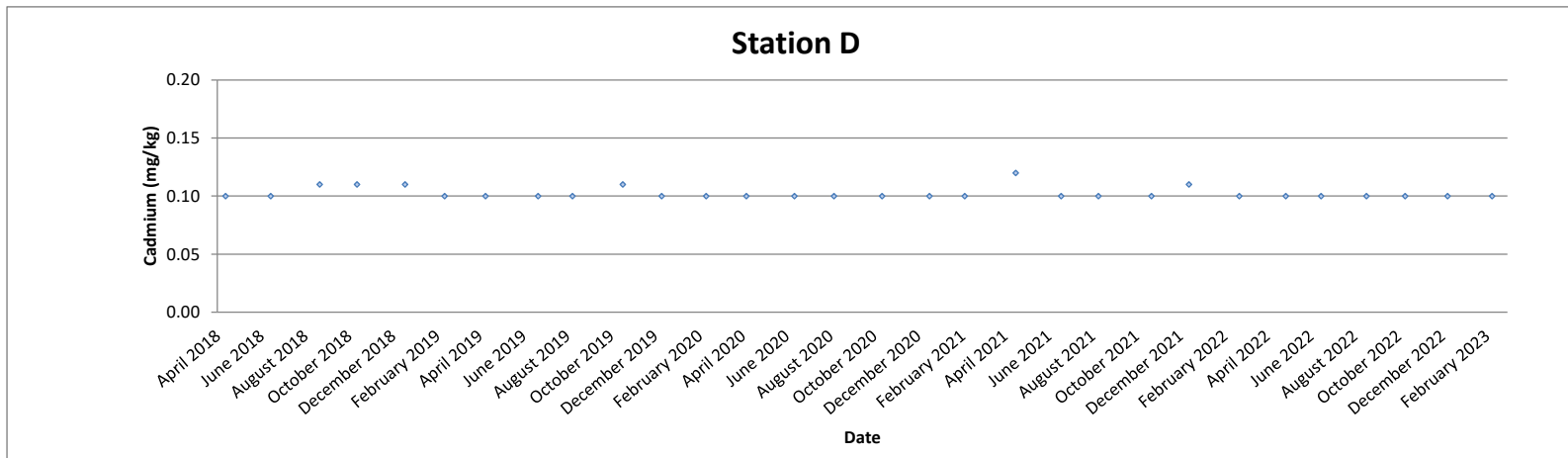
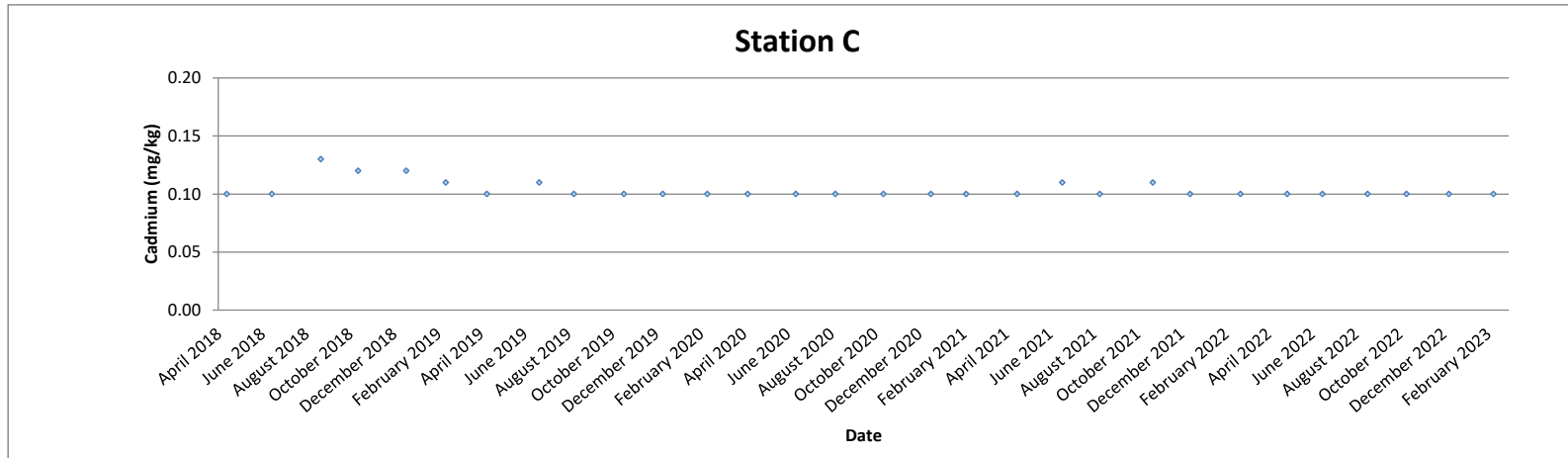
Weather Range:

Fine

Major activities in the reporting period:

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

Cadmium (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

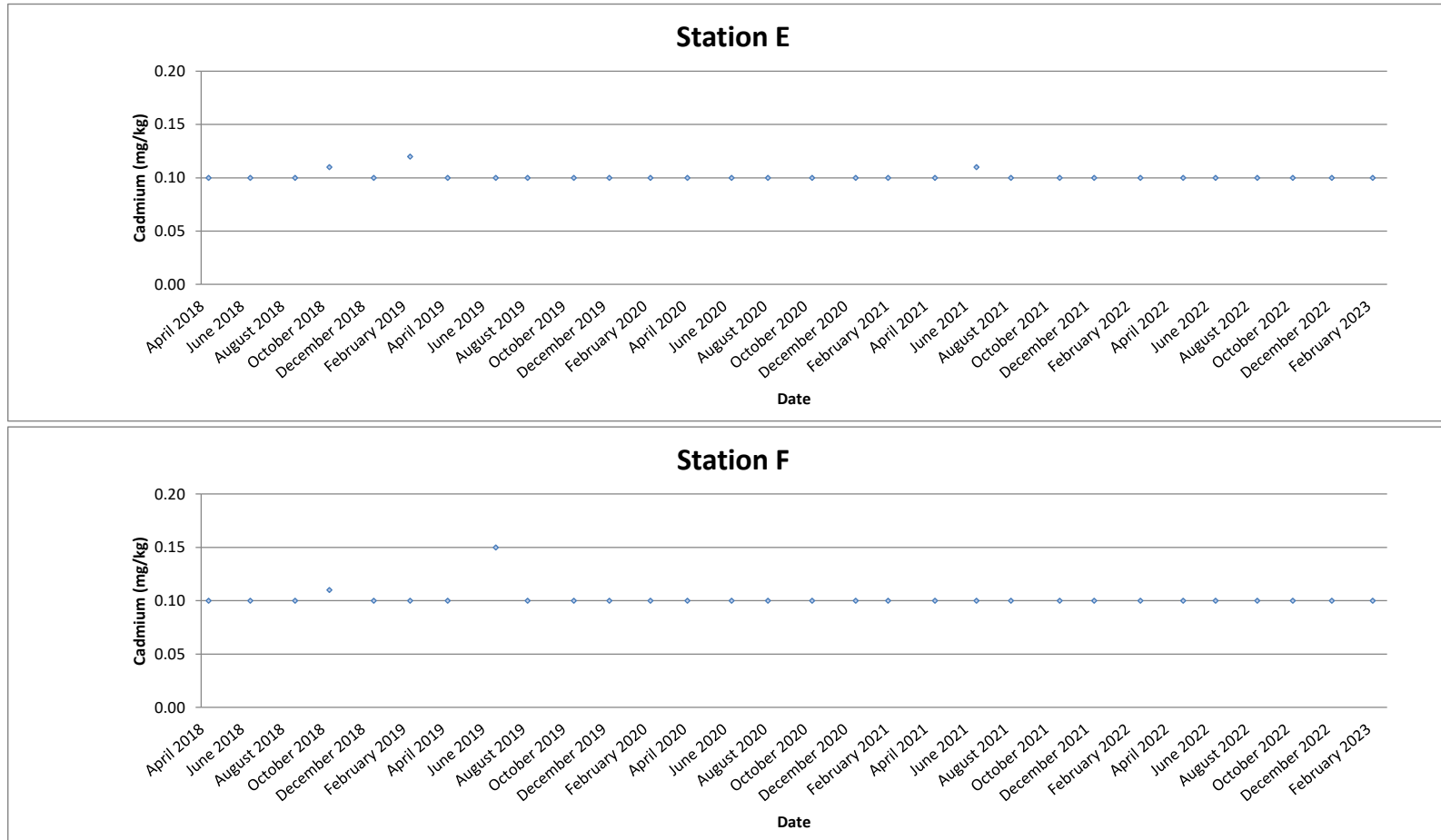
Weather Range:

Fine

Major activities in the reporting period:

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

Cadmium (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

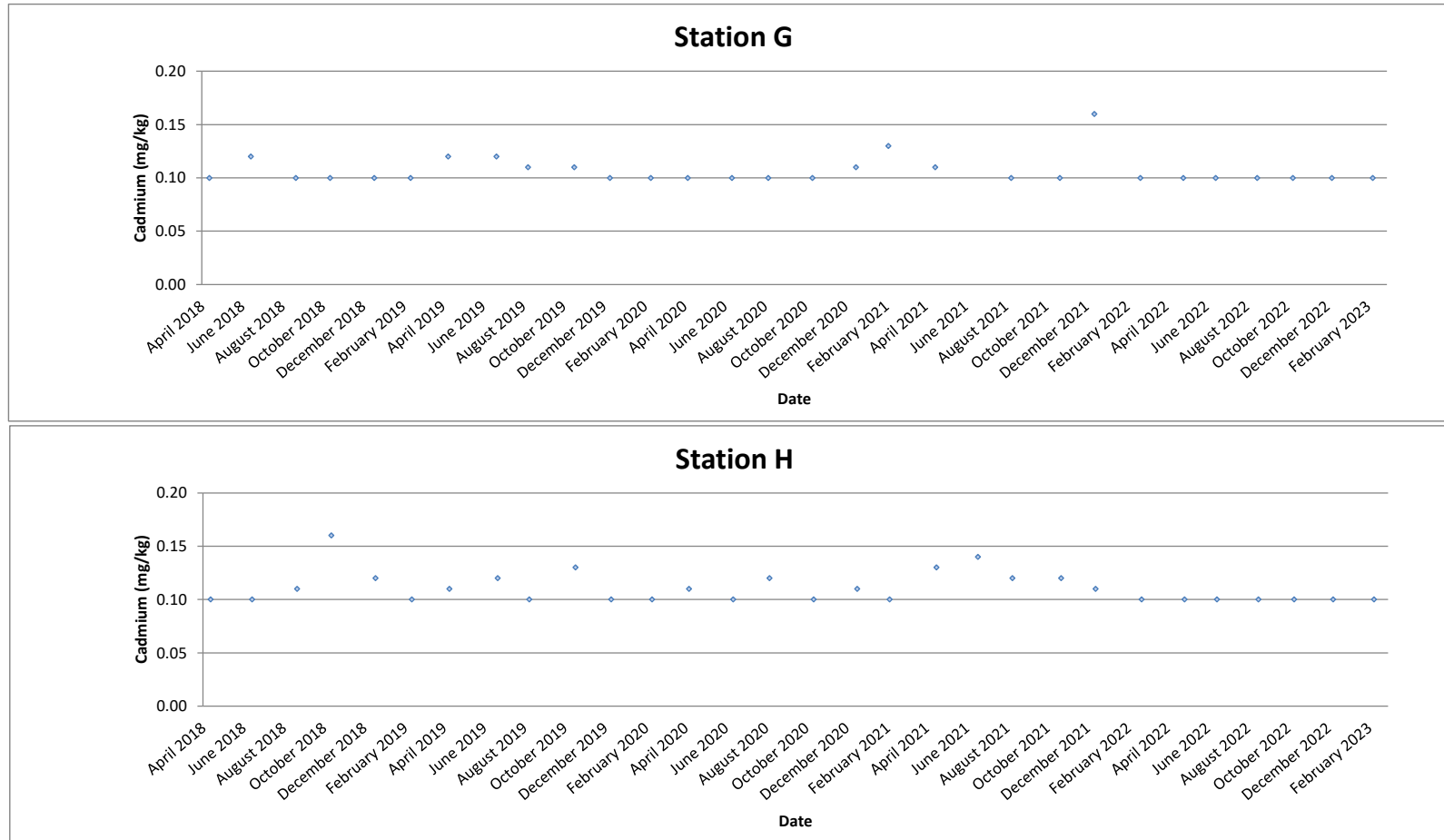
Weather Range:

Fine

Major activities in the reporting period:

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

Cadmium (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

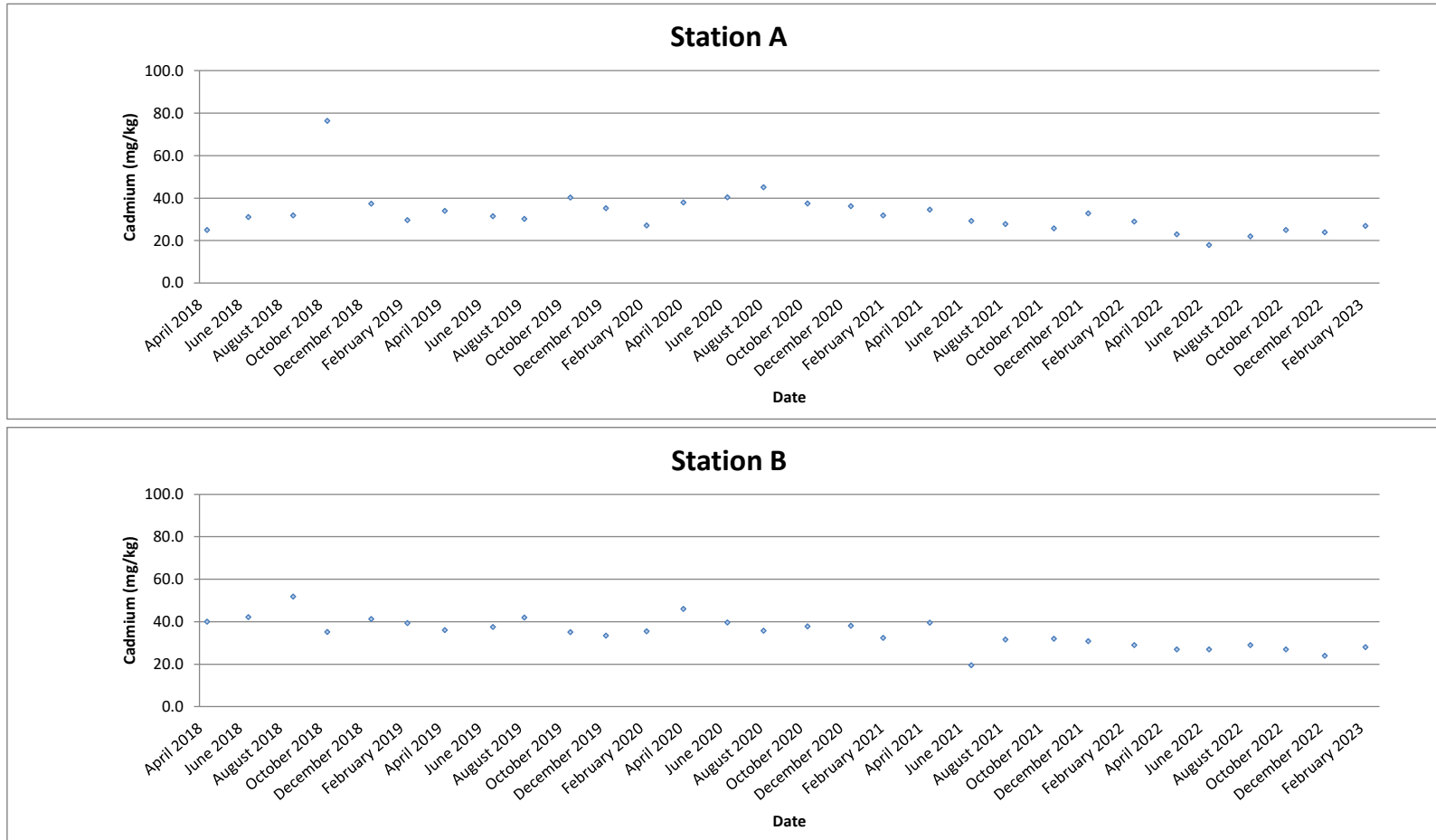
Weather Range:

Fine

Major activities in the reporting period:

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

Chromium (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

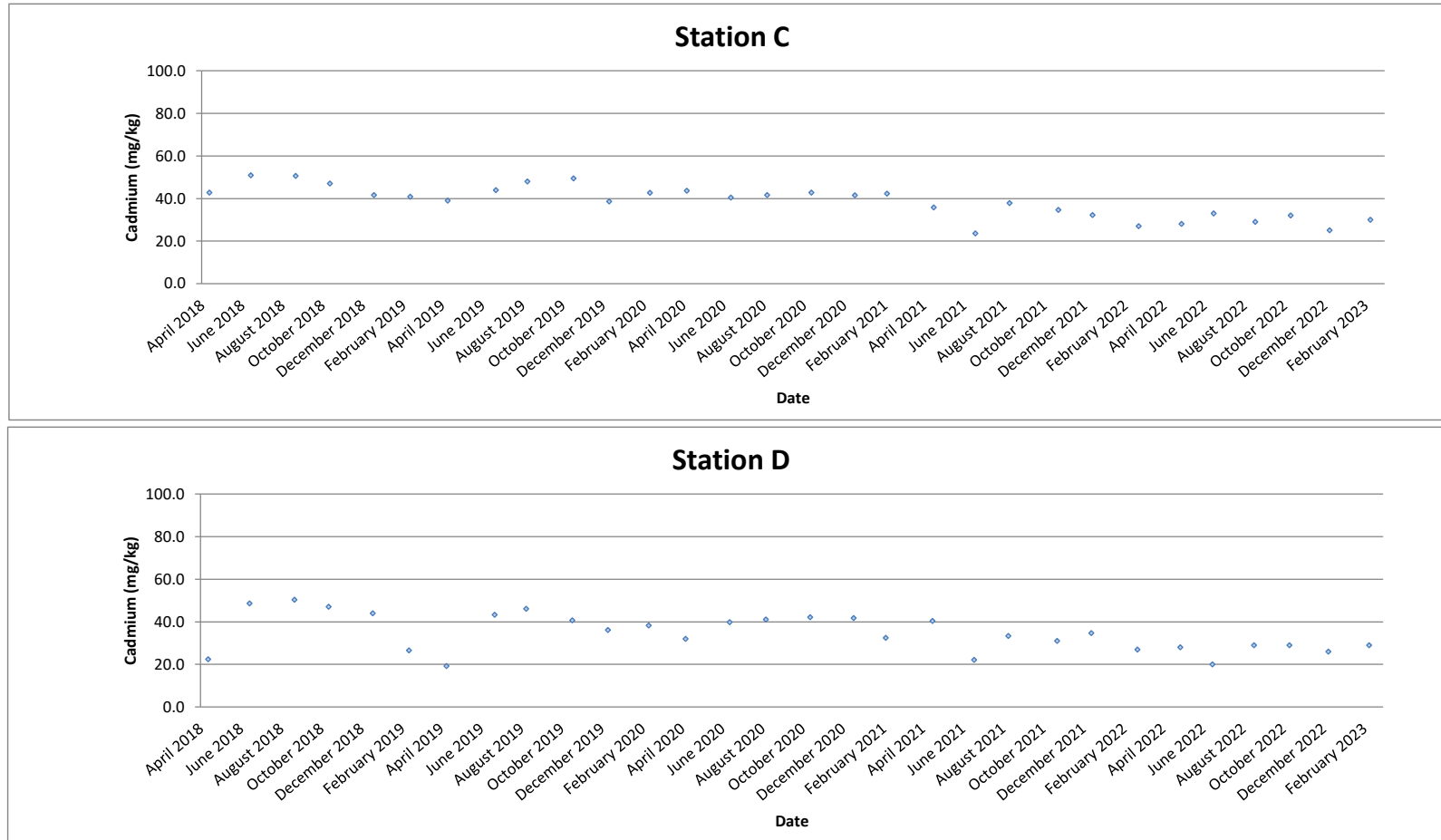
Weather Range:

Fine

Major activities in the reporting period:

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

Chromium (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

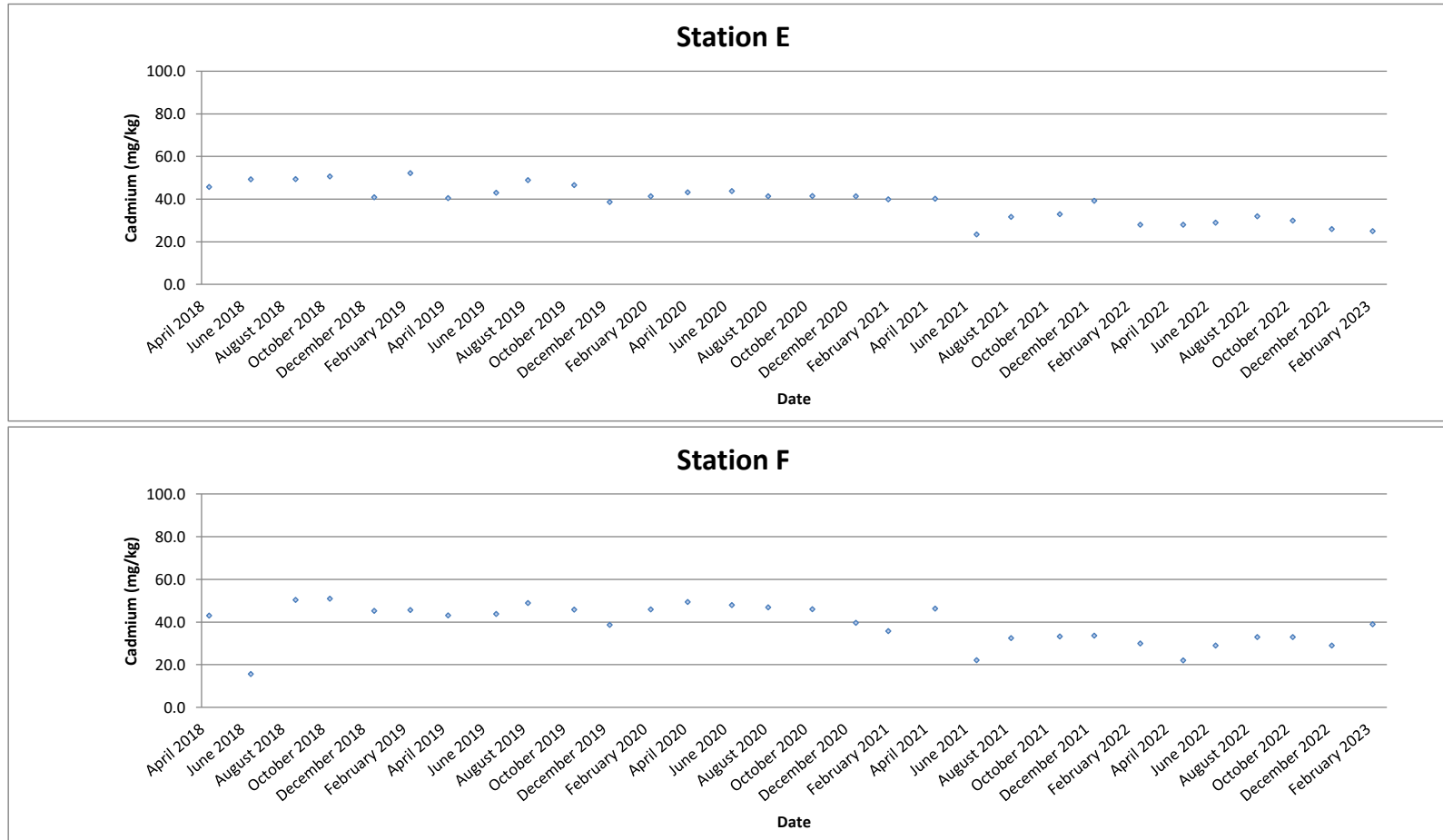
Weather Range:

Fine

Major activities in the reporting period:

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

Chromium (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

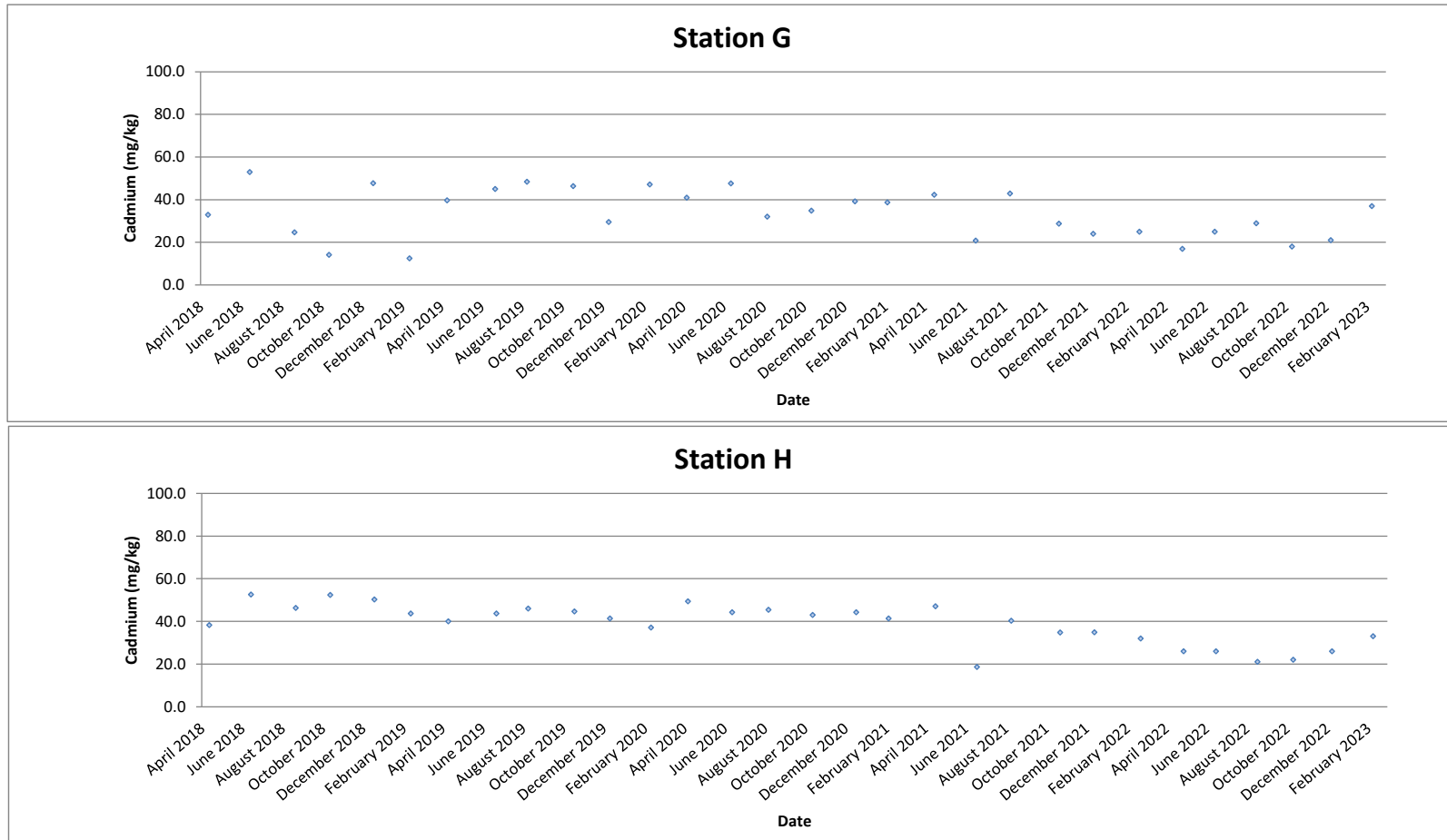
Weather Range:

Fine

Major activities in the reporting period:

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

Chromium (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

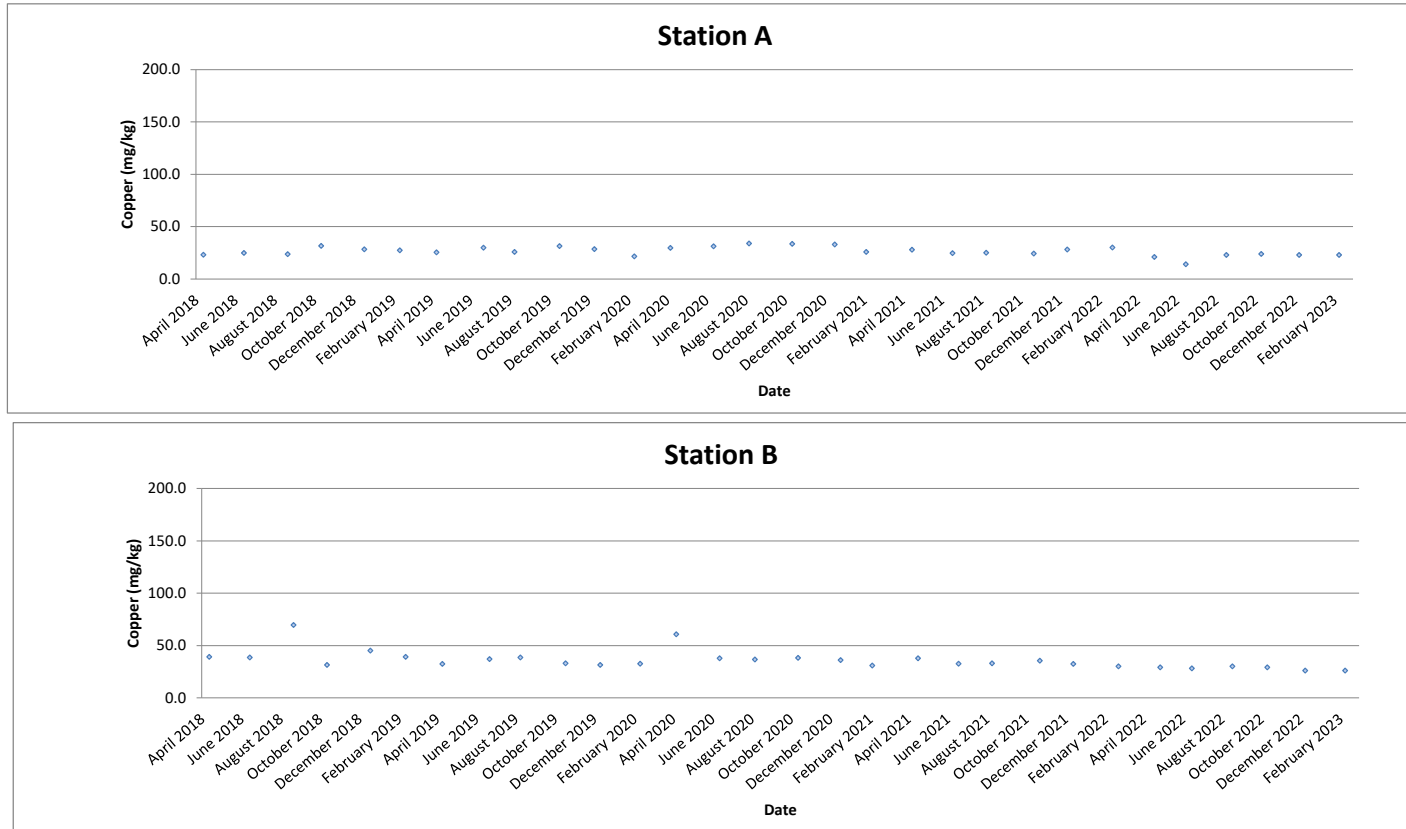
Weather Range:

Fine

Major activities in the reporting period:

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

Copper (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

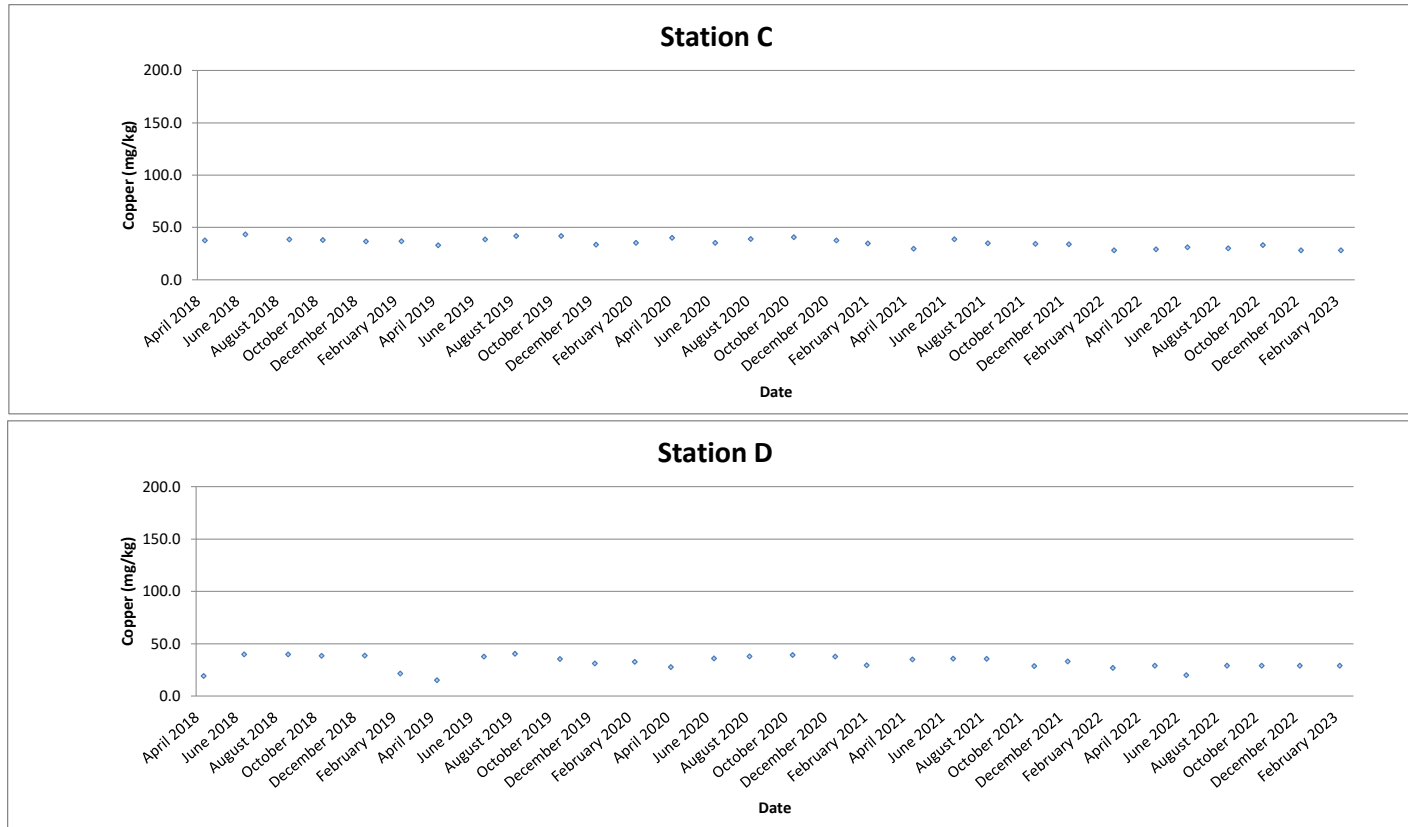
Weather Range:

Fine

Major activities in the reporting period:

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

Copper (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

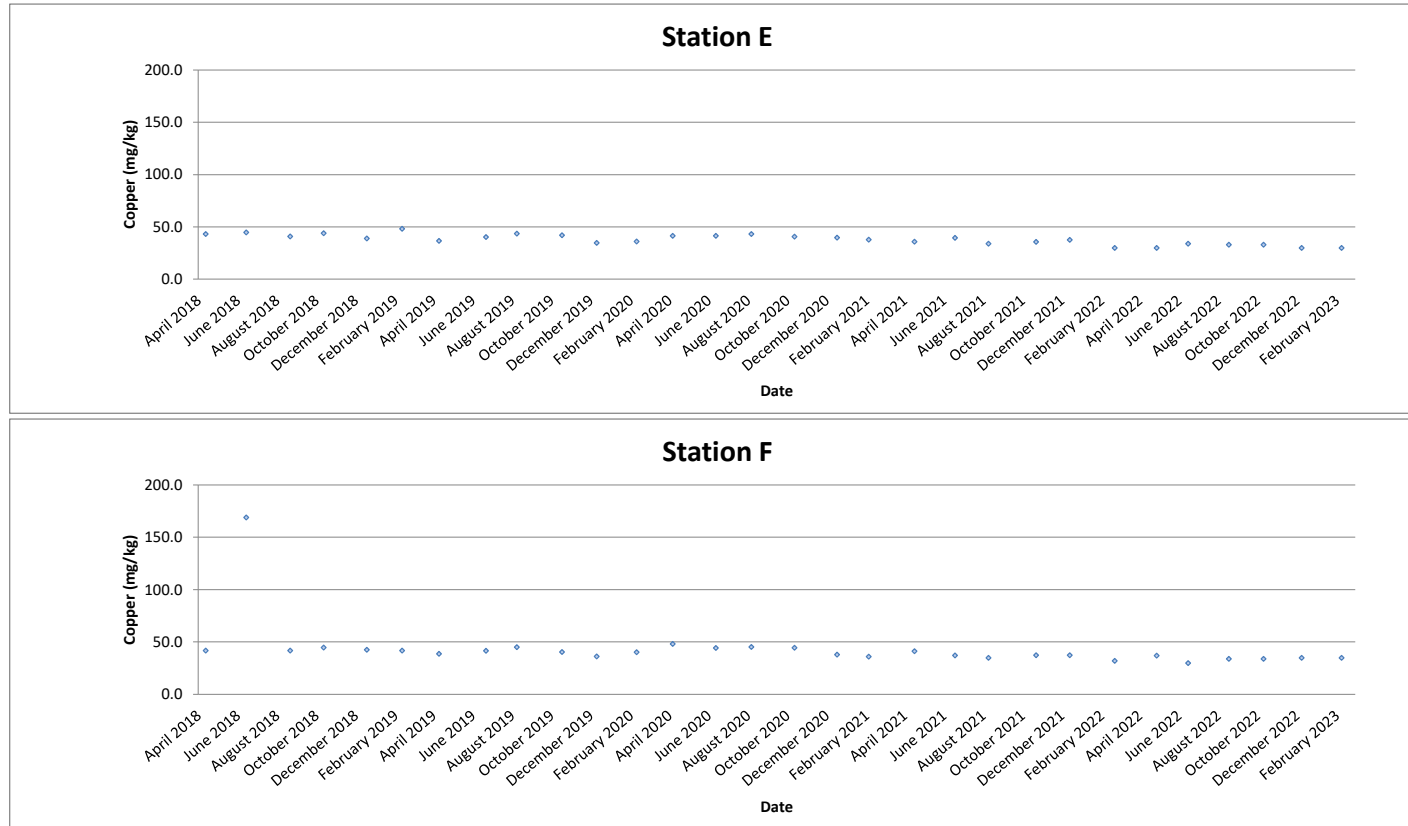
Weather Range:

Fine

Major activities in the reporting period:

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

Copper (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

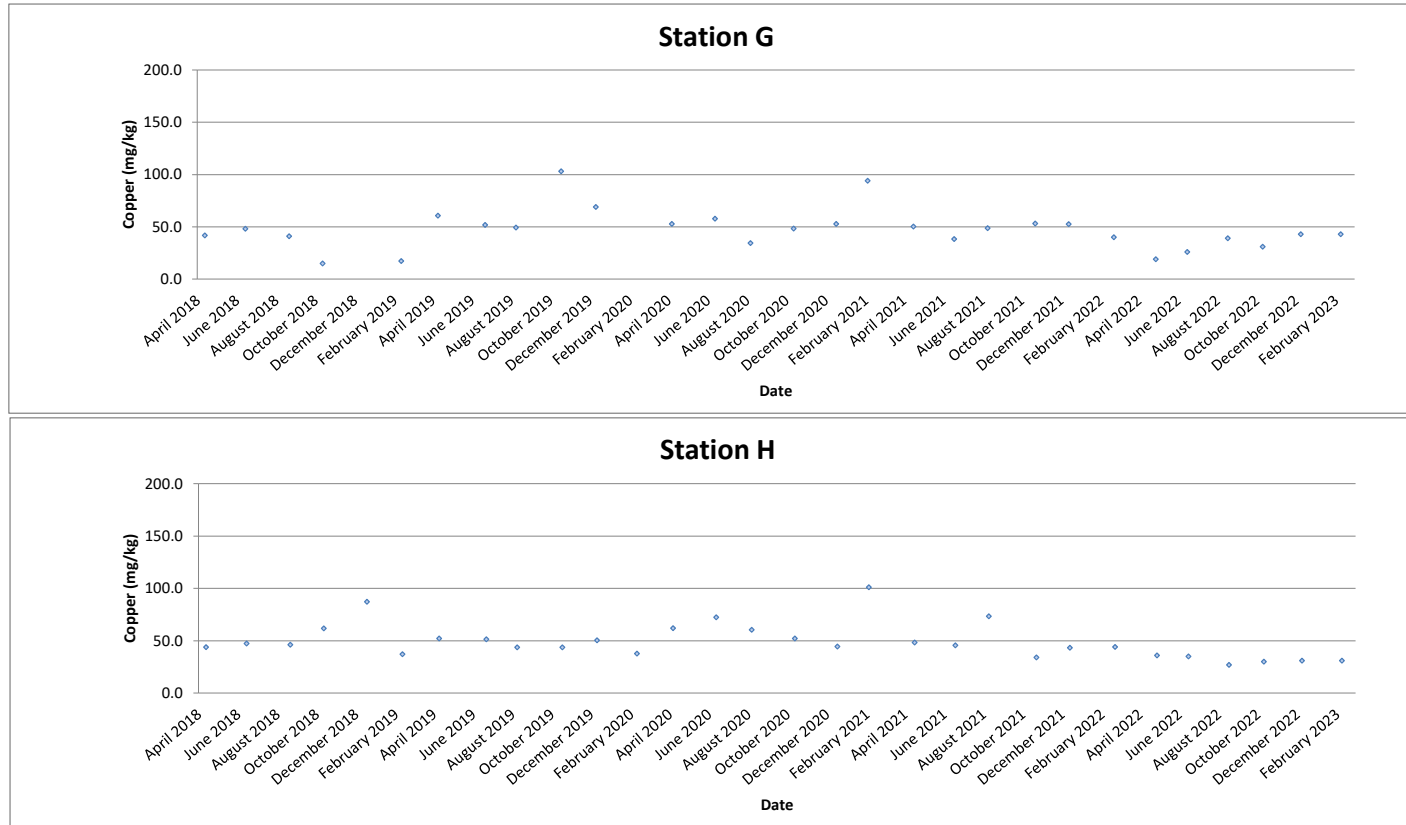
Weather Range:

Fine

Major activities in the reporting period:

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

Copper (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

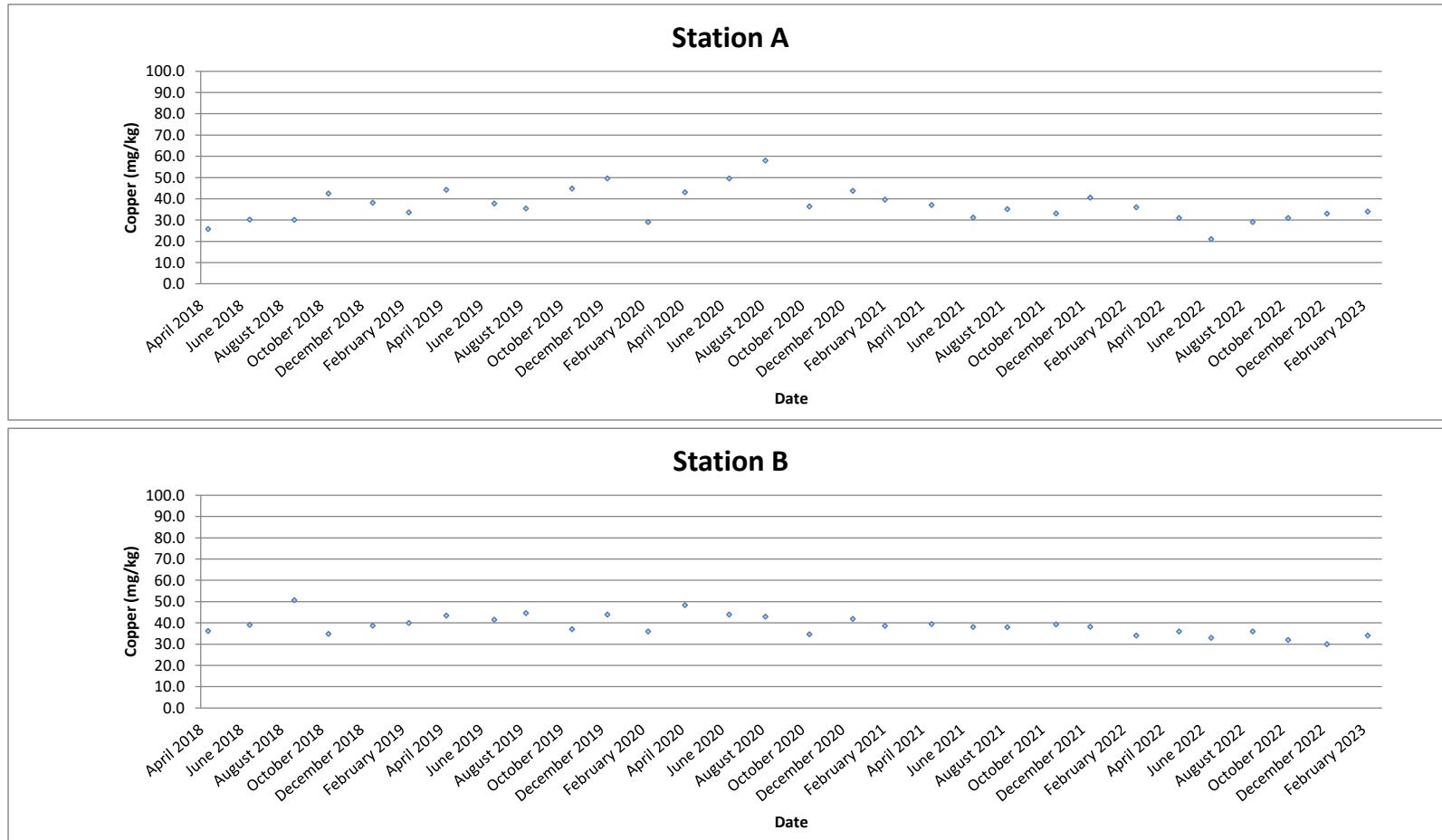
Weather Range:

Fine

Major activities in the reporting period:

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

Lead (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

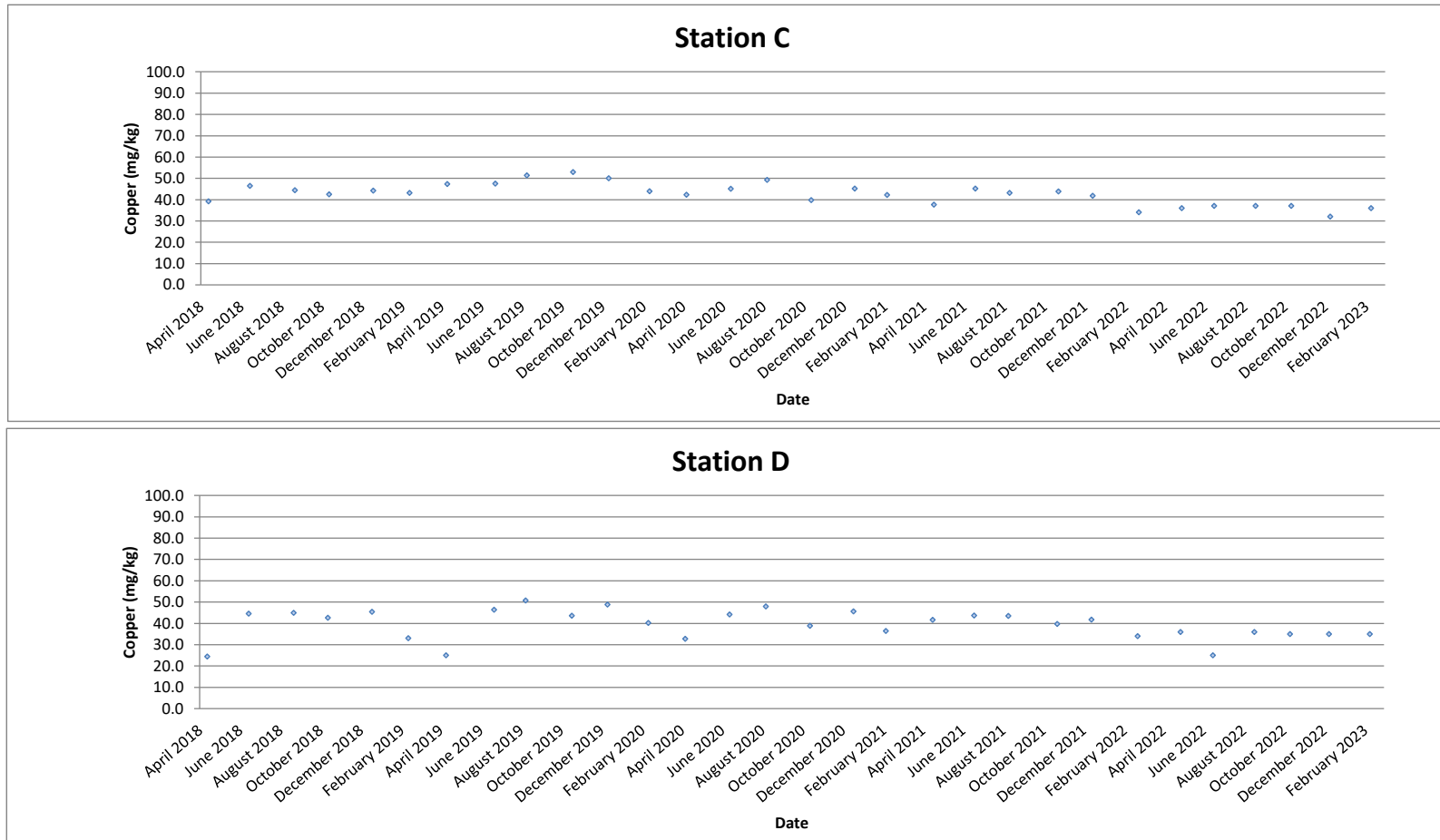
Weather Range:

Fine

Major activities in the reporting period:

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

Lead (mg/kg)



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Contraction works nearby the project site

Notes:

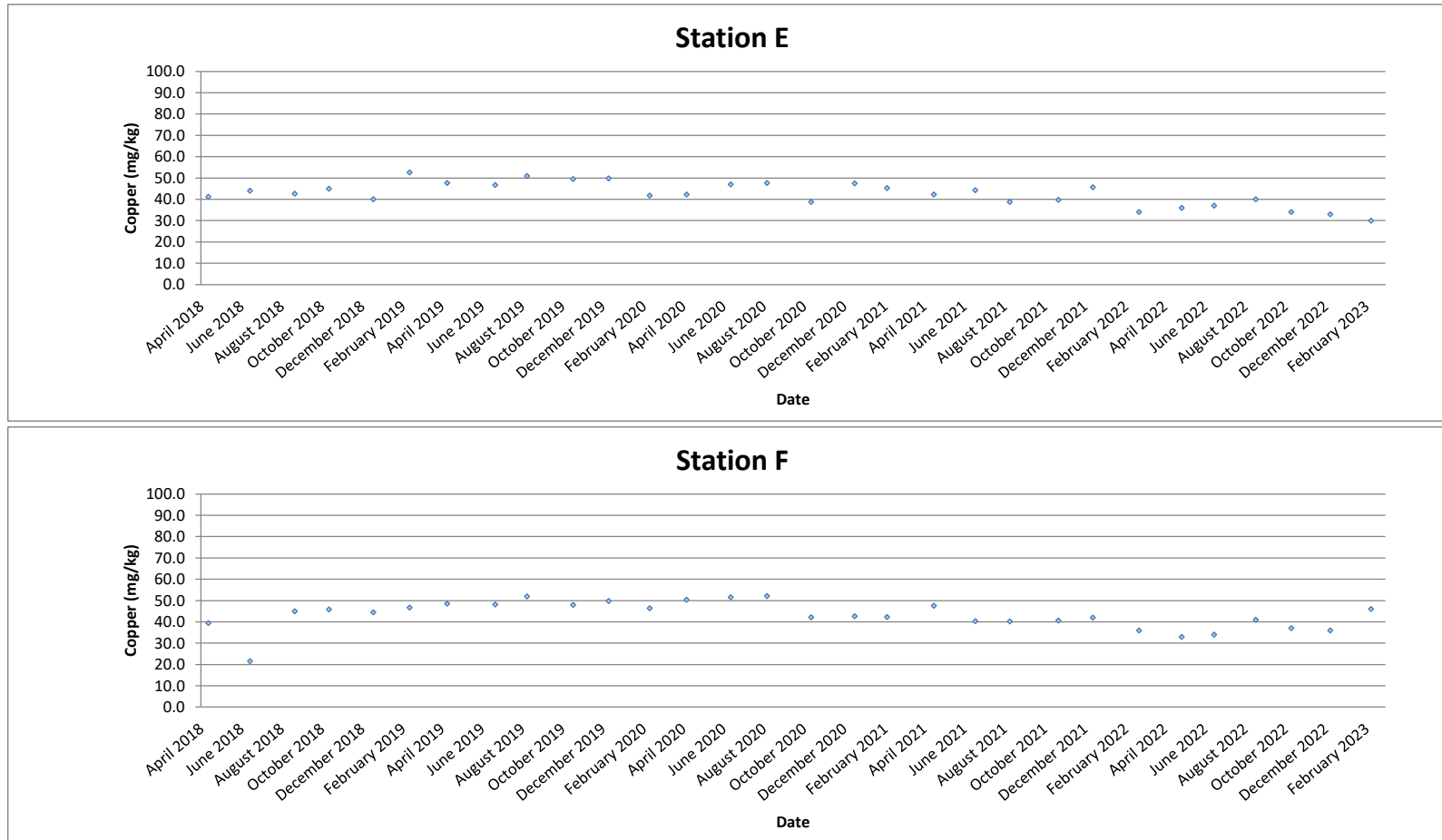
Weather Range:

Fine

Major activities in the reporting period:

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

Lead (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

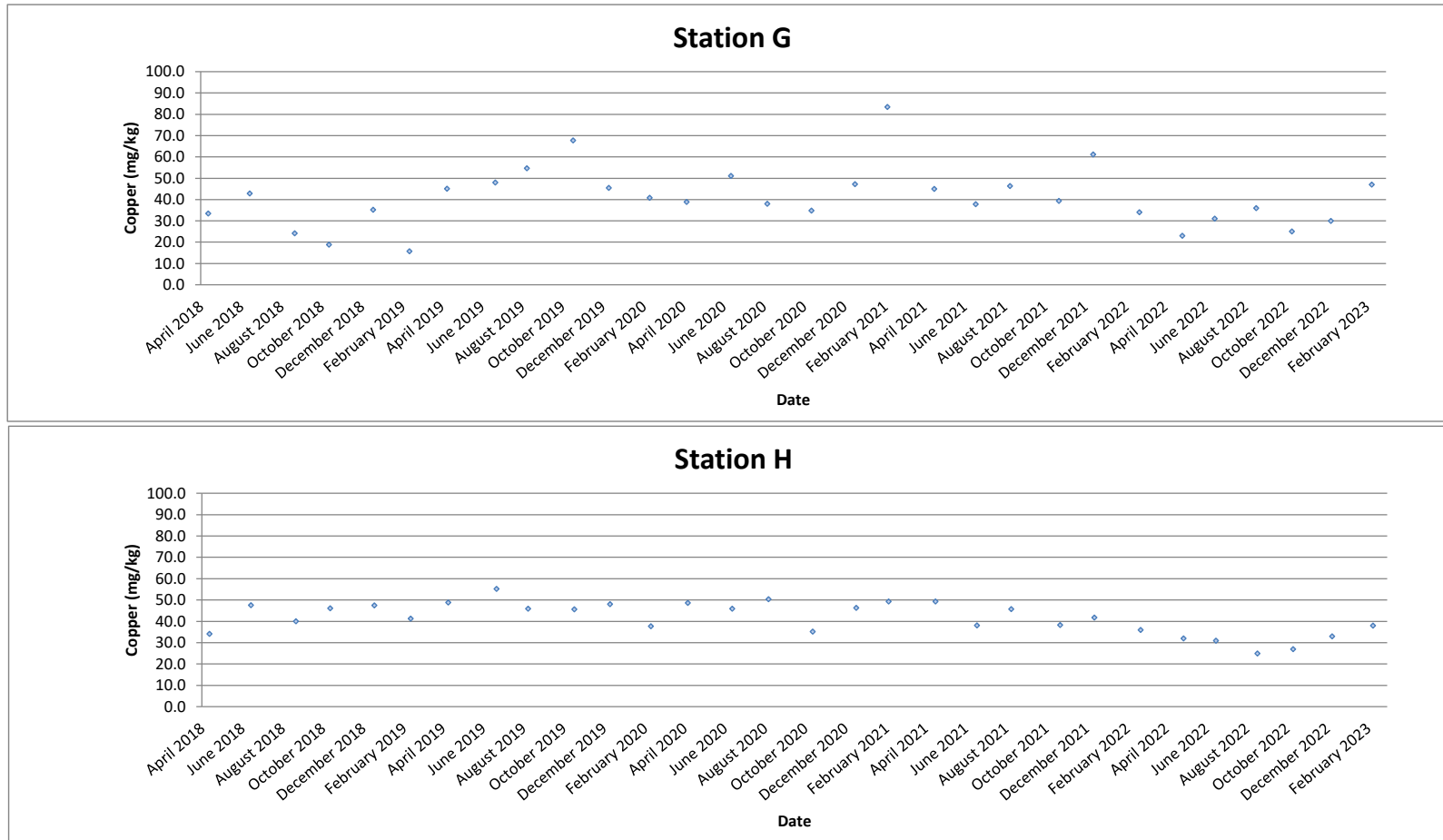
Weather Range:

Fine

Major activities in the reporting period:

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

Lead (mg/kg)



Major sources for monitoring stations

Project related:

- 1. Treated effluent discharge

Non-project related:

- 1. Heavy marine traffic
- 2. Contraction works nearby the project site

Notes:

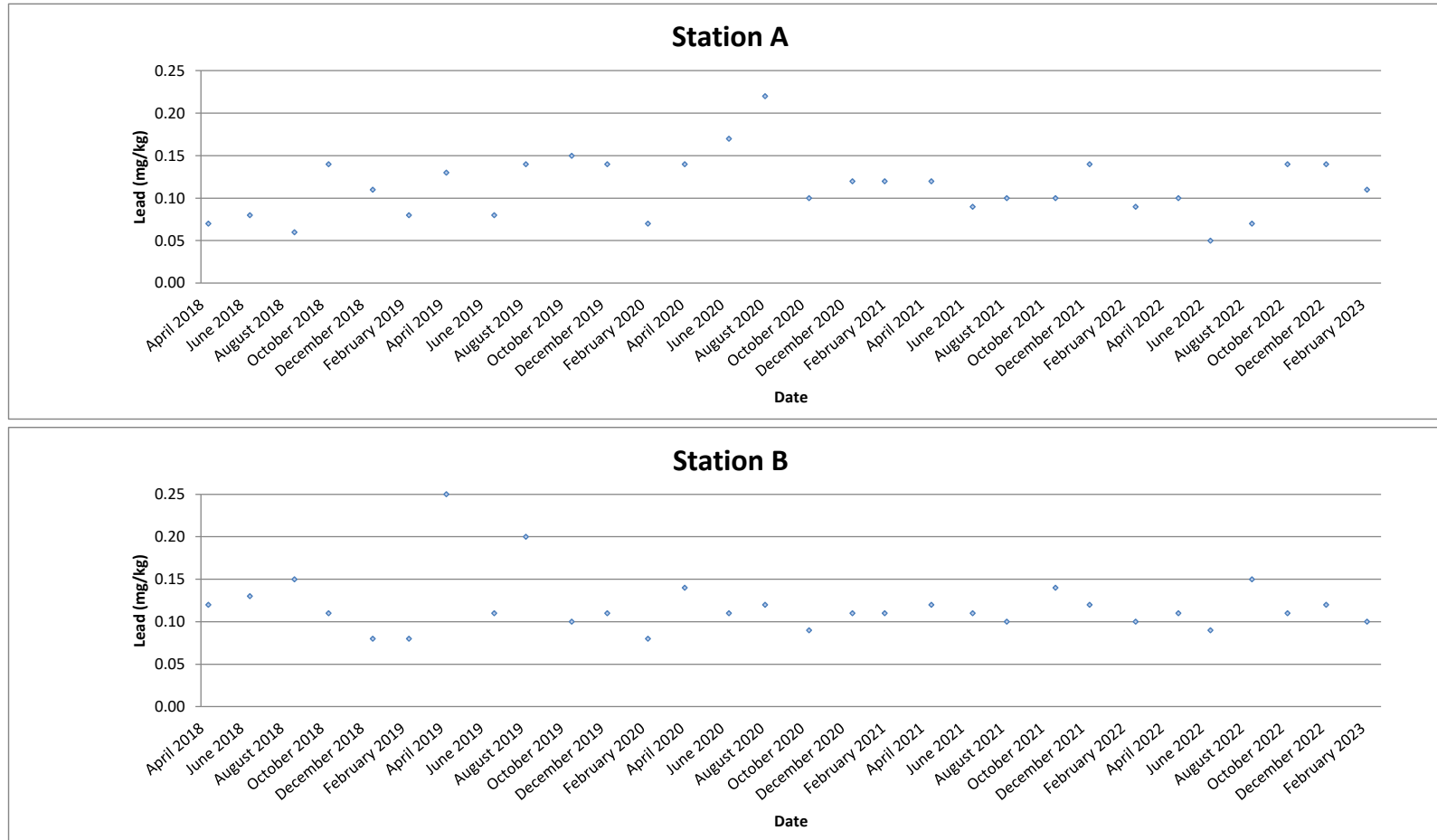
Weather Range:

Fine

Major activities in the reporting period:

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

Mercury (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

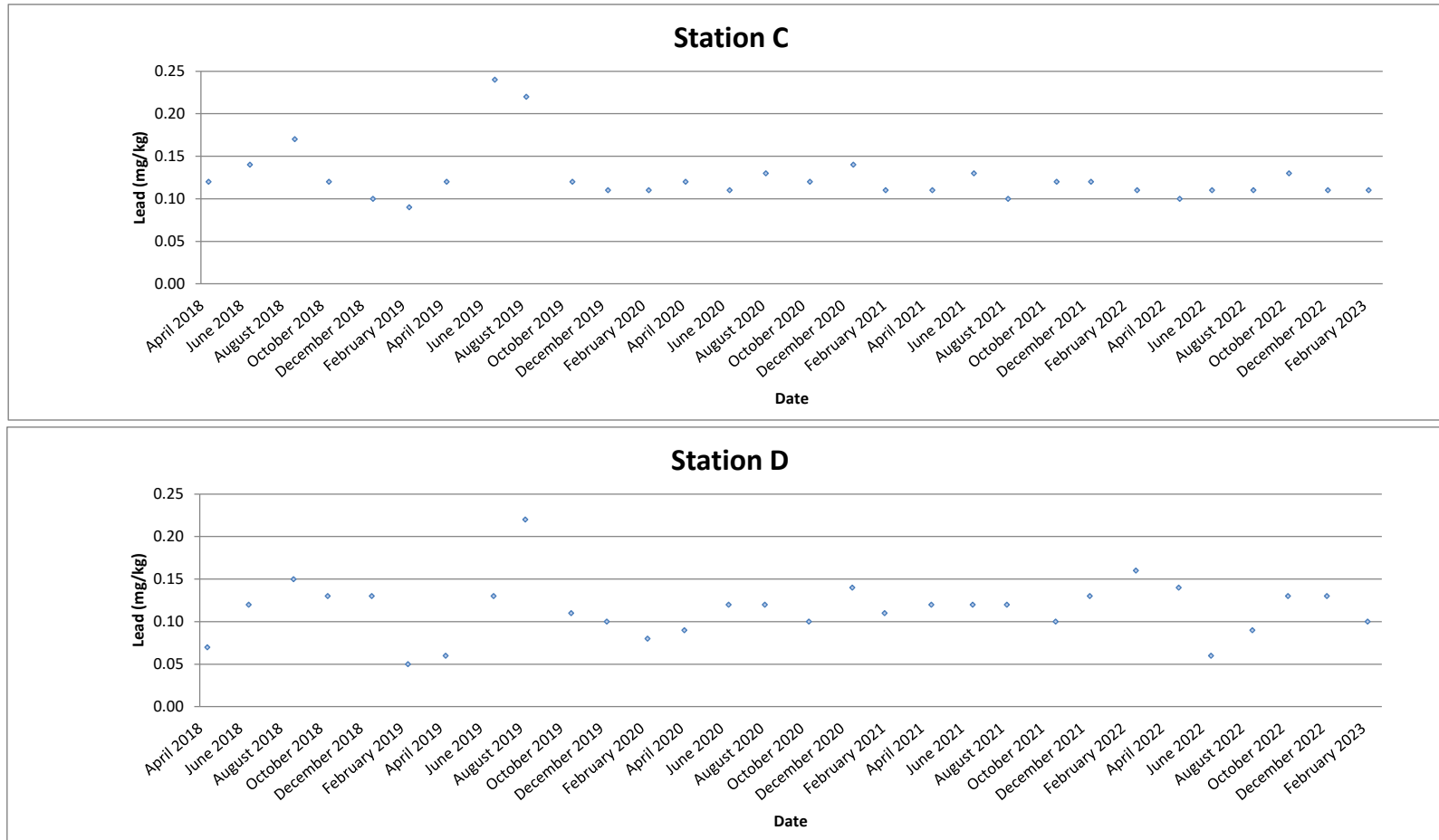
Weather Range:

Fine

Major activities in the reporting period:

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

Mercury (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

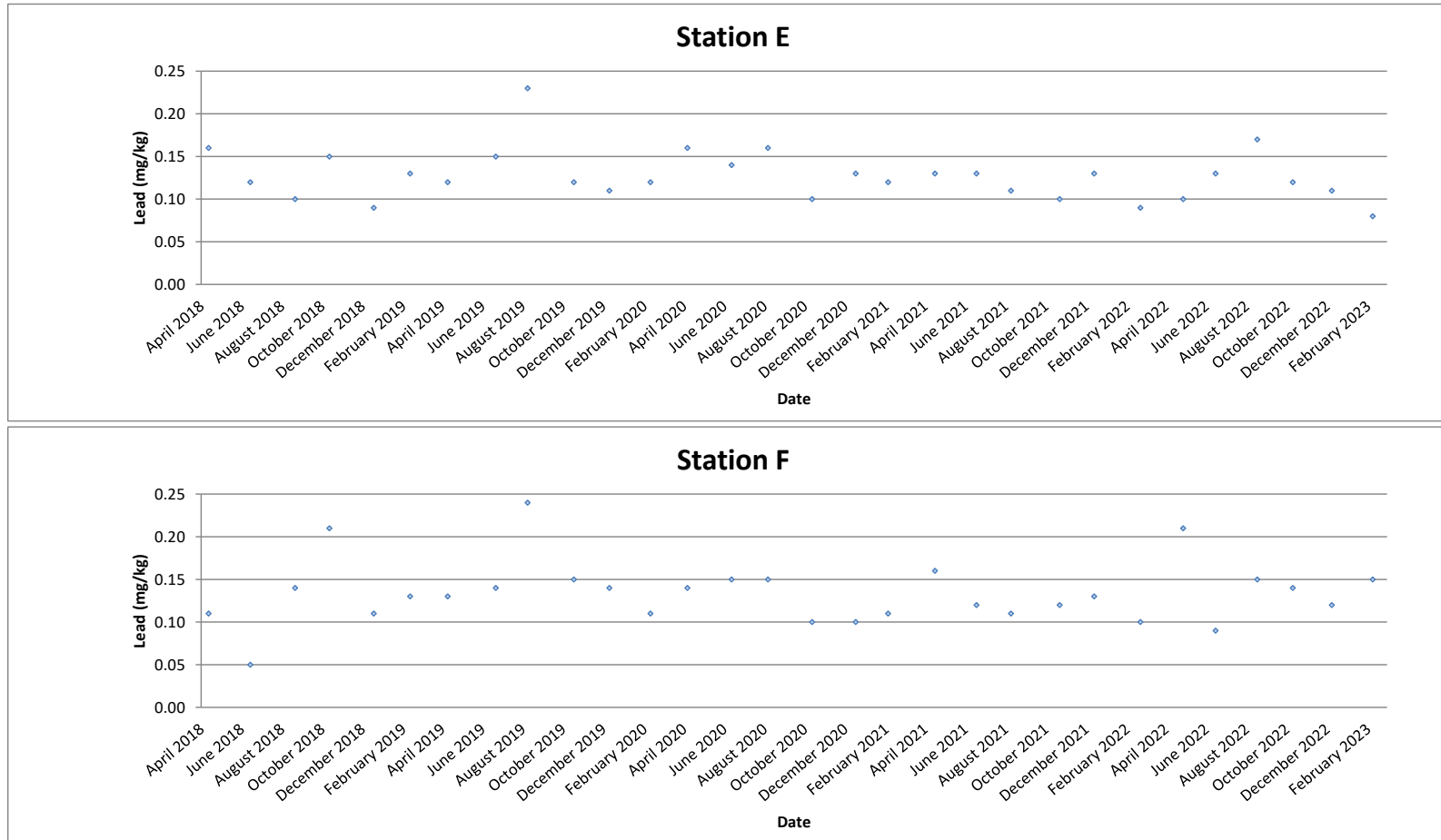
Weather Range:

Fine

Major activities in the reporting period:

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

Mercury (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

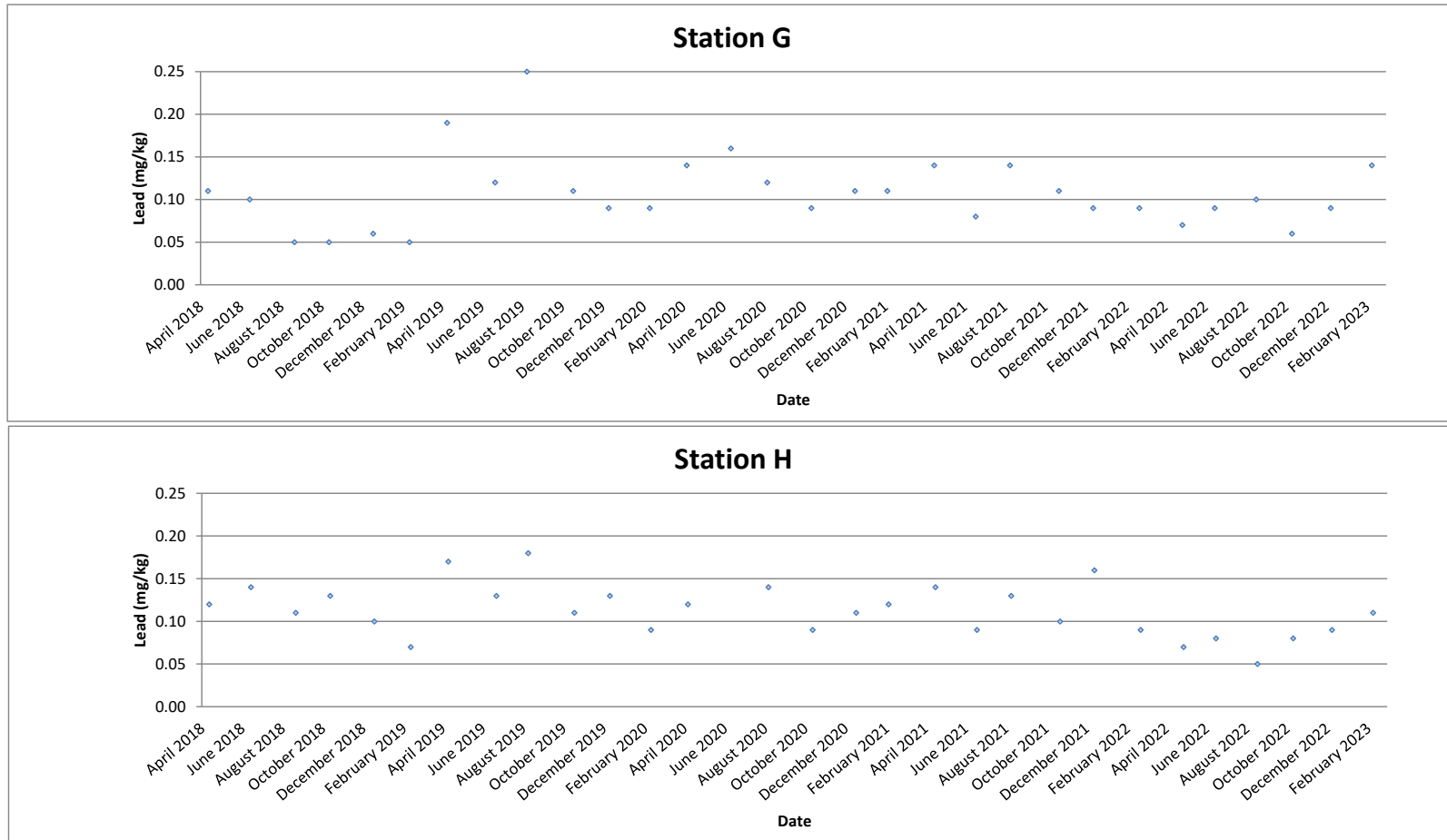
Weather Range:

Fine

Major activities in the reporting period:

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

Mercury (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

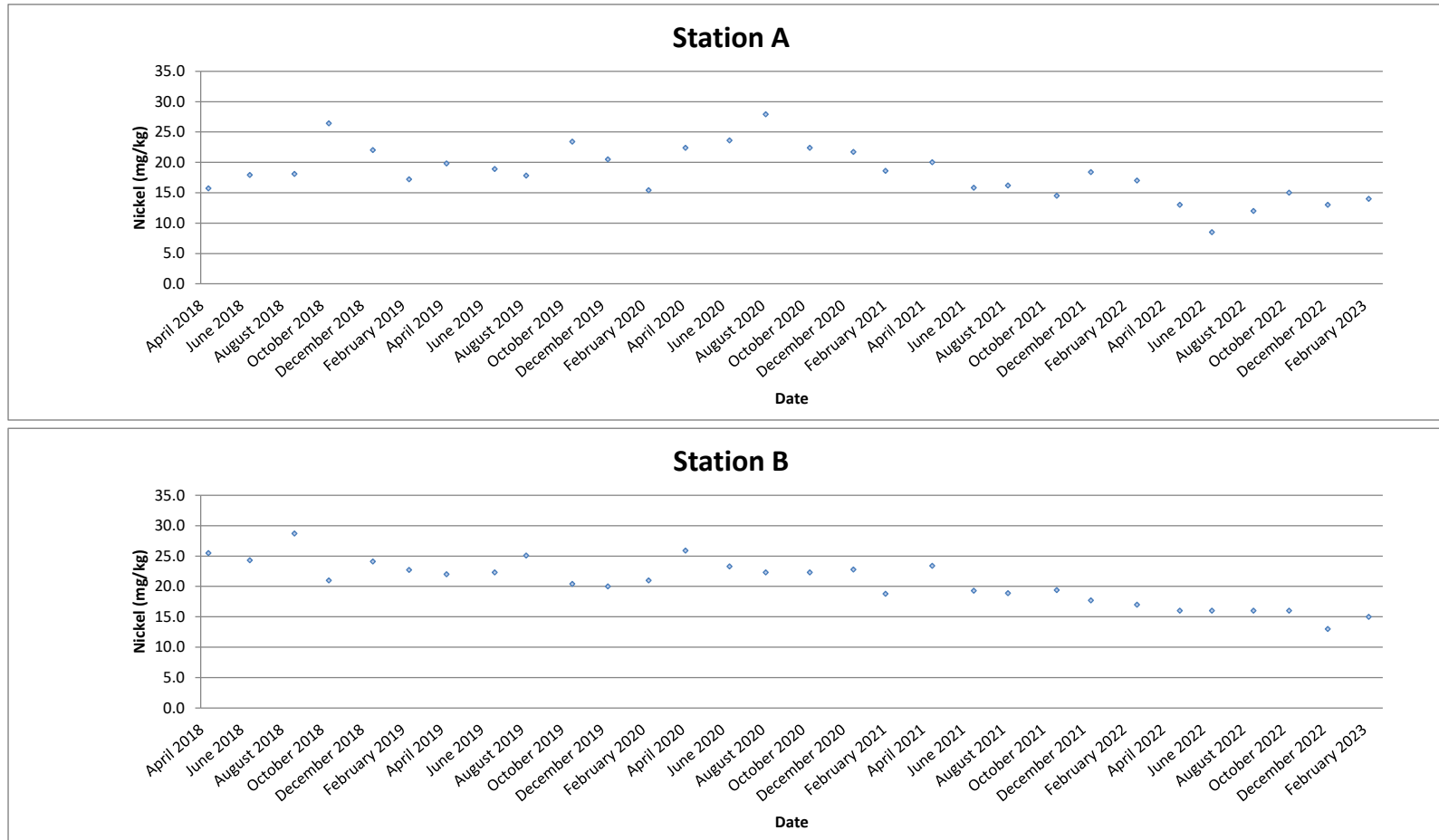
Weather Range:

Fine

Major activities in the reporting period:

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

Nickel (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

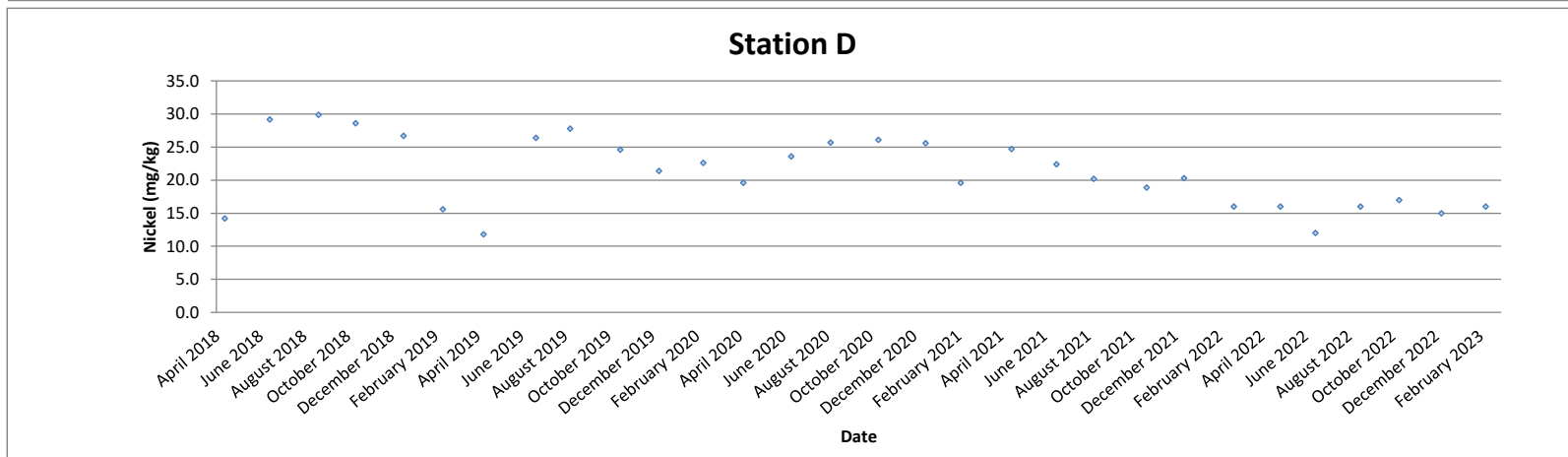
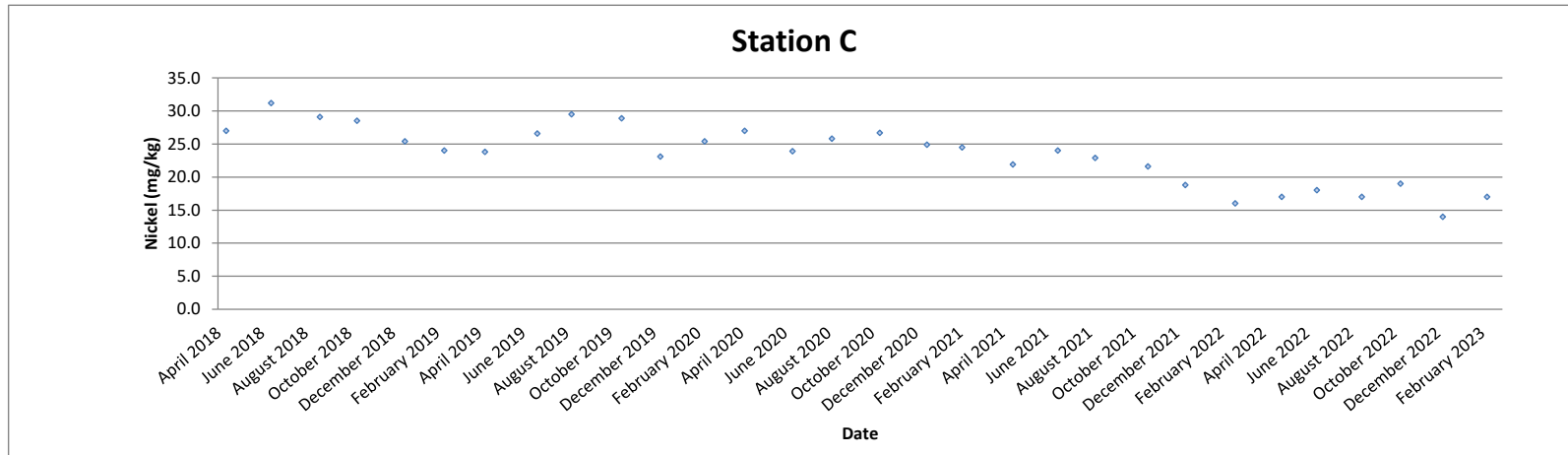
Weather Range:

Fine

Major activities in the reporting period:

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

Nickel (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

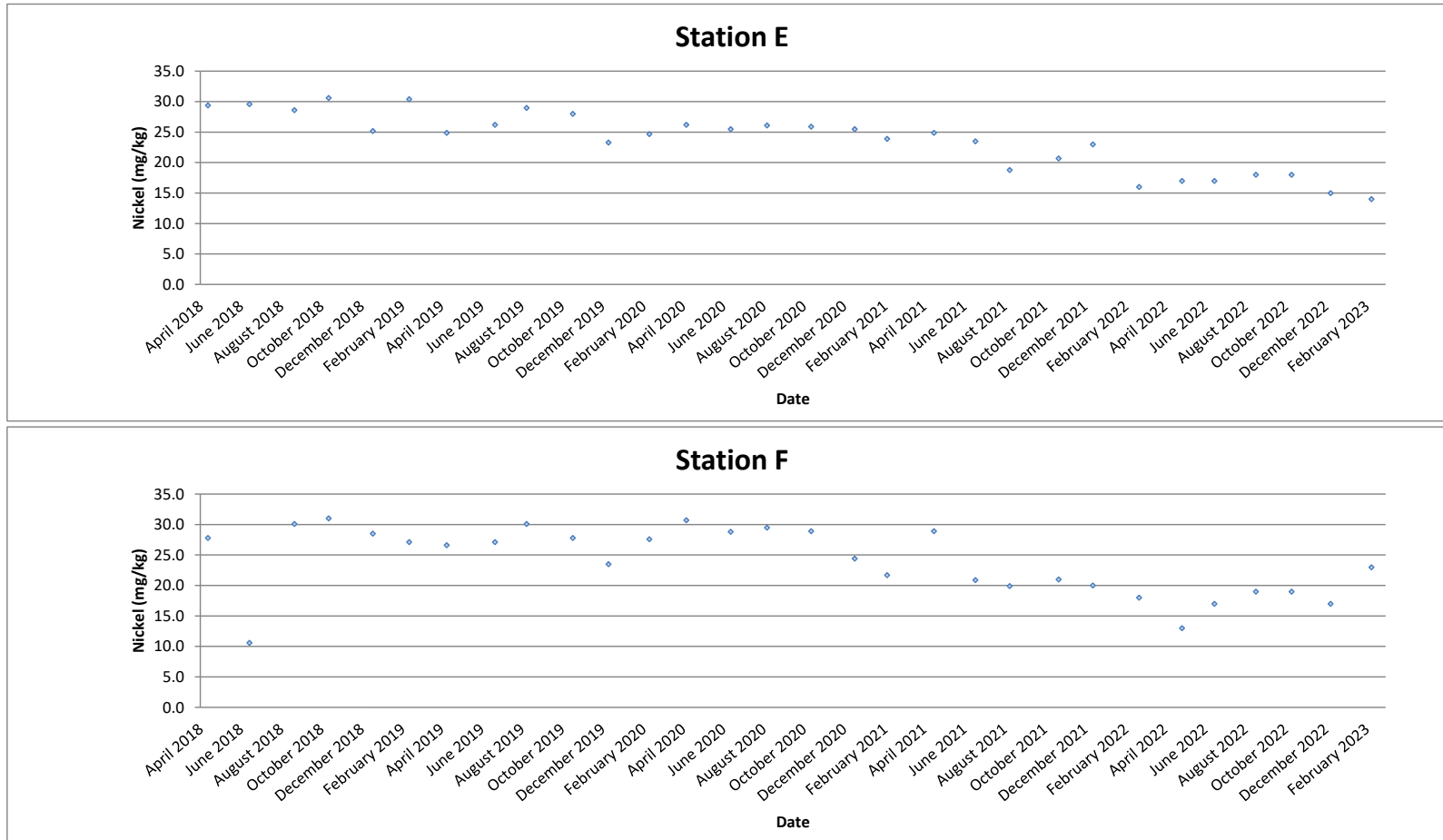
Weather Range:

Fine

Major activities in the reporting period:

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

Nickel (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

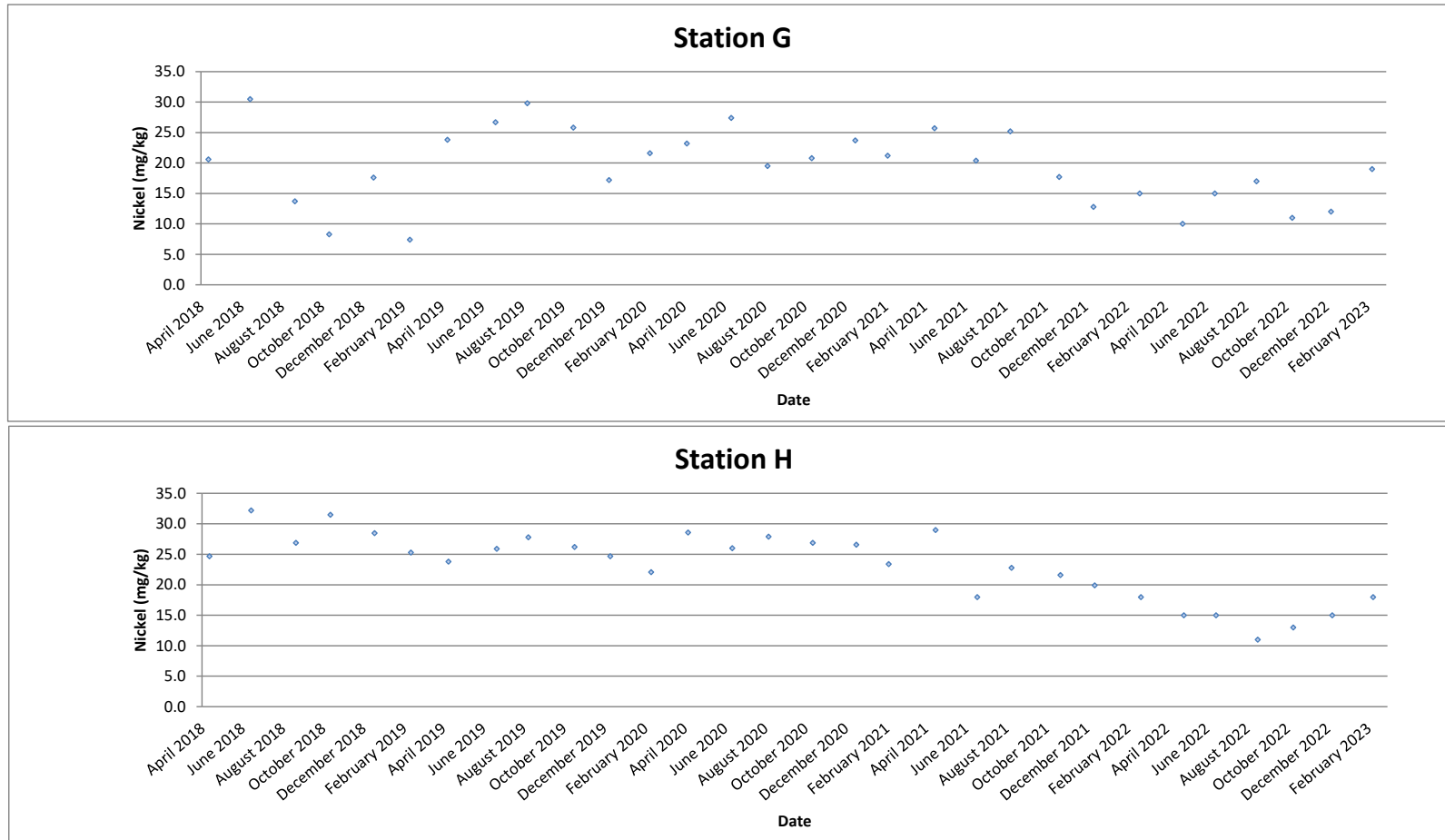
Weather Range:

Fine

Major activities in the reporting period:

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

Nickel (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

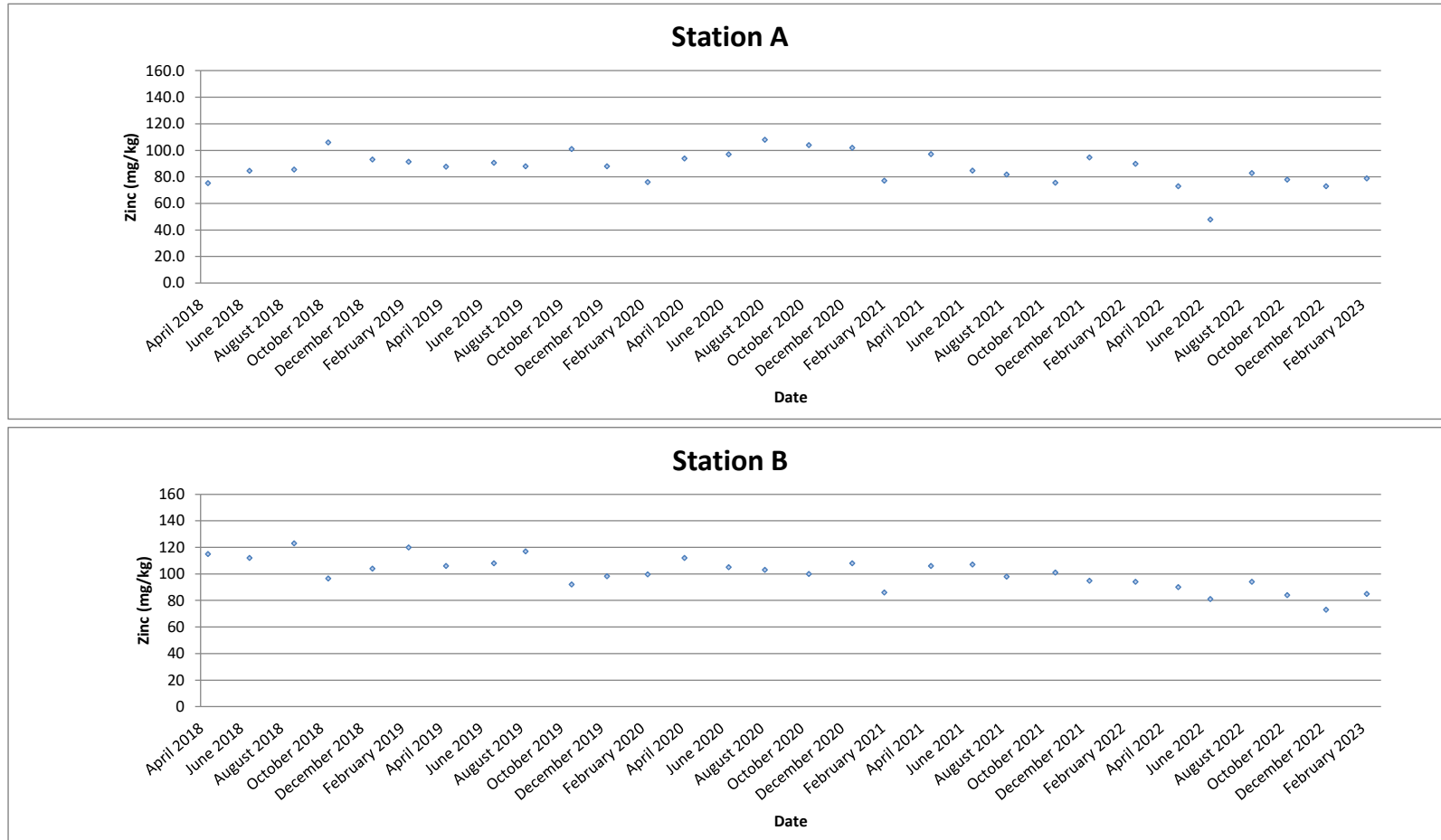
Weather Range:

Fine

Major activities in the reporting period:

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

Zinc (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

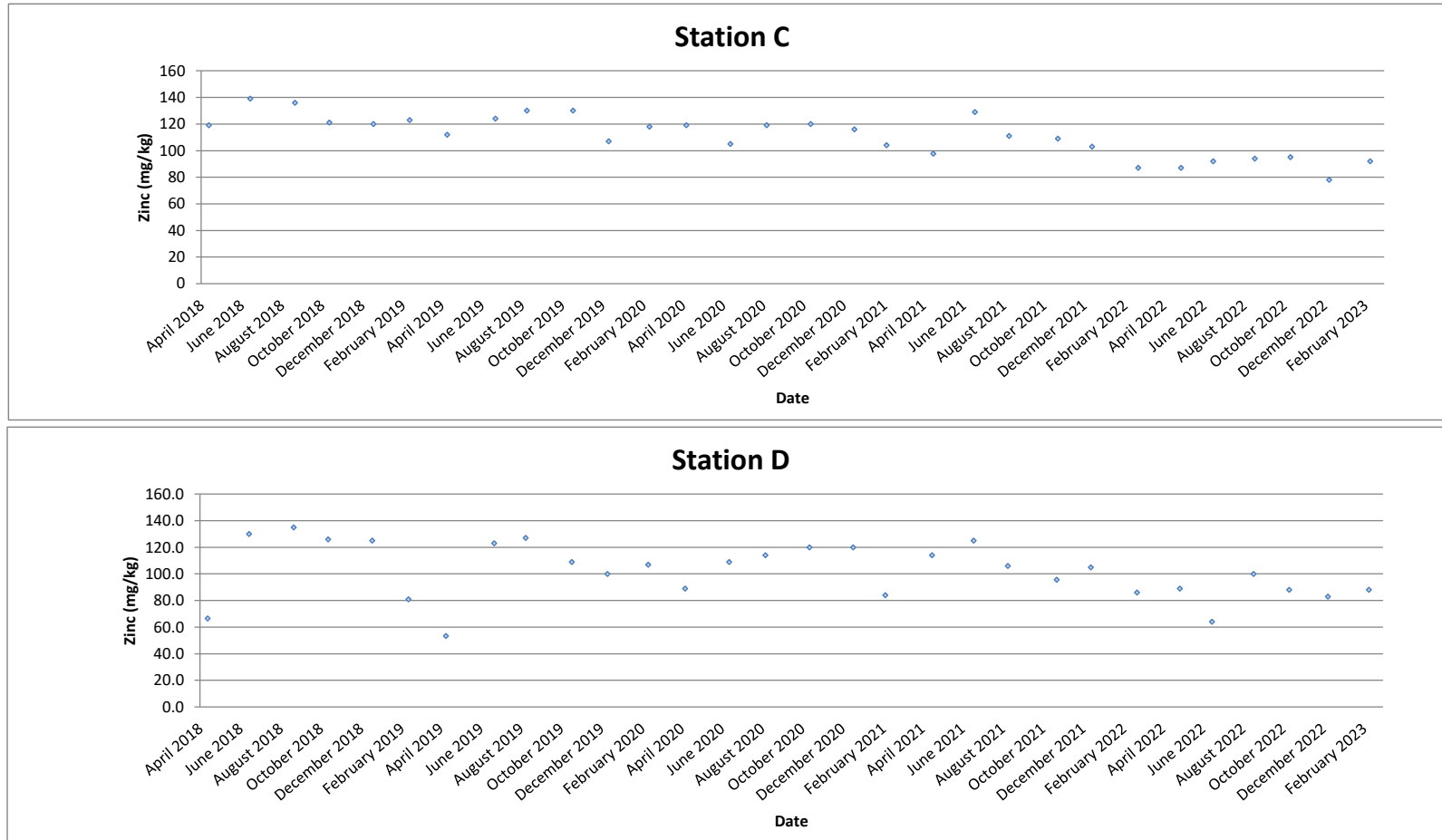
Weather Range:

Fine

Major activities in the reporting period:

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

Zinc (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

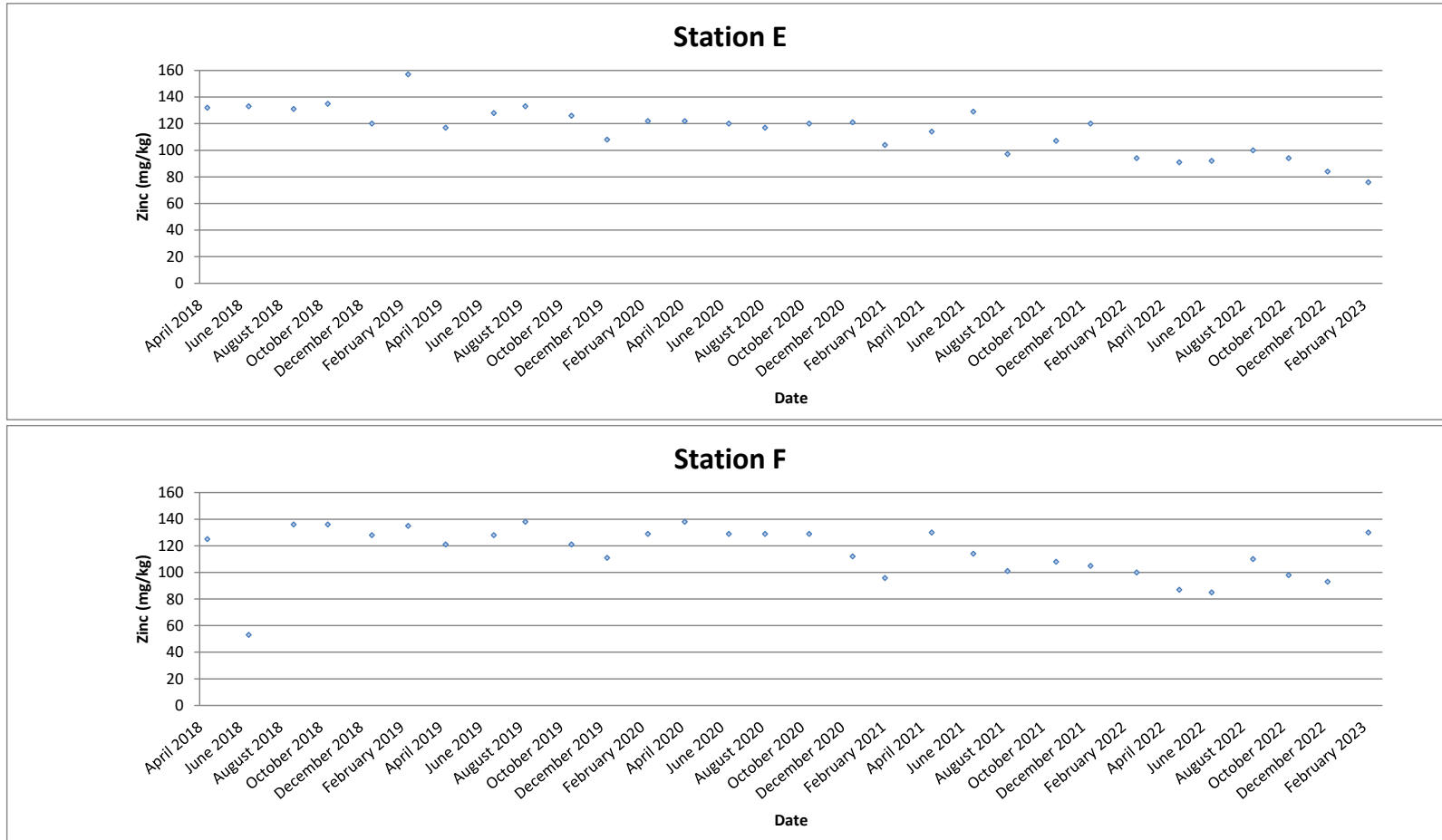
Weather Range:

Fine

Major activities in the reporting period:

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

Zinc (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

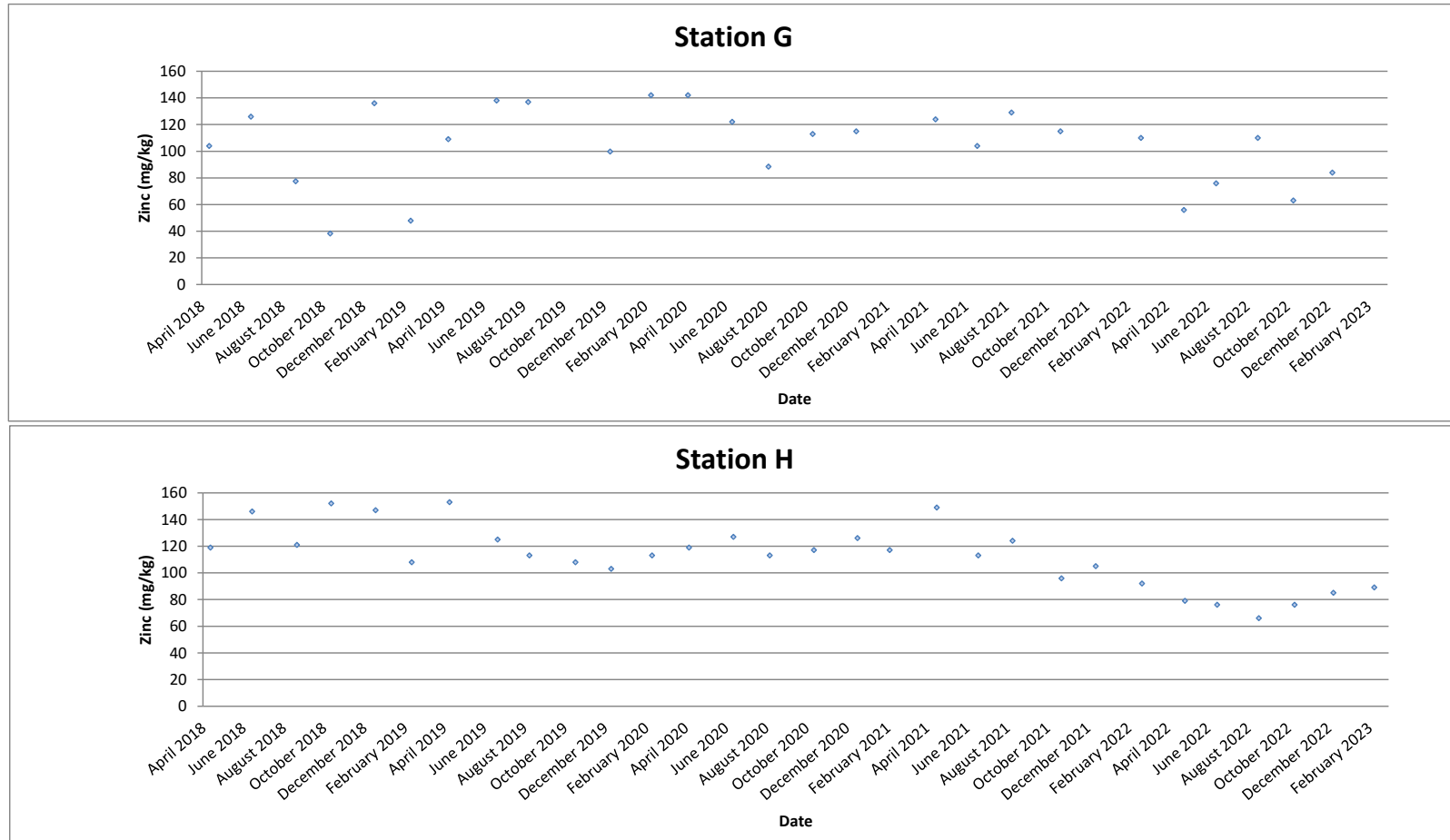
Weather Range:

Fine

Major activities in the reporting period:

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

Zinc (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

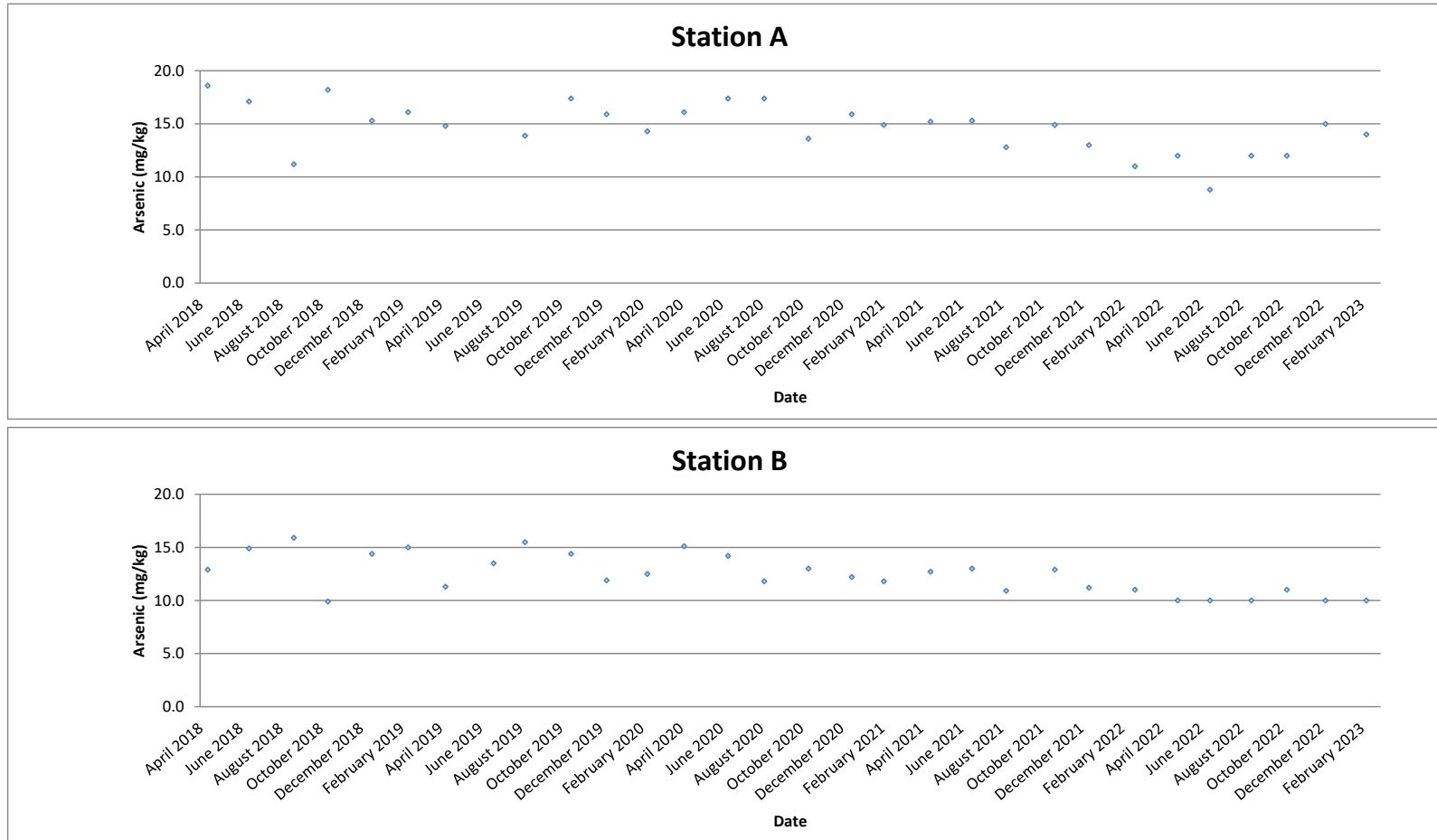
Weather Range:

Fine

Major activities in the reporting period:

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

Arsenic (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

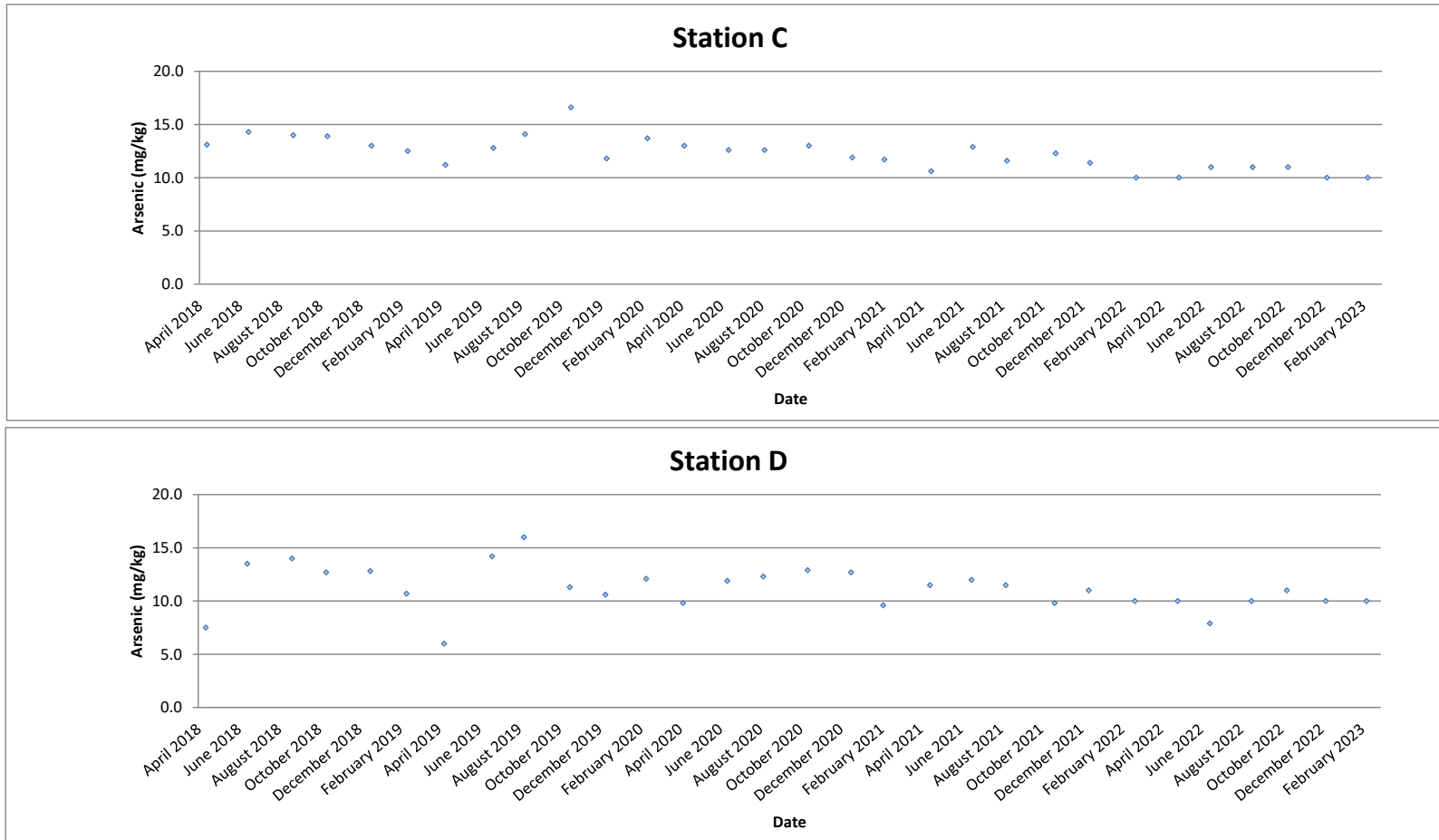
Weather Range:

Fine

Major activities in the reporting period:

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

Arsenic (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

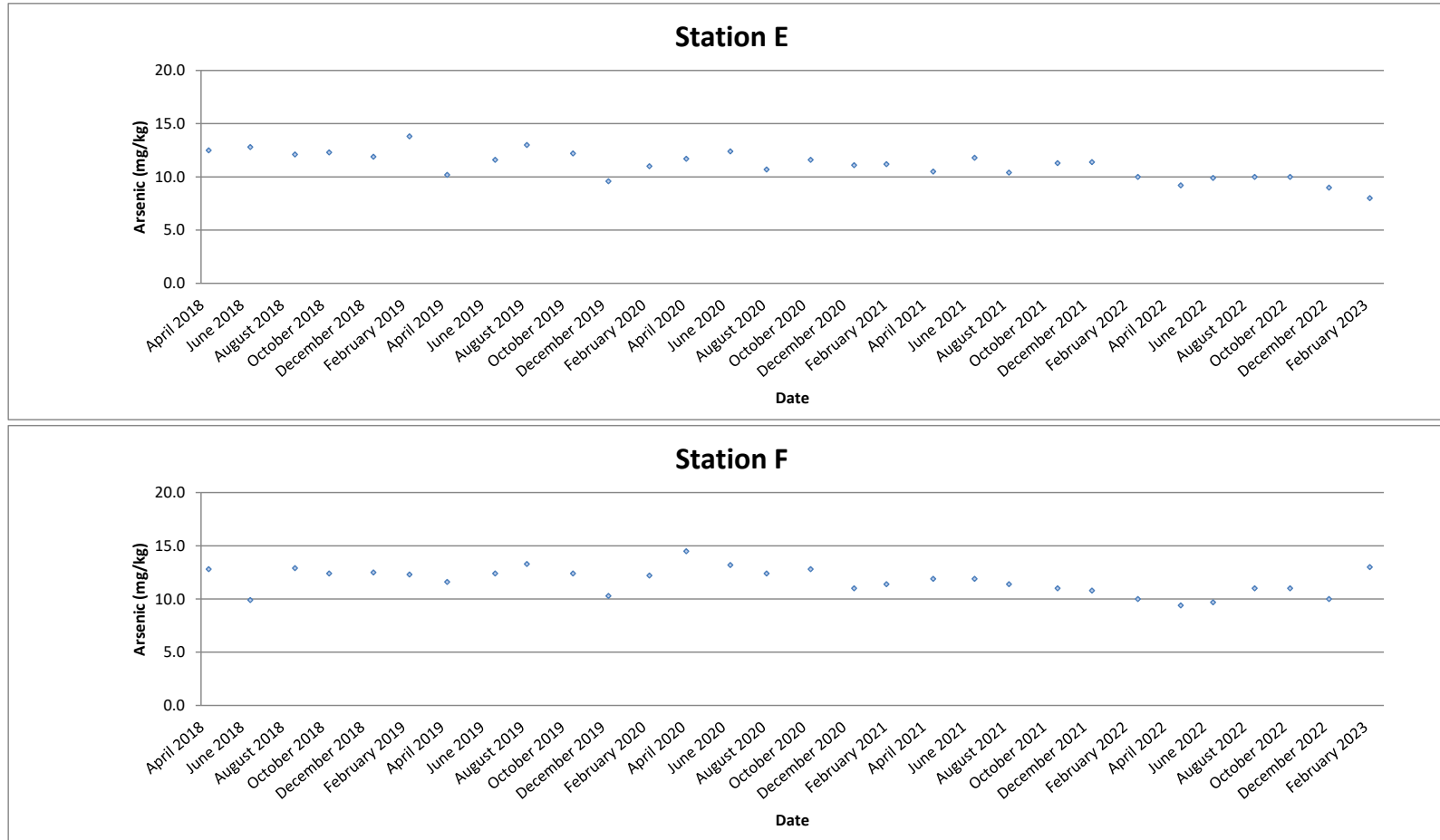
Weather Range:

Fine

Major activities in the reporting period:

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

Arsenic (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

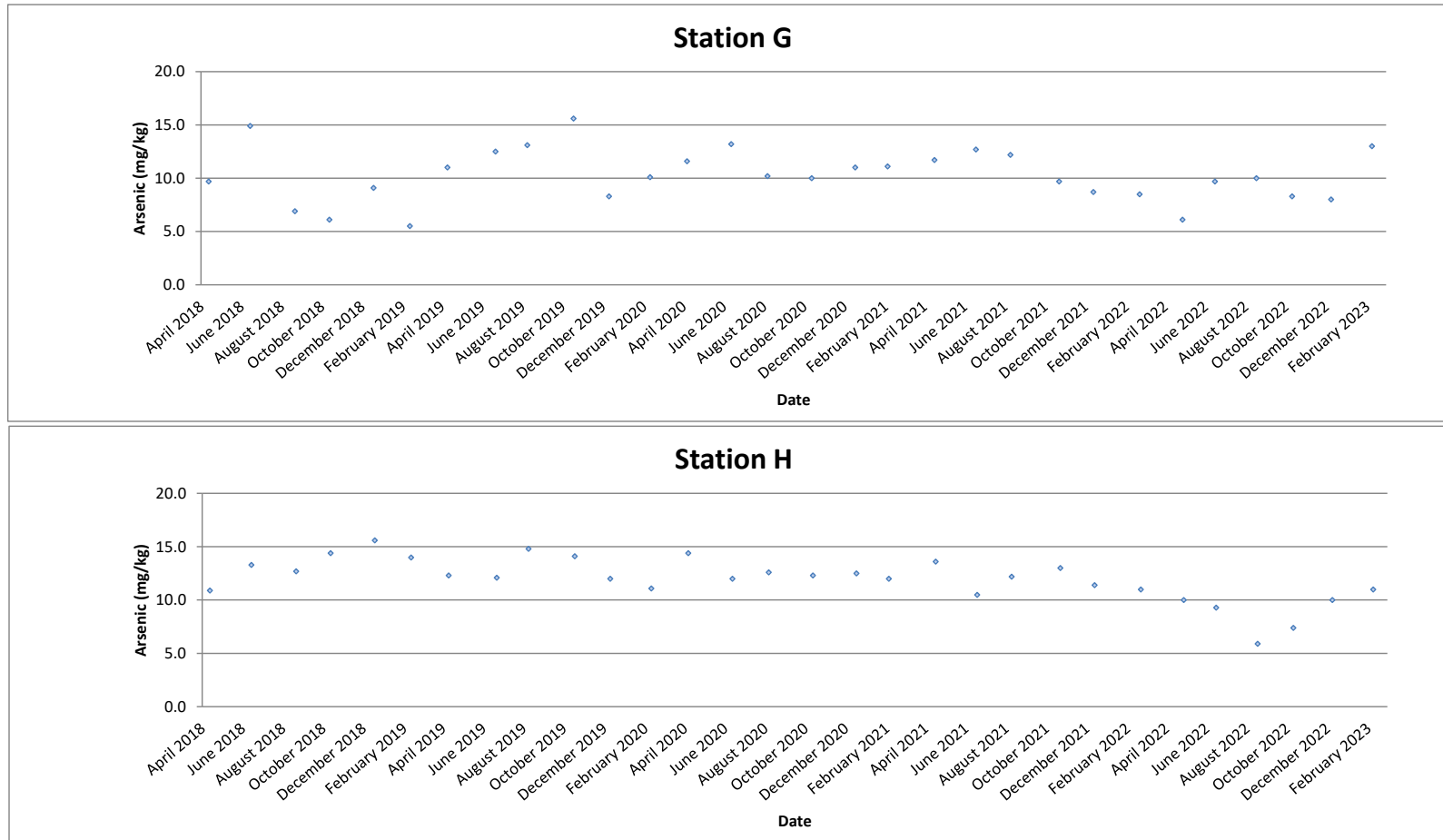
Weather Range:

Fine

Major activities in the reporting period:

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

Arsenic (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contractions works nearby the project site

Notes:

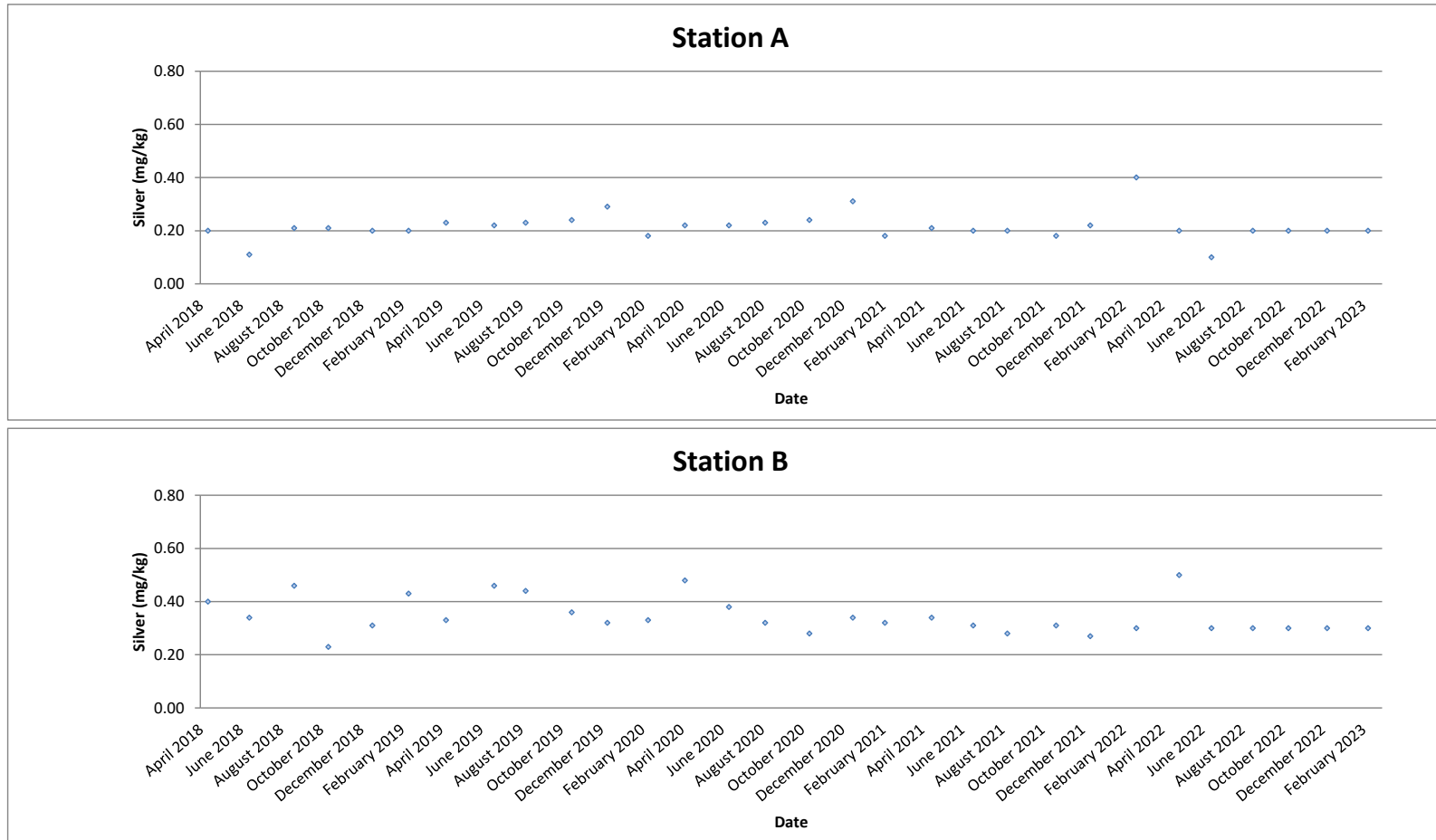
Weather Range:

Fine

Major activities in the reporting period:

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

Silver (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

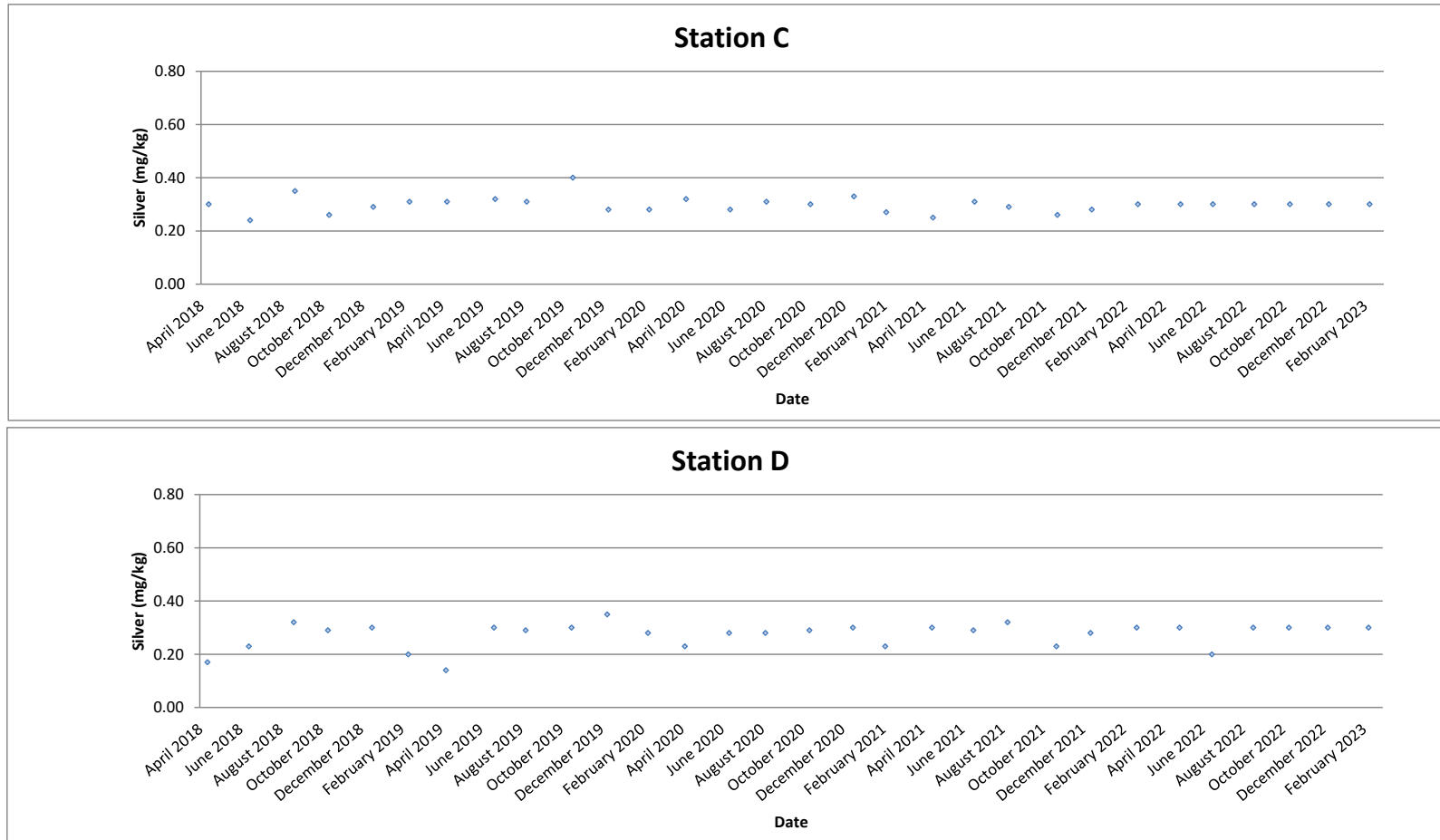
Weather Range:

Fine

Major activities in the reporting period:

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

Silver (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

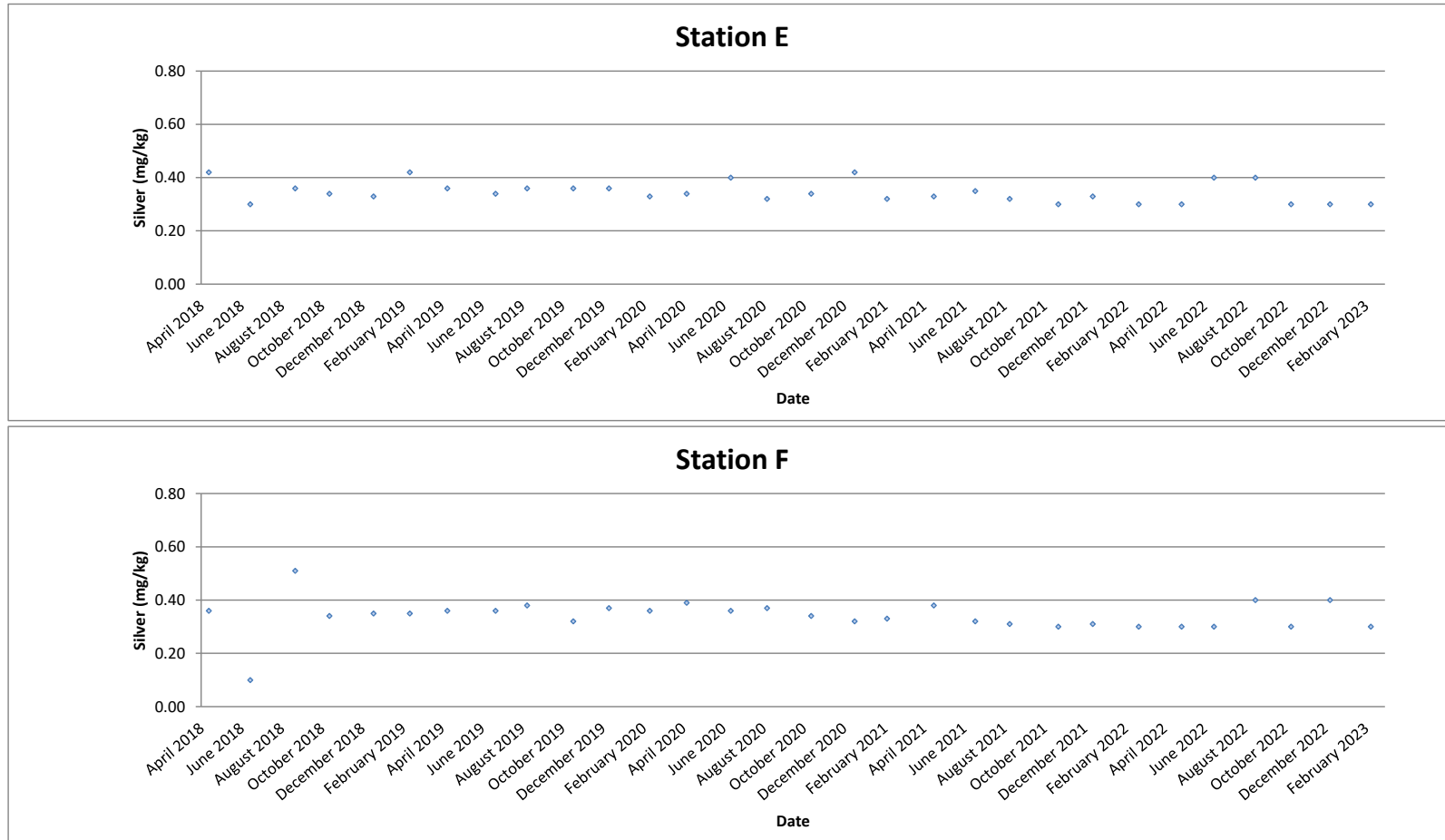
Weather Range:

Fine

Major activities in the reporting period:

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

Silver (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Contraction works nearby the project site

Notes:

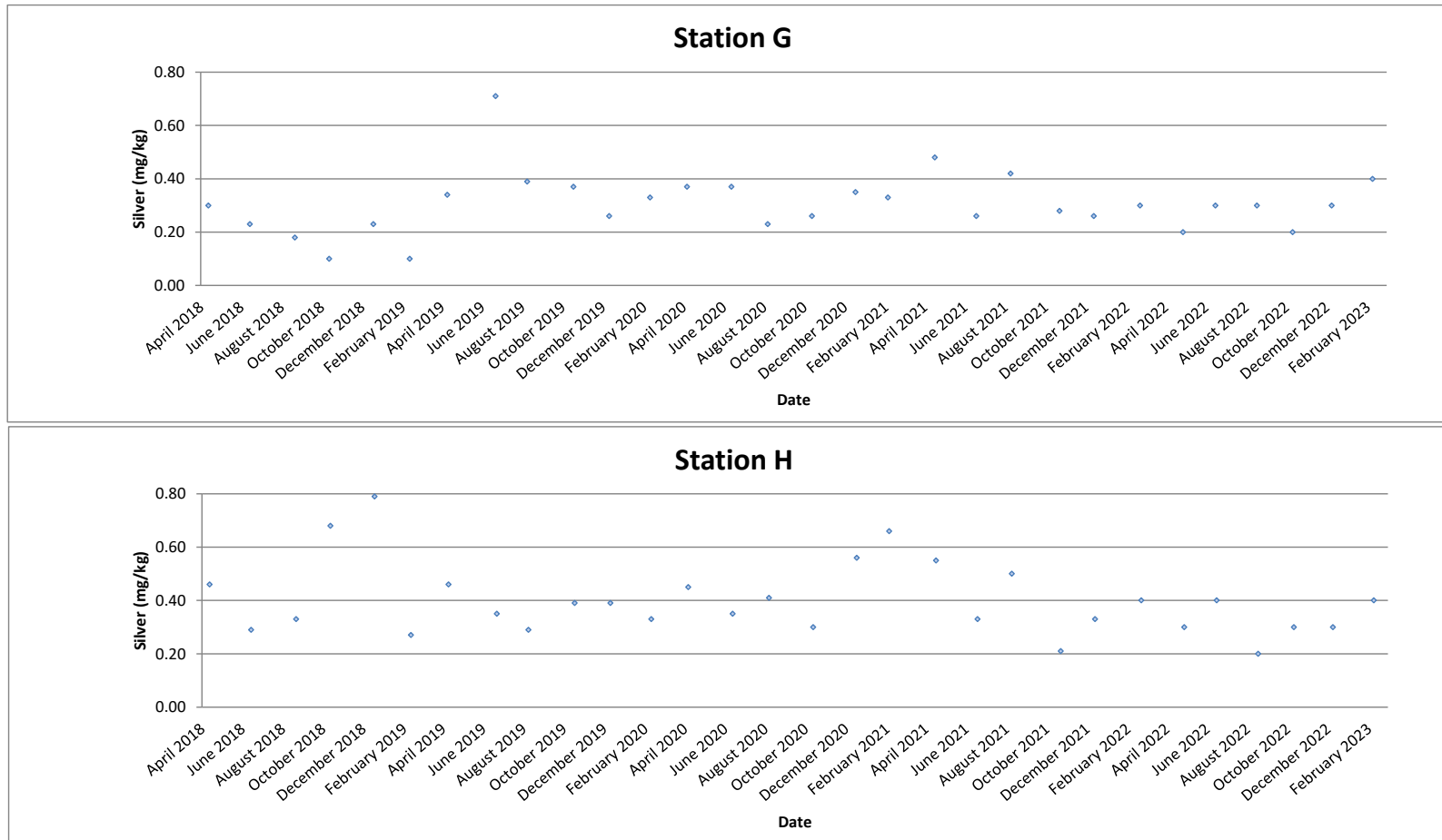
Weather Range:

Fine

Major activities in the reporting period:

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

Silver (mg/kg)



Major sources for monitoring stations

Project related:

1. Treated effluent discharge

Non-project related:

1. Heavy marine traffic
2. Construction works nearby the project site

Notes:

Weather Range:

Fine

Major activities in the reporting period:

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

Total Abundance

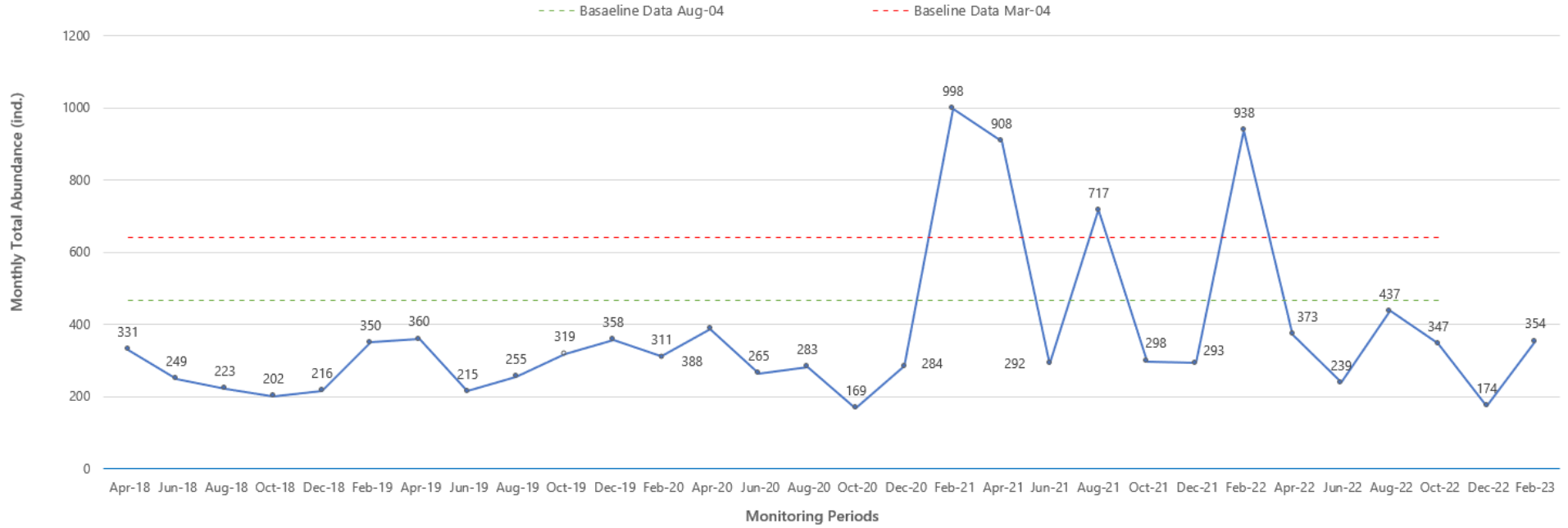


Figure 1: Monthly total abundance (ind.) of benthic organisms throughout the entire monitoring period

Total Biomass

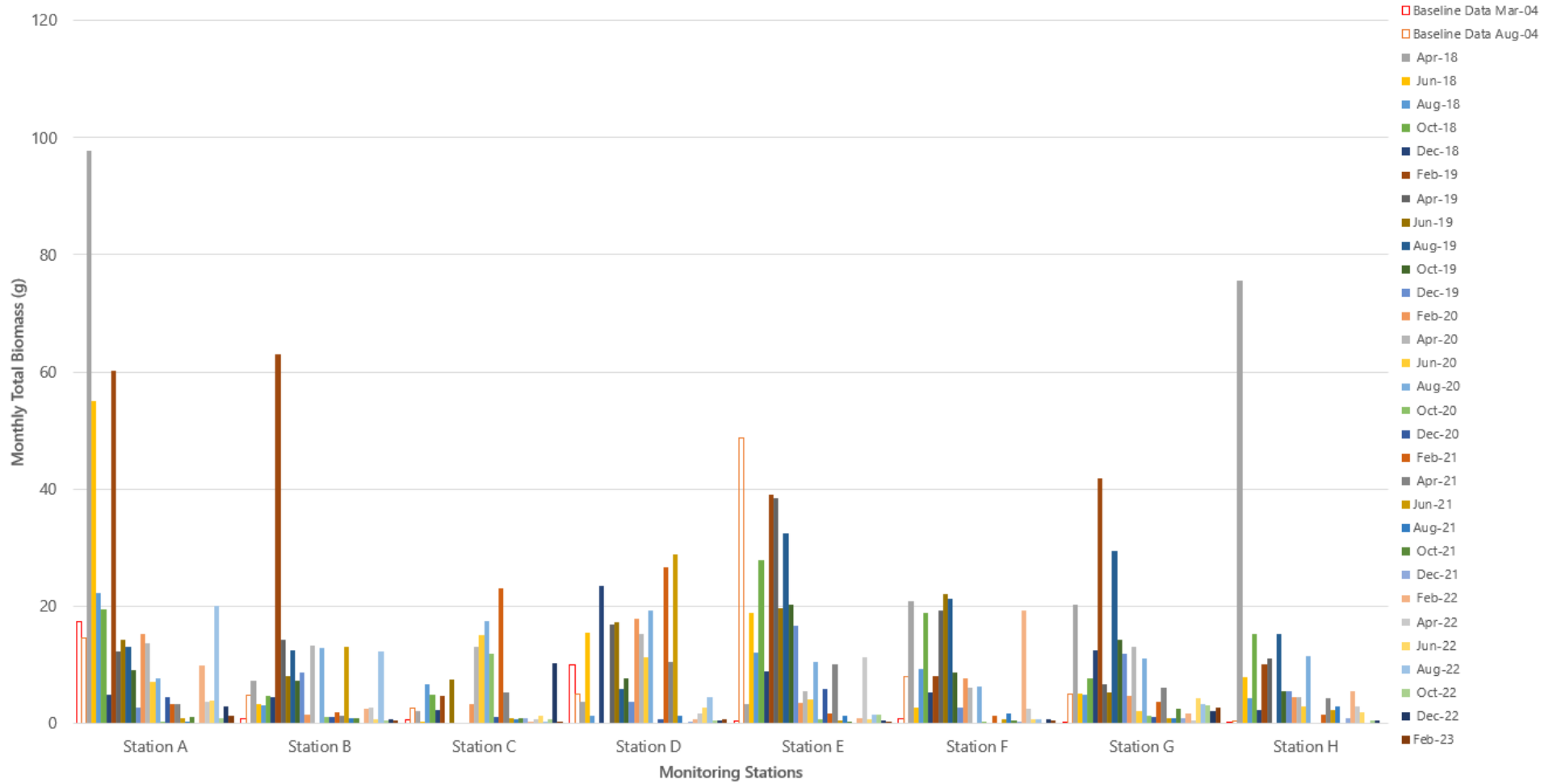


Figure 3: Monthly total biomass (g) of benthic organisms across monitoring stations throughout the entire monitoring period

Percent composition

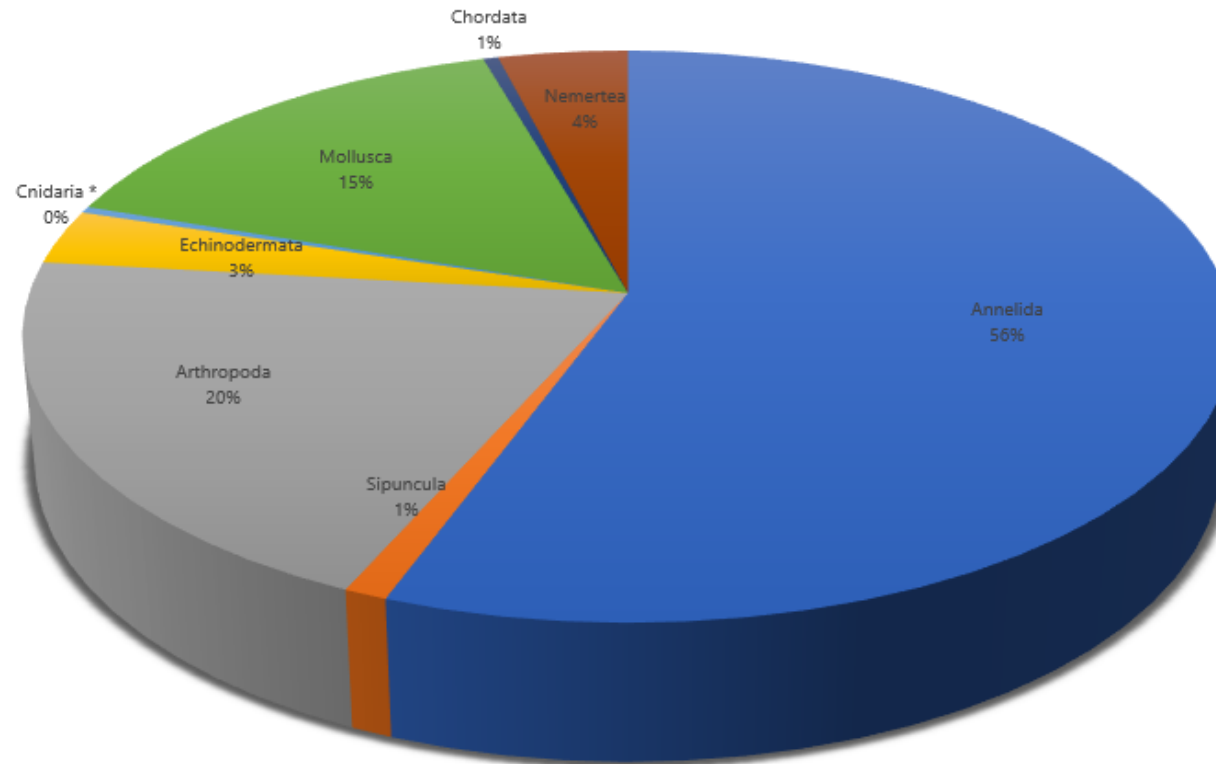


Figure 4: Percent composition of benthic organisms throughout the entire monitoring period

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

Appendix D

Environmental Mitigation Implementation Schedule (EMIS)

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

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 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

The copyright of this document is owned by Fugro Technical Services Limited. It may not be reproduced except with prior written approval from the Company.

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

EP Ref.	EIA Ref.	WMP Ref.	Environmental Protection Measures	Location of the measures	Implementation Status
NA	NA	5.07	Temporary storage areas should be identify and provided for the temporary storage of general refuse to facilitate collection	SHWSTW	Implemented
NA	NA	5.07	Domestics wastes refuse generated on-site will be stored in enclosed bins or compaction units separately	SHWSTW	Implemented
NA	NA	5.07	Sufficient dustbins should be provided for domestic waste if required.	SHWSTW	Implemented
NA	NA	5.07	Domestics wastes should be cleared daily and will be disposed off to the nearest licensed landfill or refuse transfer station.	SHWSTW	Implemented
NA	NA	5.07	Spearate labeled bins should be provided to segregate the waste generated by workforce. Waste recycle collector should be employed to collect the segregated waste	SHWSTW	Implemented
NA	NA	5.07	Cardboard and paper packaging (for plant, equipment and materials) 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	SHWSTW	Implemented

The copyright of this document is owned by Fugro Technical Services Limited. It may not be reproduced except with prior written approval from the Company.

FUGRO TECHNICAL SERVICES LIMITED

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

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



Report No.: 0041/17/ED/0707

EP Ref.	EIA Ref.	WMP Ref.	Environmental Protection Measures	Location of the measures	Implementation Status
			and submitted to the Chief Technical Officer for review on the following day. Any deficiency should be rectified promptly.		
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

The copyright of this document is owned by Fugro Technical Services Limited. It may not be reproduced except with prior written approval from the Company.