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Report No.: 0041/17/ED/0548A

## Quarterly EM&A Report February 2020 - April 2020

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/0548A

Prepared by: Andy K. H. Choi

Reviewed by: Cyrus C. Y. Lai

Certified by:

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

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

Our Ref. 1458/20-0096



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

21 May 2020

**By Post and E-mail**

Dear Sir,

**RE: CONTRACT No. CM 13/2016  
INDEPENDENT ENVIRONMENTAL CHECKER FOR OPERATIONAL ENVIRONMENTAL MONITORING  
AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT WORKS (SHWSTW)  
QUARTERLY ENVIRONMENTAL MONITORING AND AUDIT (EM&A) REPORT  
(FEBRUARY 2020 TO APRIL 2020)**

Reference is made to the submission of Quarterly Environmental Monitoring and Audit (EM&A) Report (February 2020 to April 2020) (Report No.: 0041/17/ED/0548A) received from the Environmental Team (ET), Fugro Technical Services Ltd., on 21 May 2020 via email.

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

Notwithstanding, please be reminded that the ET shall strictly follow Condition 4.3 of the EP to submit EM&A report within two weeks after the completion of each reporting period and the report shall be certified by the Independent Environmental Checker (IEC) before depositing with the Environmental Protection Department.

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

Yours faithfully,

For and on behalf of  
**Allied Environmental Consultants Ltd.**

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

Grace M. H. KWOK  
Independent Environmental Checker

GK/jn/dt

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

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

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

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### EXECUTIVE SUMMARY

The Drainage Services Department (DSD) of Hong Kong Special Administrative Region has appointed Fugro Technical Services Limited (FTS) to undertake the Environmental Team services for the Project and implement the EM&A works.

This is the eleventh Quarterly EM&A Report presents the environmental monitoring and audit works for the period between 1 February 2020 and 30 April 2020. As informed by the Contractor, major activities in the reporting period included:

#### February 2020 - April 2020

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

### Breaches of Action and Limit Levels

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

Water quality monitoring, sediment quality monitoring and benthic survey were carried out on February 2020 and April 2020. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

### Complaint Log

There were no complaints received in relation to environmental impact during the reporting period. The incident report for the complaint case received on 28 November 2019 was submitted to EPD on 19 December 2019. Further investigation based on the EPD's comments received on 21 January 2020 was completed and the updated incident report was submitted to EPD on 12 March 2020. No further comment is received from EPD on 13 March 2020. Details of the complaint case was recorded in **Appendix G**.

### Notifications of Summons and Successful Prosecutions

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

### Summary of the Environmental Mitigations Measures

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

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## 1. INTRODUCTION

### 1.1 Background

1.1.1 The Project "Upgrading of Siu Ho Wan Sewage Treatment Works" is to upgrade Siu Ho Wan Sewage Treatment Works (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 Environmental Impact Assessment Ordinance (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 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.

1.1.4 This Quarterly EM&A report is required under Section 8.5 of the OEM&A Plan. It is to report the results and findings of the EM&A programme required in the OEM&A Plan.

1.1.5 This is the eleventh quarterly OEM&A Report which summaries the impact monitoring results and audit findings for the Project within the period between 1 February 2020 and 30 April 2020.

### 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 Chinese white dolphin (CWD) 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	Ms. Grace Kwok	2815 7028	2815 5399

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	Checker (IEC)			
FTS	ET Leader (ETL)	Mr. Colin Yung	3565 4114	2450 8032

## 1.4 Work Undertaken during the Report Period

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

<b>February 2020 - April 2020</b>
<ul style="list-style-type: none"><li>▪ Perform comprehensive operation and maintenance services for the electrical, mechanical and electronic systems/equipment at SHWSTW.</li><li>▪ Alleviate as far as practicable the impact that the facilities and sewage systems imposed on the environment of Hong Kong.</li></ul>

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## 2. SUMMARY OF EM&A REQUIREMENTS AND MONITORING RESULTS

### 2.1 Monitoring Requirement

2.1.1 In accordance with the approved OEM&A Plan, air quality monitoring (odour patrol monitoring, H<sub>2</sub>S measurement and olfactometry analysis), water quality monitoring (onsite measurement and laboratory analysis), sediment quality & benthic survey at the designated monitoring stations are required. Data interpretation for the distribution and abundance of Chinese white dolphin (CWD) from the survey undertaken by the Agriculture, Fisheries and Conservation Department (AFCD) is also required for CWD monitoring.

2.1.2 Air quality monitoring (H<sub>2</sub>S concentration monitoring and Odour patrol) should be conducted on a weekly basis for six months during initial operation stage while the odour sampling for olfactometry analysis should be conducted on the first week of the odour patrol monitoring. As advice by EPD on the odour complaint received in November 2019, odour patrol monitoring was resumed on weekly basis since January 2020 and a modified version of odour patrol monitoring is proposed and approved on 13 March 2020. According to the approved proposal for odour patrol monitoring plan (0041/17/ED/0524G), a modified version of odour patrol monitoring was commenced from 20 March 2020. The Action and Limit Levels of the air quality monitoring are given in **Appendix B**.

2.1.3 For water quality monitoring, sediment quality & benthic survey and CWD monitoring should be carried out once per two months for a period of five years.

### 2.2 Monitoring Locations

2.2.1 H<sub>2</sub>S concentration monitoring and odour sampling were temporarily suspended from 14 May 2018. According to the OEM&A Plan, odour patrol monitoring was carried out at ASR, Cheung Tung Road near the Bus Depot at the west of the Siu Ho Wan Treatment Plant. The location of ASR is shown in **Figure 1**.

2.2.2 According to the approved proposal for odour patrol monitoring plan (0041/17/ED/0524G), 9 odour patrol points is chosen to conduct the modified odour patrol from 20 March 2020 for collecting more representative data and identify the particular source of odour in the site. The nine odour patrol points are shown in **Table 2.1** and **Figure 2**.

**Table 2.1 Odour Patrol Point**

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

Note:

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



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2.2.3 In accordance with Section 5 of the EM&A Plan, water quality monitoring should be carried out at 8 designated monitoring locations (2 impact stations and 6 control stations). The monitoring locations shall be the same monitoring locations that were used for the baseline monitoring programme and have been approved by EPD. The coordinates of the monitoring location is shown in **Table 2.2**. The monitoring locations of water quality monitoring, Sediment Quality Monitoring and Benthic Survey are also shown in **Figure 3**.

**Table 2.2 Location of Water Quality Monitoring, 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

**2.3 Monitoring Parameter**

2.3.1 The durations and frequencies of H<sub>2</sub>S concentration measurement, odour patrolling and odour sampling are summarized in **Table 2.3** below.

**Table 2.3 Durations and Frequencies of Air Quality Monitoring Programme**

	Duration	Frequency
H <sub>2</sub> S concentration monitoring	15 minutes	<sup>1</sup> Weekly basis for 6 months during the initial operation stage
Odour patrol		<sup>4</sup> Weekly basis
Odour sampling for olfactometry analysis	<sup>3</sup> 15 minutes	<sup>2</sup> First week of the odour patrol monitoring

Remark:

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

2.3.2 The monitoring parameters for water quality monitoring are summarized in **Table 2.4**.

**Table 2.4 Parameters for Water Quality Monitoring**

Monitoring Parameters	
In-situ Measurement	Laboratory Analysis
Dissolved oxygen (mg/L)	<i>E. coli</i> (cfu/100ml)





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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)

2.3.3 The monitoring parameters for sediment quality monitoring and benthic survey are summarized in **Table 2.5**.

**Table 2.5 Parameters for Sediment Quality Monitoring and Benthic Survey**

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

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

2.3.4 Apart from the parameters listed in the **Table 2.4** and **Table 2.5**, other relevant supplementary information such as monitoring location, time, weather conditions and any special phenomena shall be also recorded.

2.3.5 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**. Tidal data obtained from Ma Wan Marine Traffic Station is present in **Appendix E**.

**2.4 Results and Observations**

2.4.1 As advice by EPD on the odour complaint received in November 2019, odour patrol monitoring was resumed on weekly basis at ASR and carried out on 6, 12, 18 & 24 February 2020 and 6 & 12 March 2020. According to the proposal for odour patrol monitoring plan (0041/17/ED/0524G) approved on 13 March 2020, the modified odour patrol was carried out at 9 odour patrol points (OD1 – OD9) on 20, 24 & 30 March 2020 and 6, 17, 23 & 29 April 2020. As access permission from the company of Discovery Bay Tunnel is under requisition progress,



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OD5 (Spur Road near Discovery Bay Tunnel Outlet) was not covered in modified odour patrol monitoring in the reporting period temporarily. The monitoring data was summarized in **Table 2.6**. The graphical presentation of air quality monitoring results is given in **Appendix C**.

**Table 2.6 Summary of Air Quality Monitoring Data in Reporting Period**

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

Remark:

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

2.4.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H<sub>2</sub>S concentration (ppb) with the odour unit (OU/m<sup>3</sup>). H<sub>2</sub>S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H<sub>2</sub>S concentration (ppb) with the odour unit (OU/m<sup>3</sup>). Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspension on air quality monitoring was approved by EPD's memo dated 14 May 2018. In order to recommence the monitoring, a review on air quality monitoring had been carried out to determine reasonable odour-related criteria and was submitted to EPD for approval on 24 March 2020. Comments from EPD was received on 1 April 2020 and the review is currently under revision for further submission to the EPD.

2.4.3 Water quality monitoring, sediment quality monitoring and benthic survey were conducted on 10 February 2020 and 6 April 2020 to collect data for future reference in accordance with Section 5.5 and 6.5 of the Operational EM&A Plan. 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. The summaries of results collected of the monitoring were presented in the below tables. The graphical presentation of water quality monitoring results, sediment quality monitoring and benthic survey results are given in **Appendix D** and **Appendix F** respectively.

**Table 2.7 Summary of In-situ Monitoring Results on 10 February 2020 (Depth – Average)**

Monitoring Station		pH	Salinity (ppt)	Temperature (degree Celsius)	Dissolved oxygen (mg/L)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	E	8.00	34.45	18.62	6.74	2.4	0.25	212.0
	F	8.42	34.67	18.56	6.73	4.0	0.33	215.2
B	E	7.97	34.52	18.65	6.78	2.5	0.39	200.6

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Monitoring Station		pH	Salinity (ppt)	Temperature (degree Celsius)	Dissolved oxygen (mg/L)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
C	F	8.42	34.70	18.41	6.38	4.6	0.29	204.5
	E	8.03	34.54	18.63	6.84	1.8	0.36	207.9
	F	8.43	34.71	18.61	6.65	4.3	0.30	226.7
D	E	8.09	34.62	18.58	6.99	2.4	0.29	206.2
	F	8.72	34.67	18.57	6.64	4.5	0.46	203.7
E	E	8.14	34.79	18.58	7.06	2.8	0.21	222.4
	F	8.44	34.65	18.56	6.79	3.2	0.14	190.3
F	E	8.20	34.84	18.50	7.23	2.5	0.25	198.5
	F	8.15	34.71	18.64	6.69	3.0	0.28	207.9
G	E	7.86	34.48	18.57	6.82	4.7	0.29	231.7
	F	8.14	34.71	18.62	6.72	2.8	0.20	216.0
H	E	7.87	33.55	18.55	7.00	4.5	0.34	210.9
	F	8.14	34.70	18.62	6.63	3.1	0.25	211.2

Table 2.8 Summary of In-situ Monitoring Results on 6 April 2020 (Depth – Average)

Monitoring Station		pH	Salinity (ppt)	Temperature (degree Celsius)	Dissolved oxygen (mg/L)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	E	7.54	30.91	21.22	6.49	5.9	0.31	293.7
	F	7.85	29.25	21.14	6.60	5.5	0.05	47.0
B	E	7.74	30.86	21.28	6.49	5.6	0.12	122.8
	F	7.85	29.12	21.18	6.57	5.6	0.21	246.4
C	E	7.78	30.49	21.30	6.52	4.7	0.13	141.1
	F	7.85	29.19	21.19	6.57	5.6	0.13	134.5
D	E	7.78	30.45	21.30	6.41	4.9	0.20	208.0
	F	7.85	29.22	21.19	6.57	5.8	0.11	40.4
E	E	7.80	31.39	21.20	6.48	4.5	0.09	165.9
	F	7.85	29.10	21.17	6.59	5.6	0.25	151.0
F	E	7.81	31.32	21.21	6.29	4.2	0.09	70.4
	F	7.84	29.20	21.19	6.57	5.7	0.22	273.2
G	E	7.79	31.23	21.35	6.50	5.9	0.14	91.9
	F	7.81	29.19	21.18	6.59	5.9	0.17	290.8
H	E	7.80	31.37	21.34	6.32	6.7	0.22	125.7
	F	7.76	29.23	21.14	6.63	5.6	0.08	177.1

Table 2.9 Summary of Laboratory Analysis Results on 10 February 2020 (Depth – Average)

Monitoring Station		TSS (mg/L)	NH <sub>3</sub> as N (mg/L)	NO <sub>2</sub> <sup>-</sup> as N (mg/L)	NO <sub>3</sub> <sup>-</sup> as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD <sub>5</sub> (mg/L)
A	E	6.2	0.056	0.007	0.073	0.133	121	0.02	<1.0
	F	11.1	0.057	0.009	0.078	0.143	293	0.02	1.1
B	E	6.7	0.055	0.007	0.075	0.133	102	0.01	<1.0
	F	11.2	0.062	0.006	0.080	0.147	365	0.02	1.3
C	E	7.0	0.048	0.009	0.155	0.210	300	0.06	<1.0

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Monitoring Station		TSS (mg/L)	NH <sub>3</sub> as N (mg/L)	NO <sub>2</sub> <sup>-</sup> as N (mg/L)	NO <sub>3</sub> <sup>-</sup> as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD <sub>5</sub> (mg/L)
D	F	11.1	0.055	0.005	0.081	0.137	258	0.02	1.5
	E	8.5	0.053	0.006	0.095	0.151	304	0.02	<1.0
E	F	11.1	0.060	0.006	0.078	0.141	213	0.02	1.4
	E	7.8	0.053	0.007	0.082	0.141	198	0.02	<1.0
F	F	7.9	0.046	0.006	0.081	0.131	262	0.02	1.6
	E	6.8	0.053	0.006	0.083	0.139	175	0.02	1.1
G	F	8.2	0.052	0.005	0.085	0.138	242	0.02	1.9
	E	4.4	0.079	0.007	0.077	0.160	145	0.02	1.7
H	F	7.1	0.043	0.006	0.083	0.128	232	0.02	2.1
	E	4.3	0.081	0.006	0.078	0.160	137	0.02	1.6
	F	7.8	0.041	0.005	0.084	0.124	99	0.02	2.2

Table 2.10 Summary of Laboratory Analysis Results on 6 April 2020 (Depth – Average)

Monitoring Station		TSS (mg/L)	NH <sub>3</sub> as N (mg/L)	NO <sub>2</sub> <sup>-</sup> as N (mg/L)	NO <sub>3</sub> <sup>-</sup> as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD <sub>5</sub> (mg/L)
A	E	6.0	0.103	0.020	0.286	0.409	38	0.02	<1.0
	F	6.2	0.104	0.023	0.407	0.534	7	0.02	<1.0
B	E	5.4	0.104	0.020	0.284	0.407	ND	0.02	<1.0
	F	5.6	0.106	0.021	0.419	0.545	8	0.02	<1.0
C	E	5.1	0.093	0.024	0.342	0.458	ND	0.02	<1.0
	F	6.7	0.102	0.027	0.411	0.540	2	0.02	<1.0
D	E	5.3	0.094	0.021	0.337	0.451	ND	0.02	<1.0
	F	5.8	0.105	0.023	0.425	0.552	3	0.02	<1.0
E	E	4.3	0.104	0.017	0.276	0.396	14	0.02	<1.0
	F	6.5	0.108	0.026	0.412	0.546	2	0.02	<1.0
F	E	5.9	0.107	0.021	0.270	0.398	14	0.02	<1.0
	F	6.1	0.106	0.025	0.421	0.552	1	0.02	<1.0
G	E	6.4	0.106	0.018	0.252	0.376	6	0.02	<1.0
	F	6.5	0.105	0.020	0.421	0.546	1	0.02	<1.0
H	E	5.7	0.109	0.020	0.245	0.373	8	0.02	<1.0
	F	7.8	0.104	0.019	0.410	0.533	10	0.02	<1.0

Table 2.11 Summary of laboratory analysis results for sediment monitoring on 10 February 2020

Monitoring Station	pH value	NH <sub>3</sub> as N (mg/L)	Total N (mg-N/kg)	Total P (mg-P/kg)	Cd (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Hg (mg/kg)	Ni (mg/kg)	Zn (mg/kg)	As (mg/kg)	Ag (mg/kg)
A	8.2	4.4	768	332	<0.10	27.2	21.6	29.0	0.07	15.4	76.1	14.3	0.18
B	8.4	6.1	991	407	<0.10	35.5	32.5	36.0	0.08	21.0	99.6	12.5	0.33
C	8.2	13.0	1260	511	<0.10	42.7	35.2	43.9	0.11	25.4	118	13.7	0.28
D	8.4	7.2	983	446	<0.10	38.3	32.6	40.2	0.08	22.6	107	12.1	0.28
E	8.3	4.3	1330	557	<0.10	41.4	36.0	41.8	0.12	24.7	122	11.0	0.33
F	8.3	21.1	1410	581	<0.10	45.9	40.4	46.4	0.11	27.6	129	12.2	0.36
G	8.4	4.6	920	615	<0.10	47.2	214	40.8	0.09	21.6	142	10.1	0.33
H	8.4	6.6	944	444	<0.10	37.1	37.7	37.7	0.09	22.1	113	11.1	0.33

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**Table 2.12 Summary of laboratory analysis results for sediment monitoring on 6 April 2020**

Monitoring Station	pH value	NH <sub>3</sub> as N (mg/L)	Total N (mg-N/kg)	Total P (mg-P/kg)	Cd (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Hg (mg/kg)	Ni (mg/kg)	Zn (mg/kg)	As (mg/kg)	Ag (mg/kg)
A	8.2	3	911	504	<0.10	38.0	29.7	43.1	0.14	22.4	93.9	16.1	0.22
B	8.3	2	984	529	0.14	46.0	60.6	48.4	0.14	25.9	112	15.1	0.48
C	7.9	18	1410	658	<0.10	43.6	40.0	42.3	0.12	27.0	119	13.0	0.32
D	7.7	8	868	431	<0.10	32.0	27.6	32.8	0.09	19.6	89.0	9.8	0.23
E	8.1	5	1280	600	<0.10	43.2	41.5	42.2	0.16	26.2	122	11.7	0.34
F	8.1	8	1210	547	0.10	49.4	48.2	50.4	0.14	30.7	138	14.5	0.39
G	8.4	80	1200	507	<0.10	41.0	52.8	38.9	0.14	23.2	142	11.6	0.37
H	8.2	6	1100	594	0.11	49.4	62.0	48.7	0.12	28.6	119	14.4	0.45

**Table 2.13 Summary of laboratory analysis results for benthic survey**

Monitoring Date	Monitoring Station	Total organic carbon (%)	Grain size profile (%)				Description
			Gravel	Sand	Silt	Clay	
10 February 2020	A	1.12	6	43	26	25	Grey, slightly gravelly, sandy SILT/CLAY with shell fragments
	B	8.34	2	22	39	37	Grey, slightly sandy SILT/CLAY with shell fragments
	C	0.96	0	5	58	37	Grey, slightly sandy SILT/CLAY with shell fragments
	D	0.76	3	24	40	33	Grey, slightly sandy SILT/CLAY with shell fragments
	E	1.05	5	22	43	30	Grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
	F	1.21	0	3	53	44	Grey, slightly sandy SILT/CLAY with shell fragments
	G	2.32	21	35	26	18	Grey, slightly gravelly, sandy SILT/CLAY with shell fragments
	H	1.26	1	10	55	34	Grey, slightly sandy SILT/CLAY with shell fragments
6 April 2020	A	0.68	3	41	32	24	Dark grey, sandy SILT/CLAY with shell fragments
	B	0.82	3	20	50	27	Dark grey, slightly sandy SILT/CLAY with shell fragments
	C	0.93	0	4	59	37	Dark grey, slightly sandy SILT/CLAY with shell fragments
	D	0.74	1	18	52	29	Dark grey, slightly sandy SILT/CLAY with shell fragments
	E	0.88	0	13	53	34	Dark grey, slightly sandy SILT/CLAY with shell fragments
	F	0.94	0	7	58	35	Dark grey, slightly sandy SILT/CLAY with shell fragments
	G	0.54	29	25	23	23	Dark grey, slightly sandy, slightly gravelly SILT/CLAY with shell fragments
	H	0.75	0	5	56	39	Dark grey, slightly sandy SILT/CLAY with shell fragments

#### 2.4.4 The benthic survey results are analyzed and presented as below:

##### I. February 2020

##### II. Abundance

A total of 311 macrobenthic organisms was recorded from the eight monitoring stations during the February 2020 monitoring period. As of the previous monitoring periods, current results showed relatively lower abundances compared to the both dry (March 2004) and wet (August 2004) seasons baseline data. Compared to the previous monitoring period (December 2019), decrease in total abundance was also observed which can be attributed to the general decline in abundances in the monitoring stations. However, seasonal variation in the macrobenthic abundances remained to be statistically insignificant (F-value = 1.31; F-crit = 1.82; P-value = 0.22).

The lowest abundance with 33 individuals (ind.) was recorded at Station E and the highest (49 ind.) was recorded at Station F, both reference stations. Abundances in all reference stations decreased while abundances in impact stations either remained the same as the previous monitoring period (Station C, 40 ind.) or has increased (Station D 45 to 48 ind.) Similar to the previous monitoring periods, differences in the total abundance across the monitoring stations were statistically significant (F-value = 2.88 ; F-crit = 2.10; P-value = 0.01).

##### III. Biomass

The total wet biomass recorded in the eight monitoring stations was 58.33 g with the highest biomass at Station D (17.82 g) and lowest at Station B (1.44 g). The relatively higher biomass recorded at Station D was due to the presence of larger organisms such as the molluscan species, *Paphia undulata* in this station. Average biomass at the impact stations were higher compared to that of the reference stations.

##### IV. Taxonomic Composition

A total of eight phyla comprising of 38 families and 53 genera were identified. Macrobenthic assemblage remained to be dominated by annelida (60.77%), molluscs (19.94%), and arthropods (13.83%). Similar to the baseline study (August 2004), the most dominant family was the polychaete *Capitellidae*. Their dominance might indicate unbalanced and organically enriched habitats (Pearson and Rosenberg 1978; Borja et al. 2000). There is no dominant species (abundance > 10) recorded during the current monitoring period. Highest number of genera was recorded in Station D (24) and the lowest in Station B (15).

##### V. Diversity

Benthic diversity index ( $H'$ ) and evenness index ( $J$ ) ranged 2.72 – 3.07 and 0.92 – 0.96 in impact stations, and 2.22 – 2.96 and 0.90 – 0.96 among the reference stations, which suggest that benthic faunal diversity is relatively richer at some of reference stations than those at impact stations. However, overall diversity in the eight monitoring stations was within the range of typical values in the impact stations and the reference stations, respectively. Compared with the baseline survey result, the diversity index and evenness index increased.

Table 2.14 Summary of Benthic Survey Data on 10 February 2020

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Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	36	15.31	23	2.96	0.95
B	34	1.44	15	2.49	0.92
C	40	3.28	19	2.72	0.92
D	48	17.82	24	3.07	0.96
E	33	3.55	19	2.84	0.96
F	49	7.72	21	2.75	0.91
G	34	4.69	18	2.80	0.90
H	37	4.54	17	2.22	0.91
TOTAL	311	58.33			

VI. April 2020

VII. Abundance

A total of 388 macrobenthic organisms recorded from the eight monitoring stations, which is lower than that reported in baseline survey. The decrease is predominantly caused by the lower abundance of annelids recorded in this survey. The lowest abundance with 37 individuals (ind.) recorded in Station C and the highest (60 ind.) recorded in Station H. The results showed that the abundance in impact stations (Stations C and D) has no obvious difference with that in the reference stations. The sediments of impact sites and reference sites are all mainly composed of silt/clay with shell fragments. There is no significant difference between the impact sites and the reference sites. This observation is indicative of a point-source disturbance, which will be verified with continued monitoring.

VIII. Biomass

The total wet biomass from eight monitoring stations is comprised of 84.311g. The highest total biomass was observed in Station D (15.189g), while Station H (4.567g) exhibited the lowest biomass. The relatively higher biomass observed in Station D contributed to the relatively higher biomass of the mollusca species, *Paphia undulate*. The biomass at the impact stations were generally lower compared to those of the reference stations in the baseline data (August 2004).

IX. Taxonomic Composition

Specimens were identified to family, genus and species level or to the lowest practicable taxon as possible. Fauchald (1977), Huang Z.G. (1994), Rouse & Pleijel (2001), and Xu et al. (2008) were used as the reference for taxonomic or species identification and nomenclature. A total of eight phyla comprising of 38 families and 54 genera were identified. The benthic fauna composition is dominated by Annelida (56.44%), Arthropoda (28.87%) and Mollusca (11.60%). Compared to the baseline study (August 2004), the most dominant groups were the *Capitellidae* polychaetes and *Veneridae* Bivalvia, typical of unbalanced and organically enriched habitats (Pearson and Rosenberg 1978; Borja et al. 2000). Based on the recorded abundance, the percentage of mollusca decreased during monitoring period.

The dominant species (abundance > 10) were the Arthropoda, *Gammarus sp.1* and the Annelida *Paraprionospio*. Arthropoda, *Gammarus sp.1* with the abundance of 14 ind from Stations E and the abundance of 18 ind from Stations H in this survey. While



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Annelida *Paraprionospio* with the abundance of 15 ind from Station A. Compared to the baseline study (August 2004), the most dominant groups were the capitellid and cirratulid polychaetes, typical of unbalanced and organically enriched habitats (Pearson and Rosenberg 1978; Borja et al. 2000).

Highest number of genera was recorded in Station G (29) and relatively lower in Station C & Station F (18). Similar to abundance and biomass, little differences in number of taxa was observed at impact stations compared to the reference stations.

X. Diversity

Benthic diversity index ( $H'$ ) and evenness index ( $J$ ) ranged 2.705 – 2.706 and 0.889 – 0.936 in impact stations, and 2.471 – 3.085 and 0.839 – 0.916 among the reference stations as shown in data summary, which suggest that benthic faunal diversity is relatively richer at some of reference stations than those at impact stations. However, overall diversity in the eight monitoring stations was within the range of typical values in the impact stations and the reference stations, respectively. Compared with the baseline survey result, the diversity index and evenness index increased obviously.

Table 2.15 Summary of Benthic Survey Data on 6 April 2020

Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity ( $H'$ )	Evenness ( $J$ )
A	46	13.649	19	2.471	0.839
B	45	13.202	21	2.733	0.898
C	37	12.997	18	2.705	0.936
D	58	15.189	21	2.706	0.889
E	45	5.571	19	2.487	0.845
F	43	6.019	18	2.602	0.900
G	54	13.117	29	3.085	0.916
H	60	4.567	22	2.618	0.847
TOTAL	388	84.311			

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



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### 3. ADVICE ON IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

#### 3.1 Implementation Status

- 3.1.1 Although no site inspection was prescribed during the operation of the Plant in accordance with the approved EM&A Plan, SHWSTW is reminded to fully and properly implement 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 H**.

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### 4. ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS

4.1.1 SHWSTW is reminded to fully comply with EP conditions. All measures and recommendations in the EP, EIA Report and approved waste management plan shall be fully and properly implemented. During the reporting period, following measures in related to solid and liquid waste management was implemented:

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

4.1.2 A summary of mitigation measures implementation schedule is provided in **Appendix H**.

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### **5. SUMMARY OF EXCEEDANCE OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS**

- 5.1.1 Odour patrol monitoring was resumed from January 2020 and carried out in the reporting period. No exceedances of Action/Limit levels at ASRs were recorded.
- 5.1.2 Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 10 February 2020 and 6 April 2020. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

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### 6. SUMMARY OF ENVIRONMENTAL COMPLAINTS

6.1.1 No complaint (written or verbal), inspection notice, notification of summons or prosecution was received in relation to environmental impact during the report period. The incident report for the complaint case received on 28 November 2019 was submitted to EPD on 19 December 2019. Further investigation based on the EPD's comments received on 21 January 2020 was completed and the updated incident report was submitted to EPD on 12 March 2020. No further comment is received from EPD on 13 March 2020. Summaries of complaints, notification of summons and successful prosecutions are presented in **Table 6.1** and **Table 6.2**.

**Table 6.1 Cumulative Statistics on Complaints**

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

**Table 6.2 Cumulative Statistics on Notification of Summons and Successful Prosecutions**

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

6.1.2 The cumulative complaint log and summaries of complaints are presented in **Appendix G**.



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## 7. CONCLUSION

- 7.1.1 Odour patrol monitoring was resumed from January 2020 and carried out in the reporting period. The modified odour patrol monitoring plan including updated Event and Action Plan was approved on March 2020, and was commenced from 20 March 2020. No exceedances of Action/Limit levels at Air Sensitive Receivers (ASR) and odour patrol points were recorded and no non-compliance of odour monitoring at odour patrol points were recorded in the reporting period.
- 7.1.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H<sub>2</sub>S concentration (ppb) with the odour unit (OU/m<sup>3</sup>). H<sub>2</sub>S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H<sub>2</sub>S concentration (ppb) with the odour unit (OU/m<sup>3</sup>). Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspension on air quality monitoring was approved by EPD's memo dated 14 May 2018. In order to recommence the monitoring, a review on air quality monitoring had been carried out to determine reasonable odour-related criteria and was submitted to EPD for approval on 24 March 2020. Comments from EPD was received on 1 April 2020 and the review is currently under revision for further submission to the EPD.
- 7.1.3 Water quality monitoring, sediment quality monitoring and benthic survey were conducted on 10 February 2020 and 6 April 2020 to collect data for future reference in accordance with Section 5.5 and 6.5 of the Operational EM&A Plan. The details of methodology and results collected of the monitoring were presented in Section 2. 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.
- 7.1.4 The latest AFCD's report dated 1 August 2019, "*Monitoring of Marine Mammals in Hong Kong Waters (2018-19)*", in terms of the distribution and abundance of CWDs, was reviewed in the Monthly EM&A report in August 2019. According to the advice from AFCD, the data of distribution and abundance of CWDs would only be available in the annual reports for Monitoring of Marine Mammals In Hong Kong Waters which cover monitoring data from 1 April to 31 March (next year). The updated status of the distribution and abundance of CWDs will be provided once the annual report (2019-20) is uploaded to AFCD's webpage.
- 7.1.5 SHWSTW is reminded to fully comply with EP conditions. All environmental mitigation measures and recommendations in the EP, EIA Report and approved waste management plan shall be fully and properly implemented.
- 7.1.6 No complaint (written or verbal), inspection notice, notification of summons or prosecution was received in relation to environmental impact during the report period. The incident report for the complaint case received on 28 November 2019 was submitted to EPD on 19 December 2019. Further investigation based on the EPD's comments received on 21 January 2020 was completed and the updated incident report was submitted to EPD on 12 March 2020. No further comment is received from EPD on 13 March 2020.

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## 7.2 Comment and Recommendations

7.2.1 The recommended environmental mitigation measures, as proposed in the EIA reports and OEM&A Plan were effectively and efficiently minimize the potential environmental impacts from the Project. Therefore, no complaint or non-compliance of monitoring were recorded during the reporting period. As inadequacy of representative data was result between August 2017 and May 2018, current H<sub>2</sub>S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H<sub>2</sub>S concentration (ppb) with the odour unit (OU/m<sup>3</sup>). Alternative methods shall be proposed and submitted for EPD's approval to ensure that EM&A programme could effectively monitor the environmental impacts generated from the site and ensure the proper implementation of mitigation measure.

7.2.2 According to the environmental monitoring performed in the reporting period, the following recommendations were made:

### Air Quality Monitoring

- Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspension on air quality monitoring was approved by EPD's memo dated 14 May 2018. In order to recommence the monitoring, a review on air quality monitoring had been carried out to determine reasonable odour-related criteria and was submitted to EPD for approval on 24 March 2020. Comments from EPD was received on 1 April 2020 and the review is currently under revision for further submission to the EPD.

### Water Quality Monitoring

- No specific observation was identified in the reporting period.

### Sediment Quality Monitoring and Benthic Survey

- No specific observation was identified in the reporting period.

### Chinese White Dolphin Monitoring

- No specific observation was identified in the reporting period.

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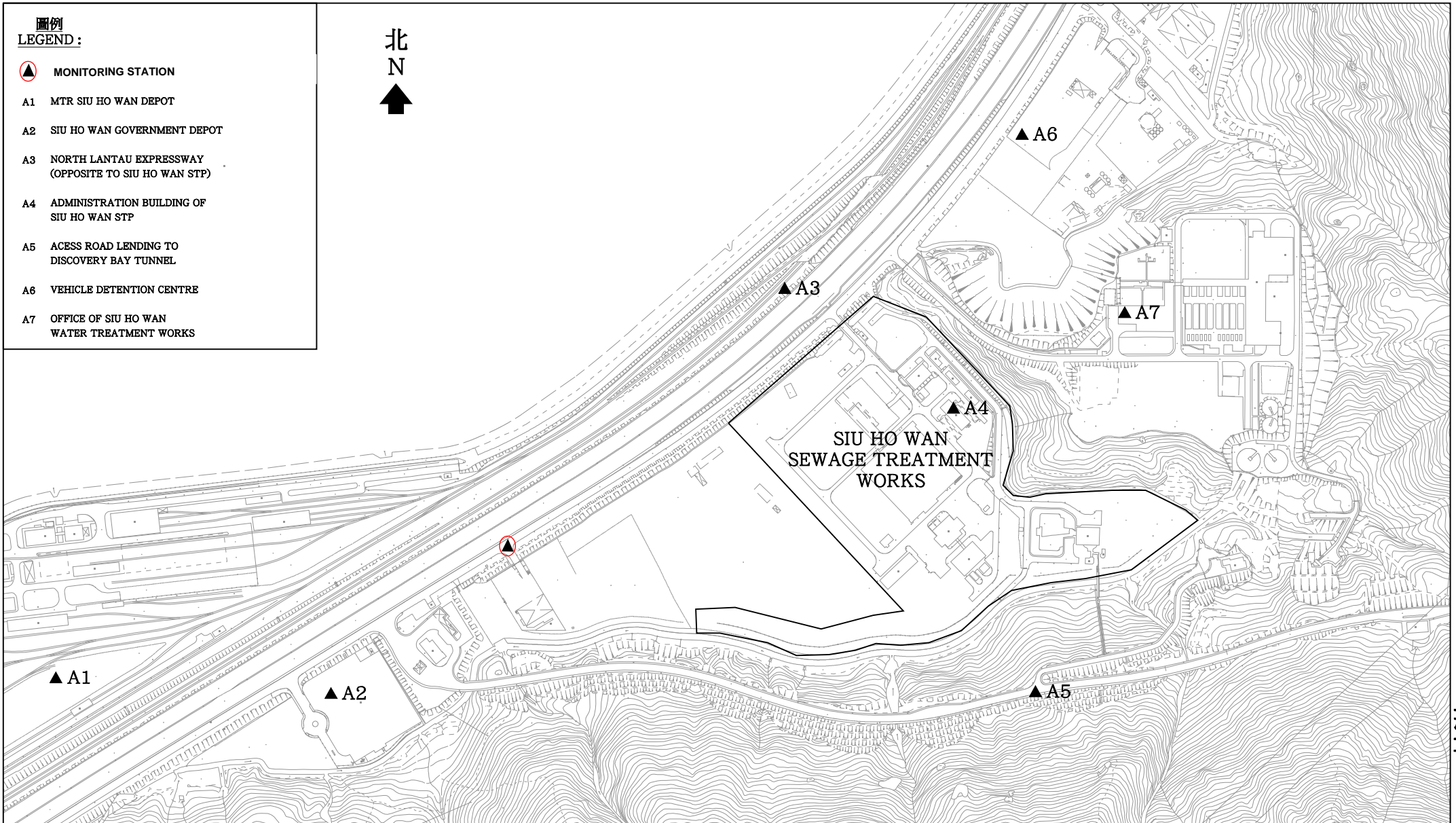
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## Figure 1

Monitoring Location of Air Sensitive Receiver

**圖例**  
**LEGEND :**

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



<p>圖則名稱 drawing title</p> <p><b>UPGRADING OF SIU HO WAN SEWAGE TREATMENT PLANT OPTIONAL ENVIRONMENTAL MONITORING AND AUDIT PLAN ODOUR PATROL MONITORING STATIONS</b></p>	繪畫 drawn	C.W. CHAN	日期 date	16-08-2006	圖則編號 drawing no.	DCM/2006/063	比例 scale	N.T.S.
	核對 checked	C.K. LAM	日期 date	16-08-2006	保留版權 COPYRIGHT RESERVED			
	批核 approved	S.K. WONG	日期 date	16-08-2006	 <p>香港特別行政區政府渠務署 DRAINAGE SERVICES DEPARTMENT GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION</p>			
	部門 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION						



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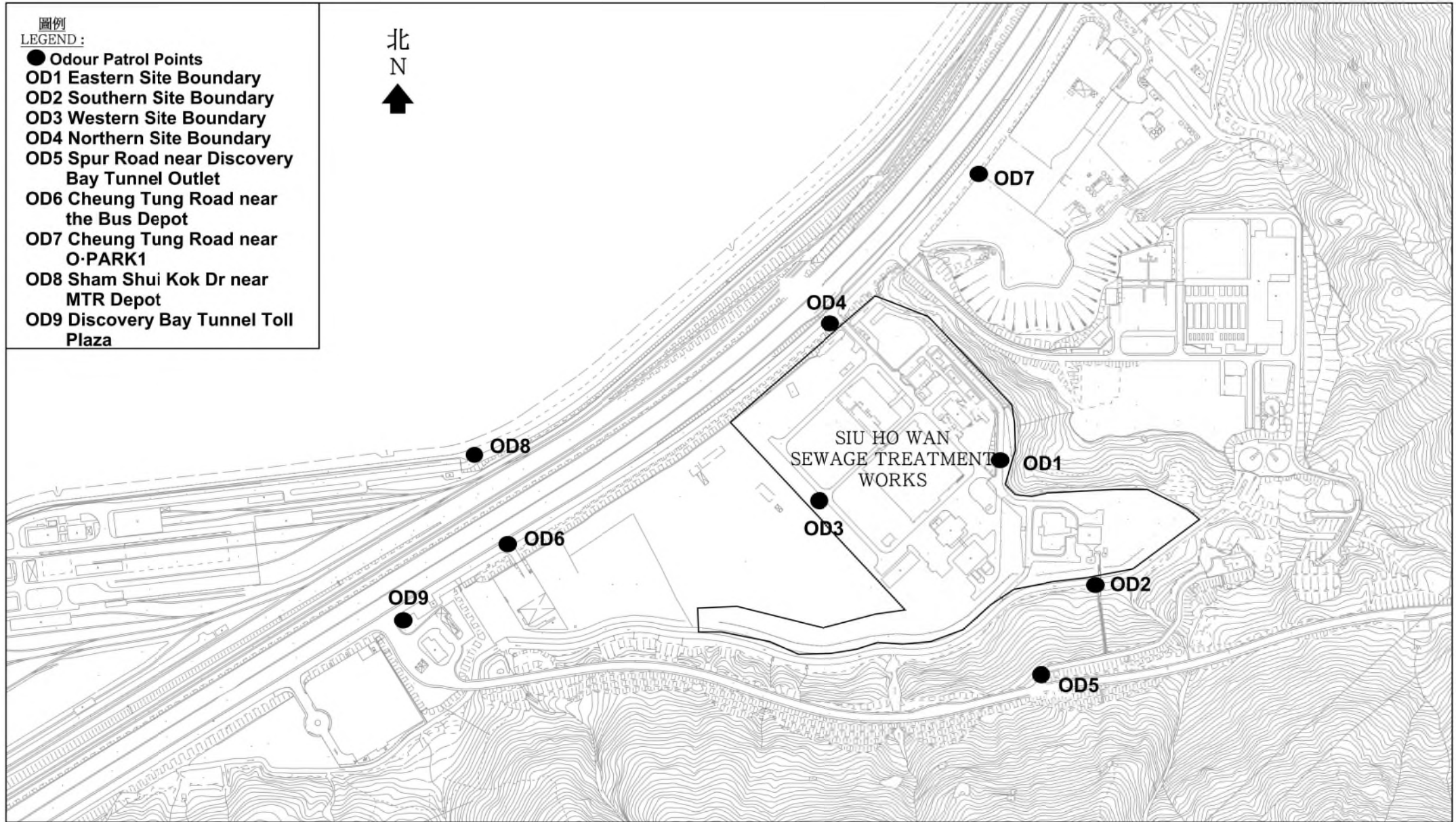
Report No.: 0041/17/ED/0548A

## Figure 2

Odour Patrol Points of Modified Odour Patrol

圖例  
LEGEND:

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



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## Figure 3

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



816000E

818000E

820000E

822000E

822000N

大小磨刀  
BROTHERS

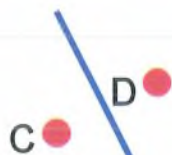
820000N

## CO-ORDINATES OF CONTROL STATIONS :

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

## CO-ORDINATES OF IMPACT STATIONS :

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

圖例  
LEGEND :

- IMPACT STATION
- ⊕ CONTROL STATION
- SUBMARINE OUTFALL

圖則名稱 drawing title

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

繪畫 drawn

H.K. LAI

日期 date

06-02-2004

核對 checked

C.K. LAM

日期 date

04-03-2004

批核 approved

S.K. WONG

日期 date

04-03-2004

部門 office

顧問工程管理部

CONSULTANTS MANAGEMENT DIVISION

圖則編號 drawing no.

DCM/2004/002

比例 scale

N.T.S.

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Figure 4  
Location of the Tide Gauge

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Location of the Tide Gauge

Source: Google Maps

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## Appendix A Project Organization Chart

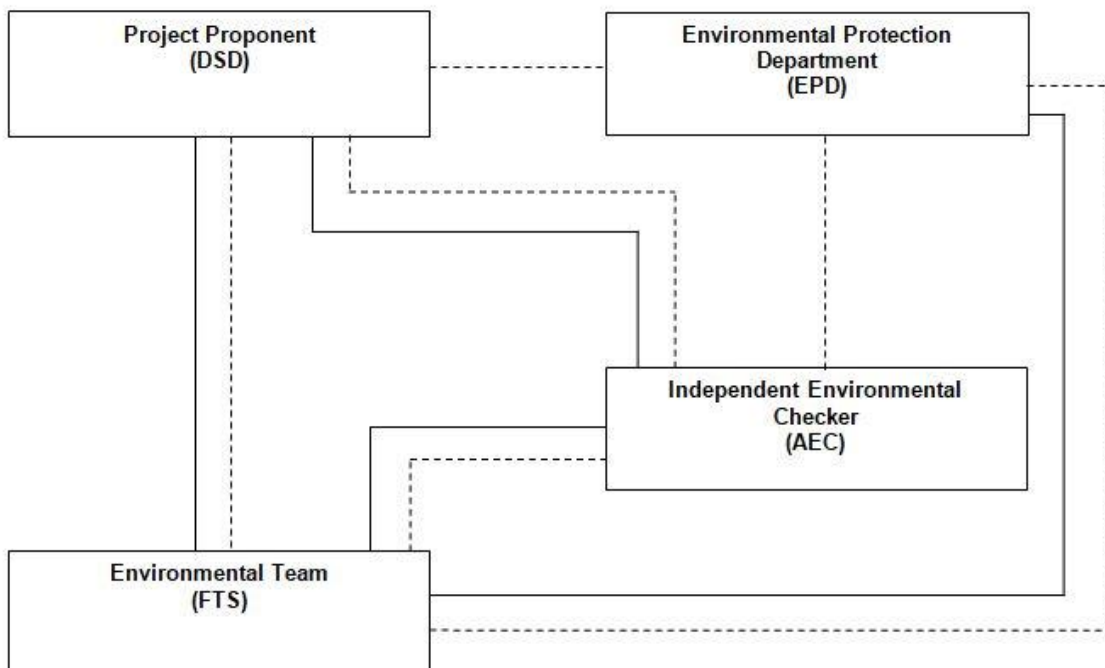
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Legend:  
— Line of Reporting  
--- Line of Communication



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## Appendix B

### Action and Limit Levels for Air Quality Monitoring

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## Action and Limit Levels for Air Quality Monitoring

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

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Website : www.fugro.com

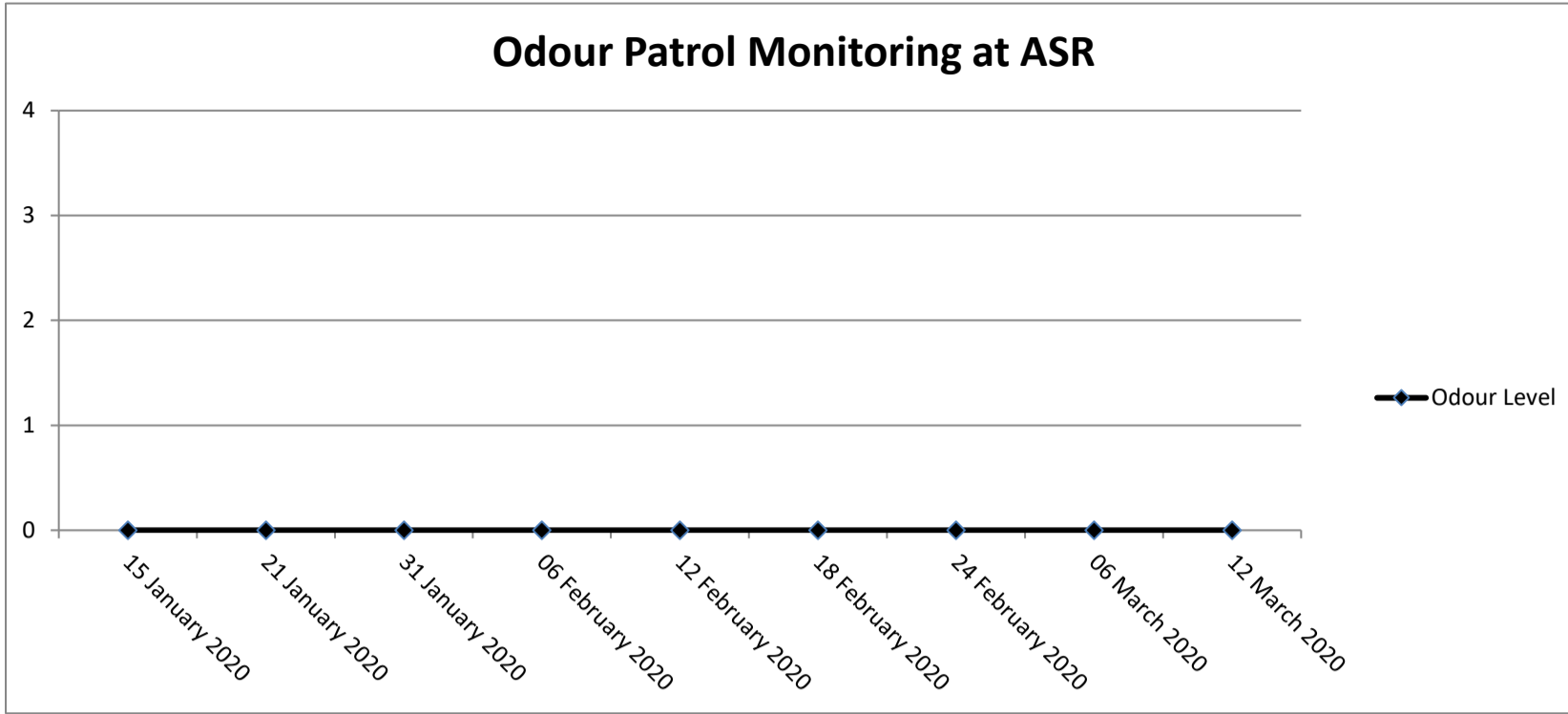


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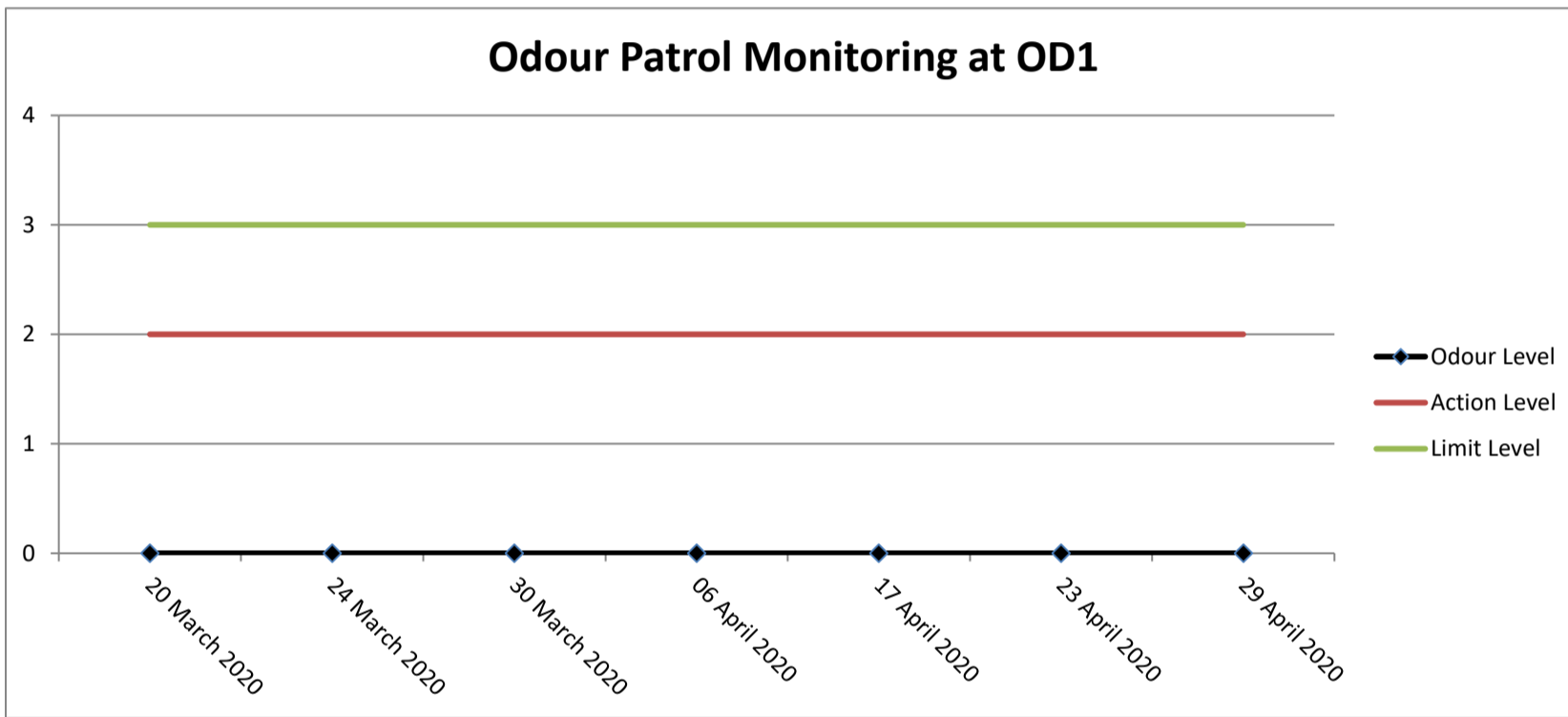
Report No.: 0041/17/ED/0548A

## Appendix C

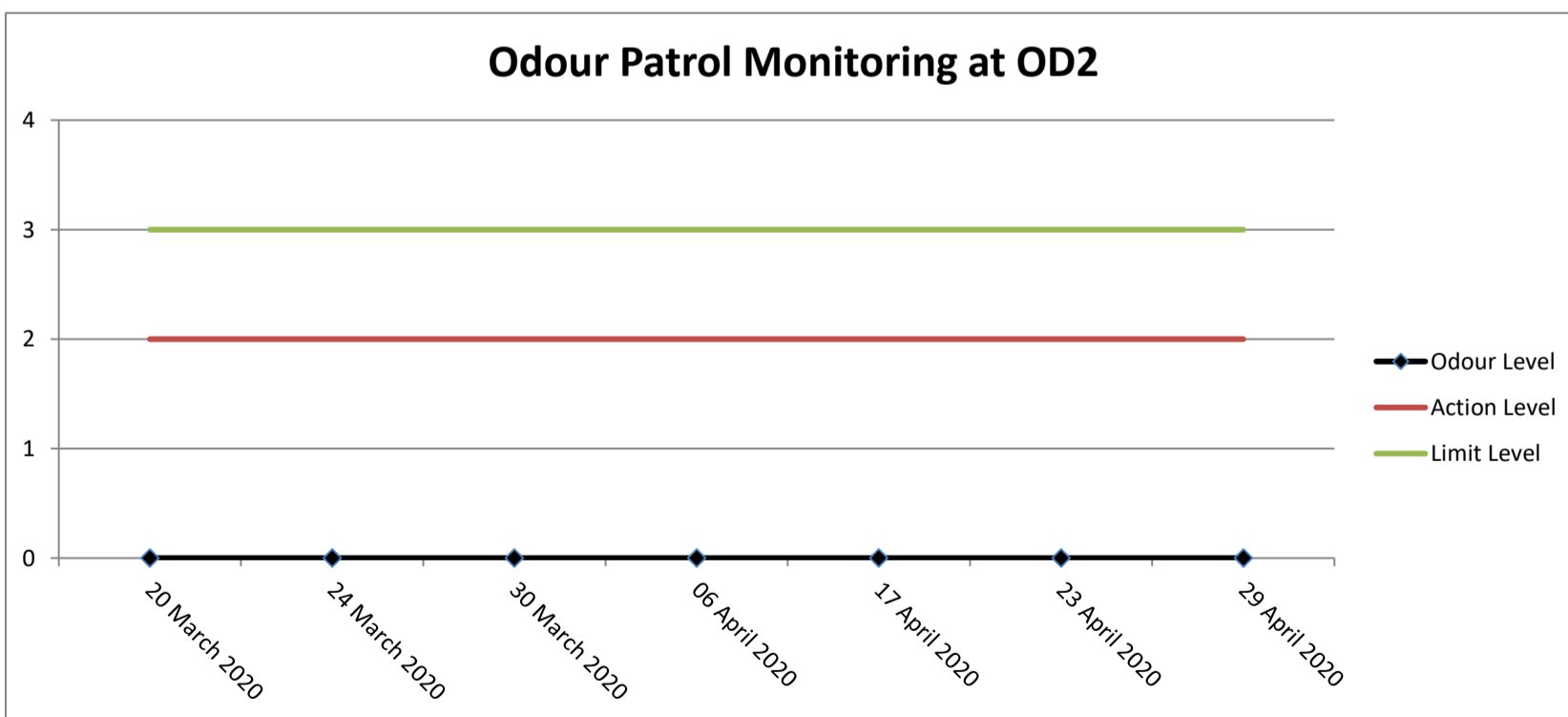
### Graphical Presentation of Air Quality Monitoring



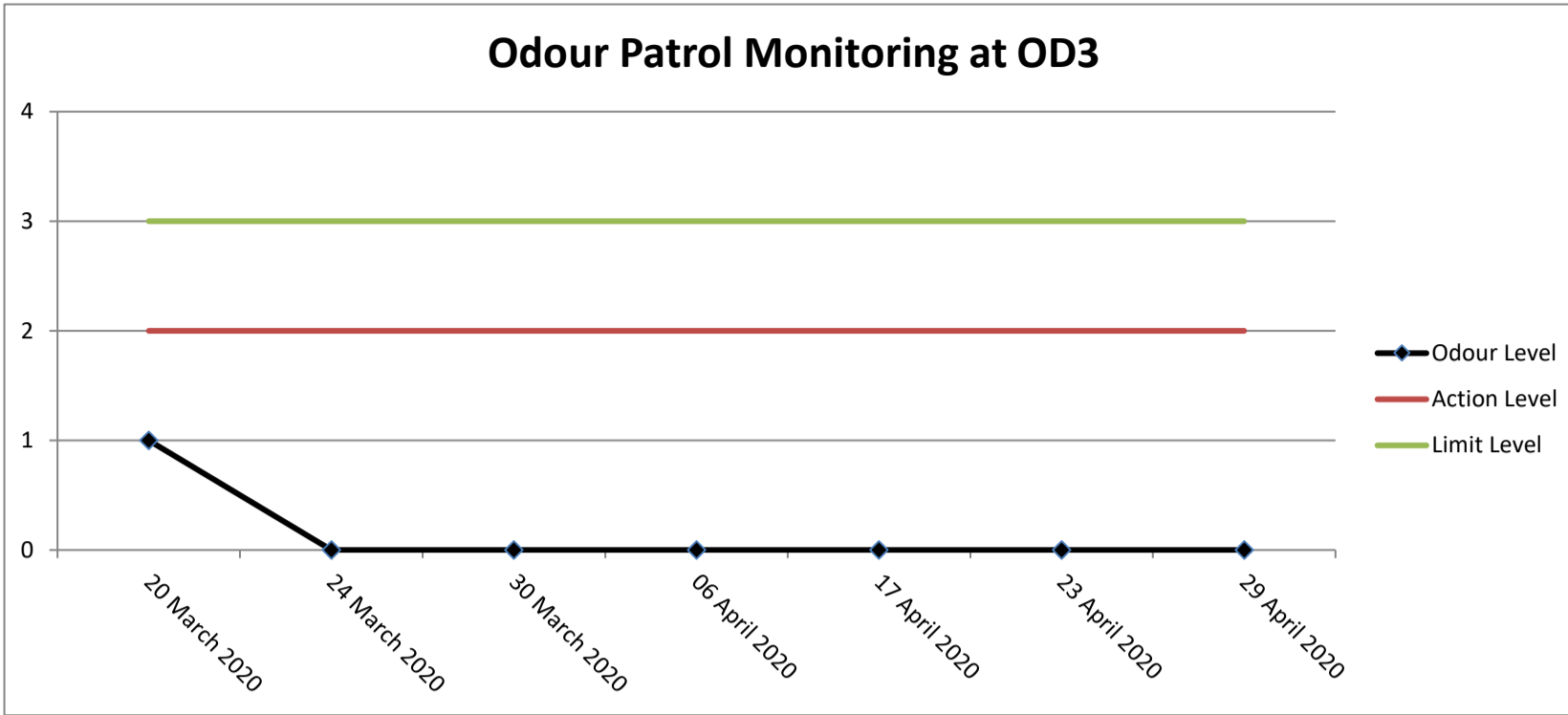
Note:  
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Noticeable; 3 - Strong; 4 - Extreme



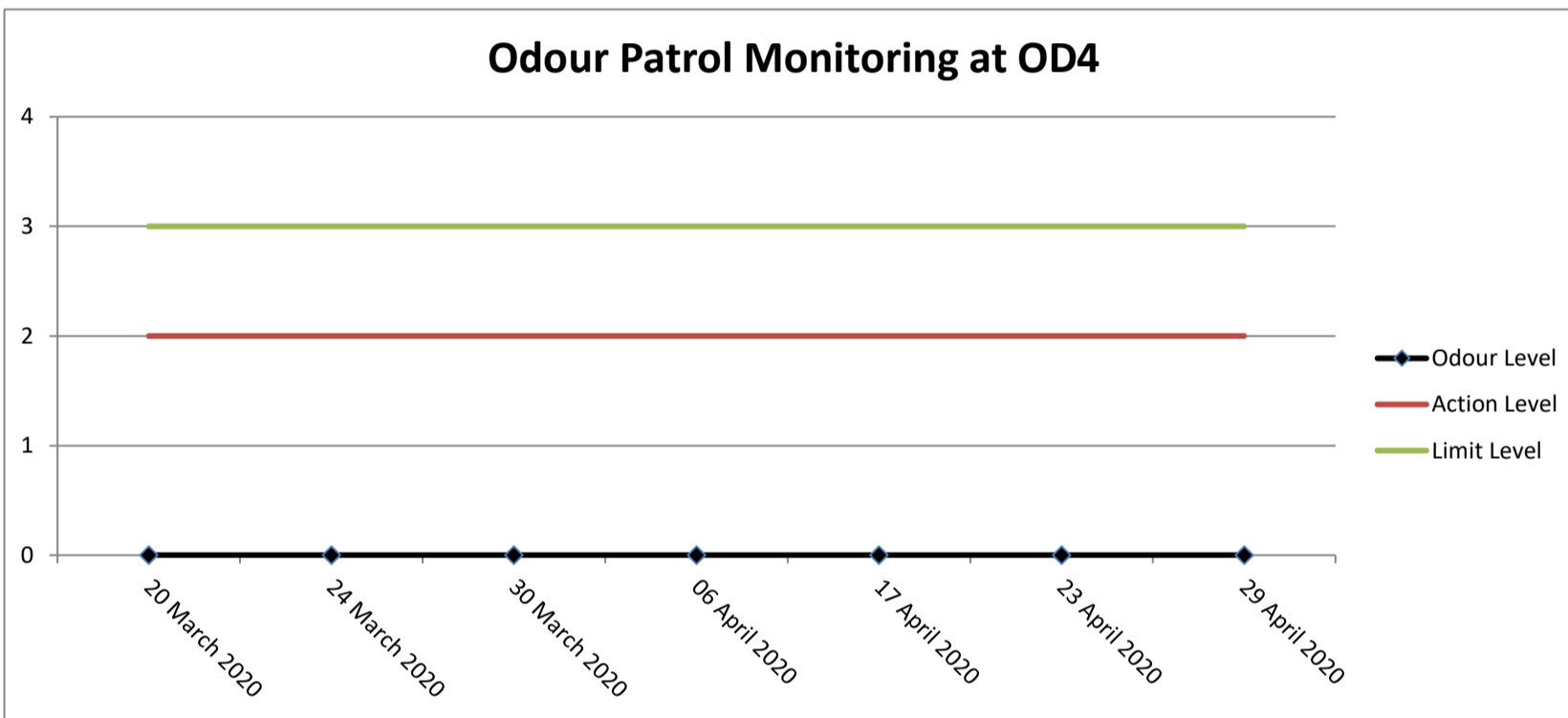
Note:  
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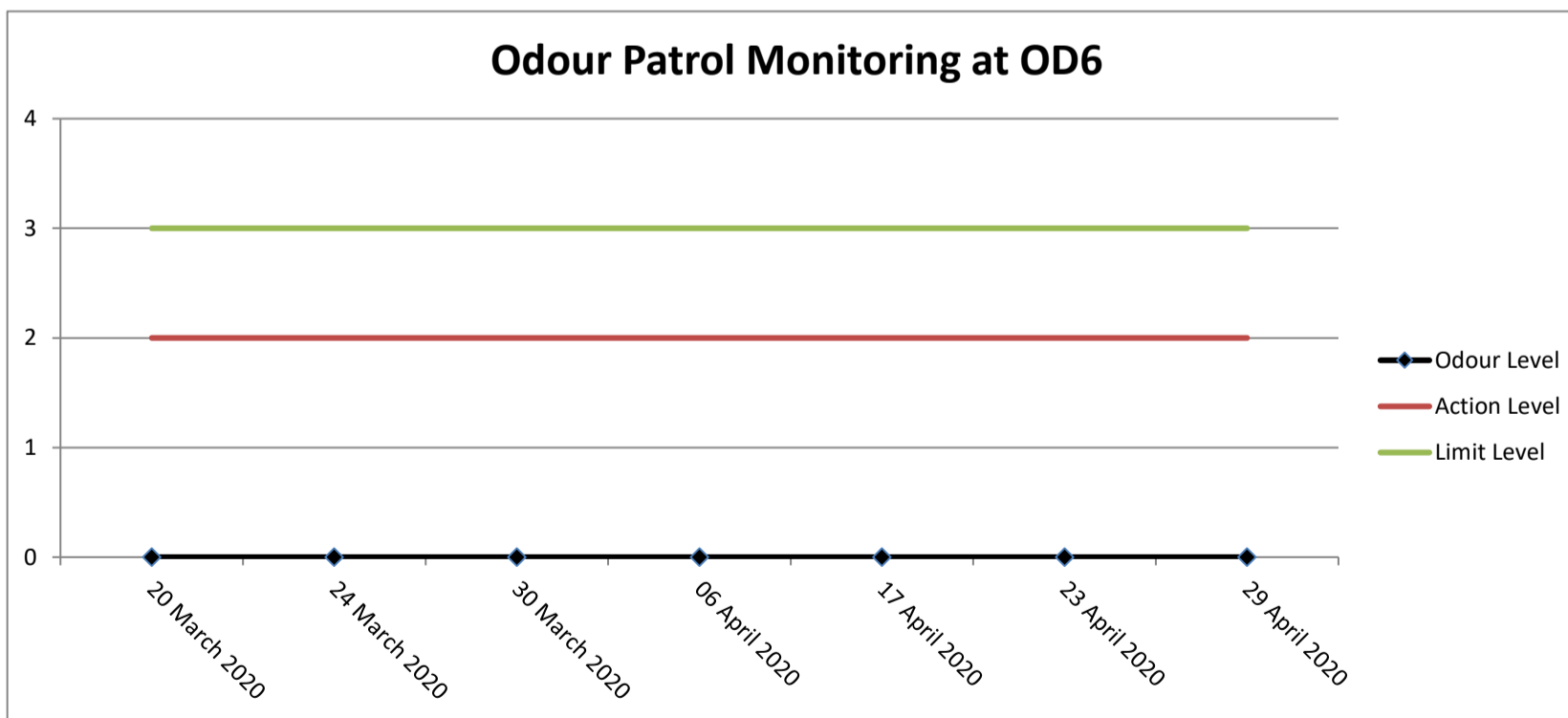
Note:  
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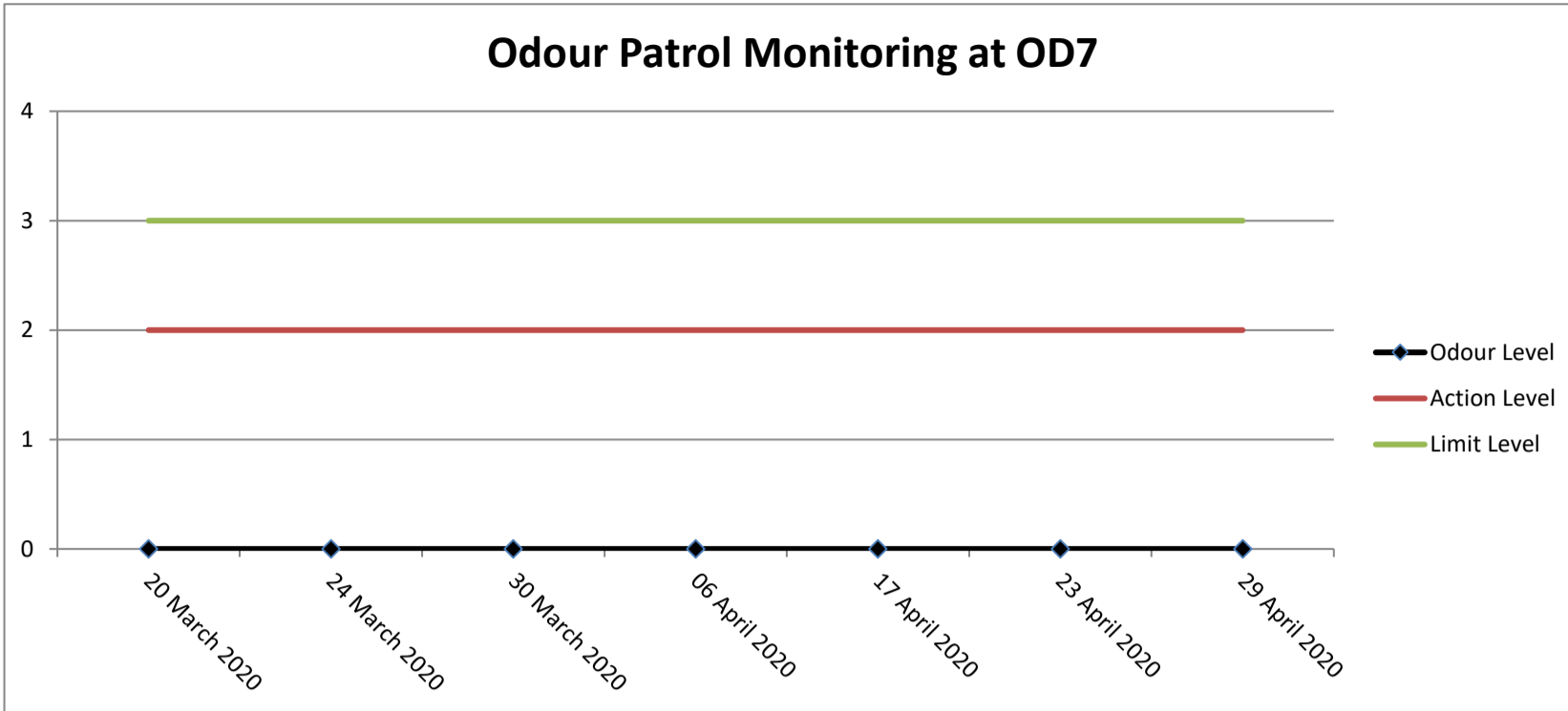
Note:  
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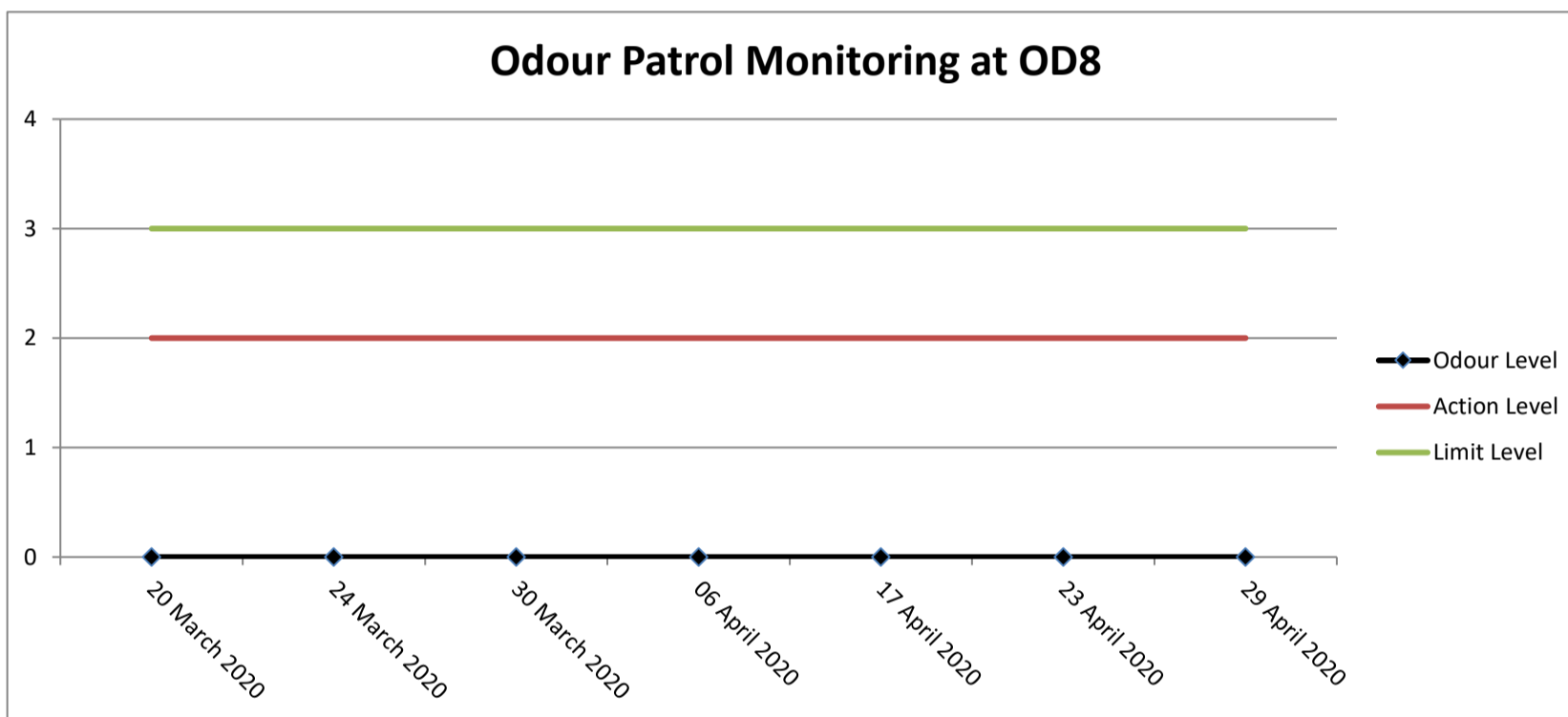
Note:  
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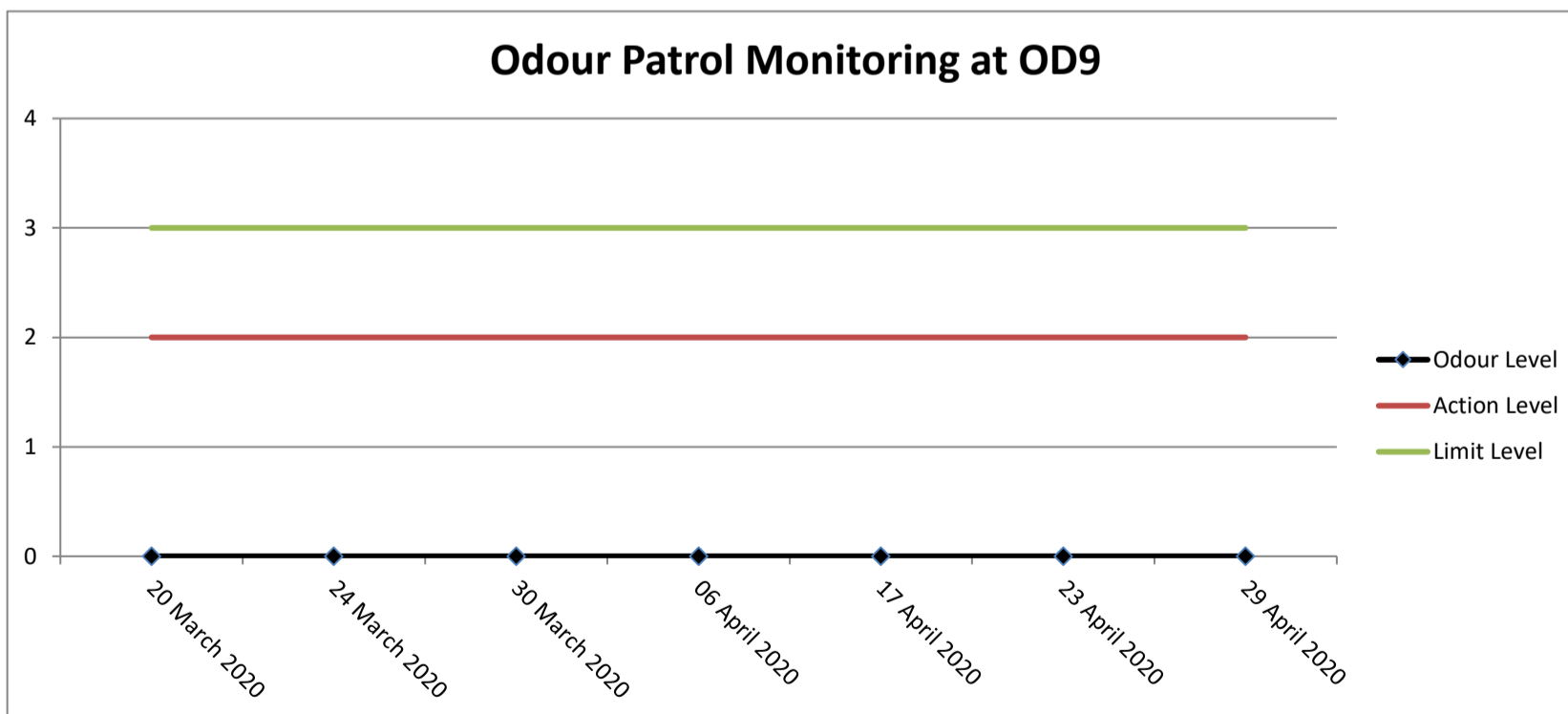
Note:  
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



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



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



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

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

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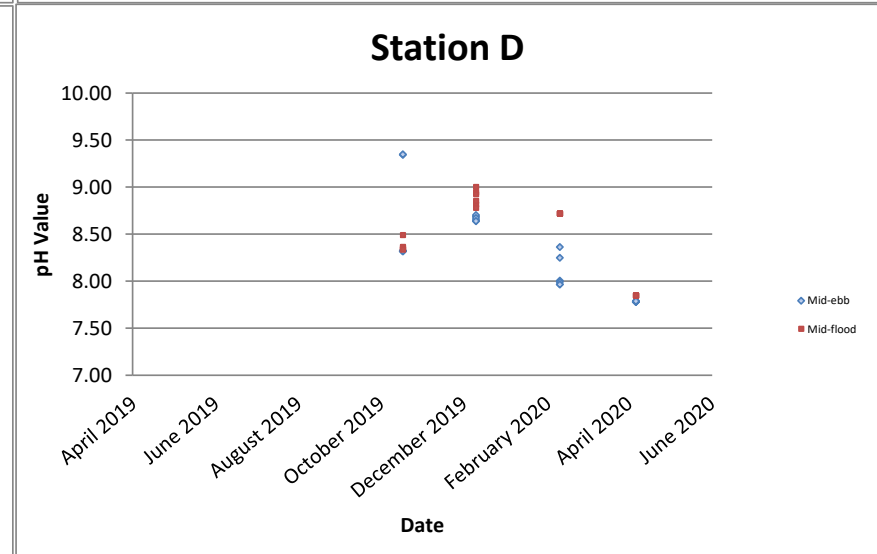
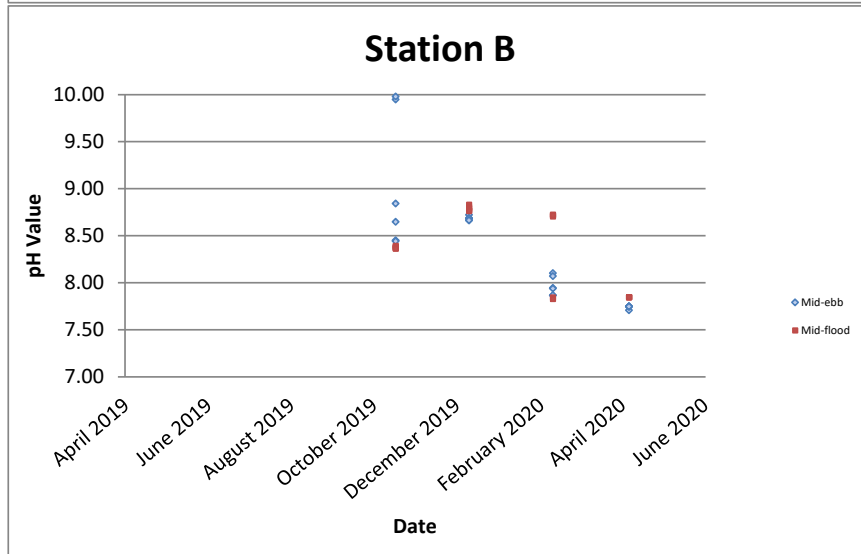
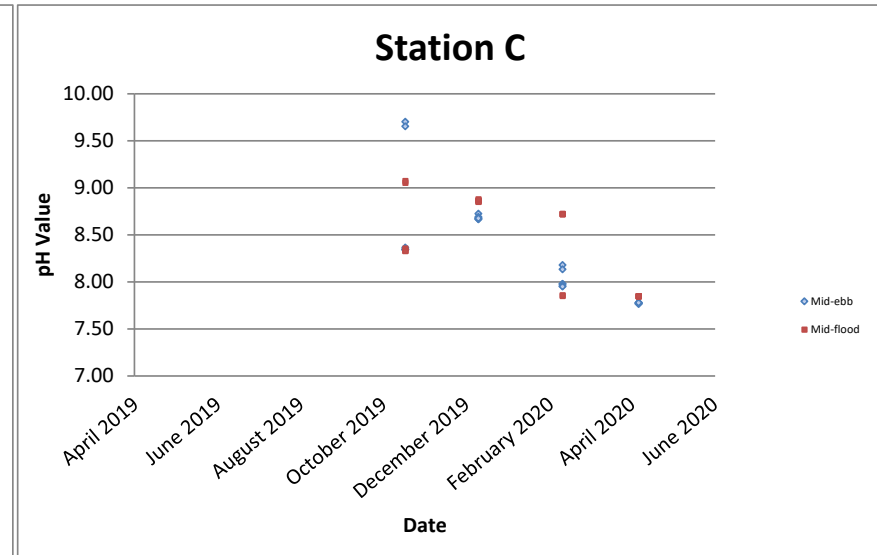
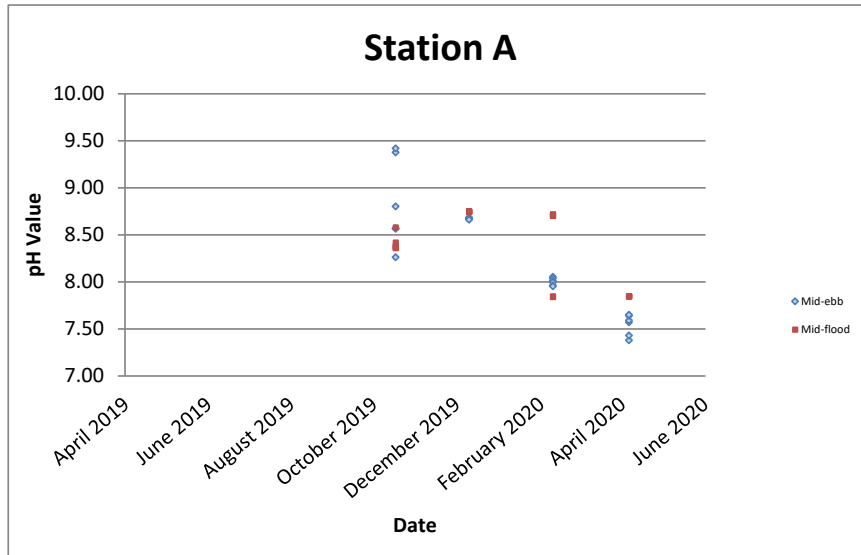
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## Appendix D

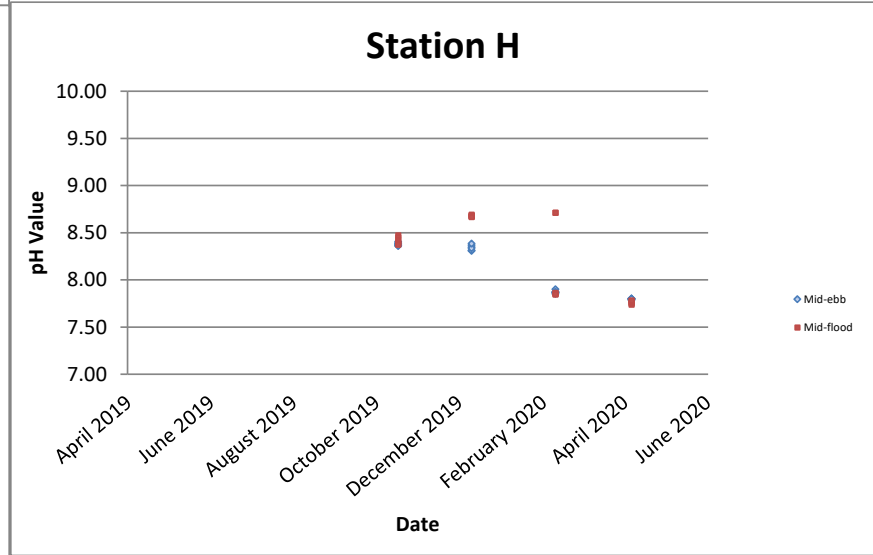
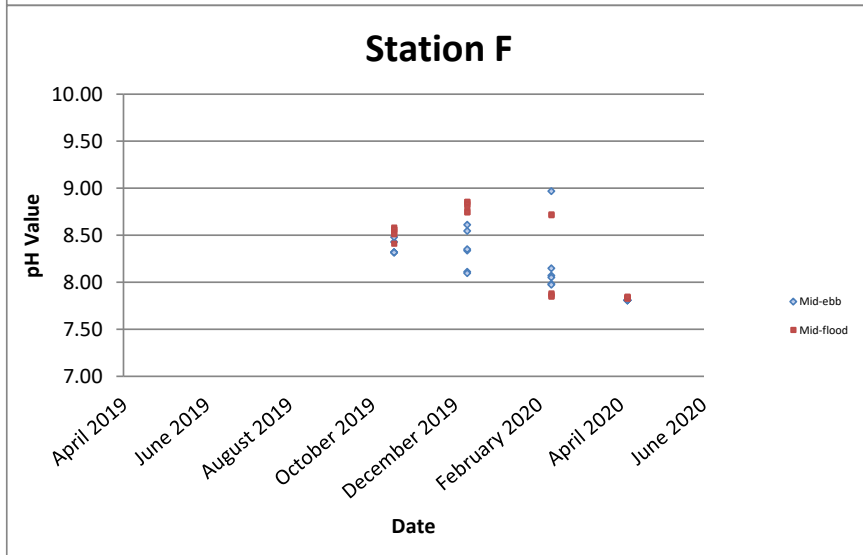
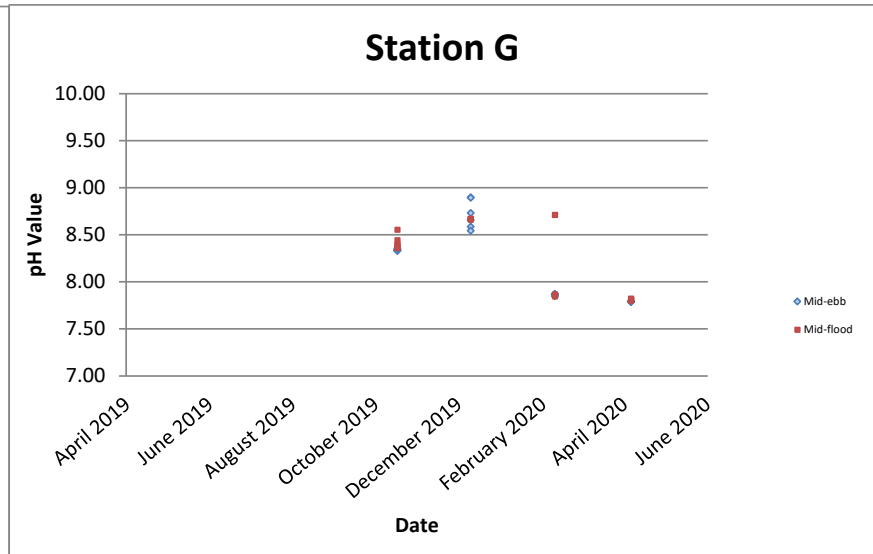
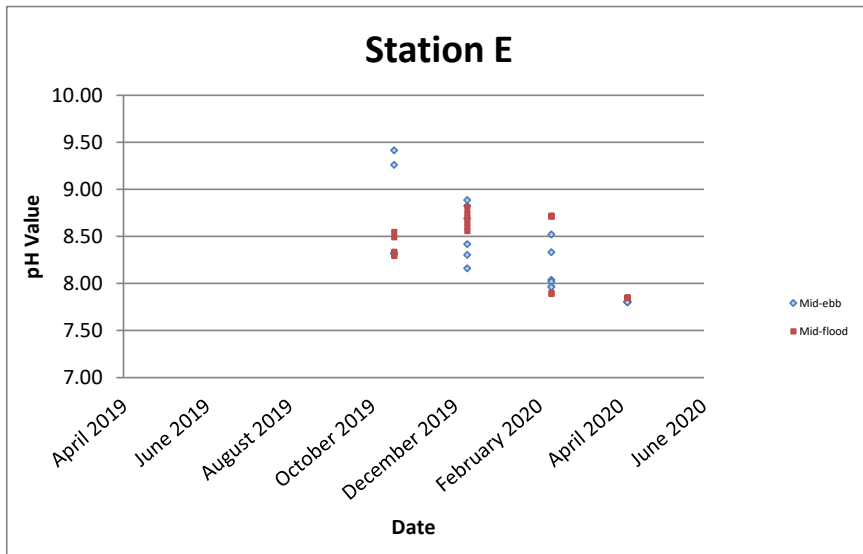
### Graphical Presentation of Water Quality Monitoring

pH value

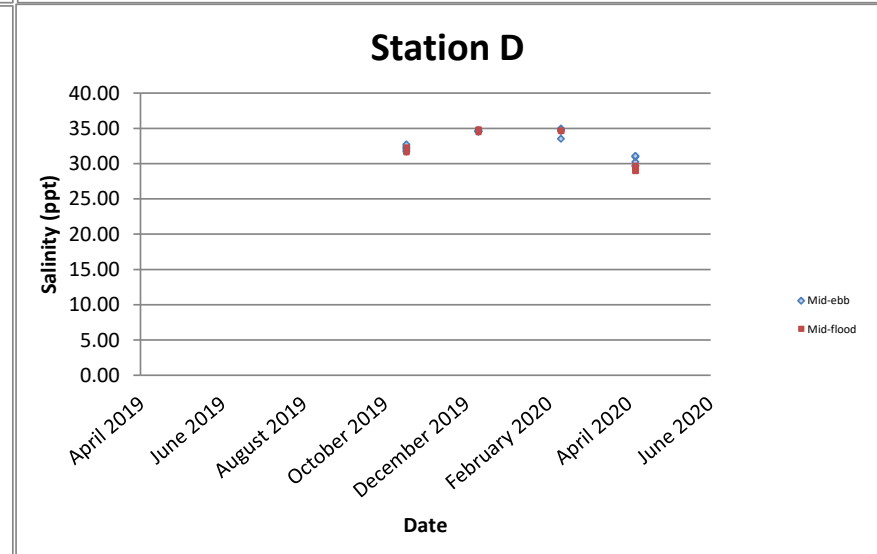
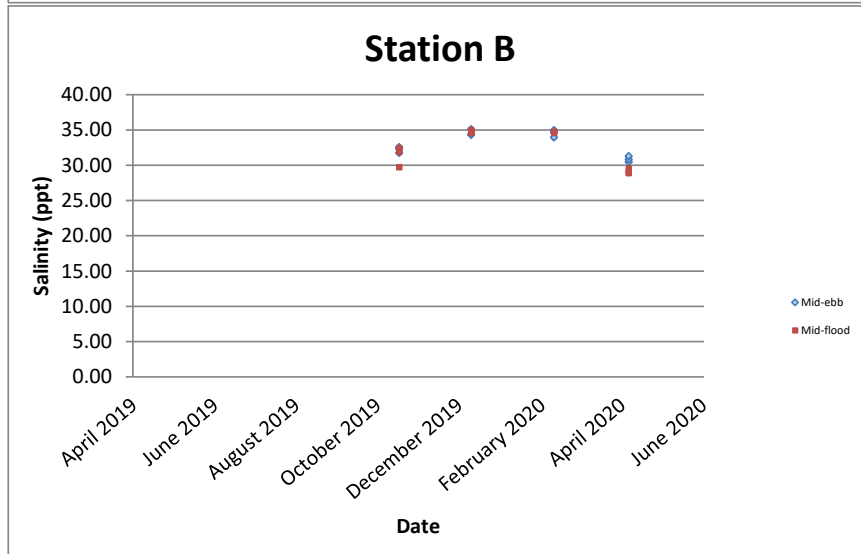
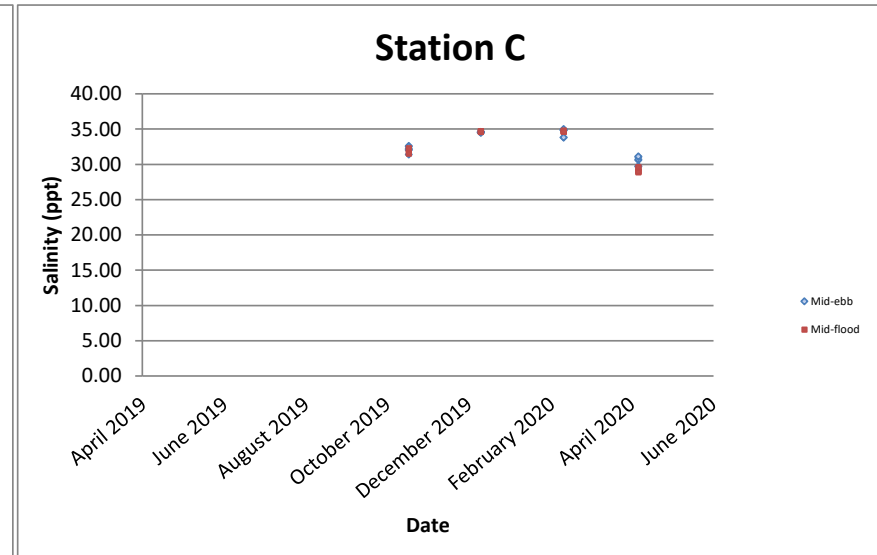
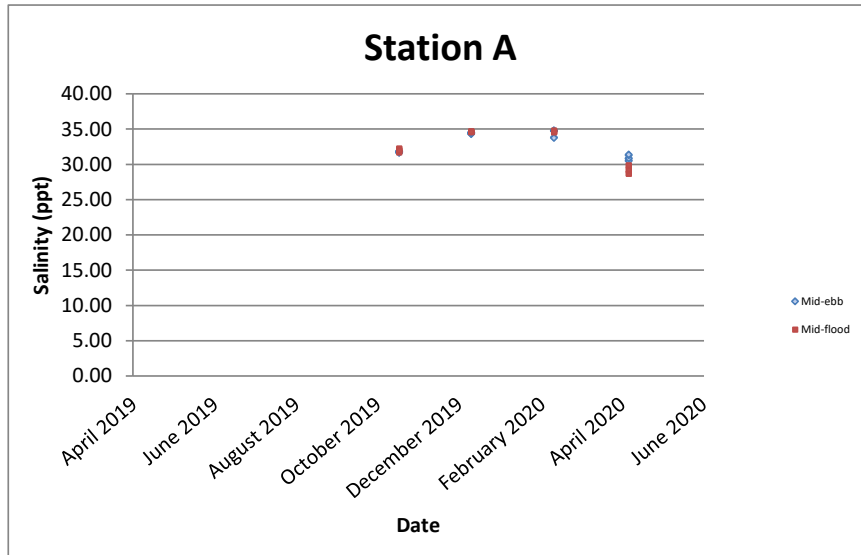




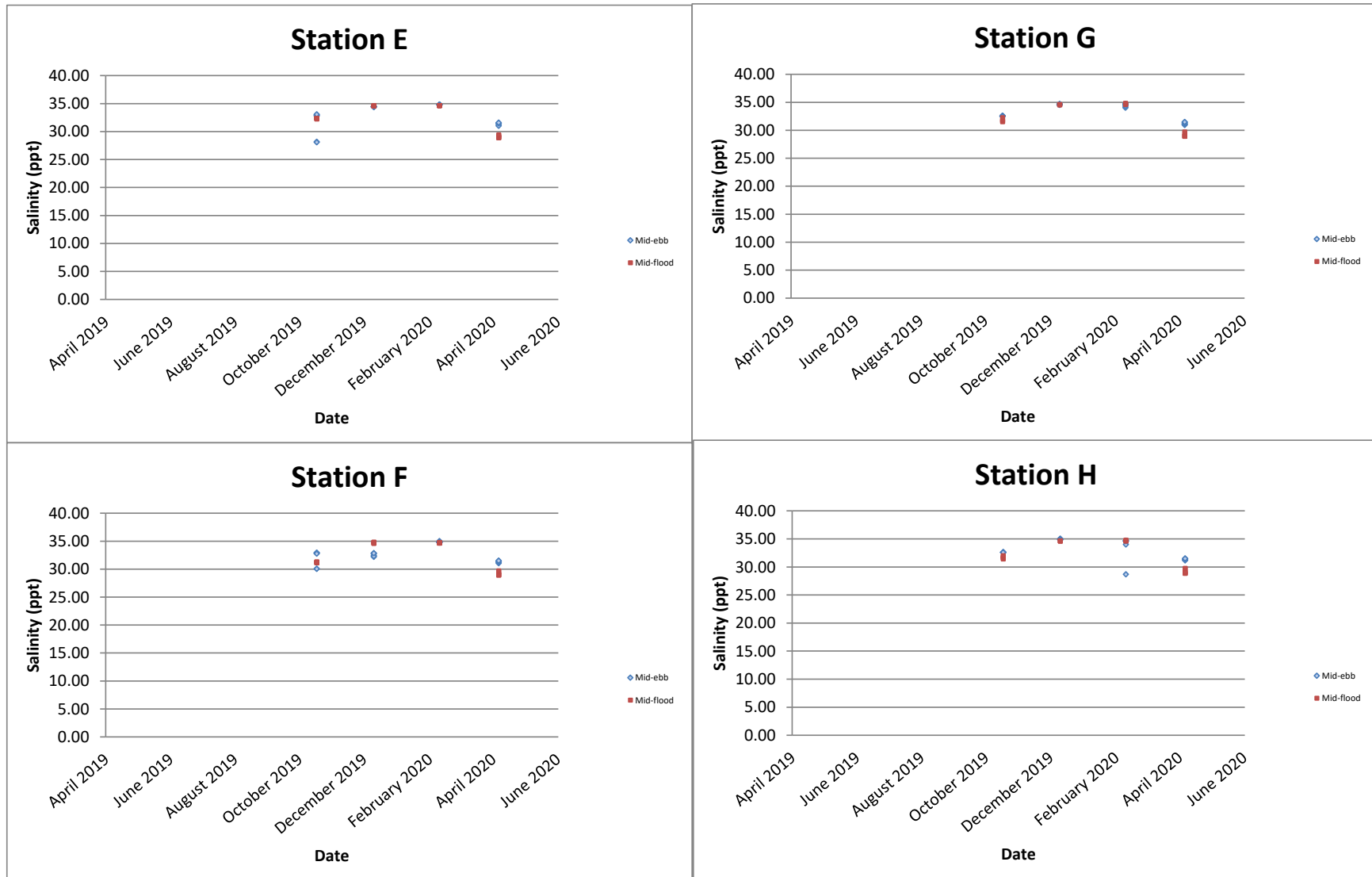
pH value



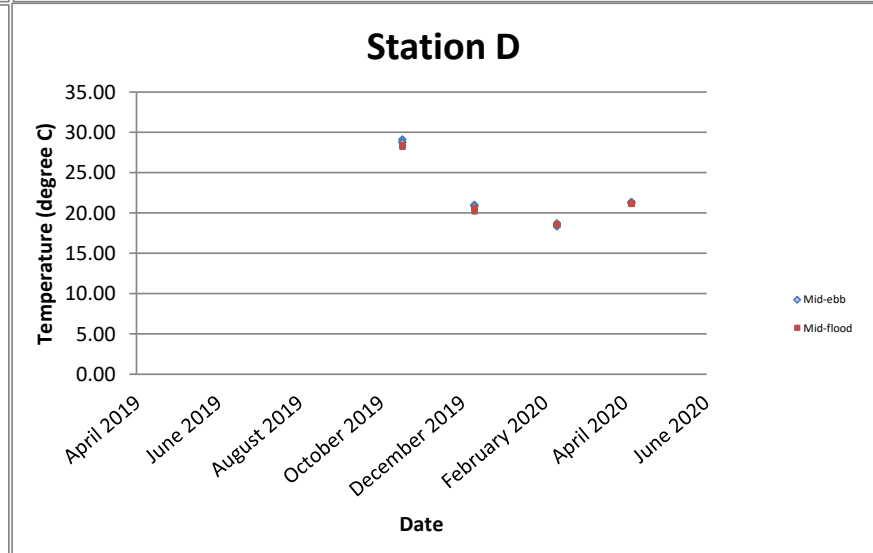
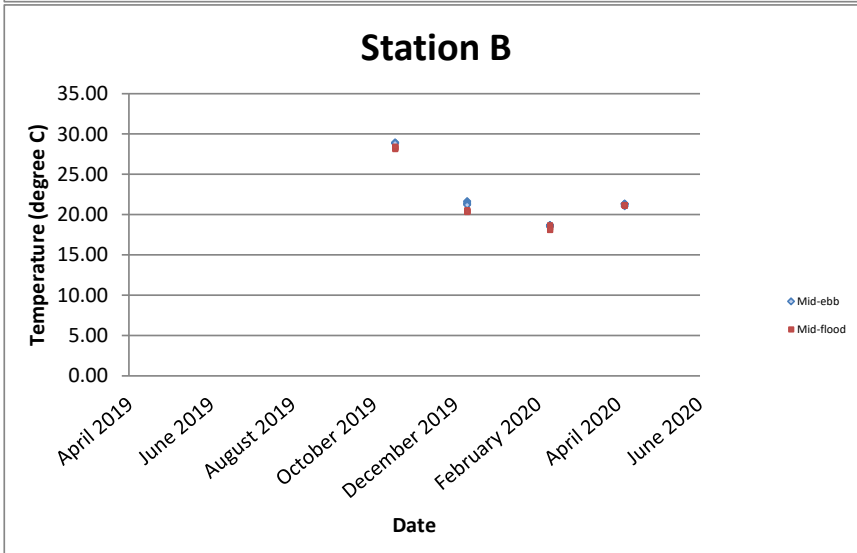
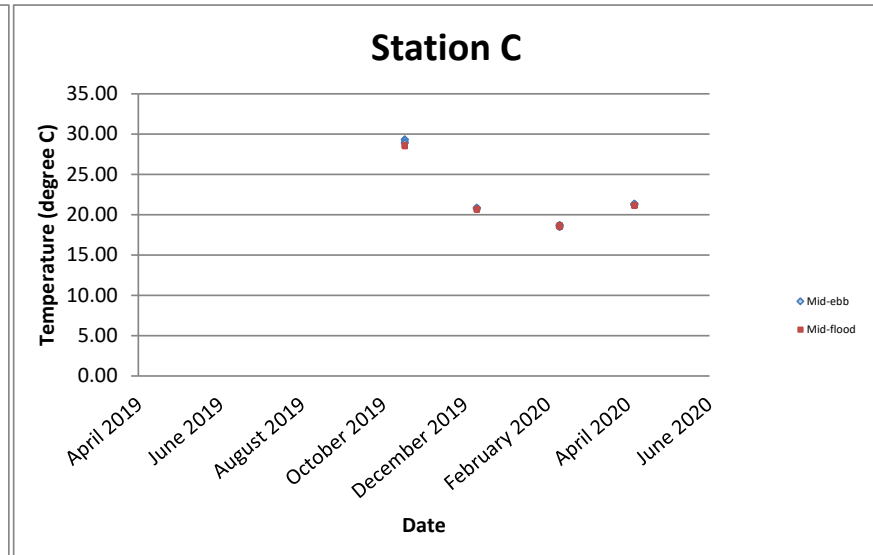
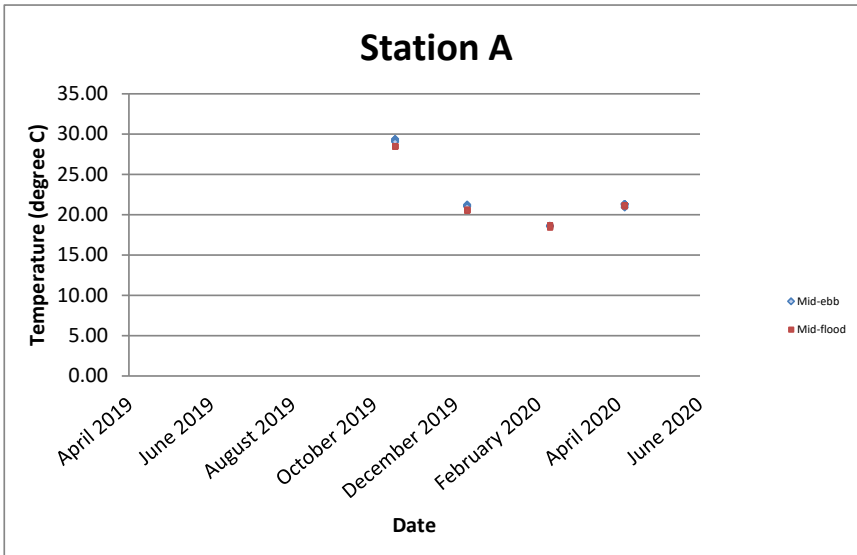
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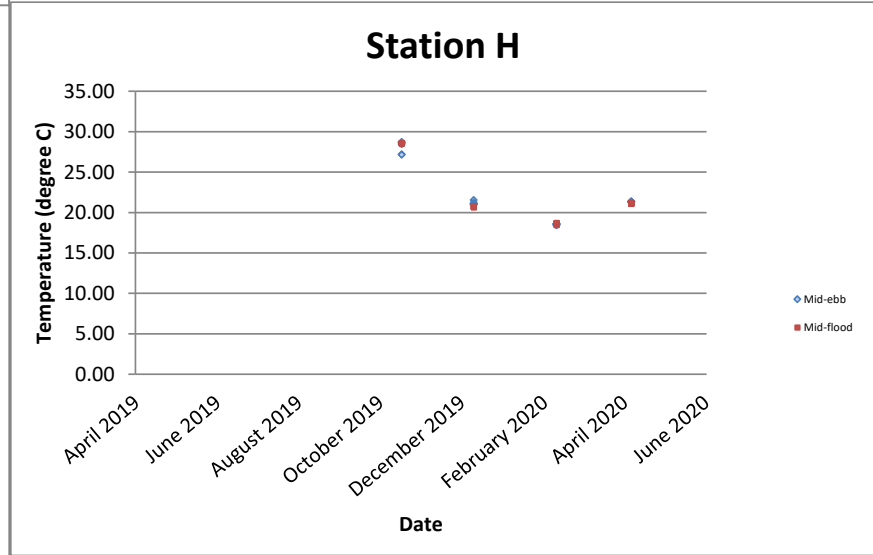
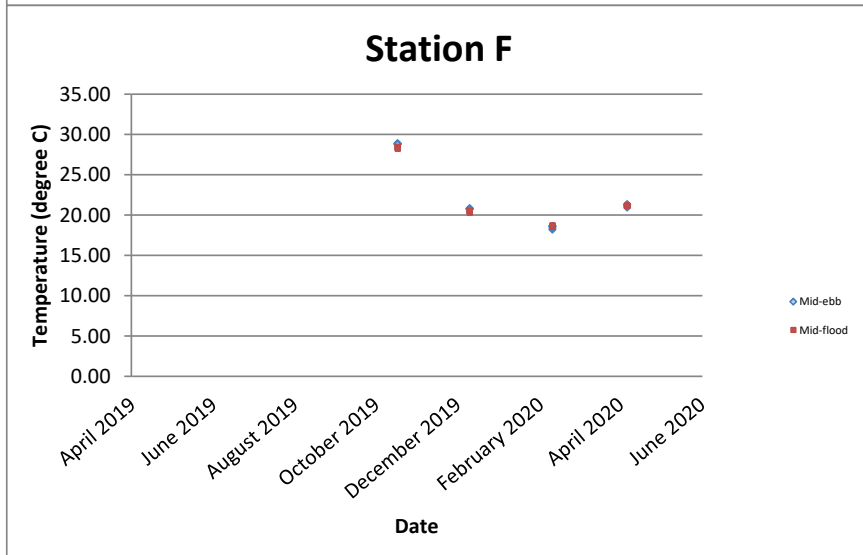
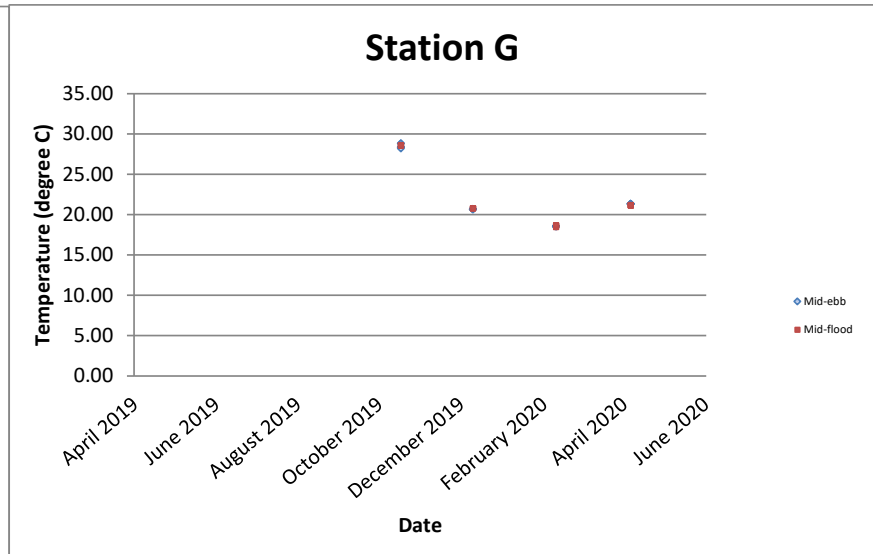
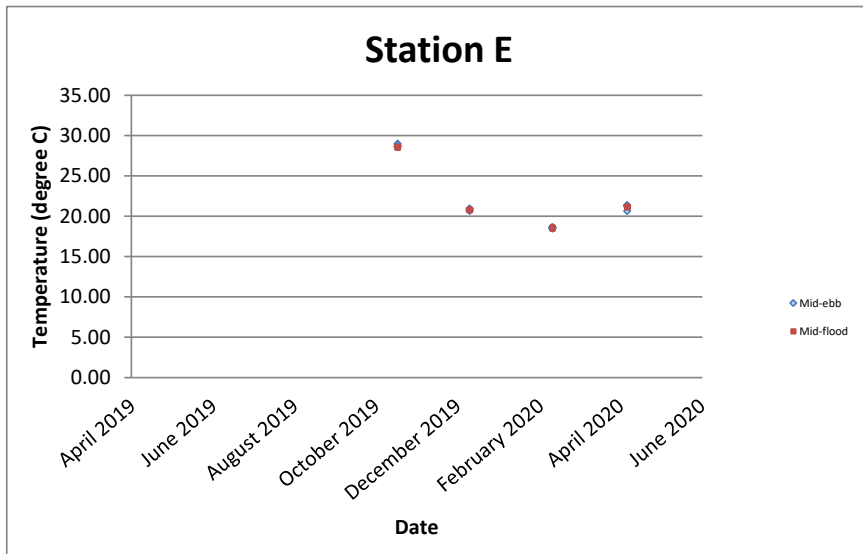
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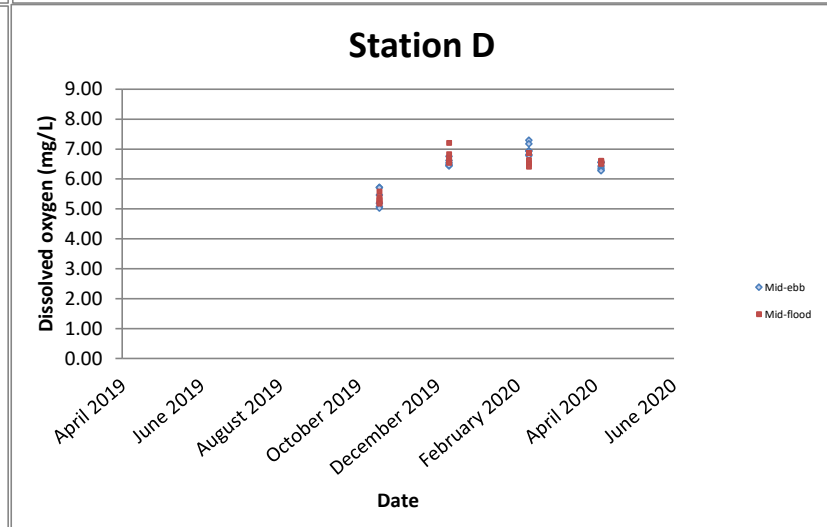
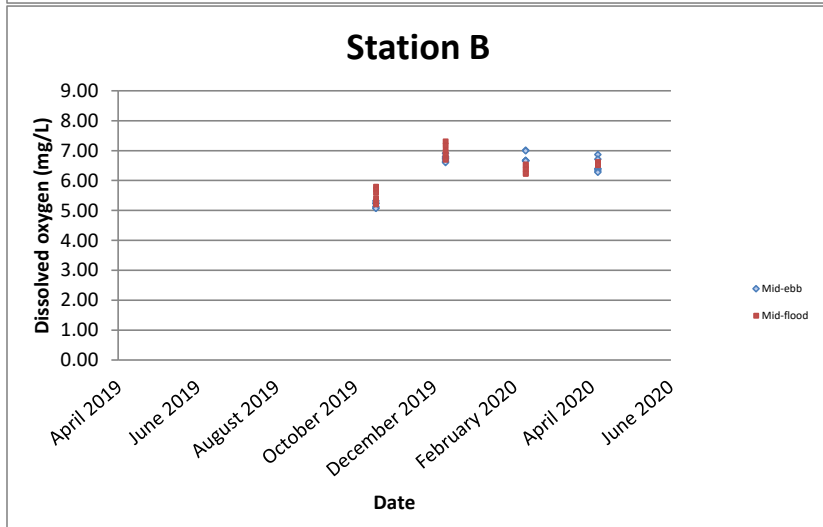
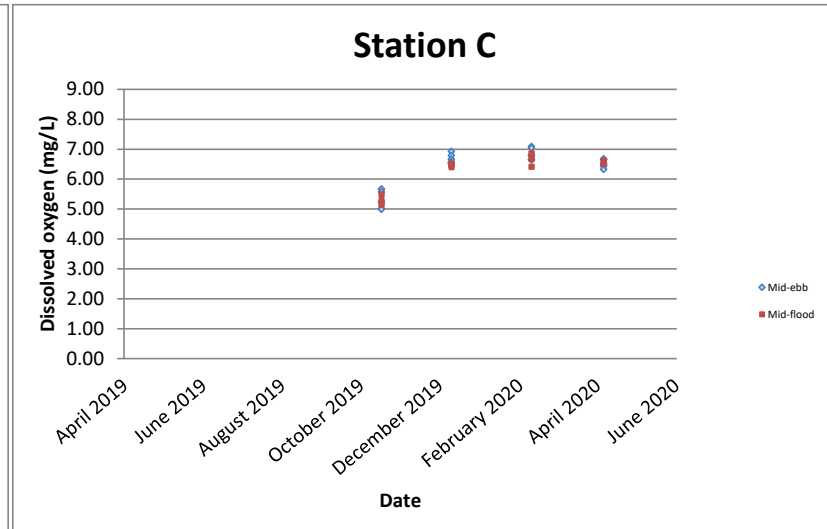
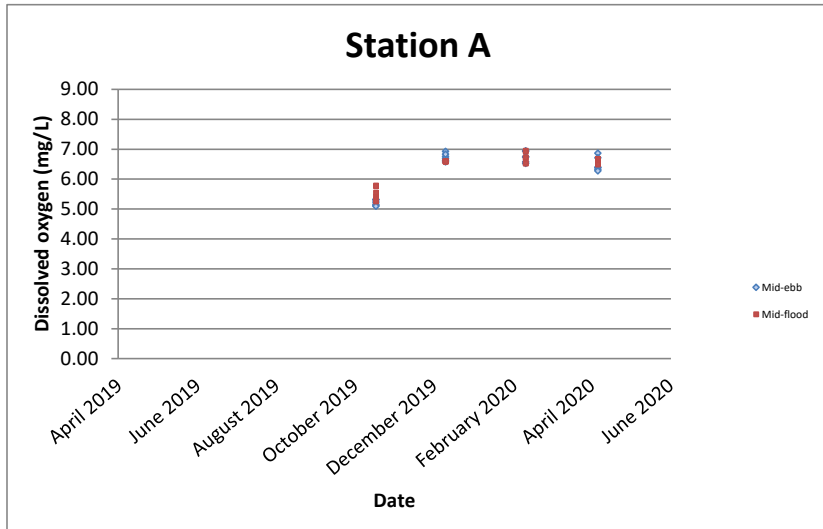
Temperature (degree C)



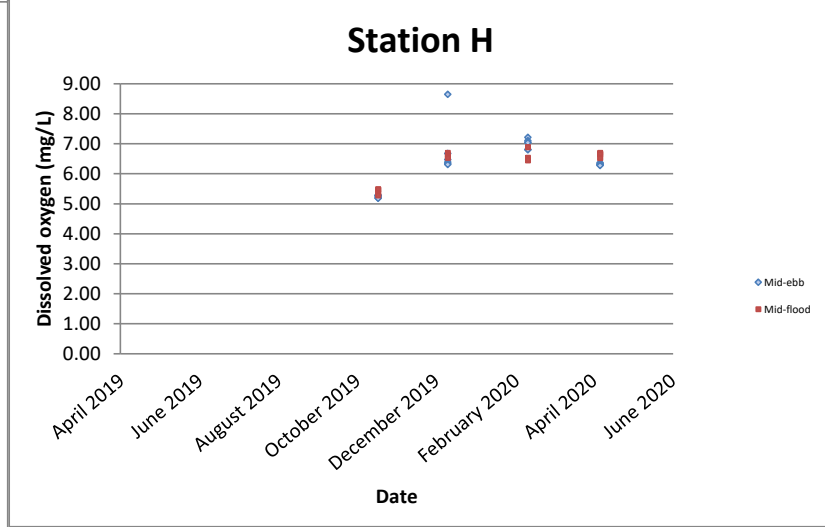
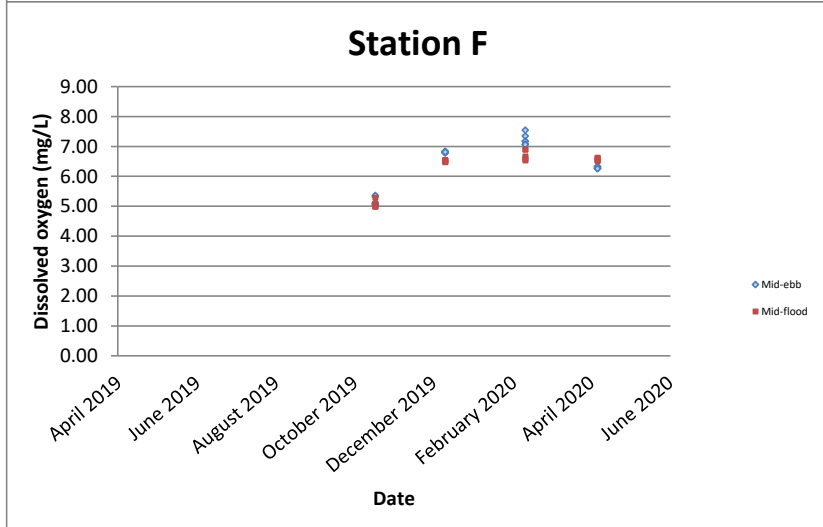
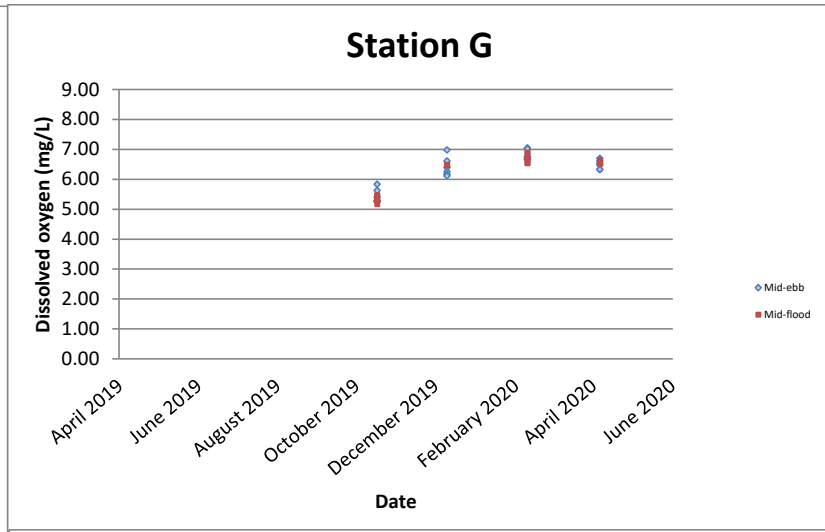
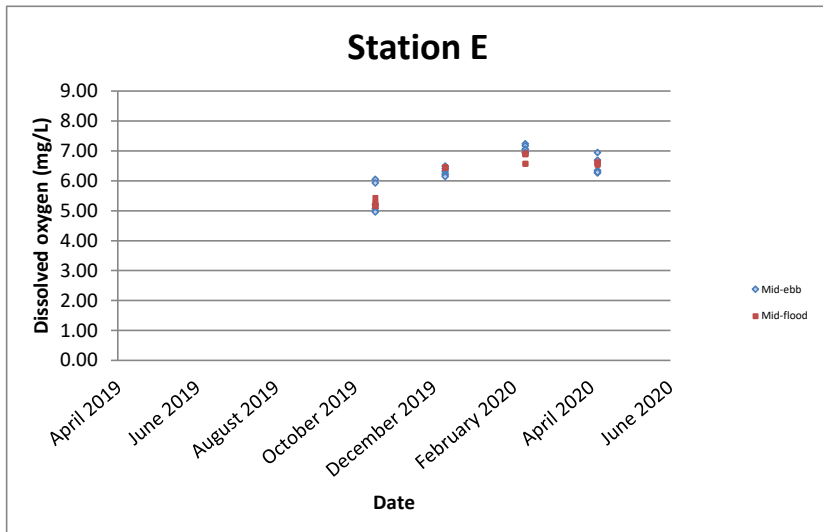
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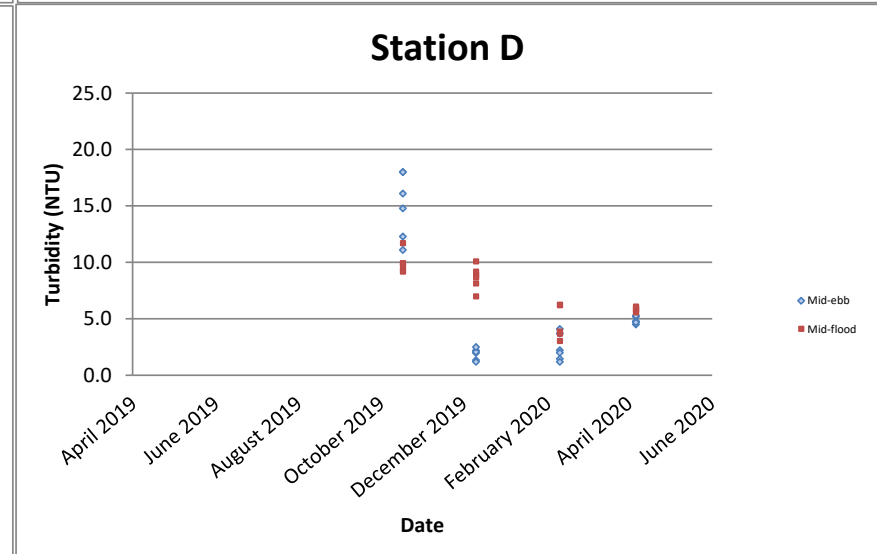
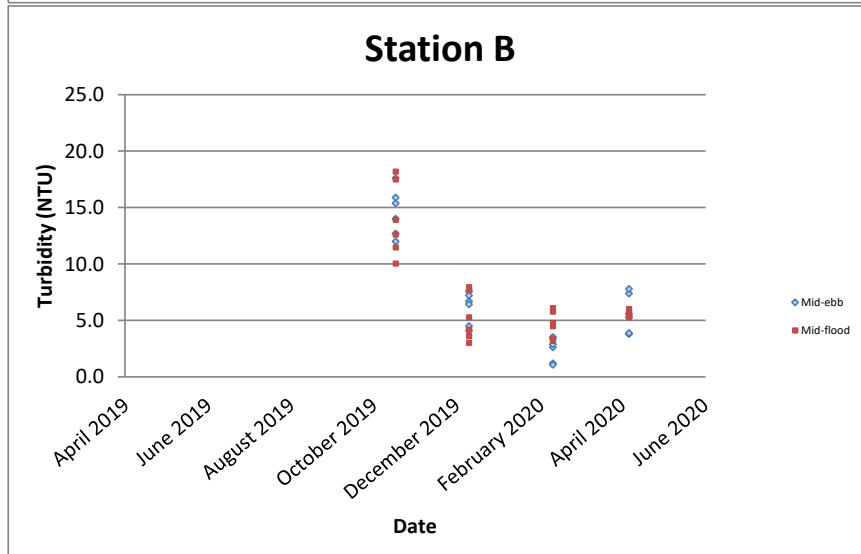
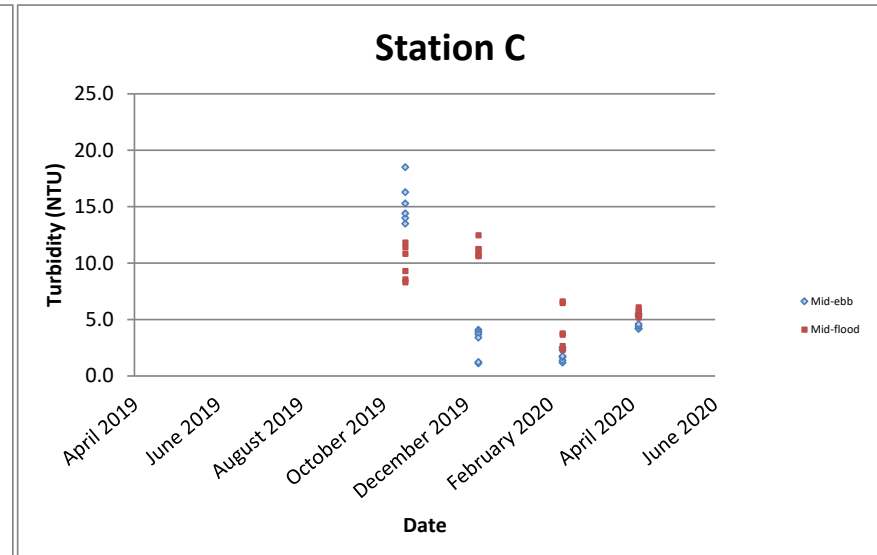
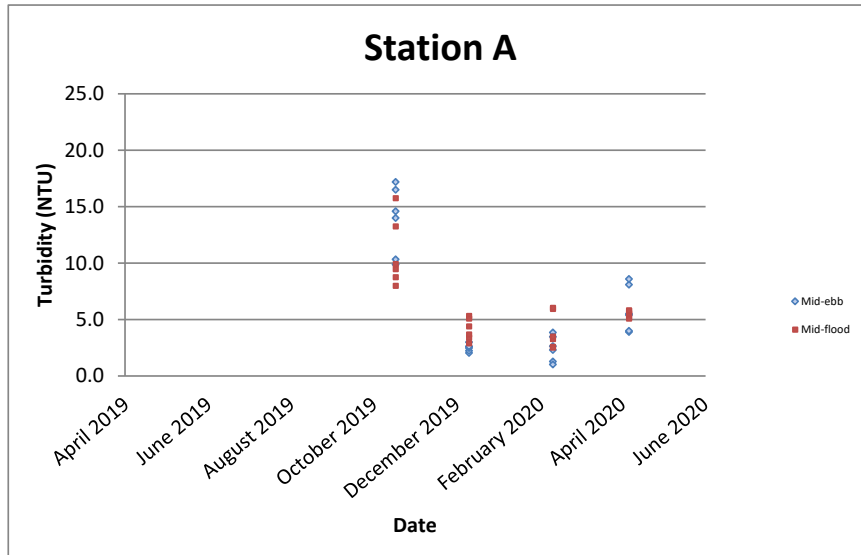
Dissolved oxygen (mg/L)



Dissolved oxygen (mg/L)

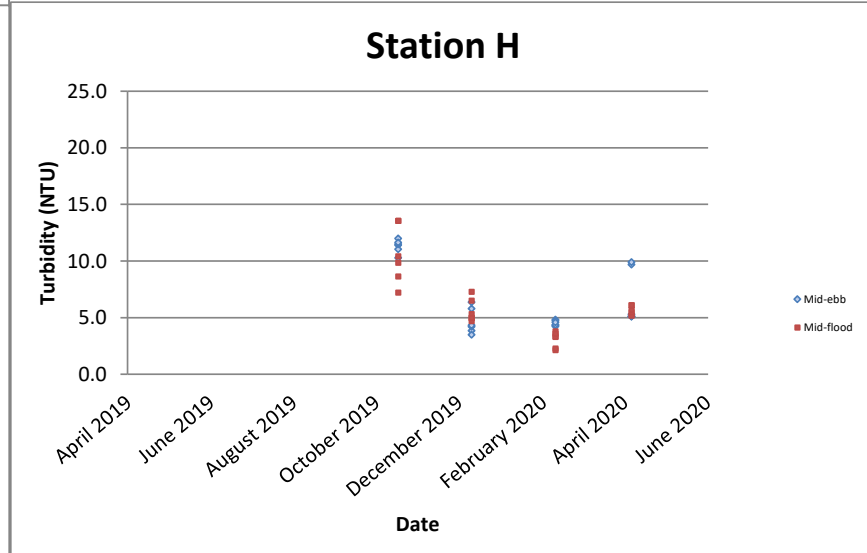
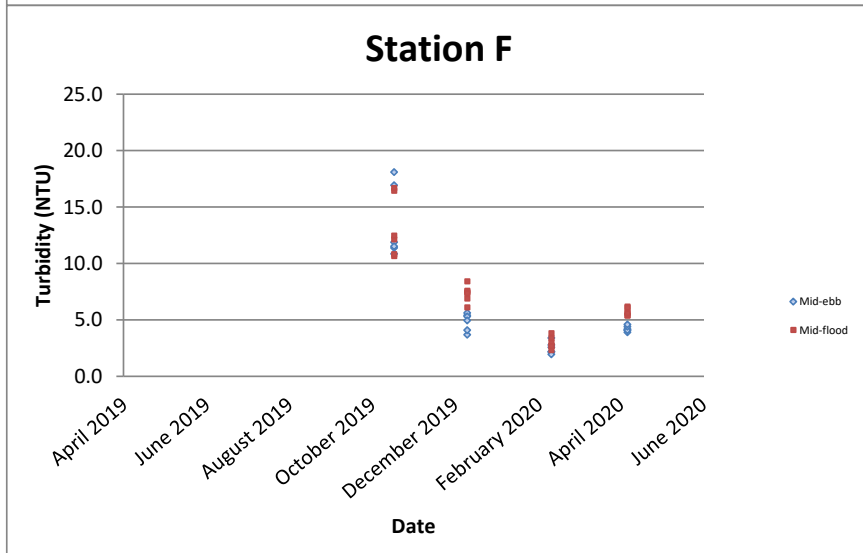
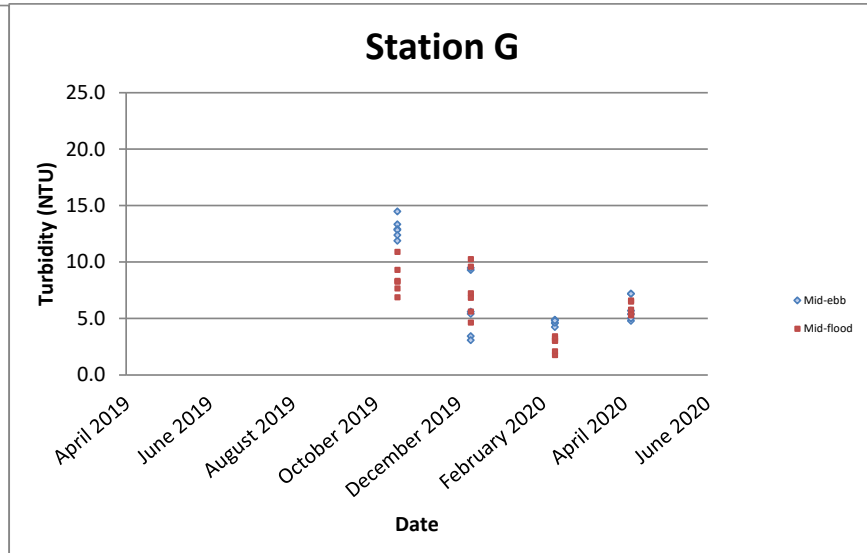
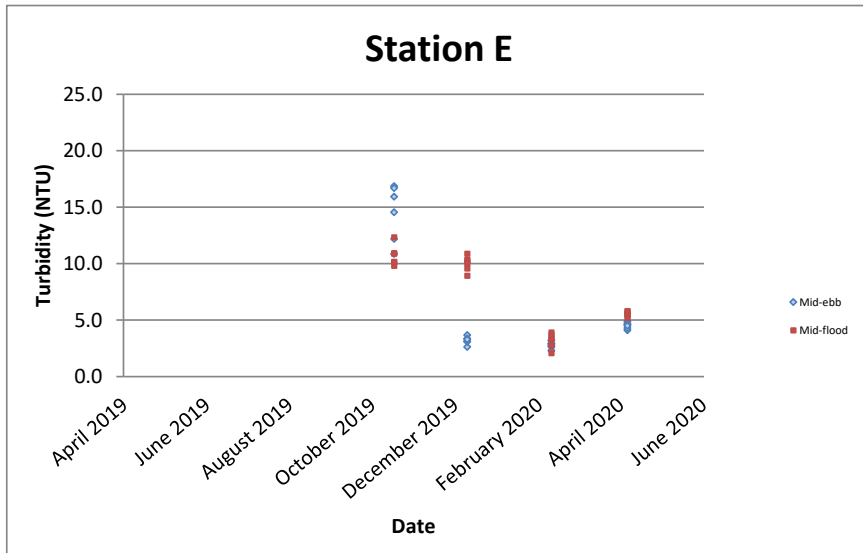


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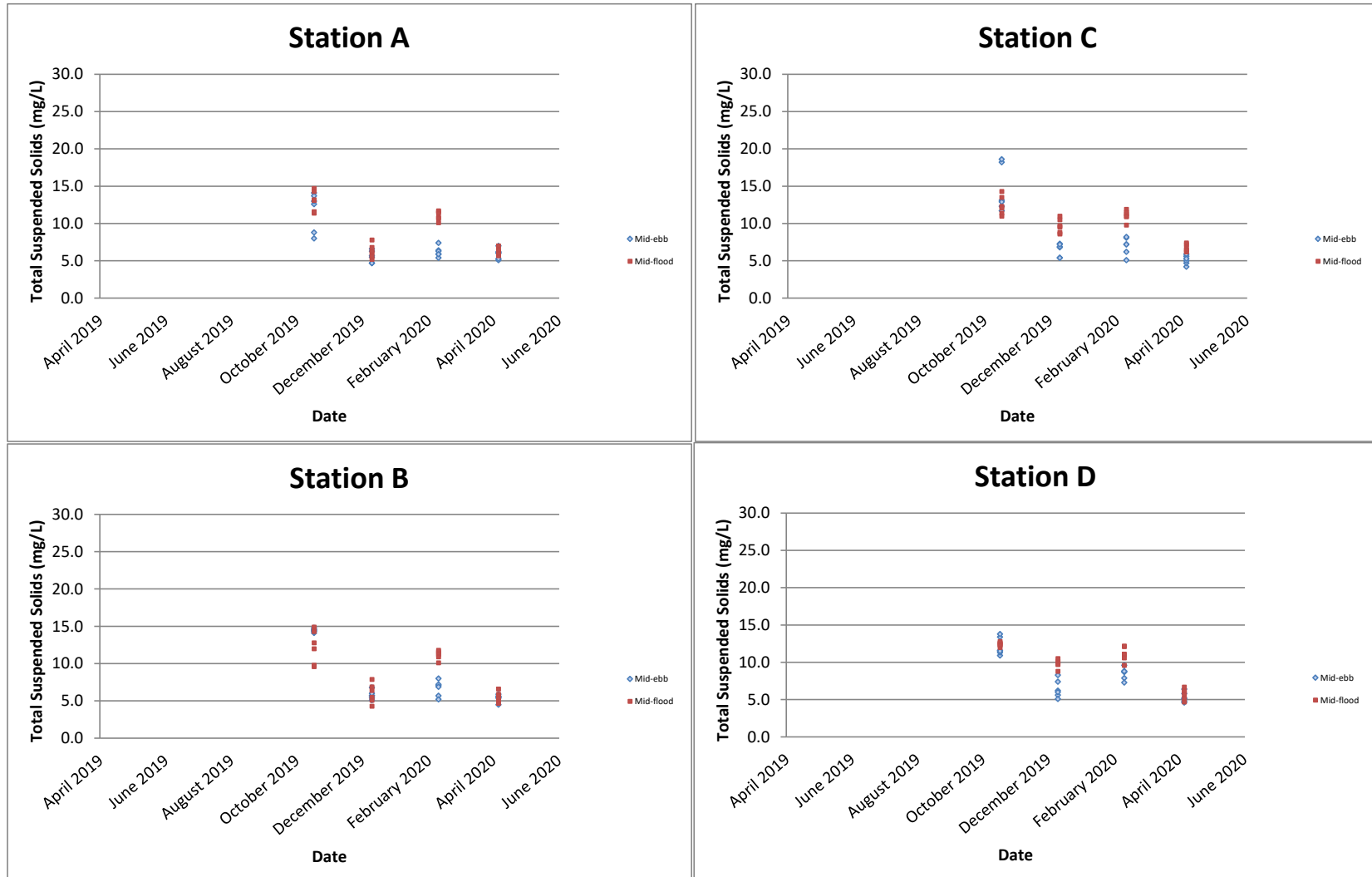




# Turbidity (NTU)

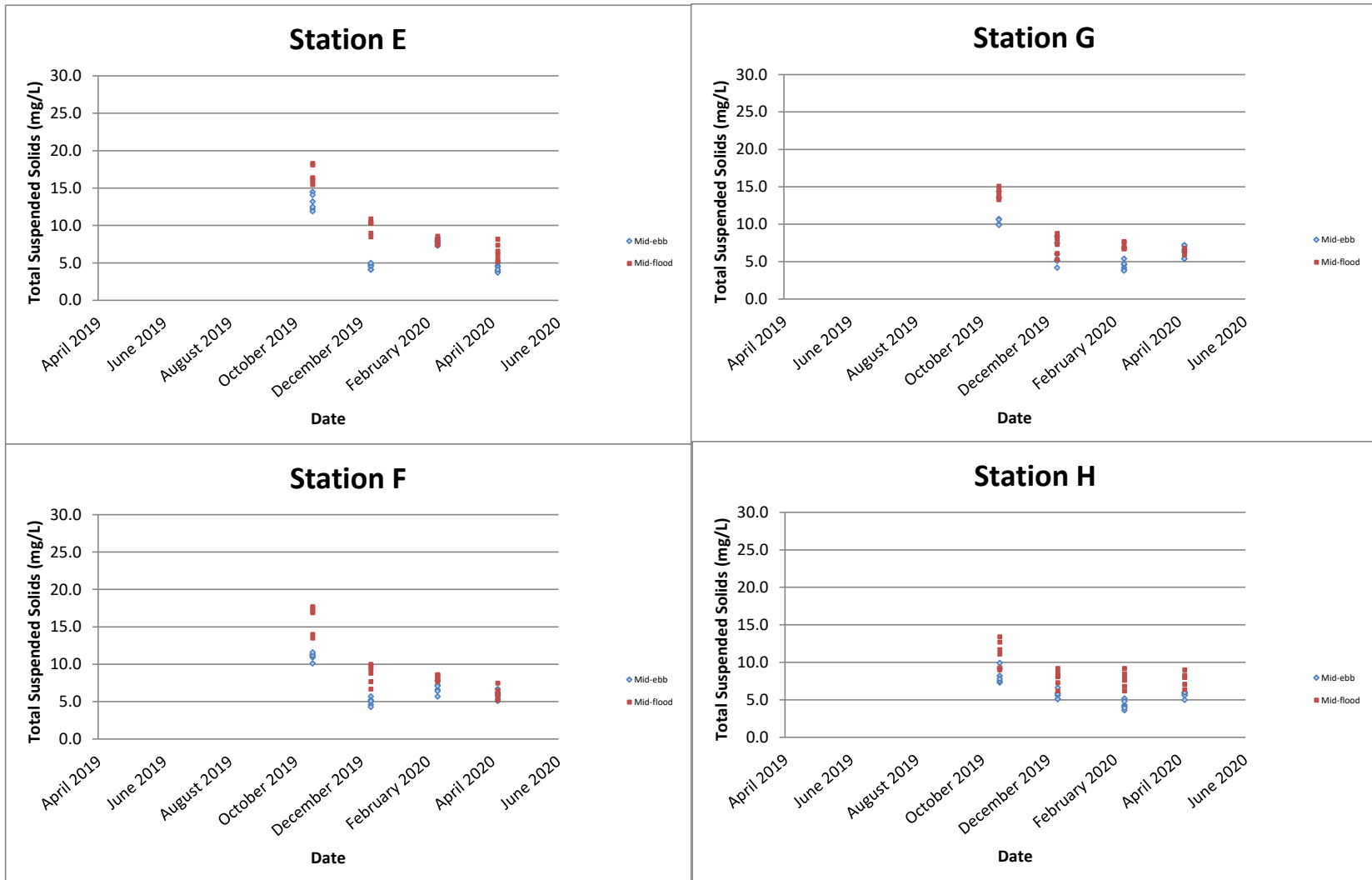


Total Suspended Solids (mg/L)



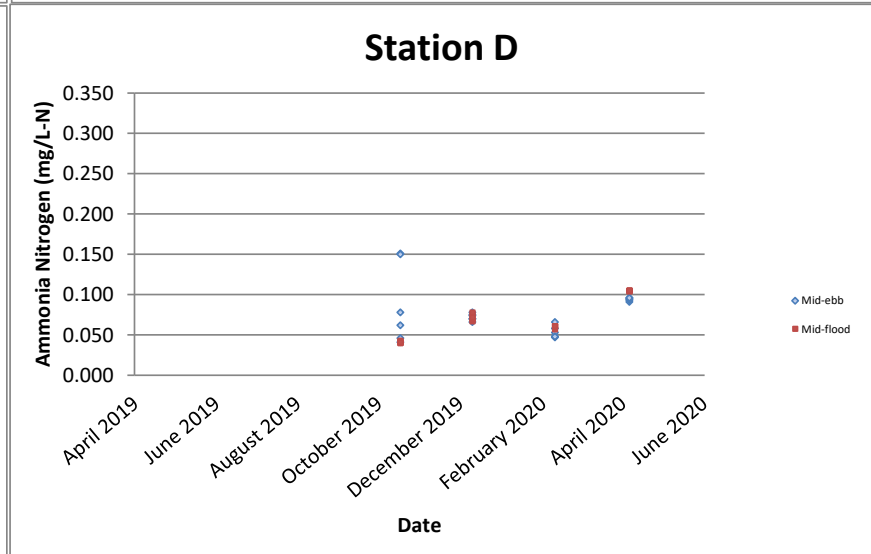
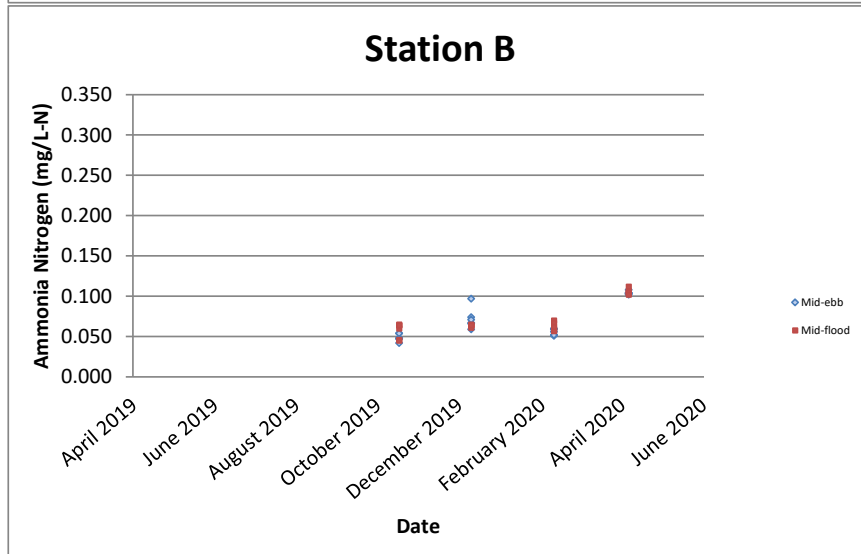
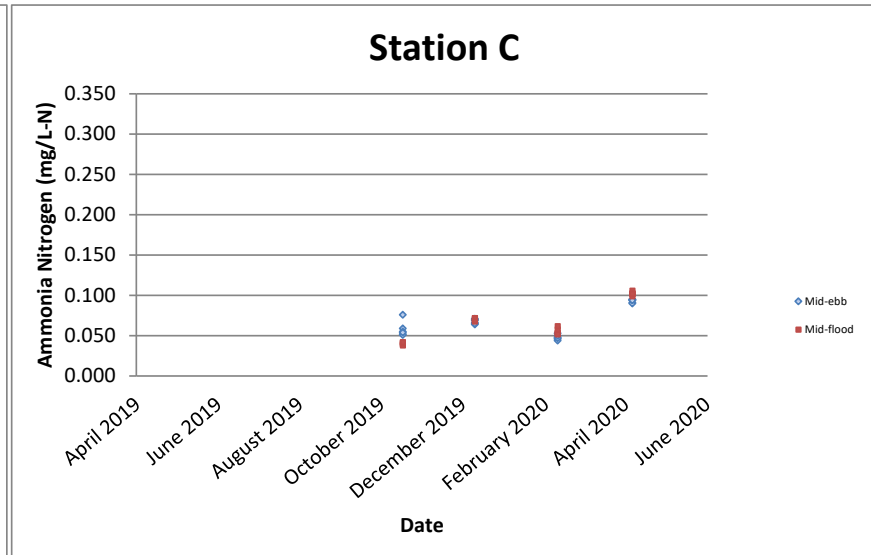
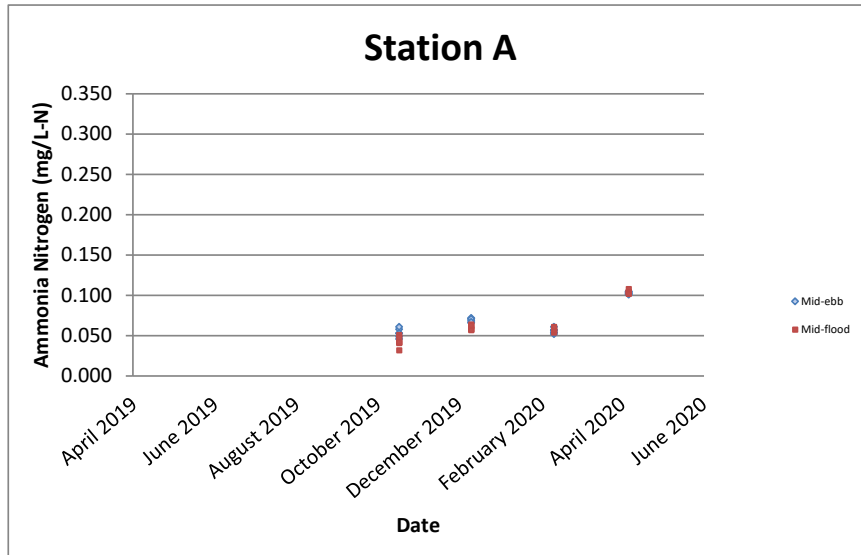
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Total Suspended Solids (mg/L)



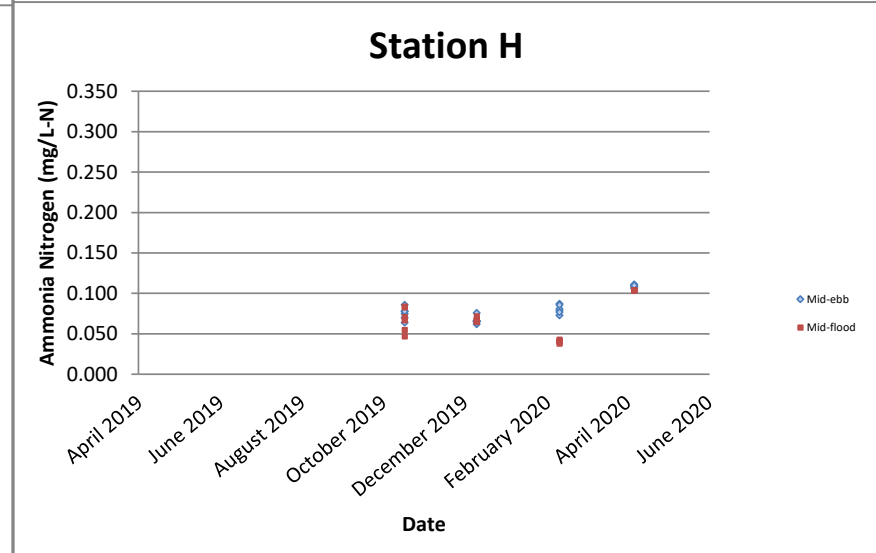
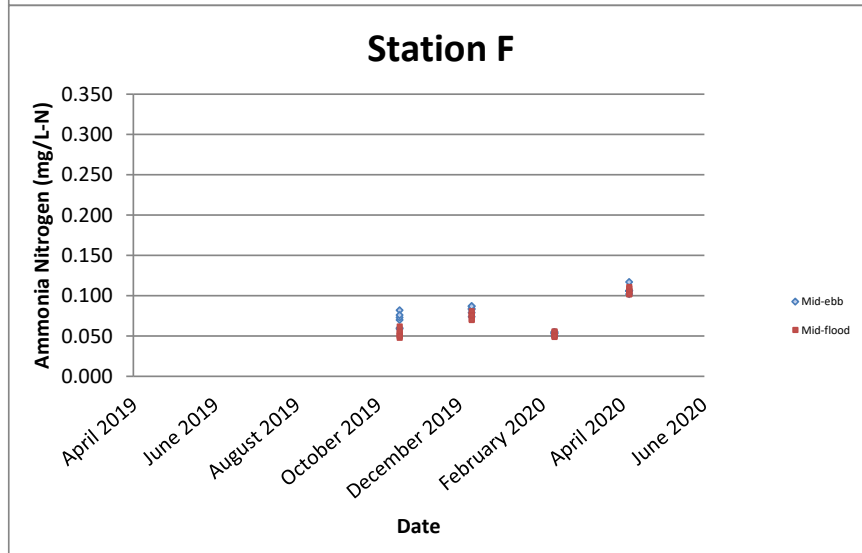
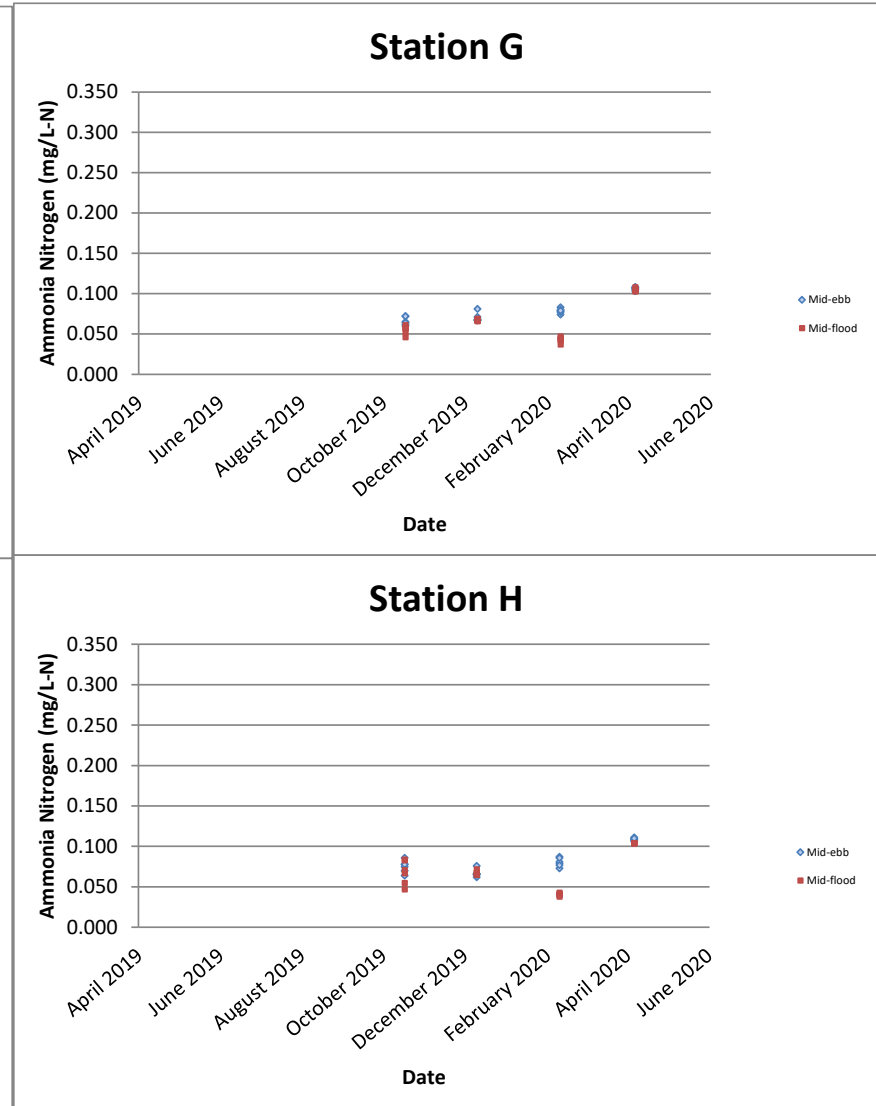
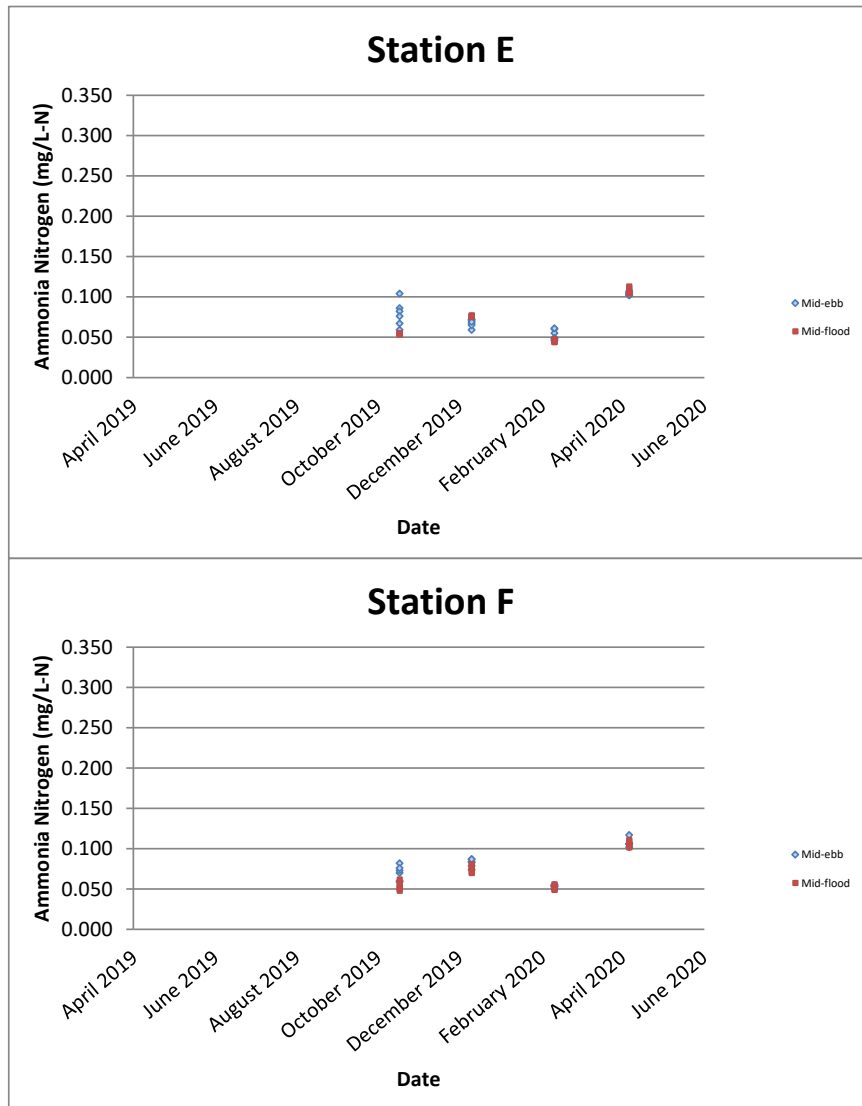
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## Ammonia Nitrogen (mg/L-N)



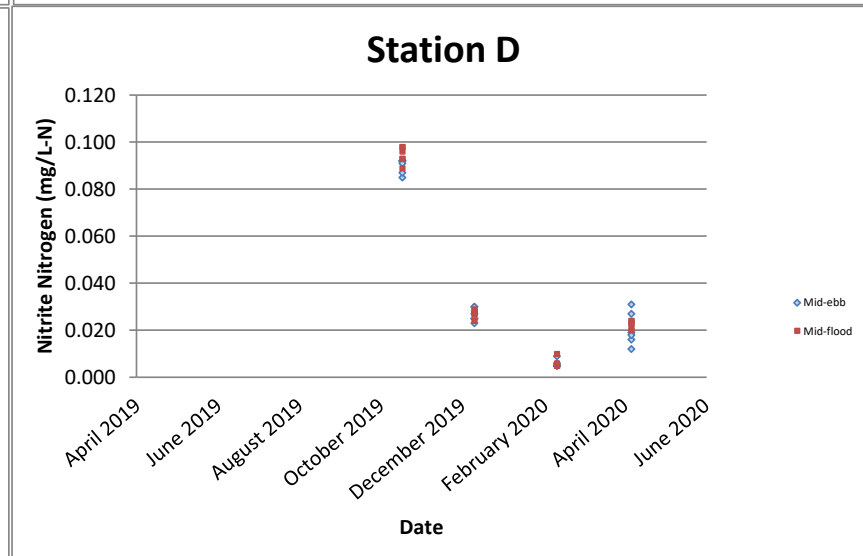
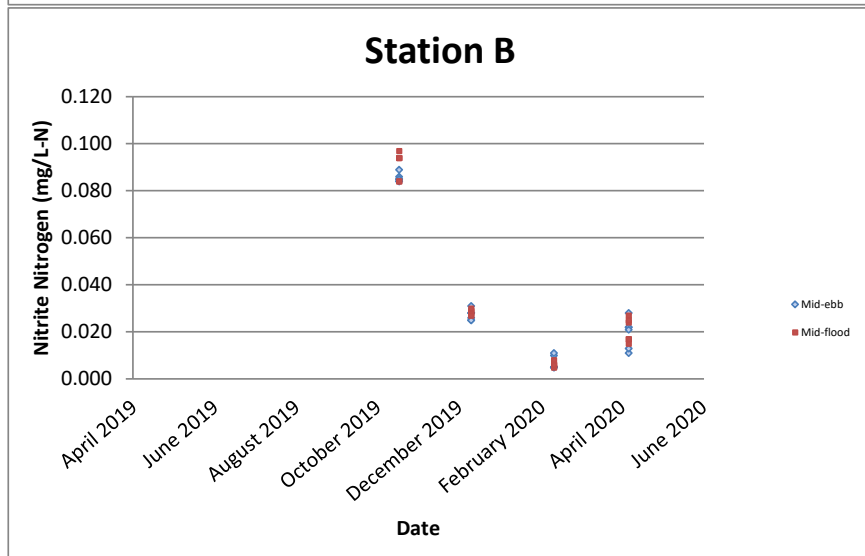
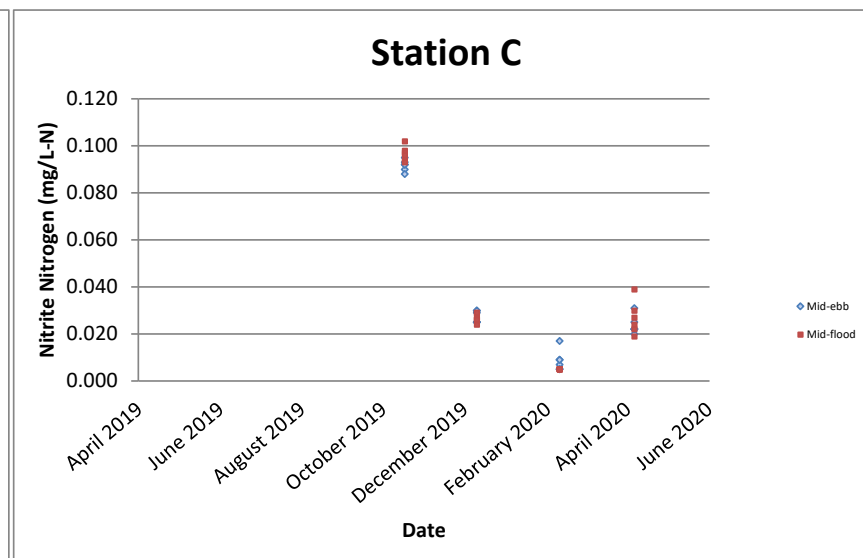
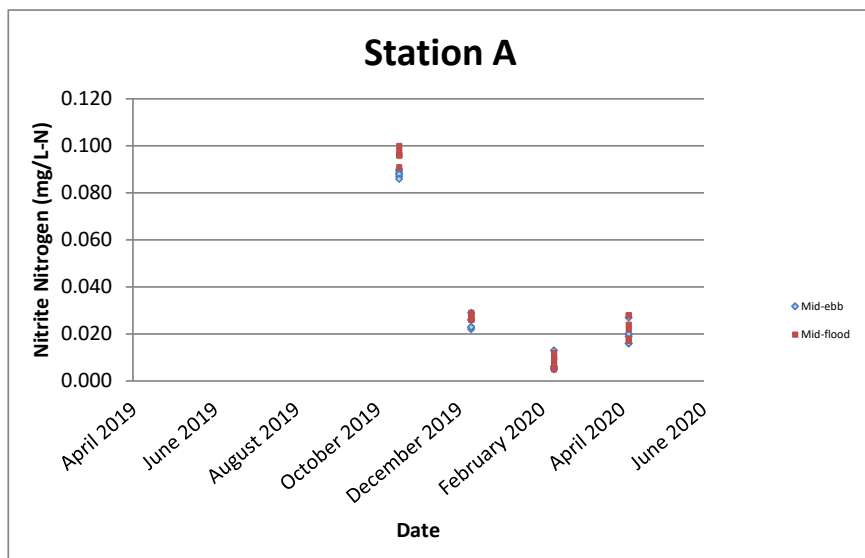
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## Ammonia Nitrogen (mg/L-N)



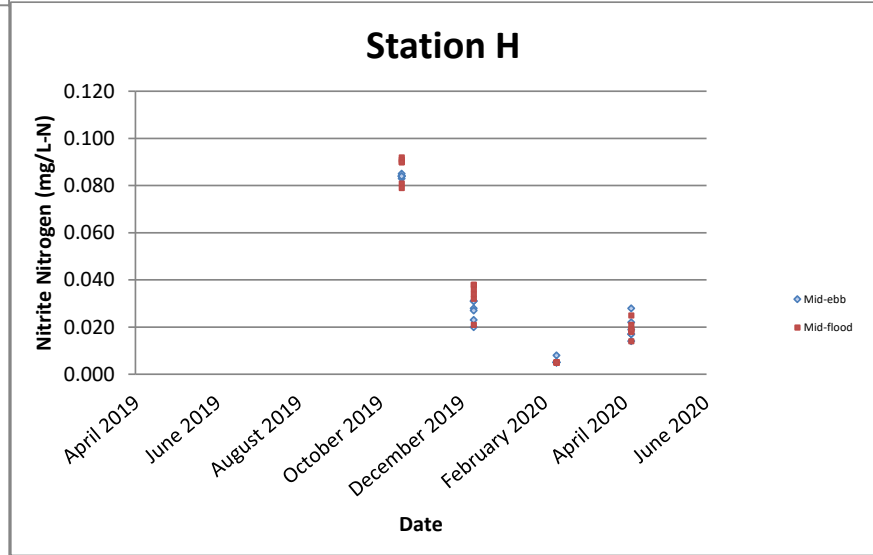
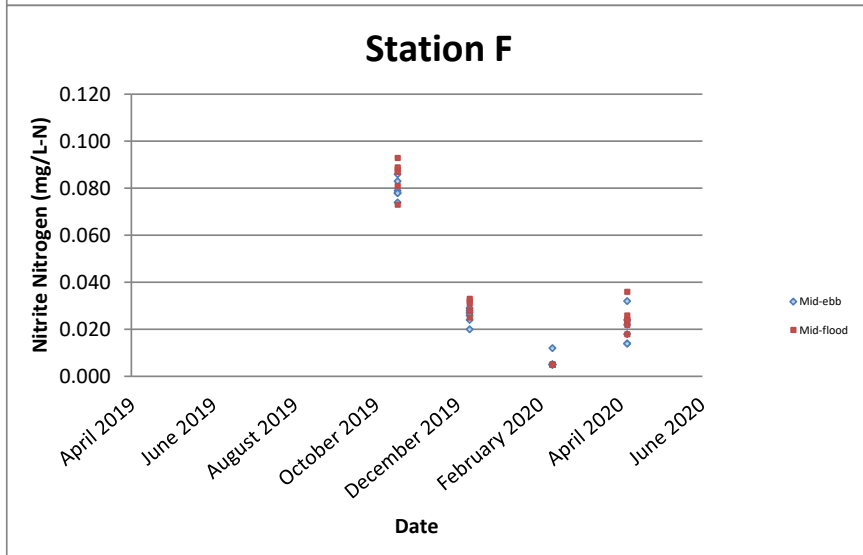
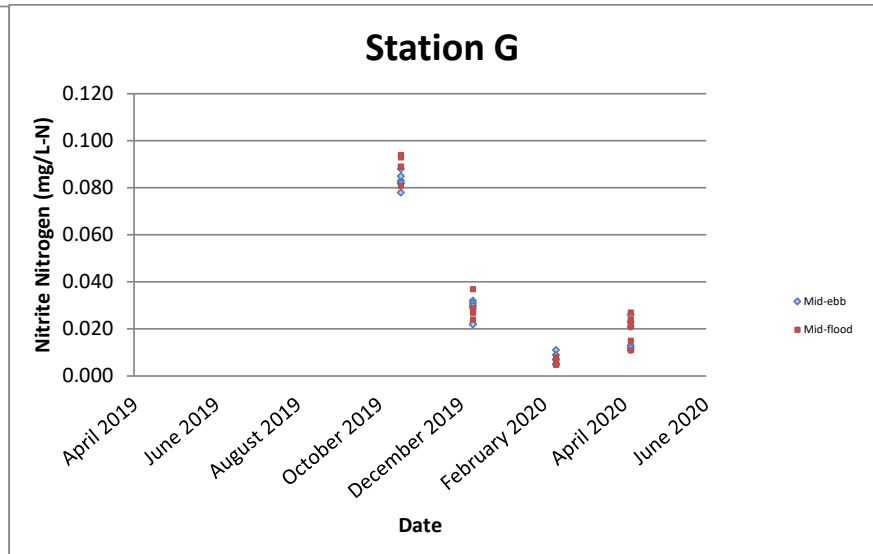
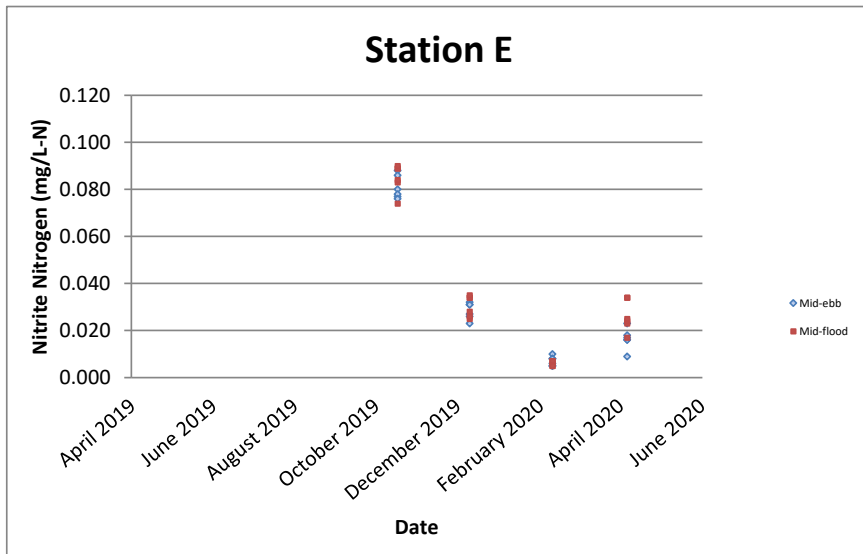
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Ammonia Nitrogen is regarded as 0.005 mg/L in graphical presentation.

### Nitrite Nitrogen (mg/L-N)



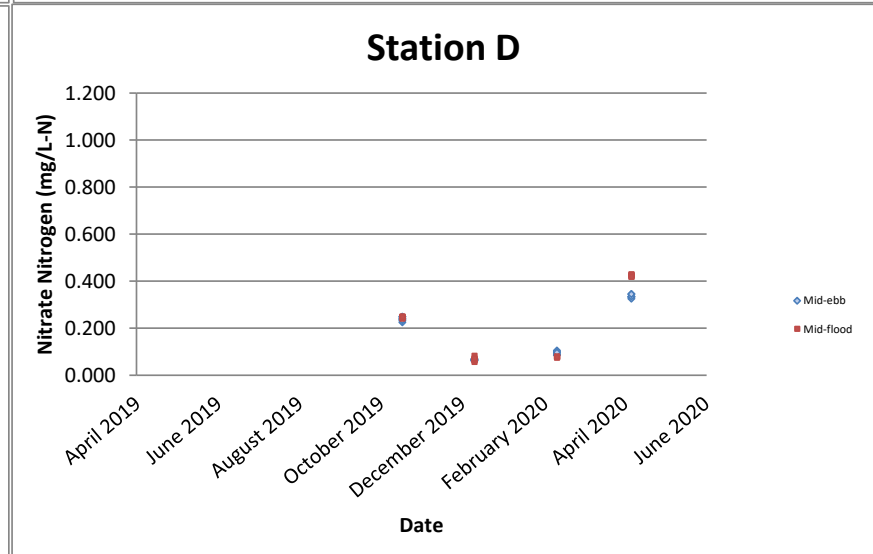
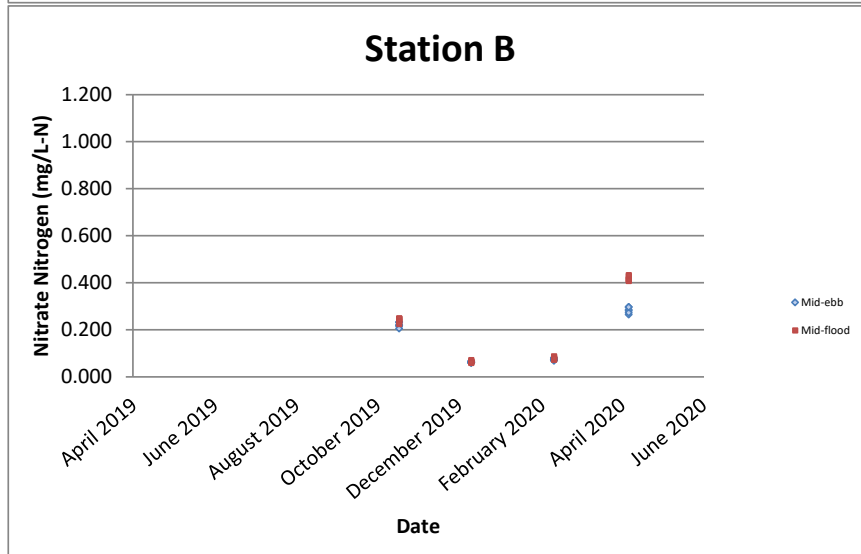
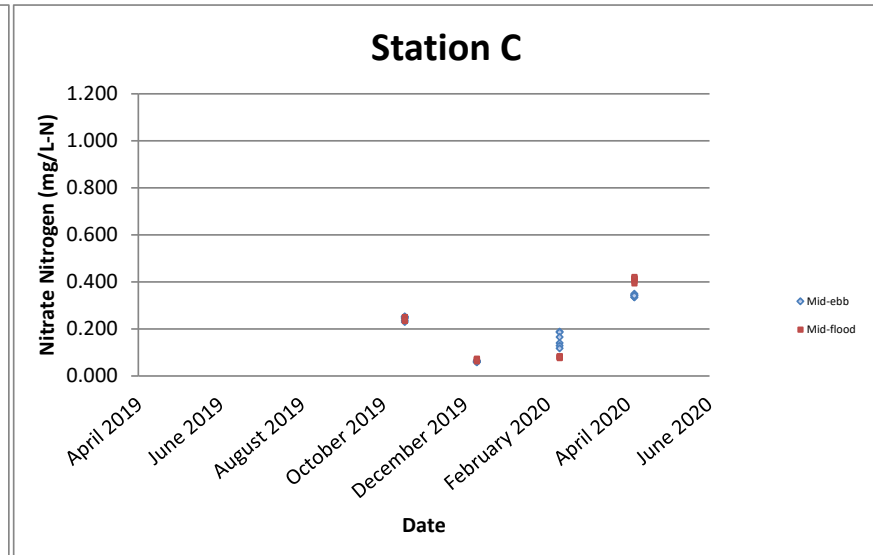
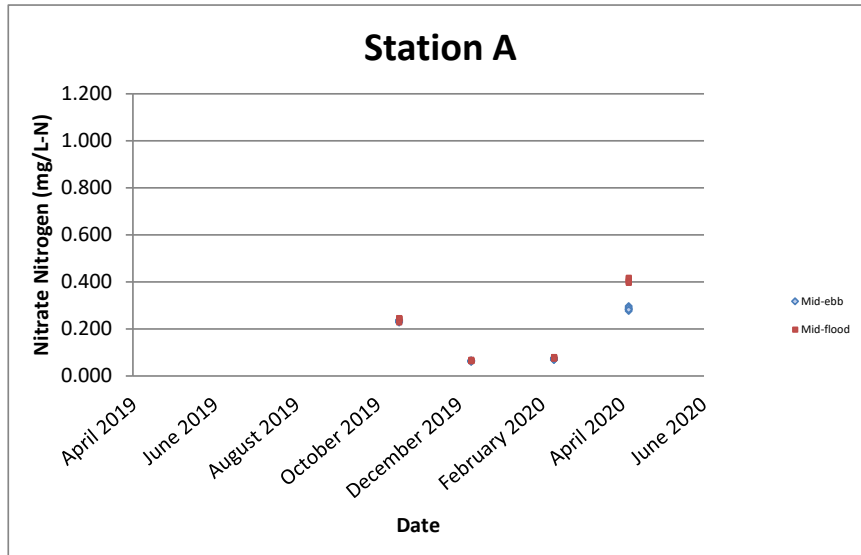
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrite Nitrogen is regarded as 0.005 mg/L in graphical presentation.

Nitrite Nitrogen (mg/L-N)



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

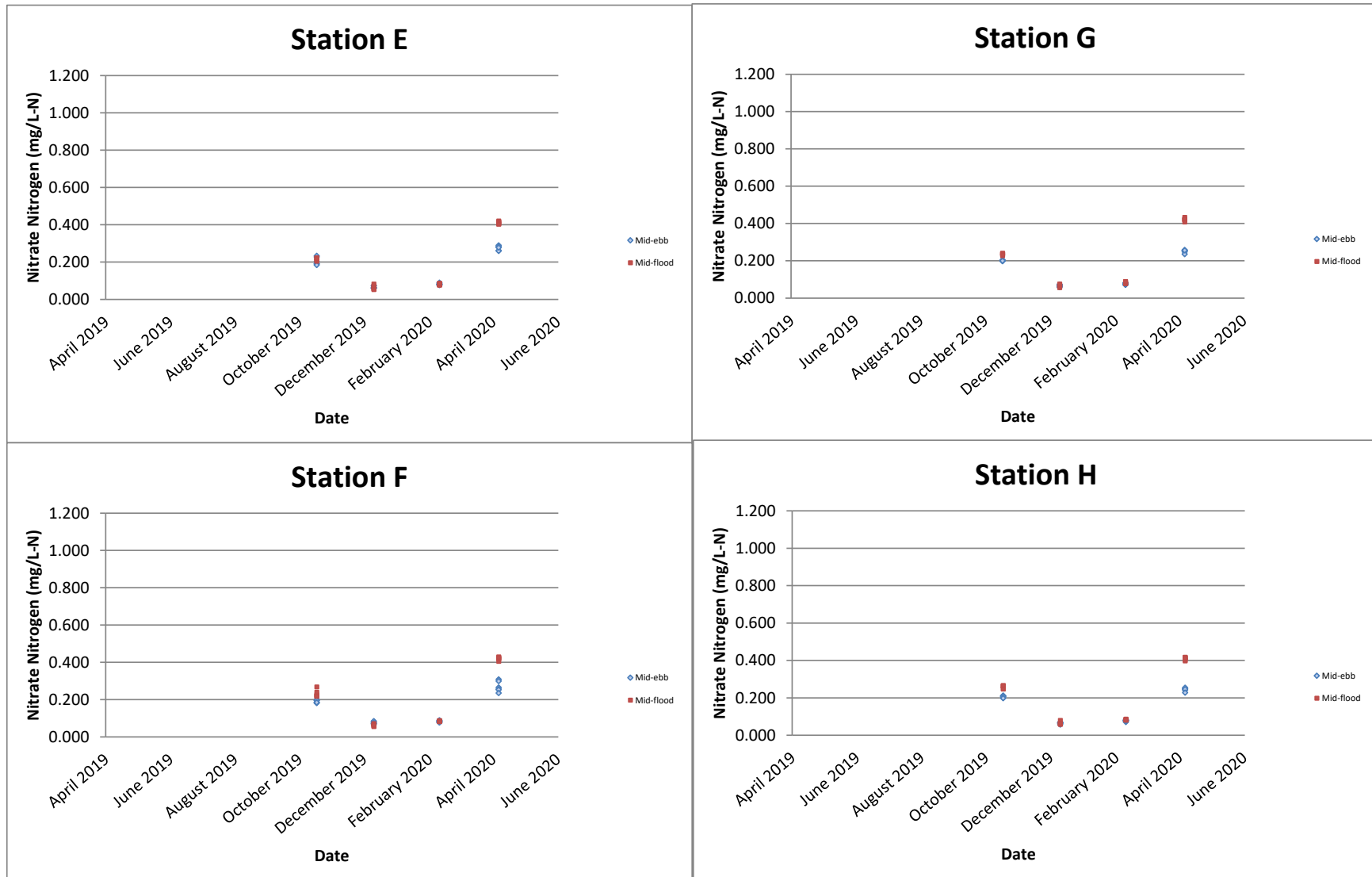
Nitrate Nitrogen (mg/L-N)



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

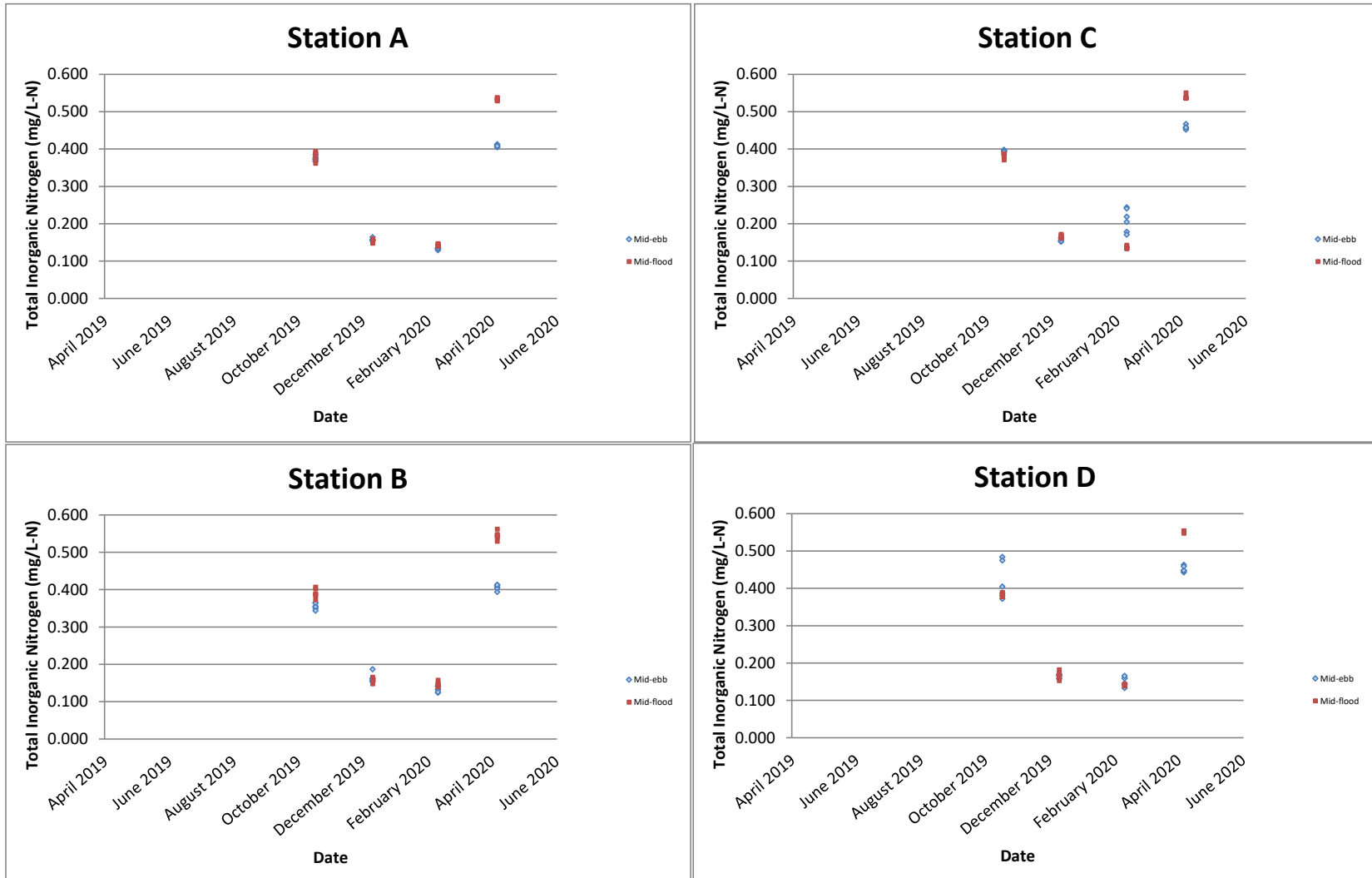


## Nitrate Nitrogen (mg/L-N)



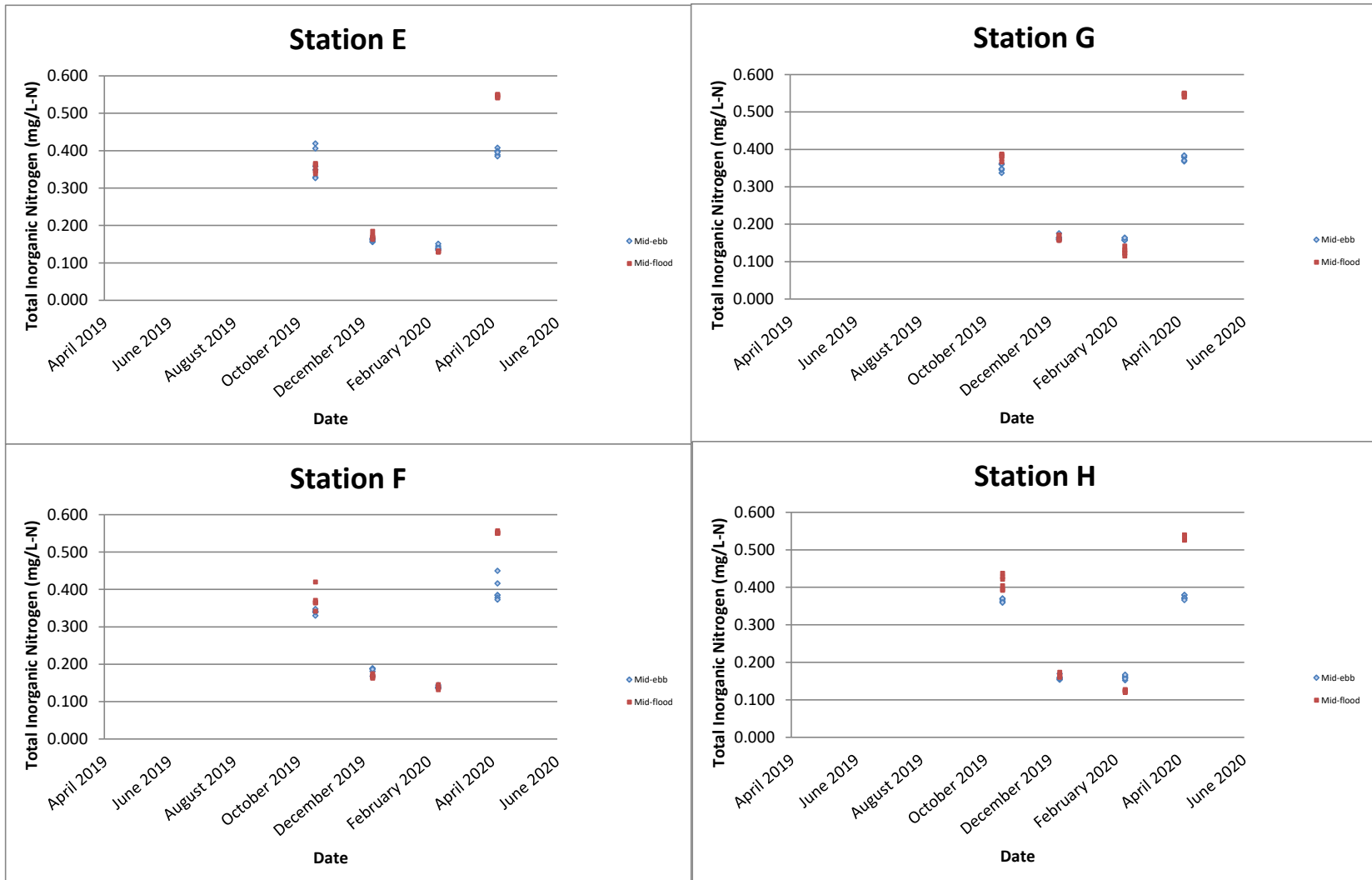
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrate Nitrogen is regarded as 0.005 mg/L in graphical presentation.

Total Inorganic Nitrogen (mg/L-N)



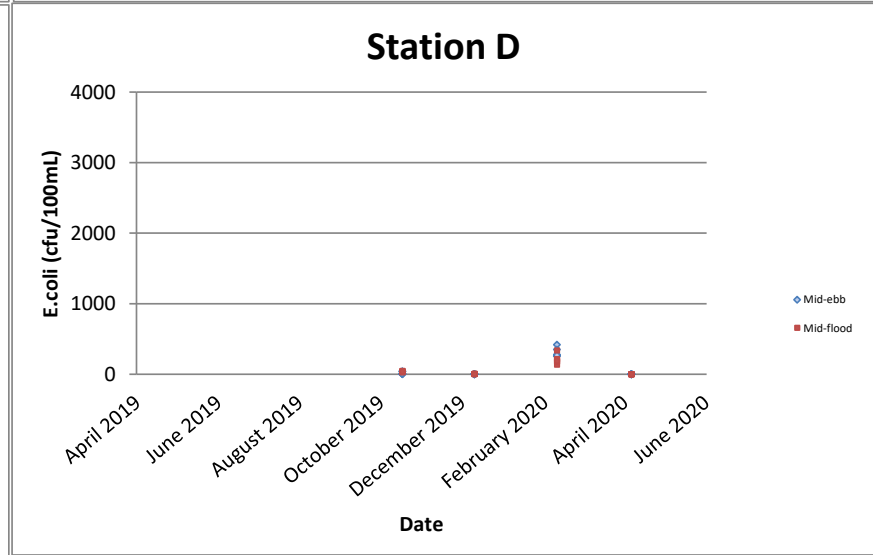
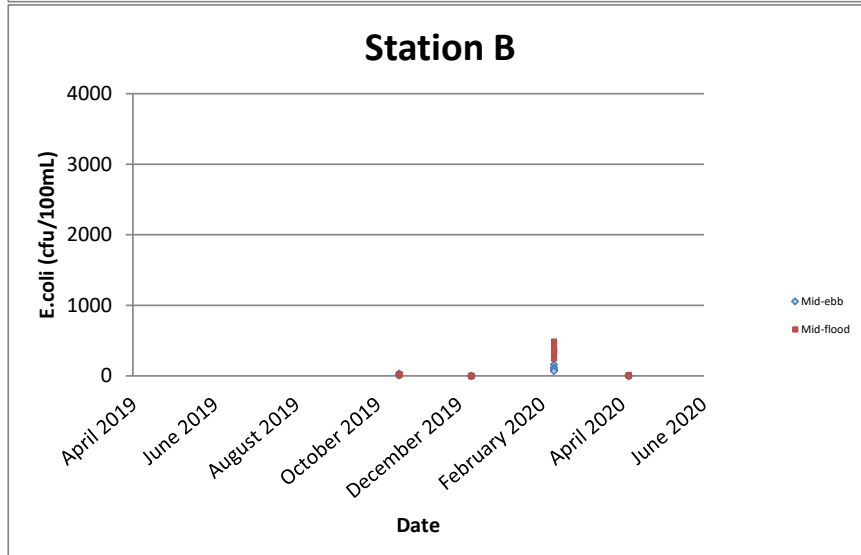
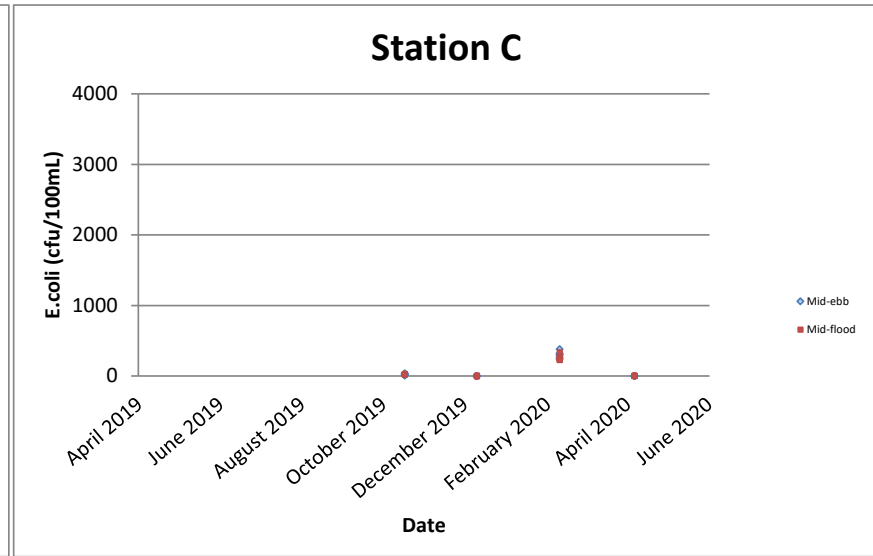
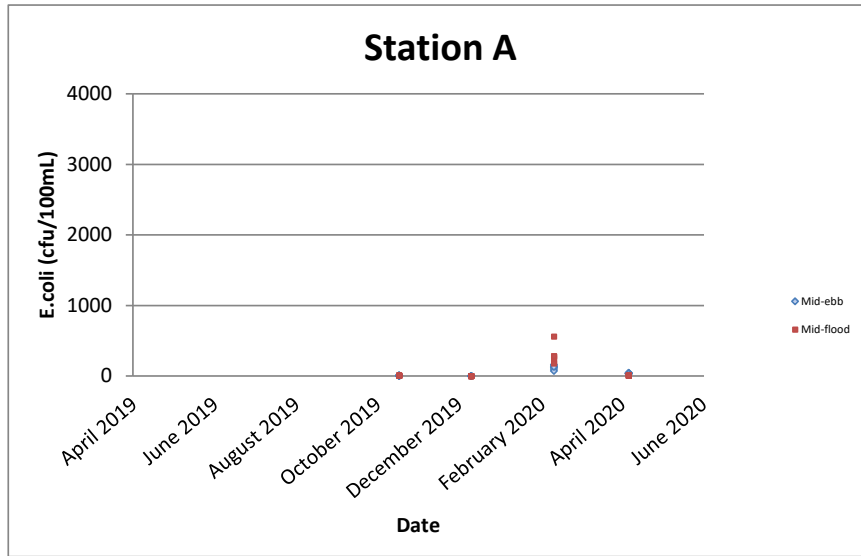
Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

Total Inorganic Nitrogen (mg/L-N)



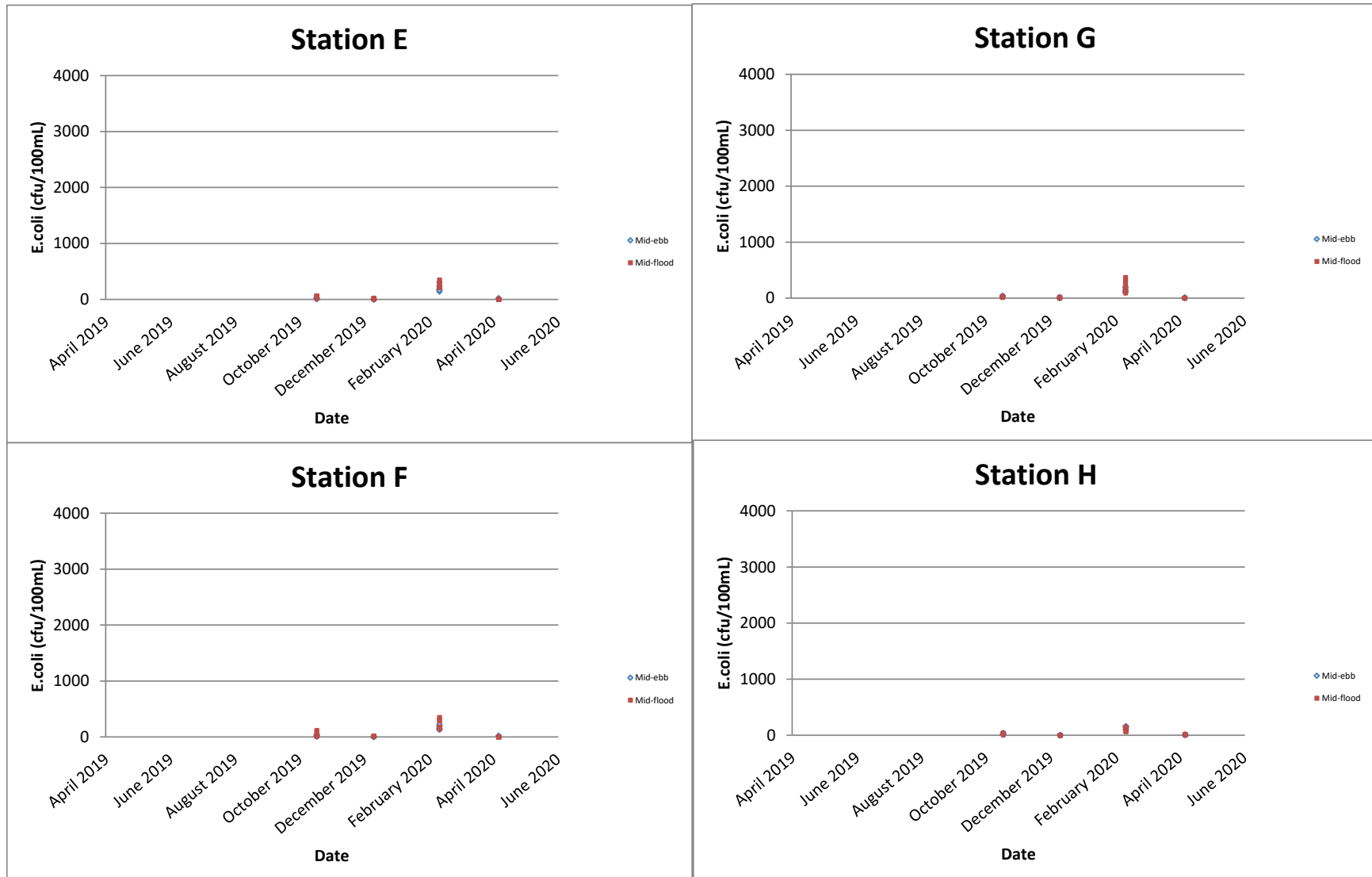
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E.coli (cfu/100mL)



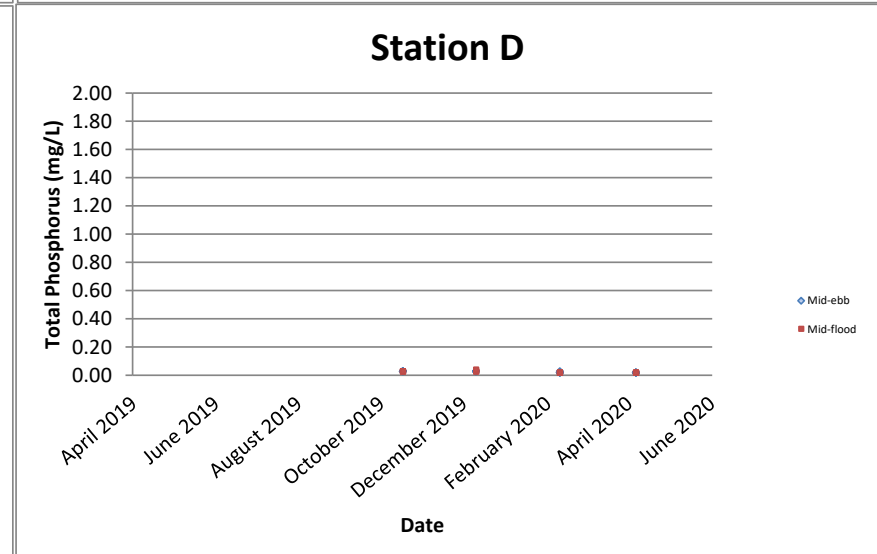
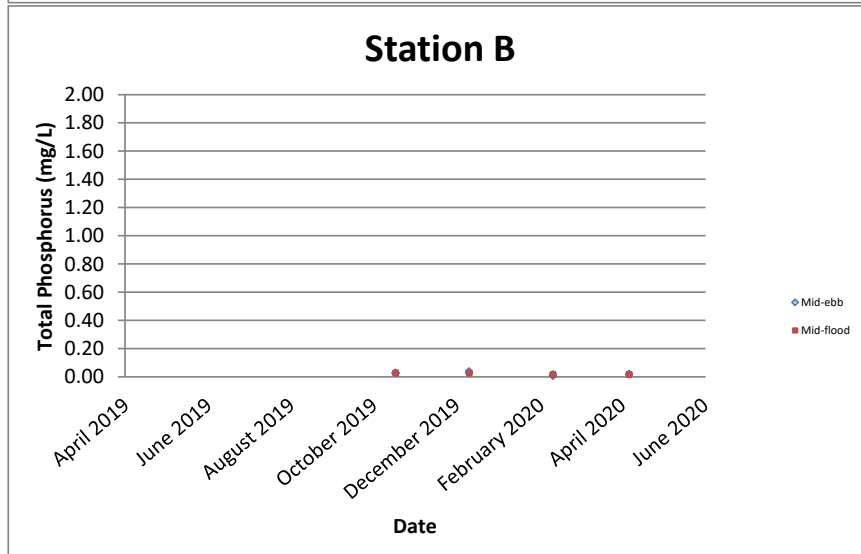
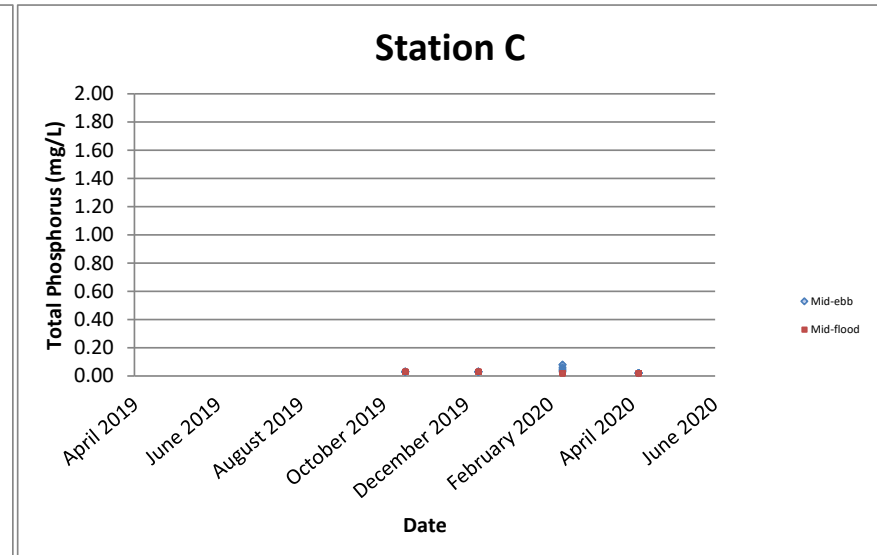
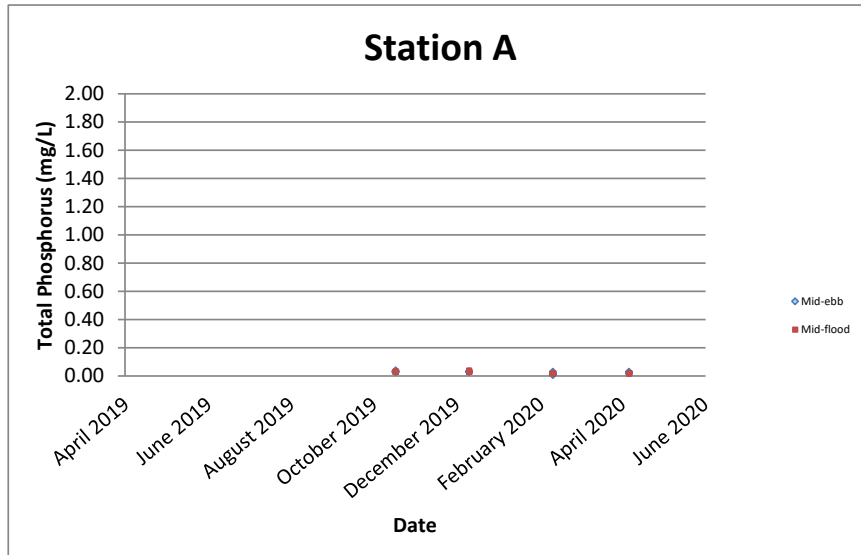
Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 1 CFU/100mL in graphical presentation.

E.coli (cfu/100mL)



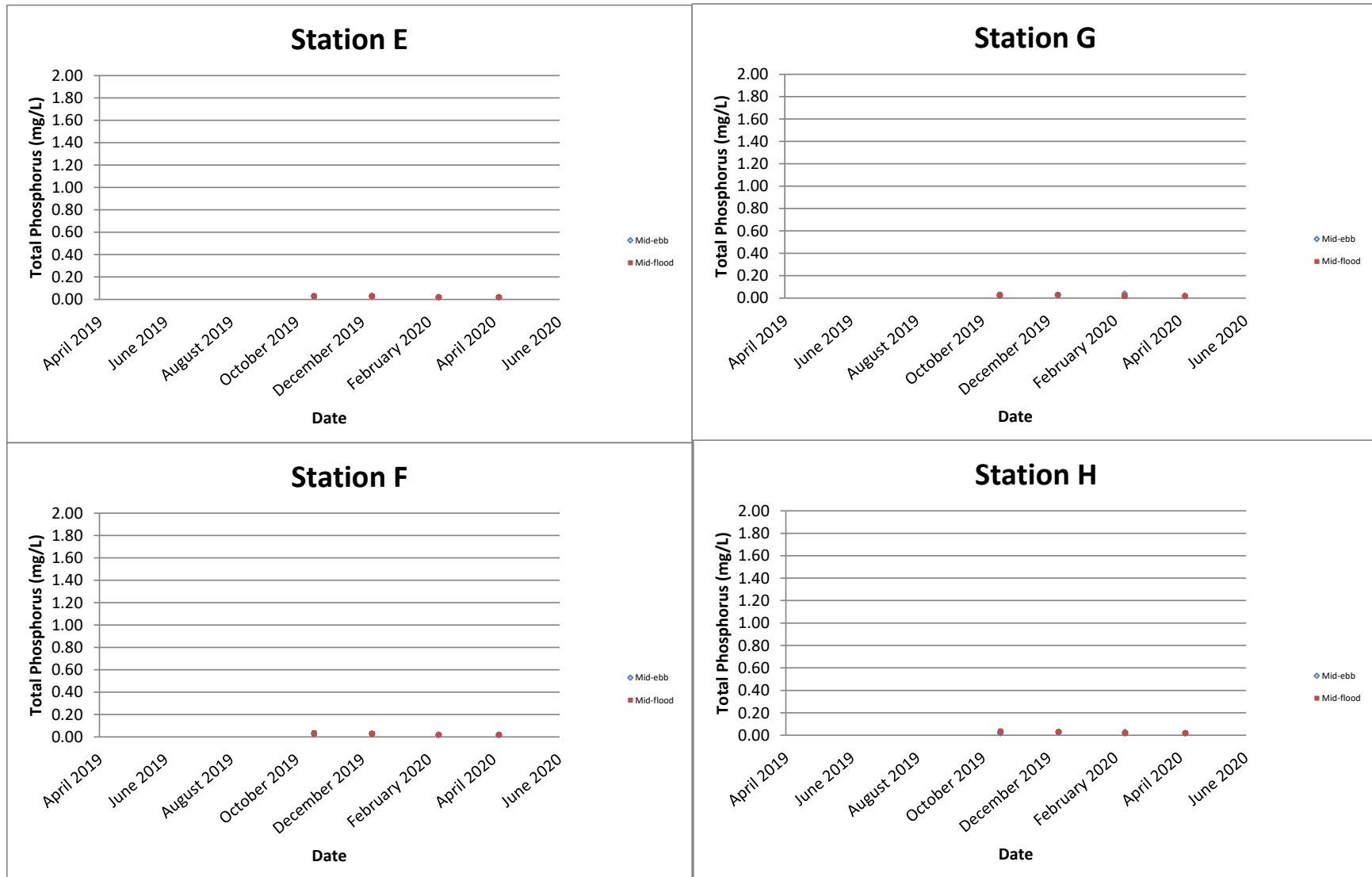
Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 1 CFU/100mL in graphical presentation.

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



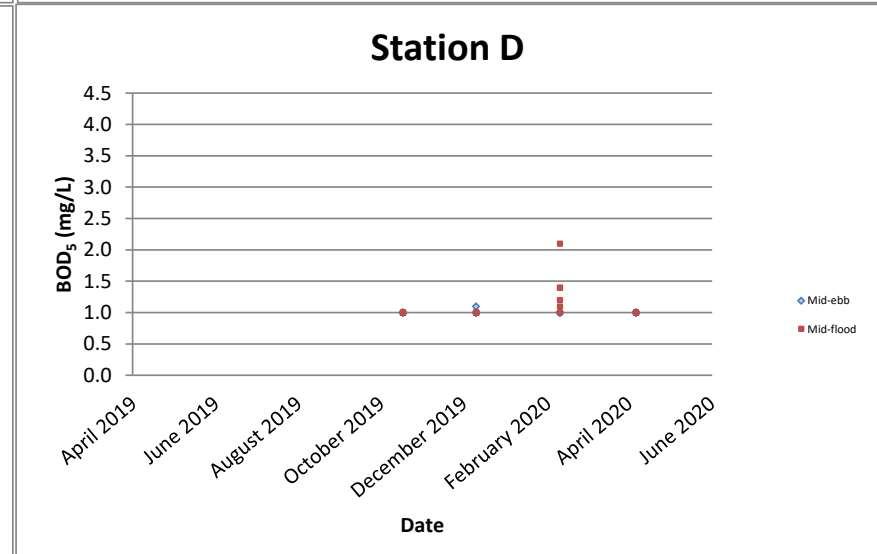
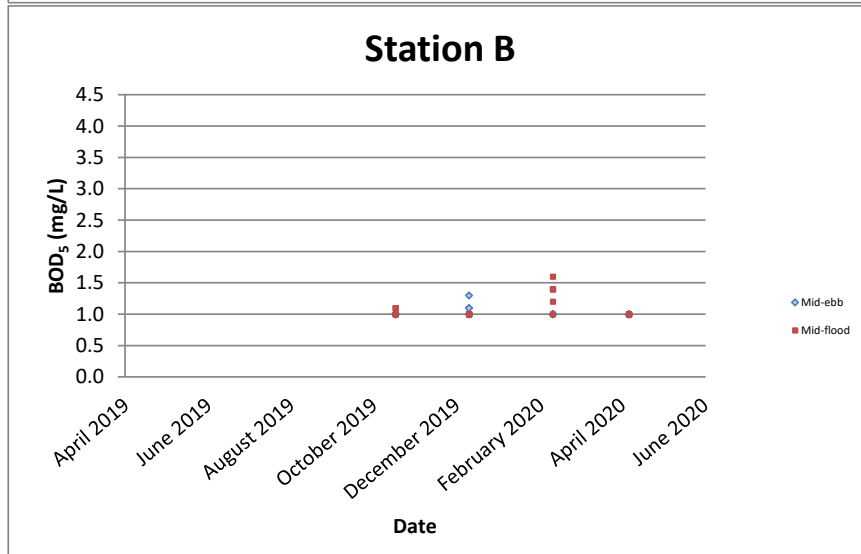
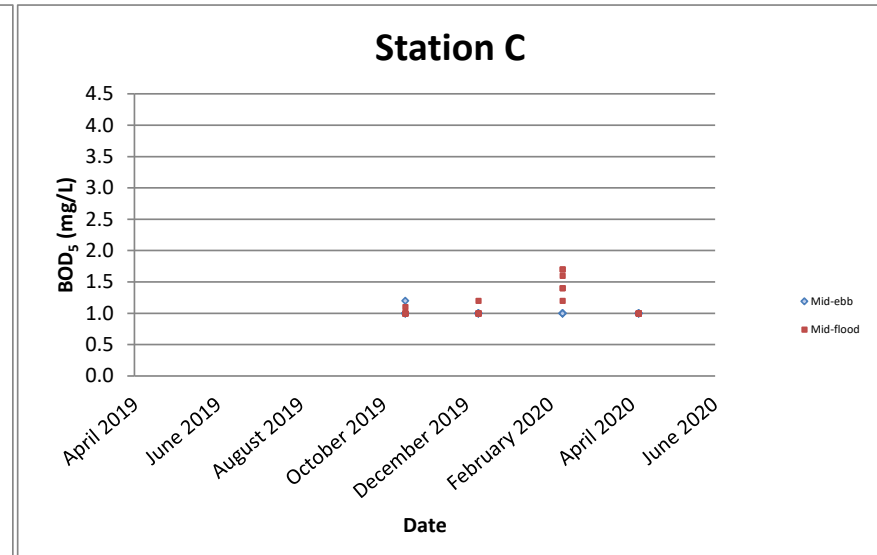
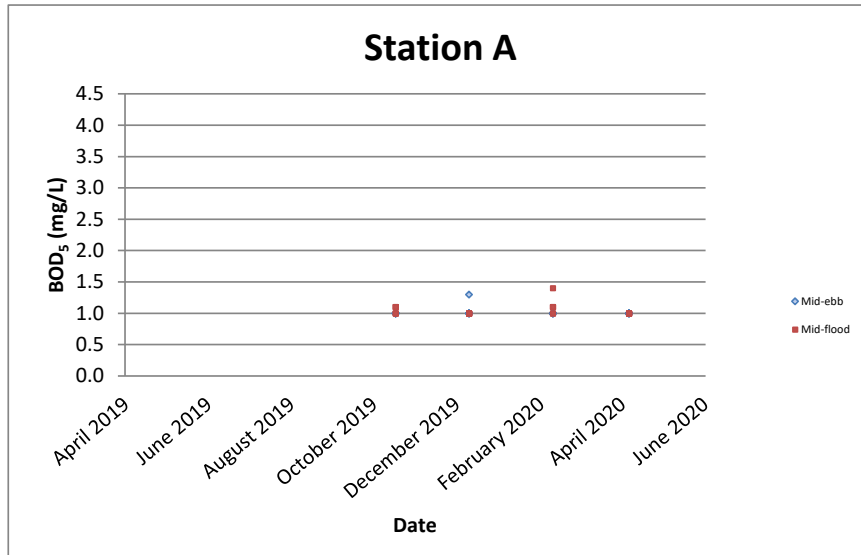
Remark: All below the Limit of Report sample results (<0.01 mg/L) for Total Phosphorus is regarded as 0.01 mg/L in graphical presentation.

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



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

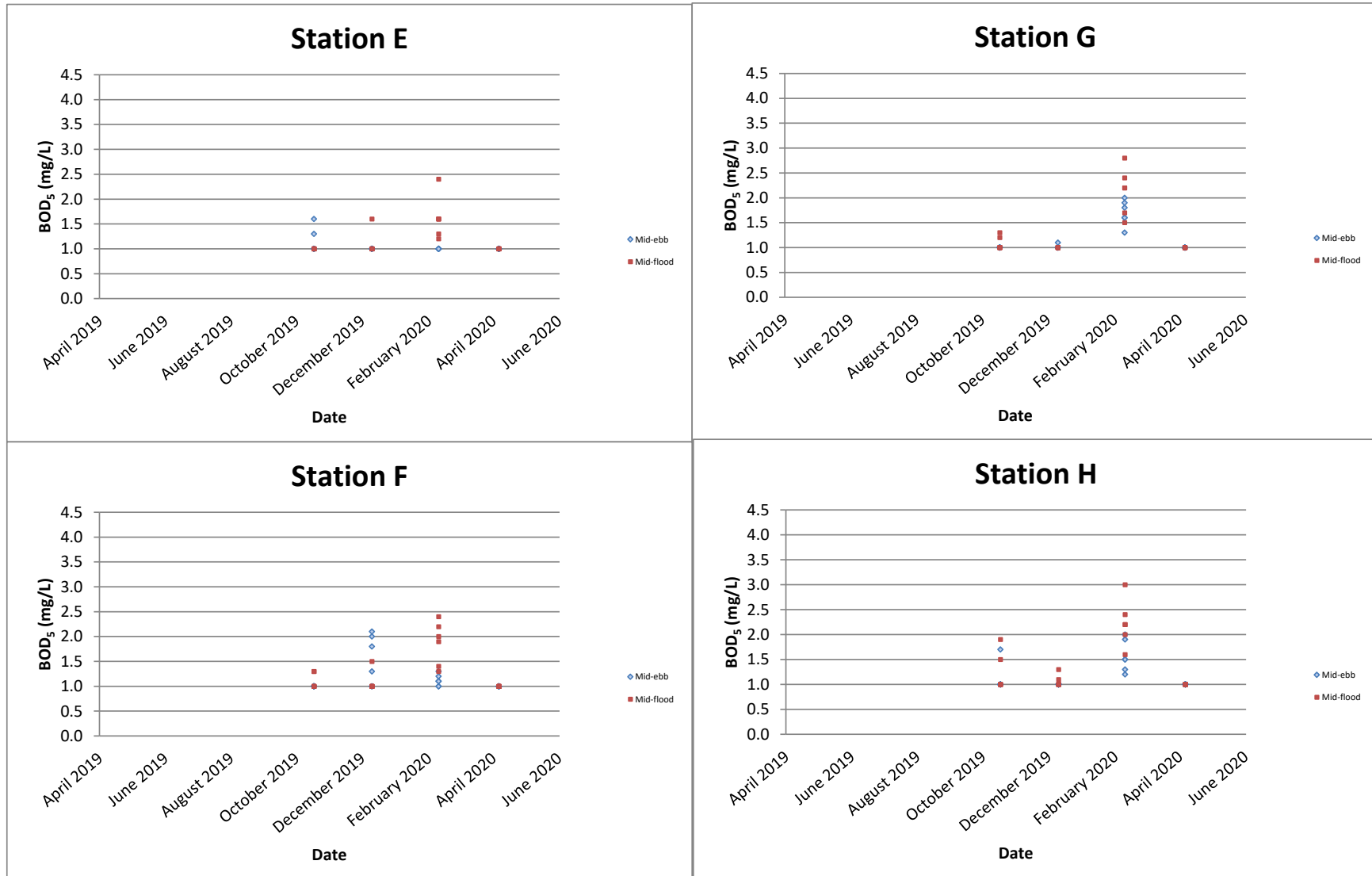
BOD<sub>5</sub> (mg/L)



Remark: All below the Limit of Report sample results (<1.0 mg/L) for BOD<sub>5</sub> is regarded as 1.0 mg/L in graphical presentation.



BOD<sub>5</sub> (mg/L)



Remark: All below the Limit of Report sample results (<1.0 mg/L) for BOD<sub>5</sub> is regarded as 1.0 mg/L in graphical presentation.

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Website : www.fugro.com



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Report No.: 0041/17/ED/0548A

## Appendix E

### Tidal Data obtained from Ma Wan Marine Traffic Station

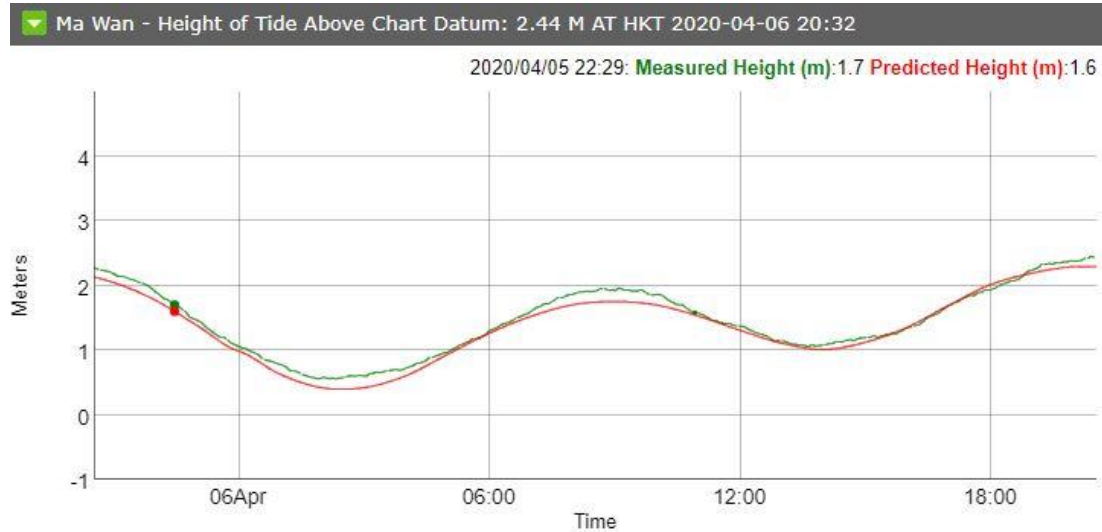
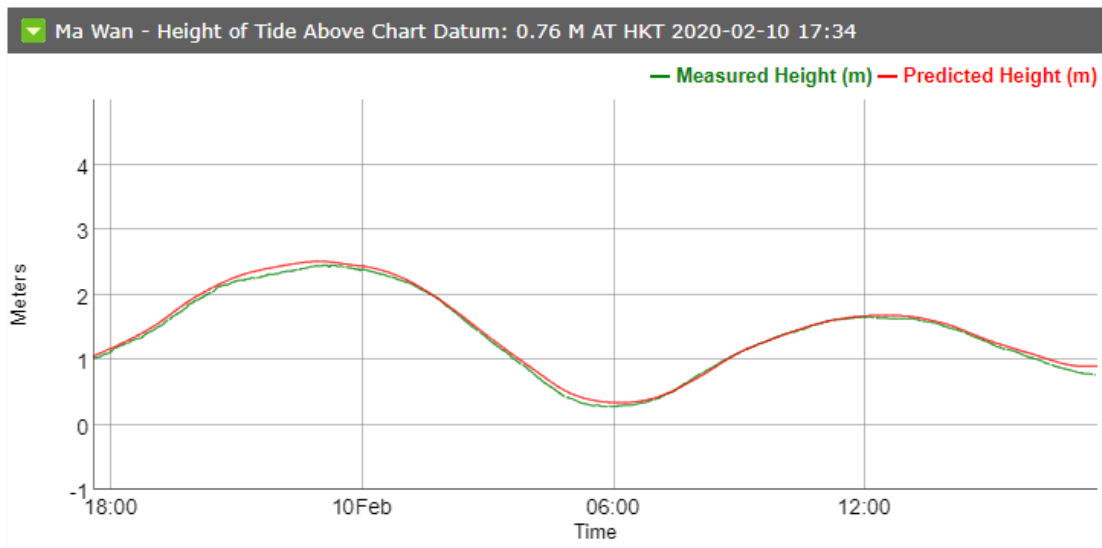
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Website : www.fugro.com



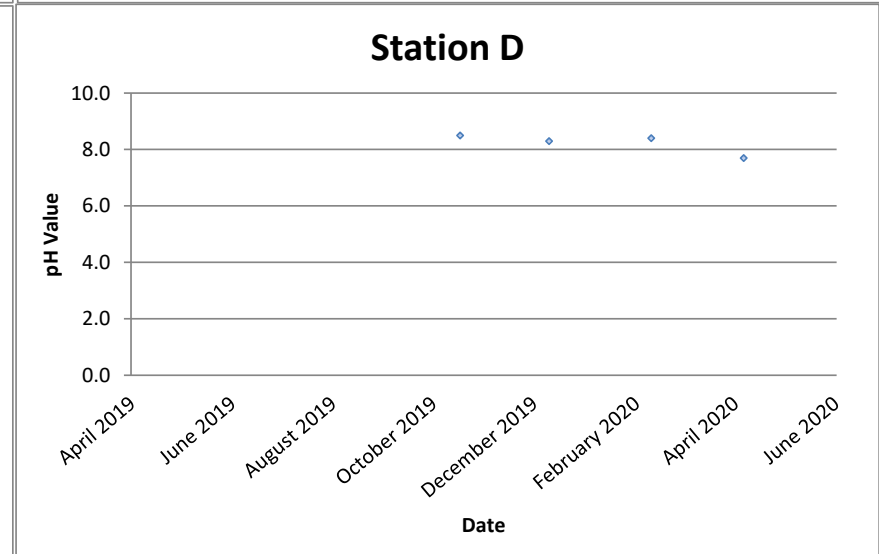
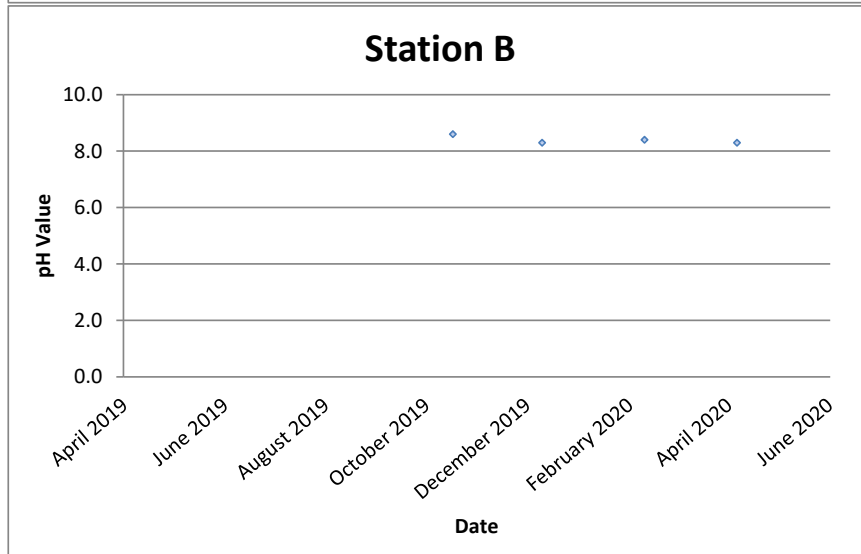
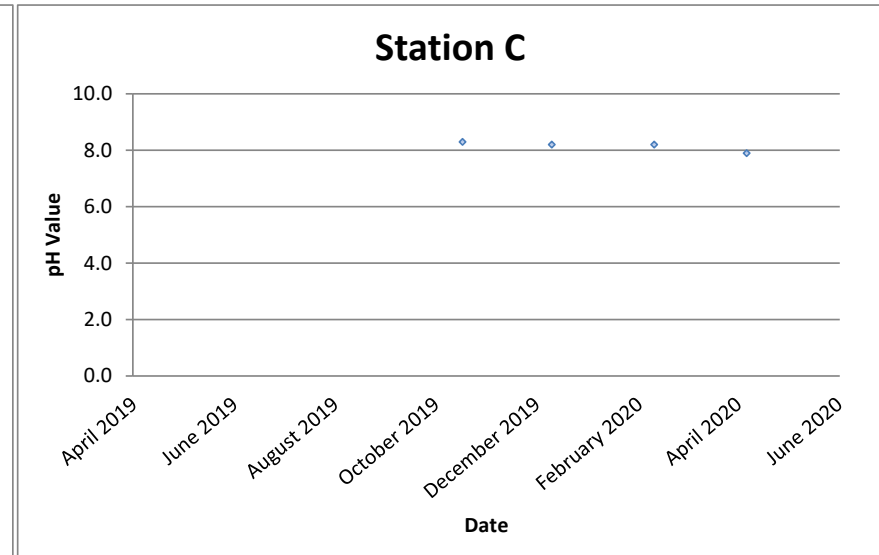
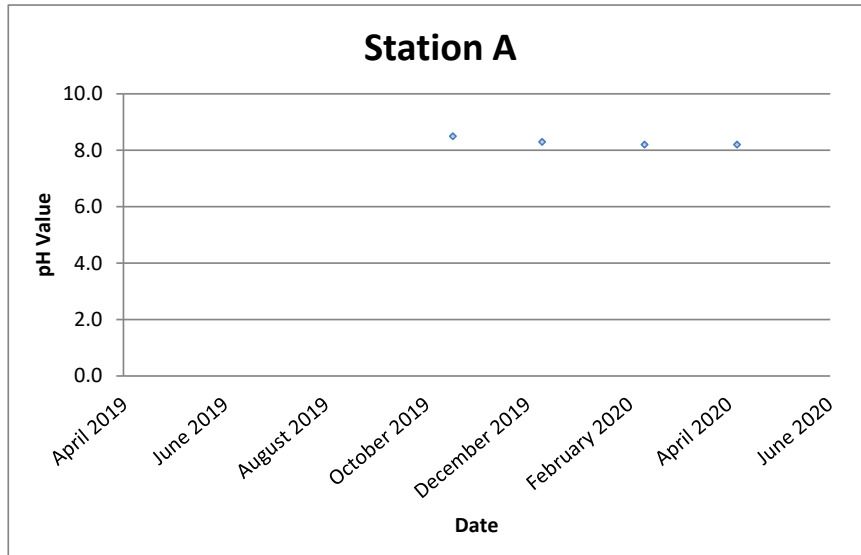
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Report No.: 0041/17/ED/0548A

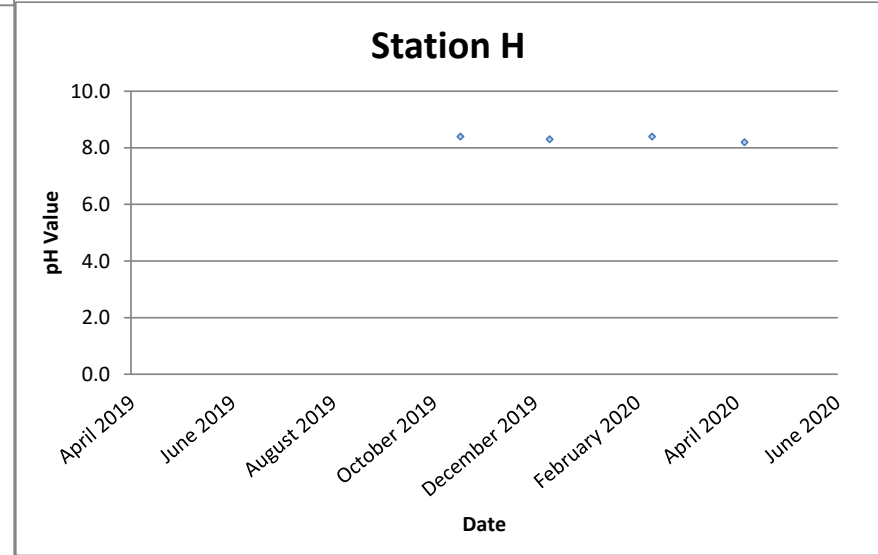
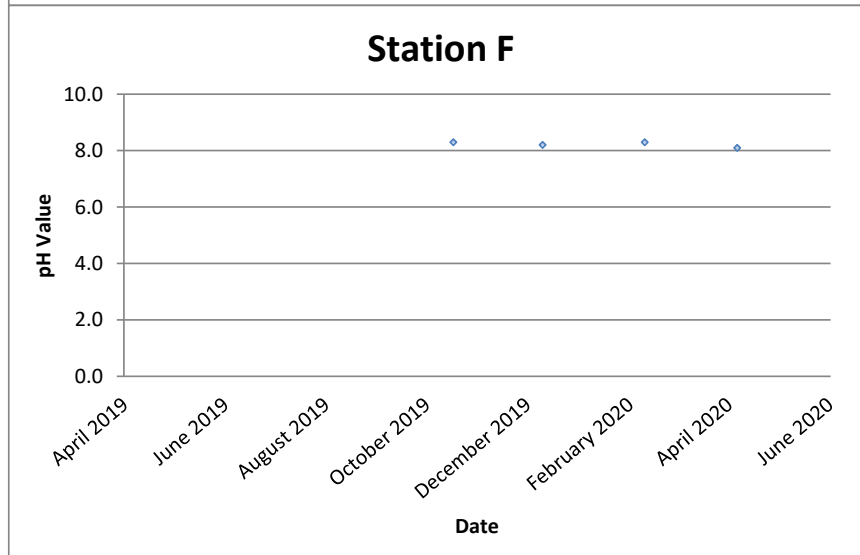
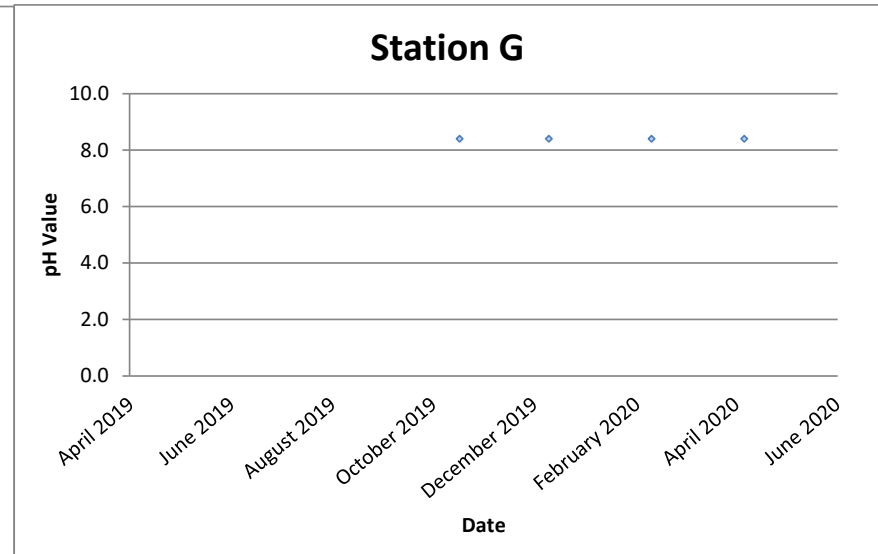
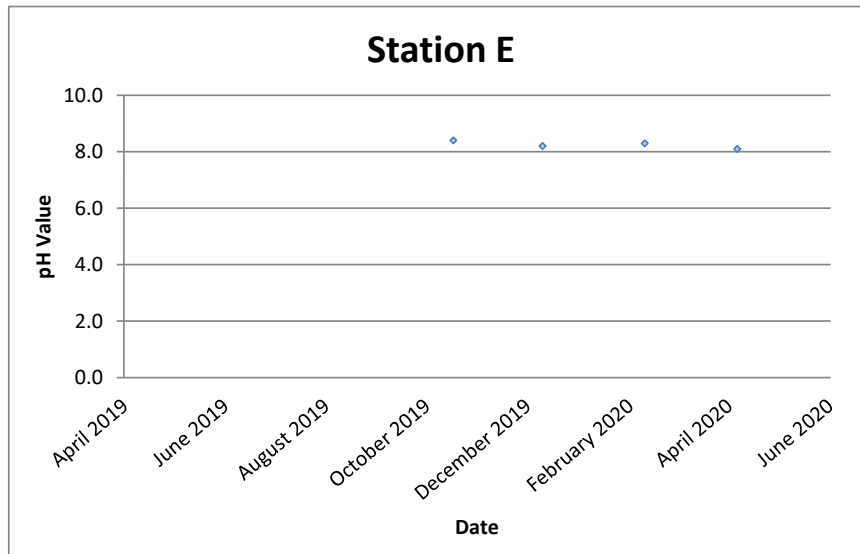
## Appendix F

### Graphical Presentation of Sediment Quality Monitoring and Benthic Survey

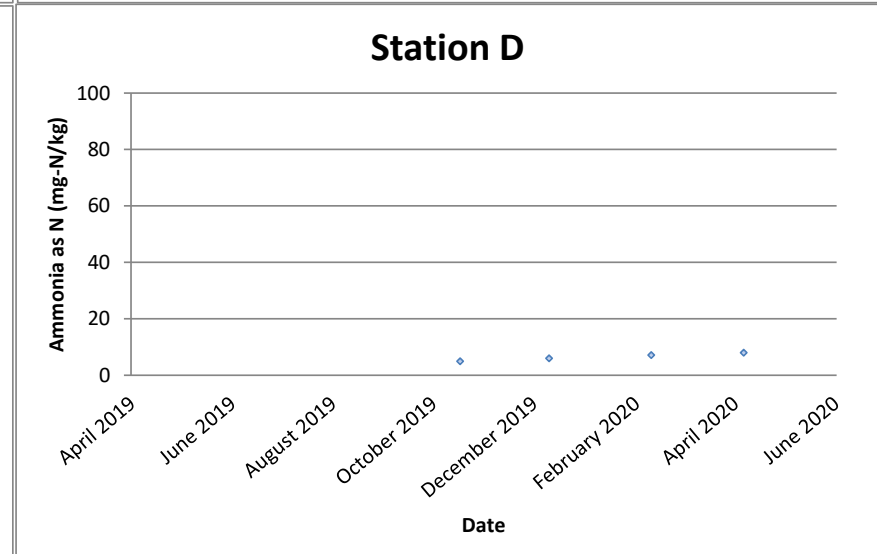
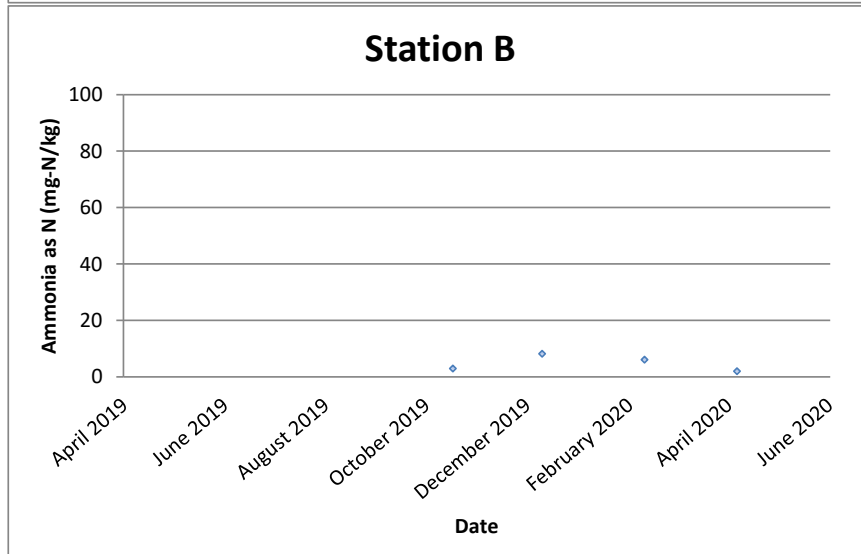
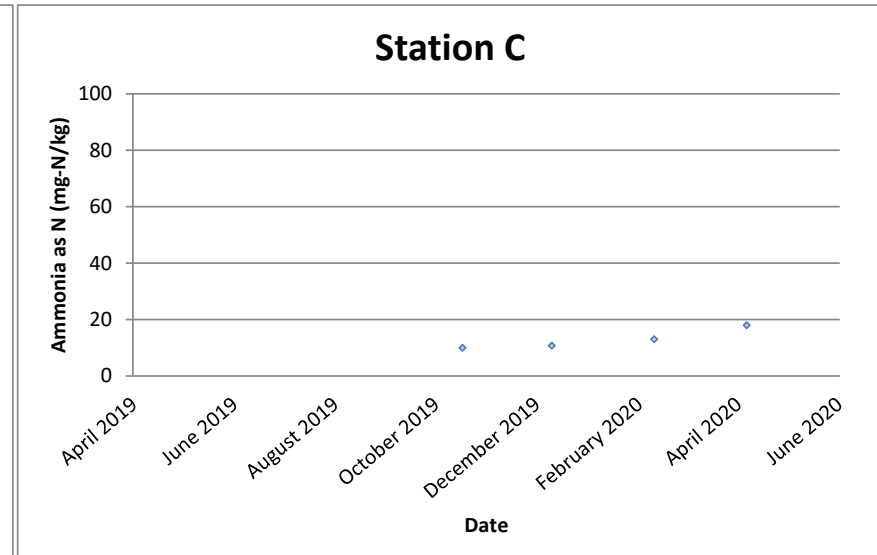
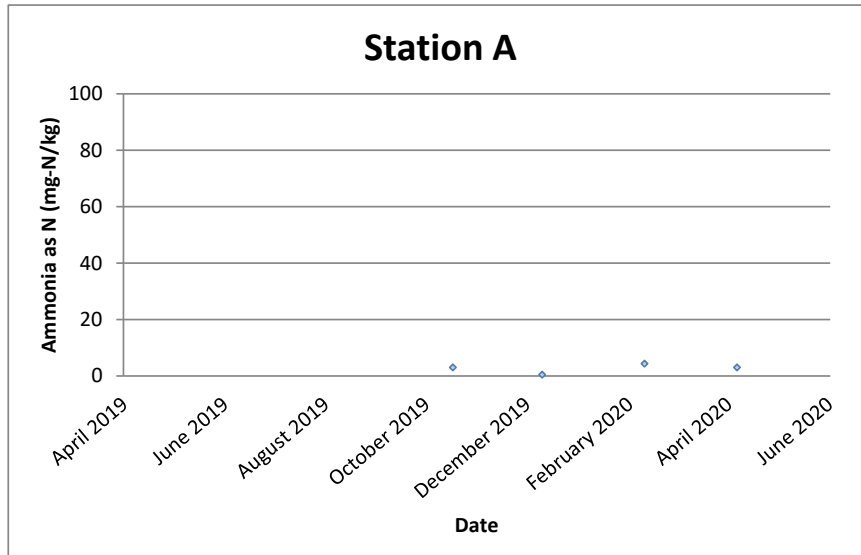
pH value



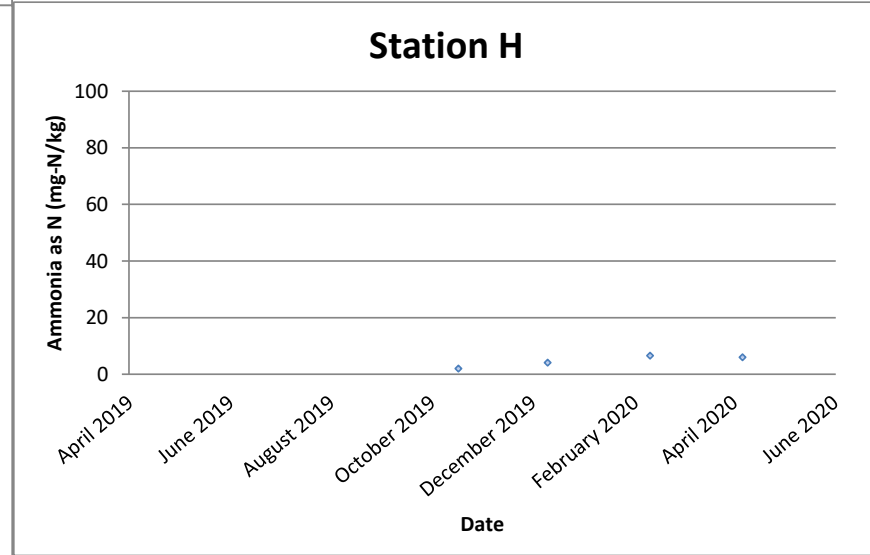
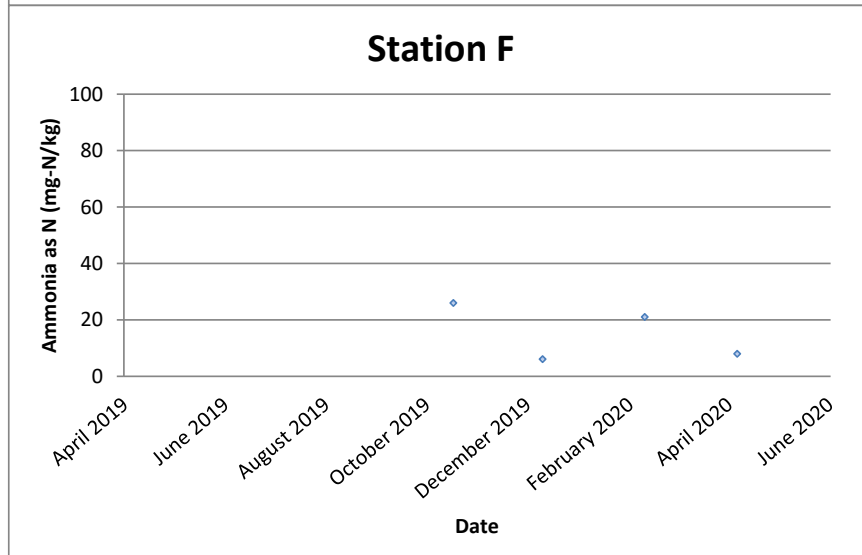
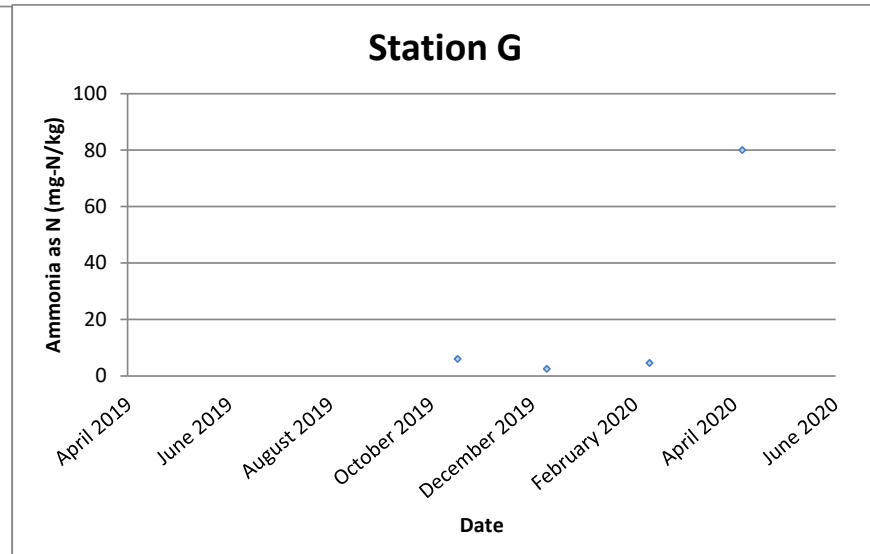
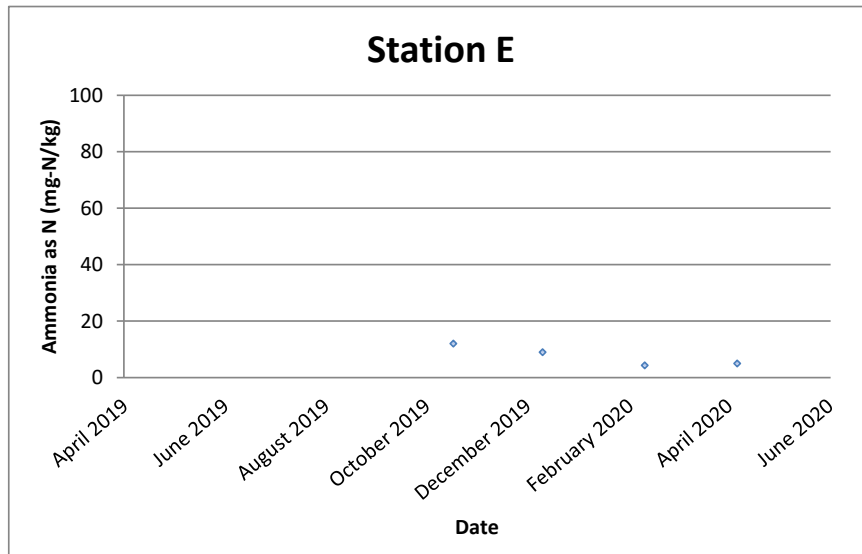
pH value



Ammonia Nitrogen (mg-N/kg)

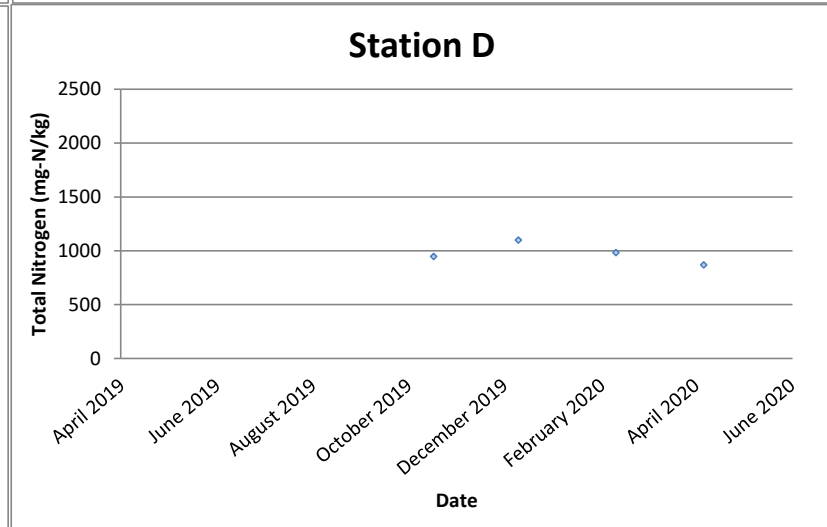
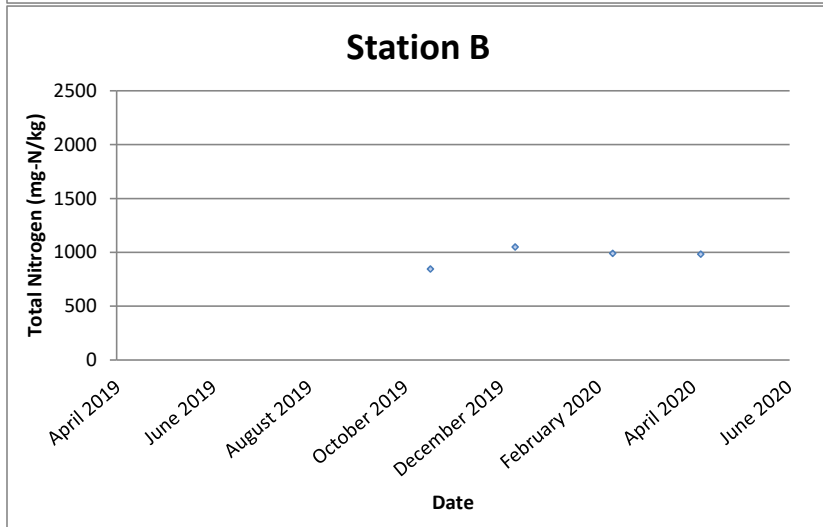
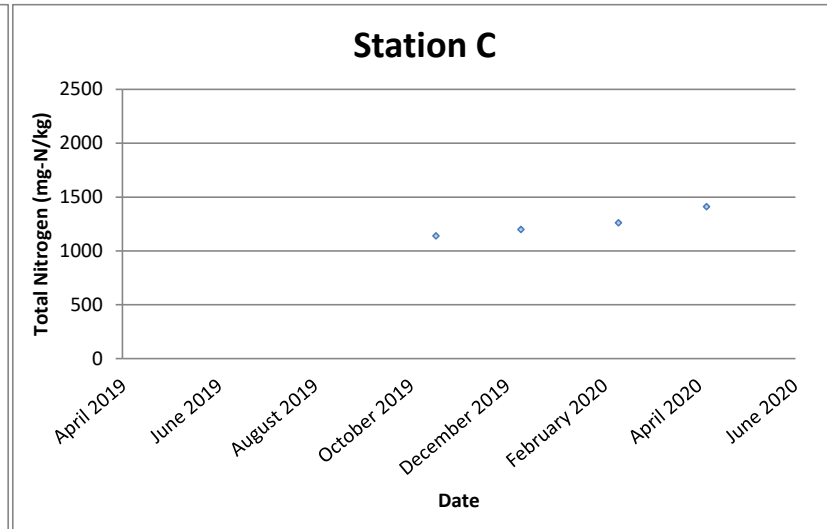
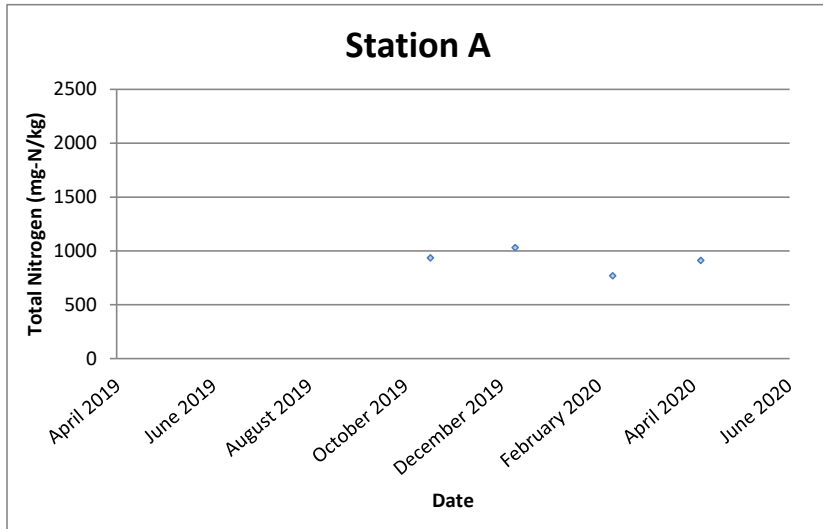


Ammonia Nitrogen (mg-N/kg)

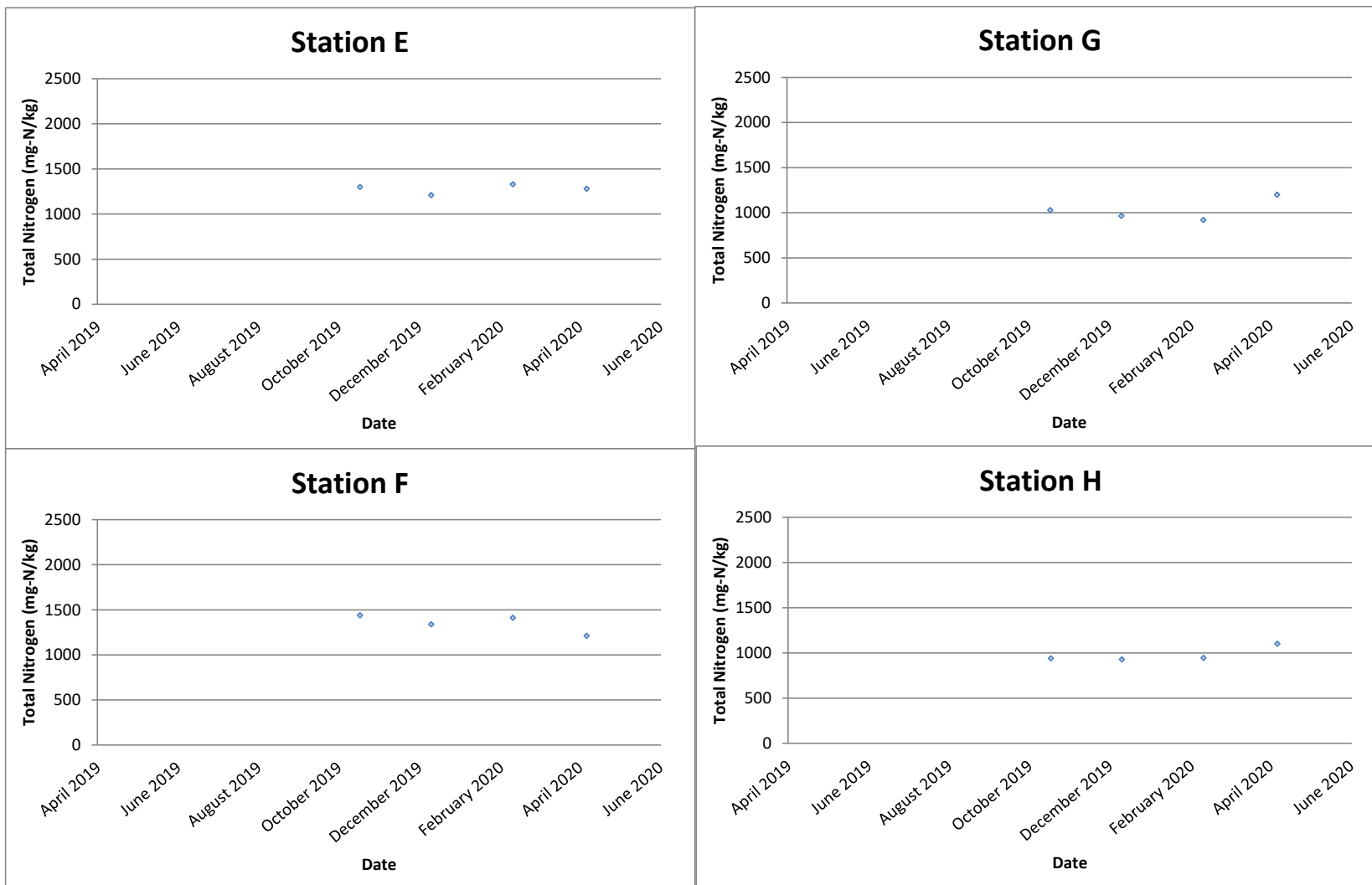




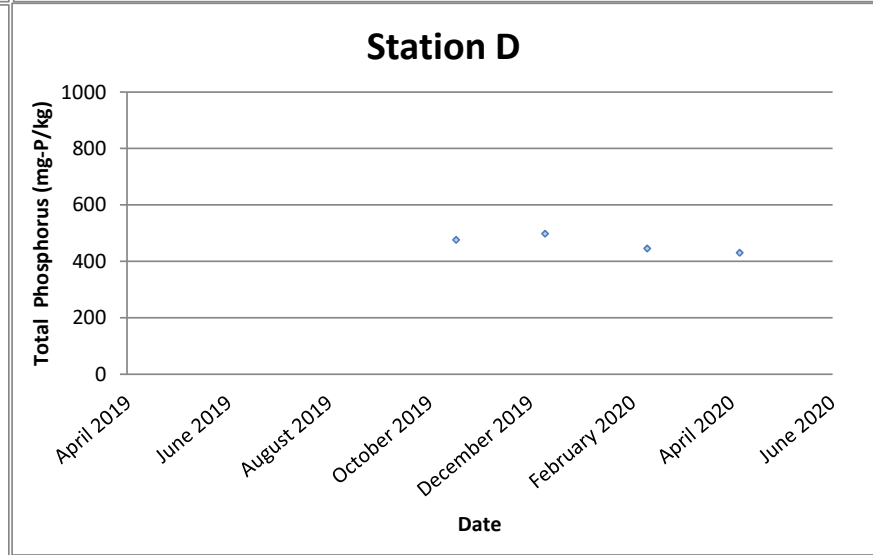
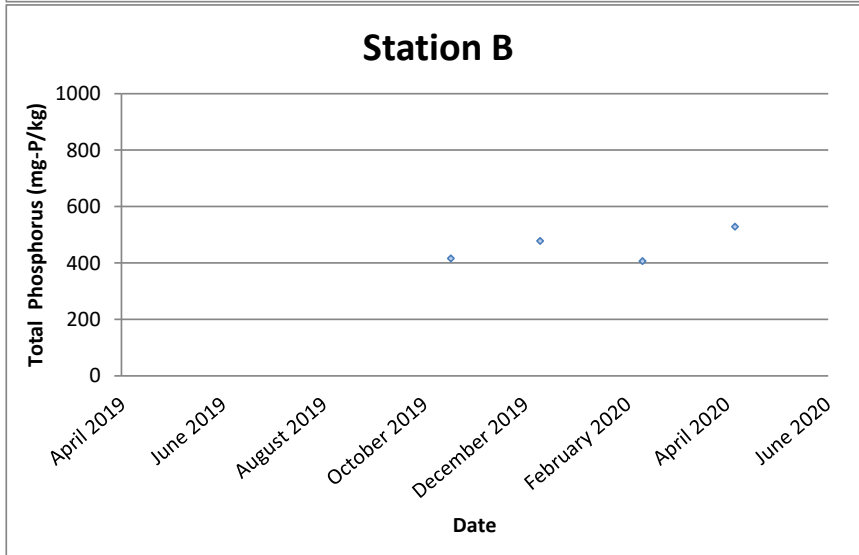
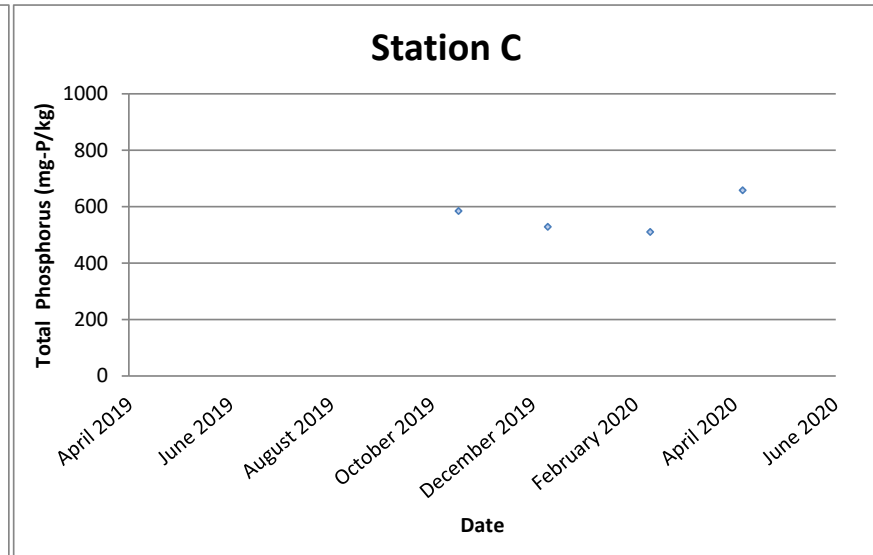
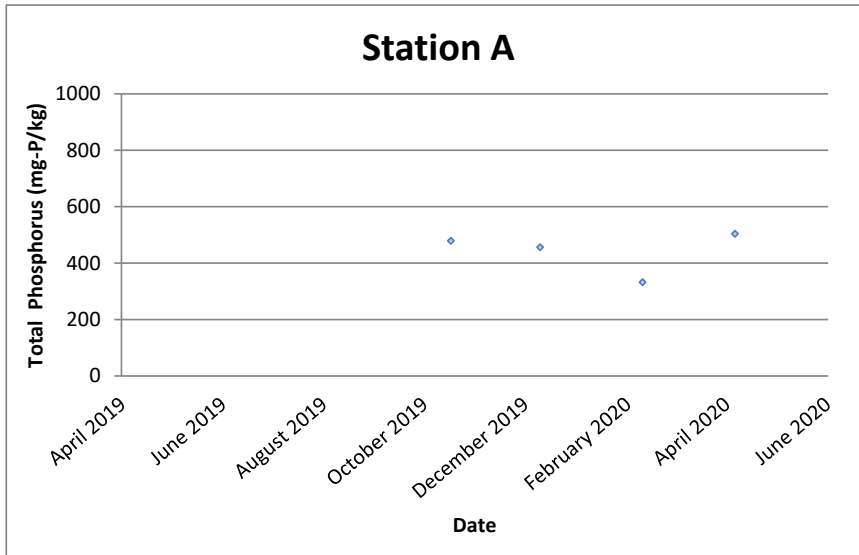
Total Nitrogen (mg-N/kg)



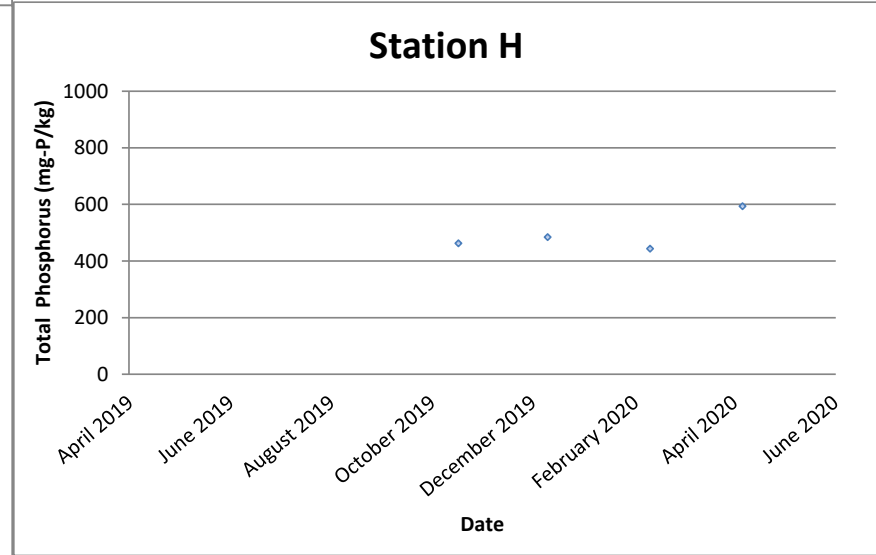
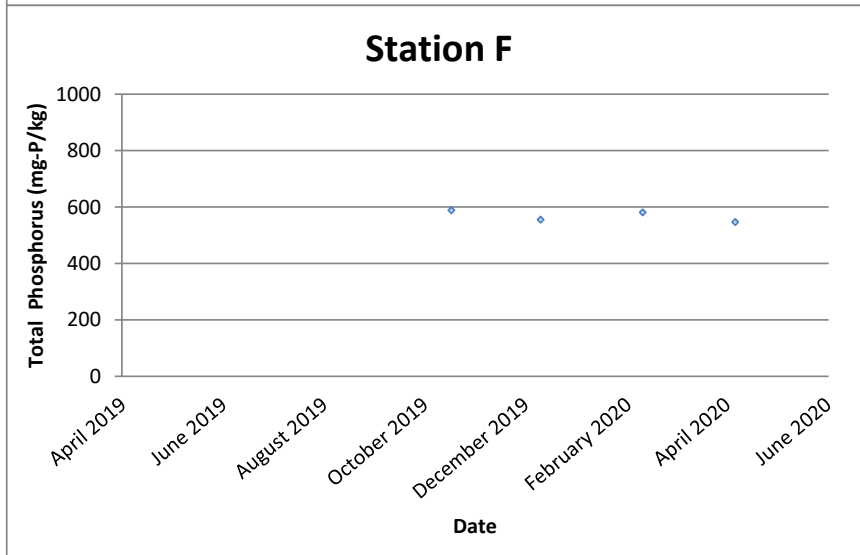
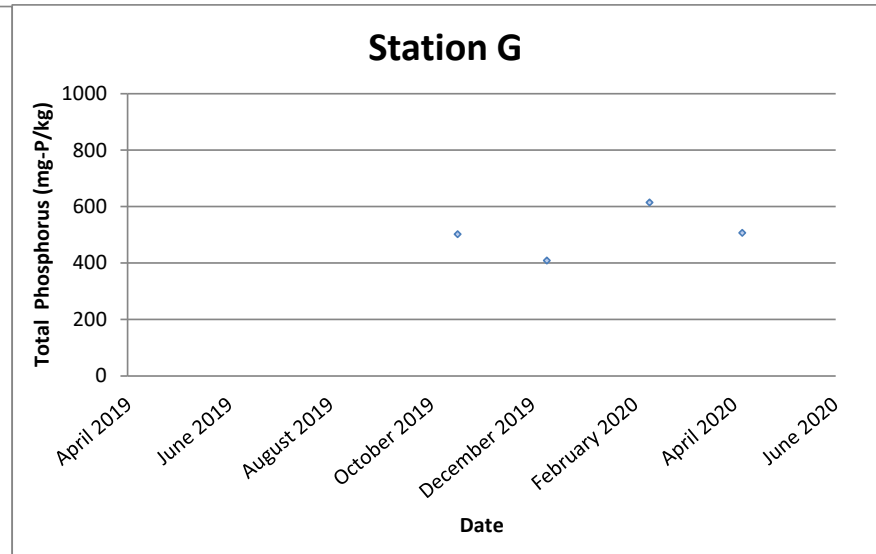
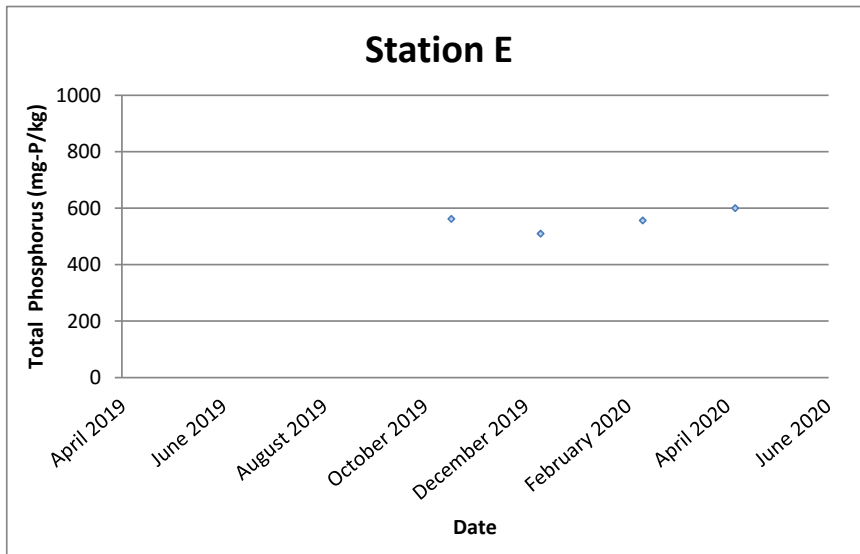
Total Nitrogen (mg-N/kg)



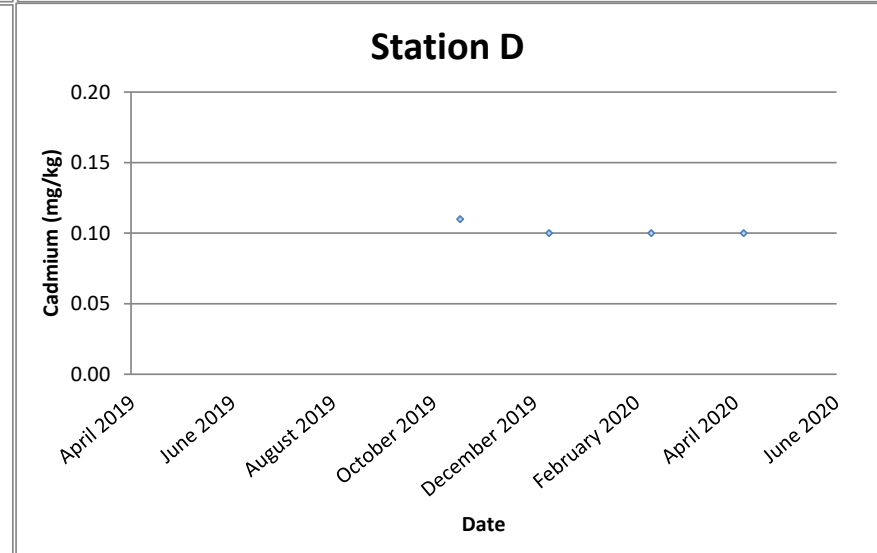
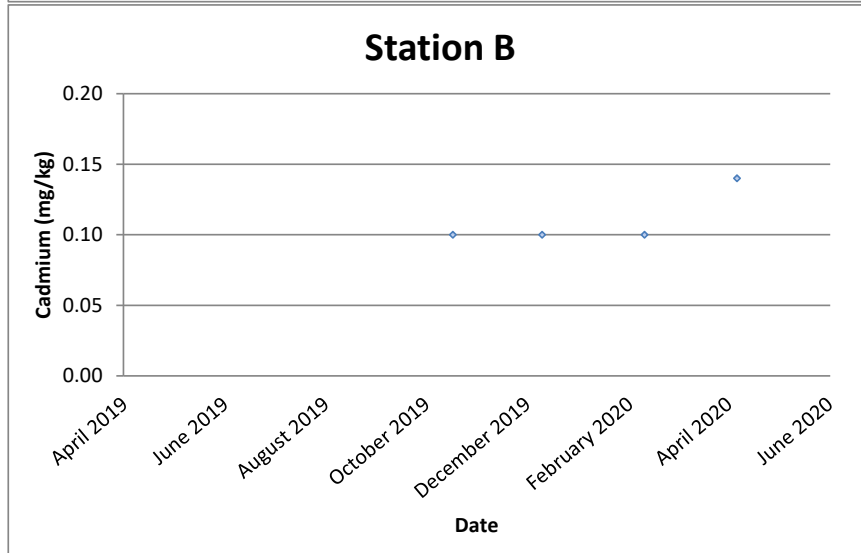
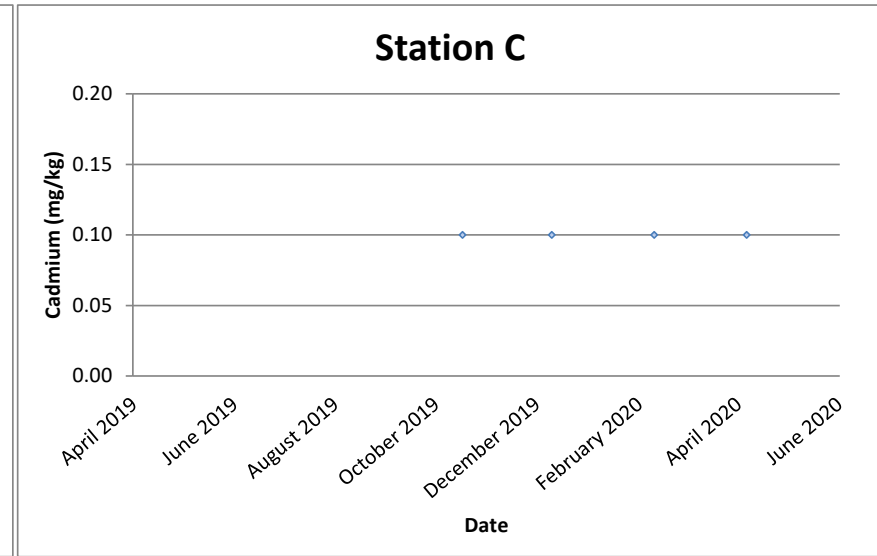
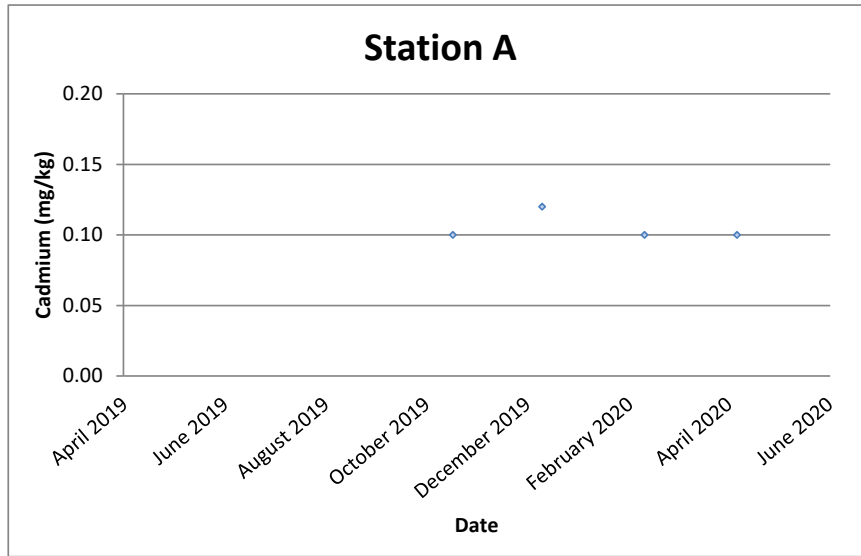
Total Phosphorus (mg-P/kg)



Total Phosphorus (mg-P/kg)

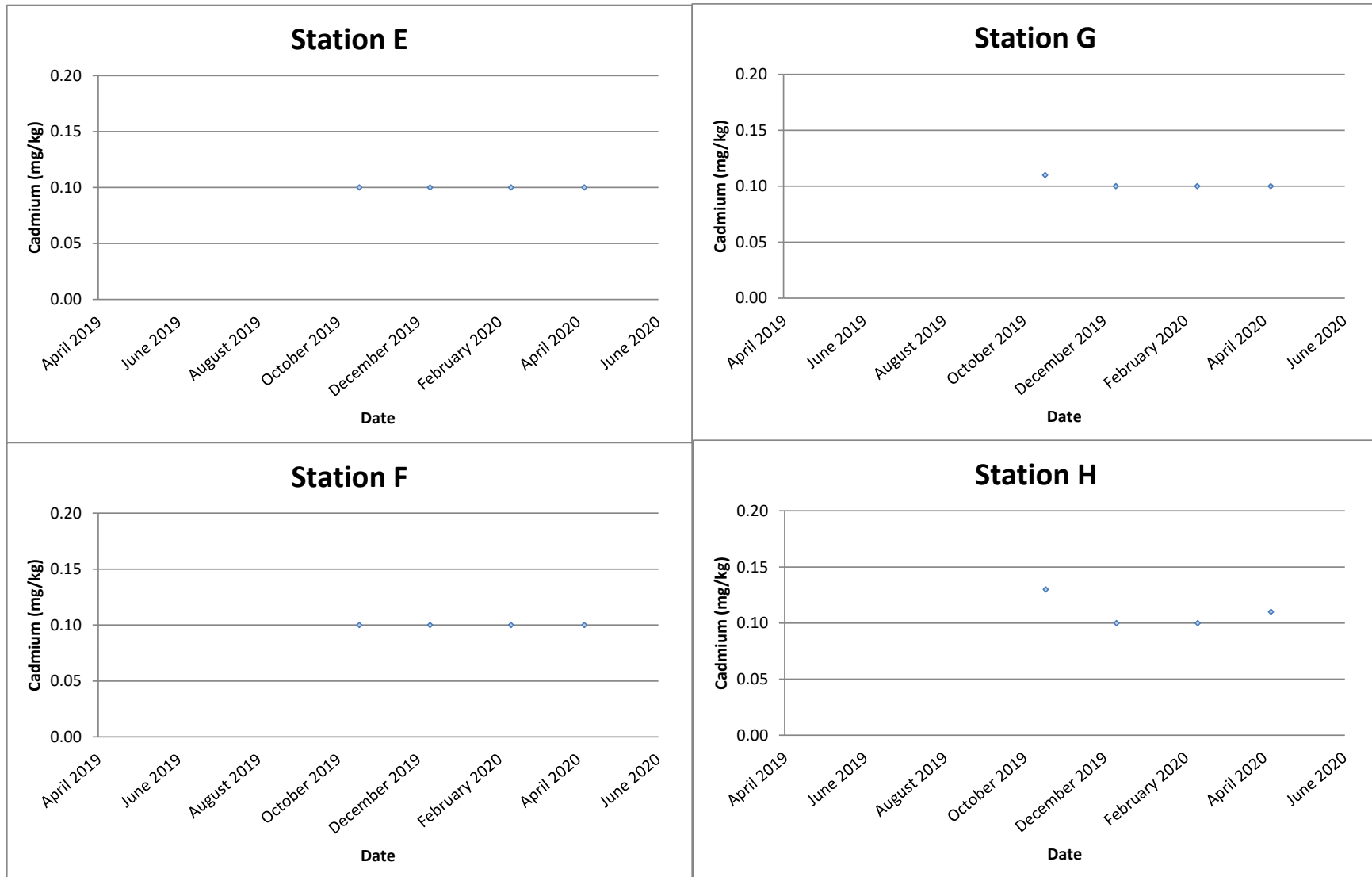


# Cadmium (mg/kg)



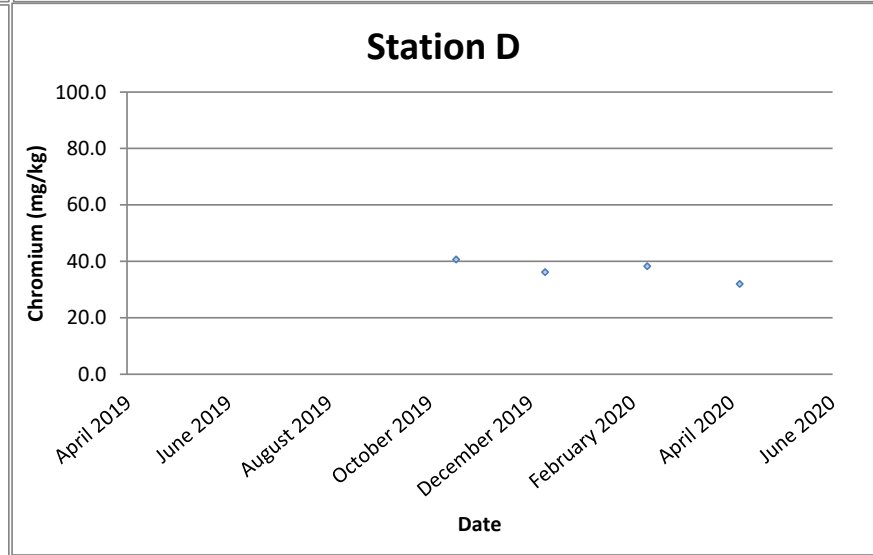
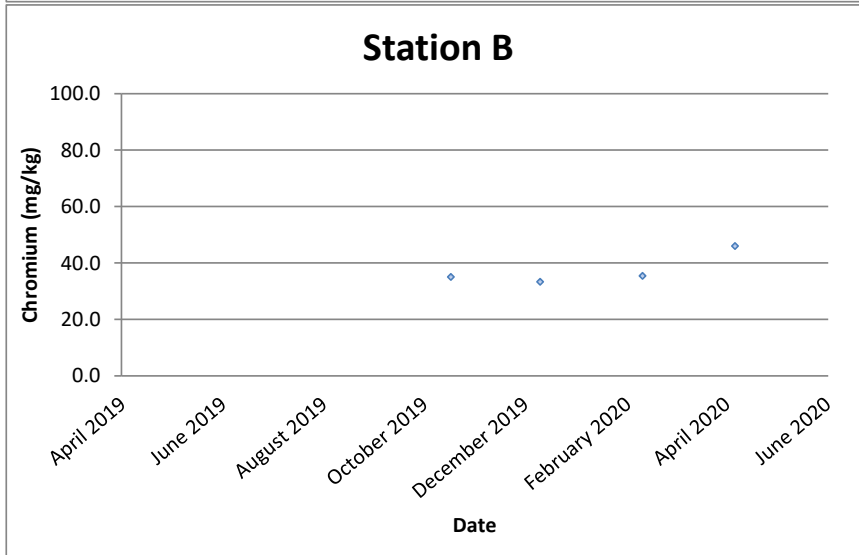
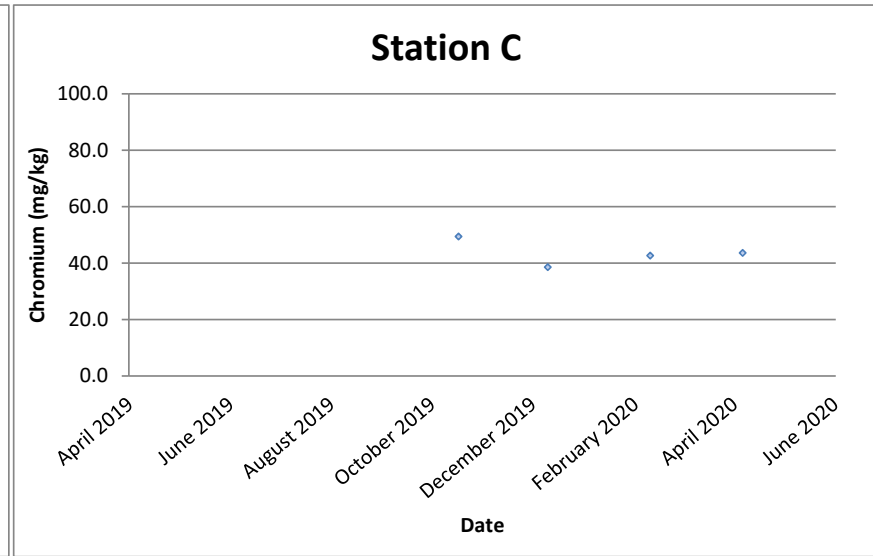
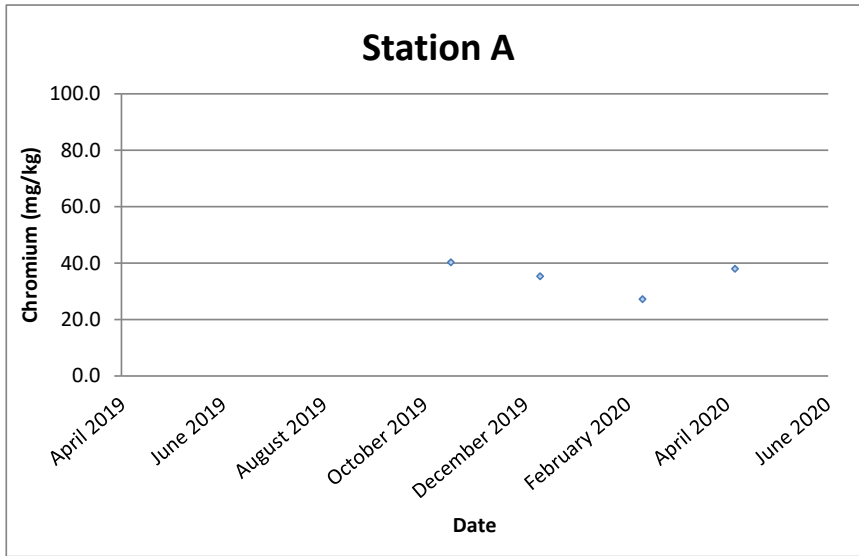
Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

# Cadmium (mg/kg)

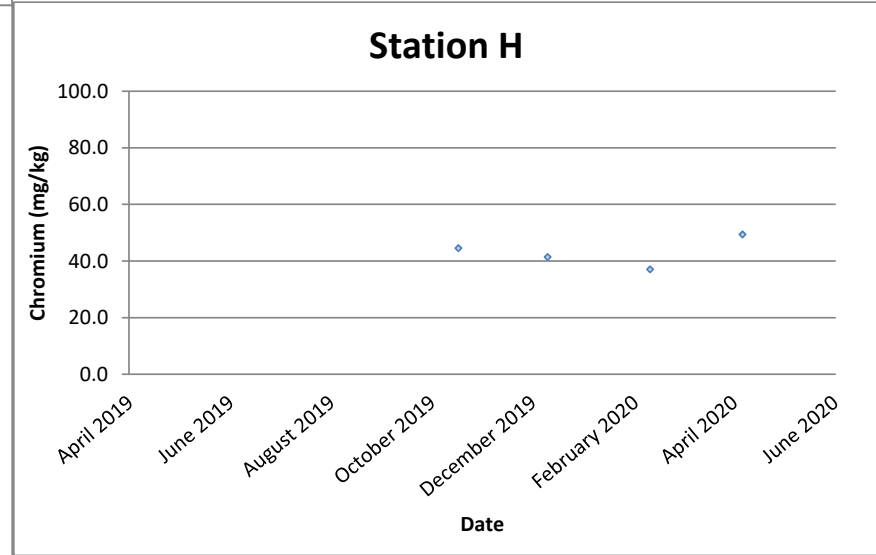
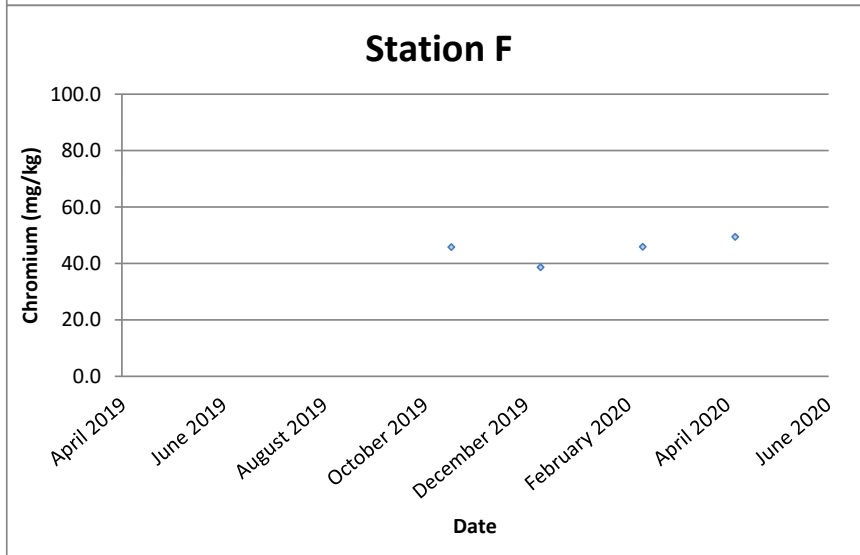
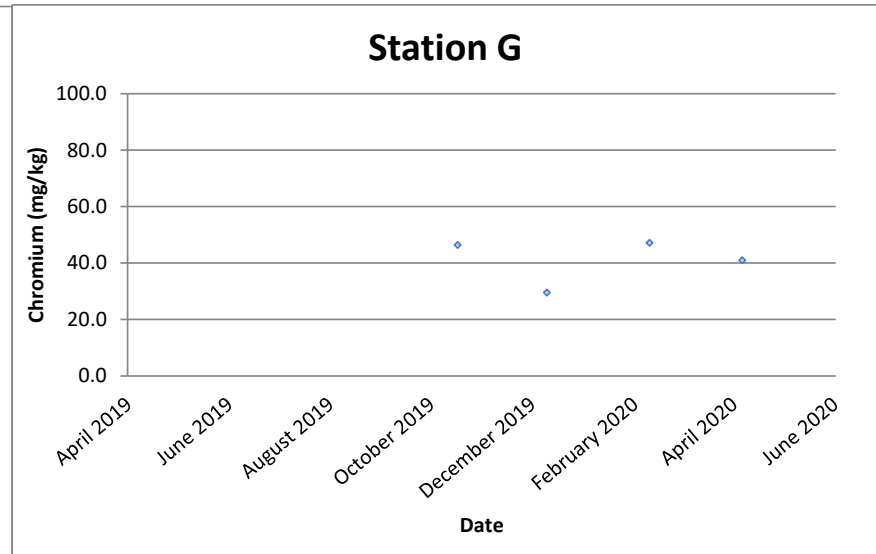
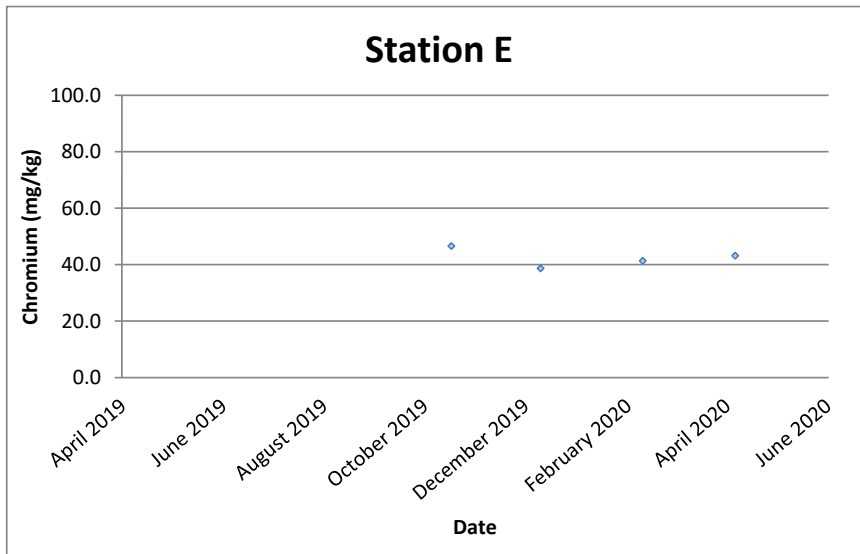


Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

Chromium (mg/kg)

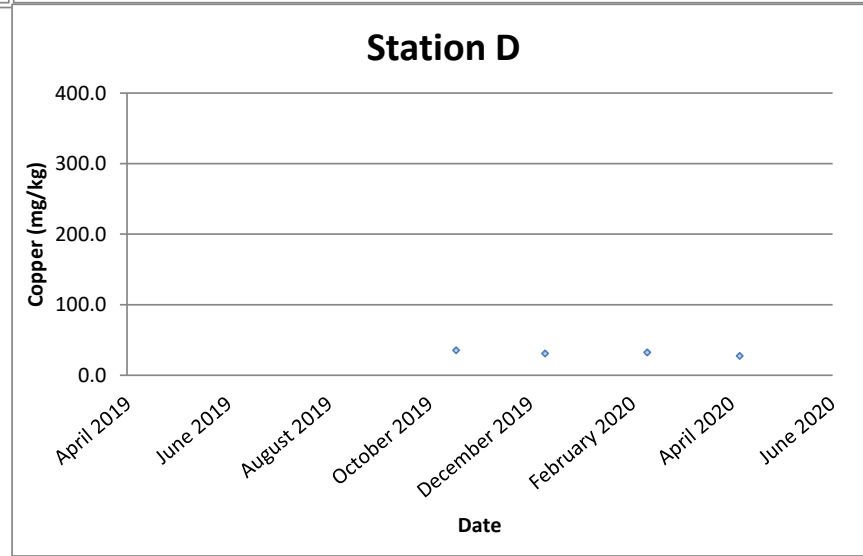
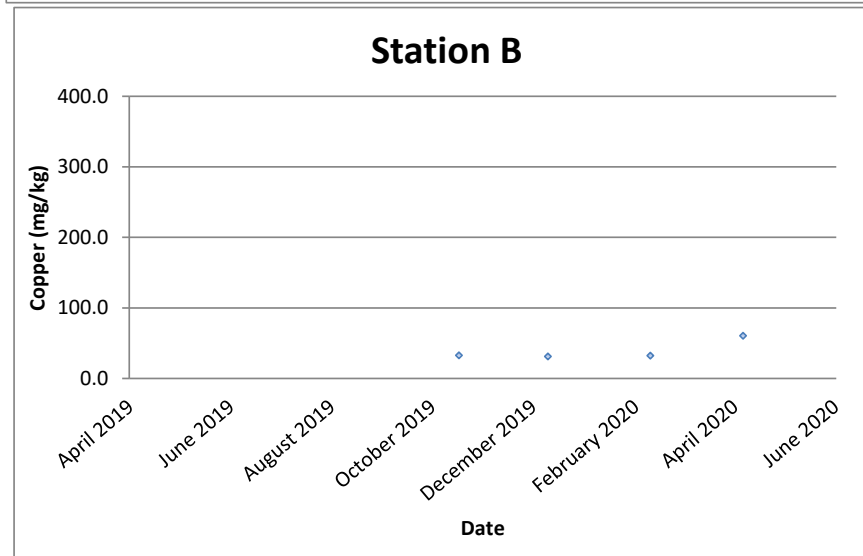
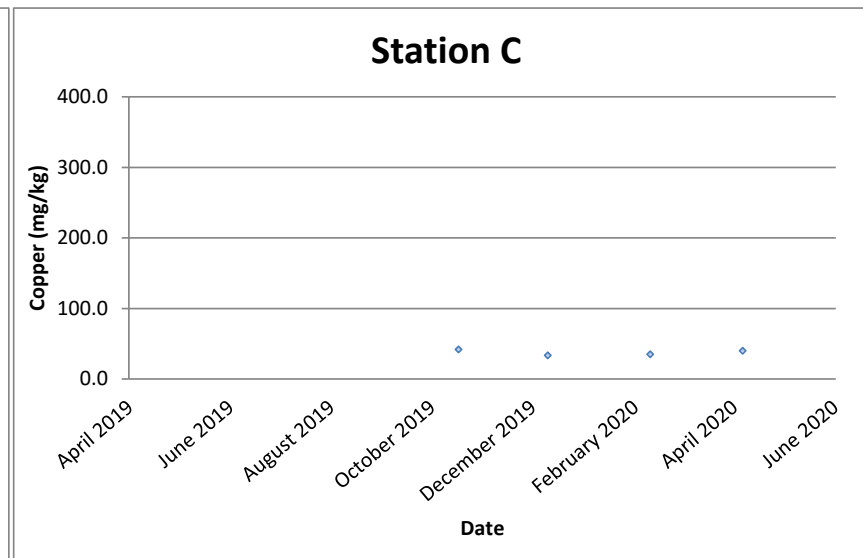
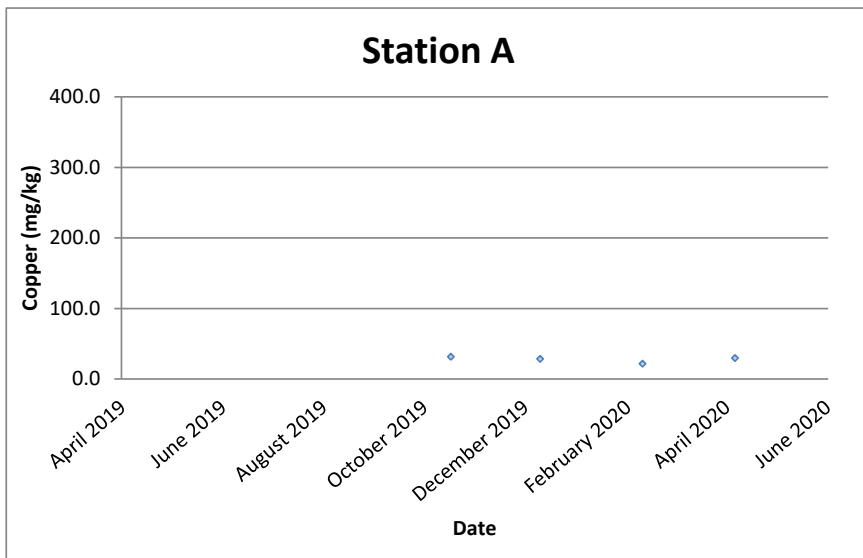


Chromium (mg/kg)

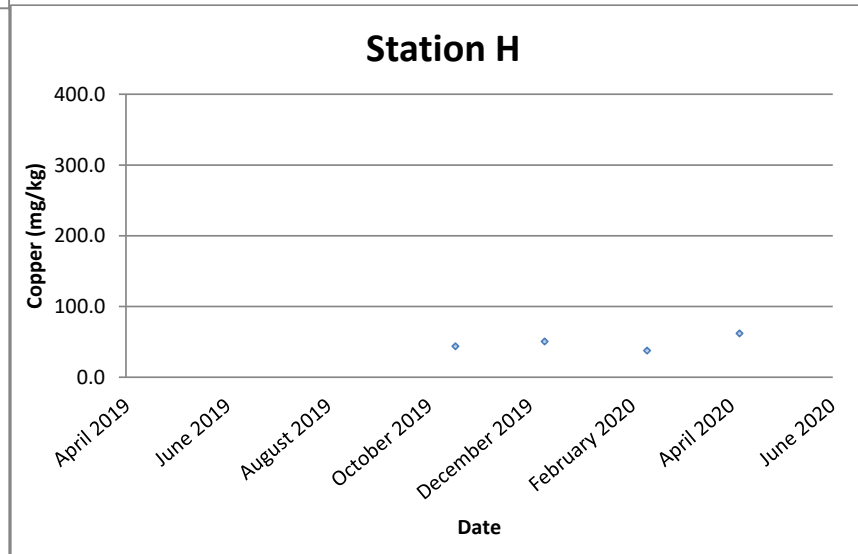
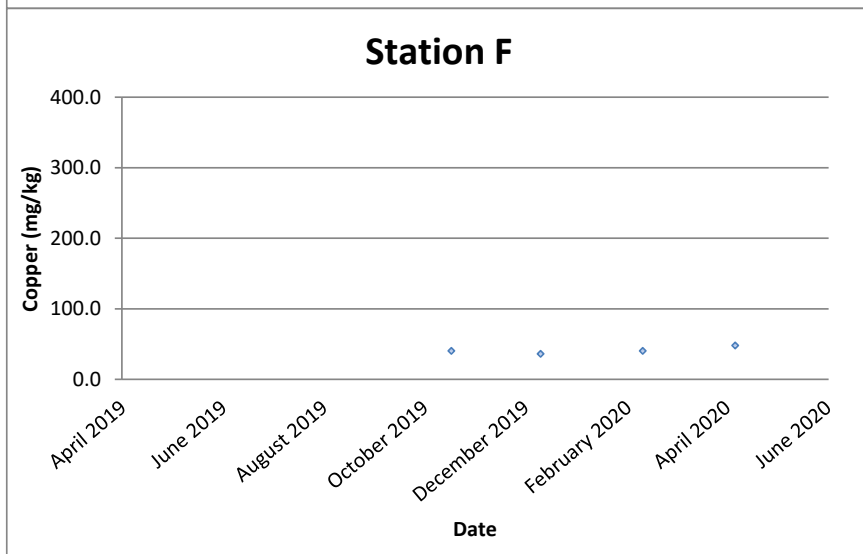
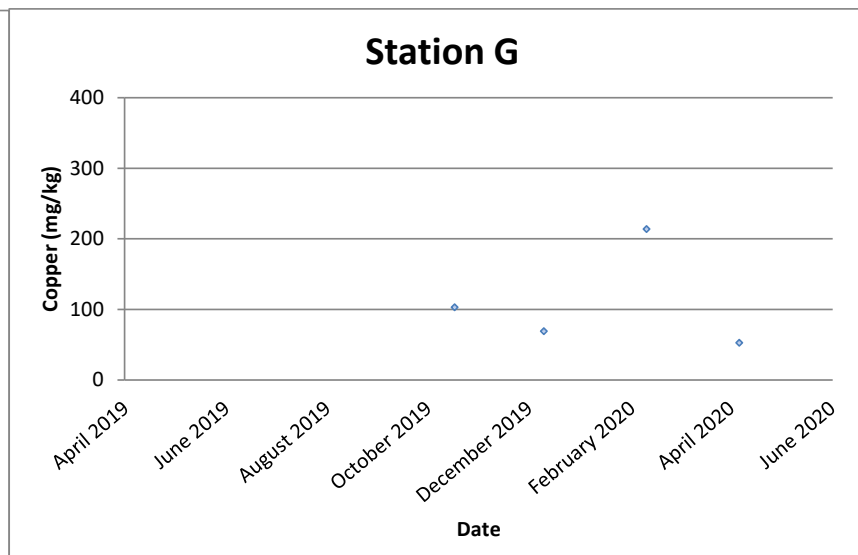
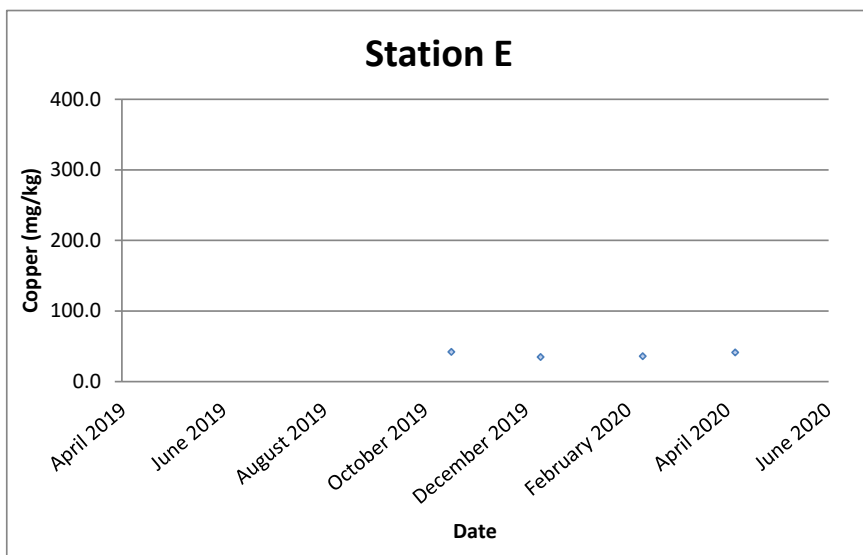




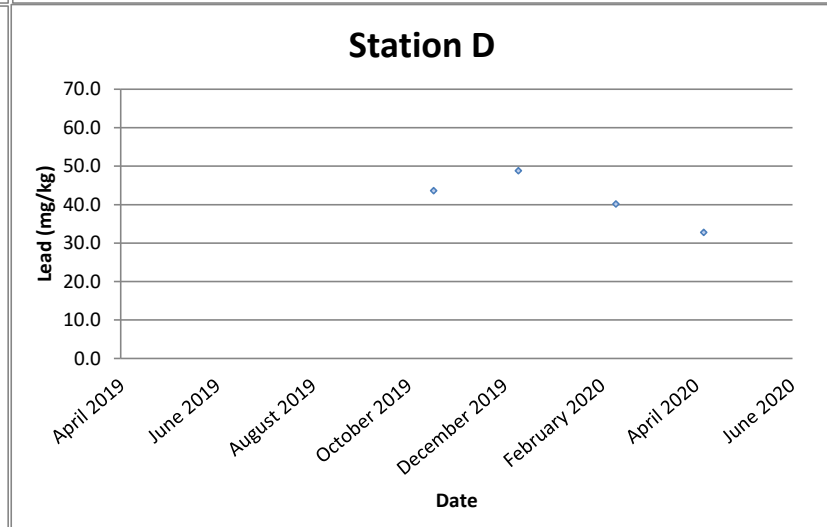
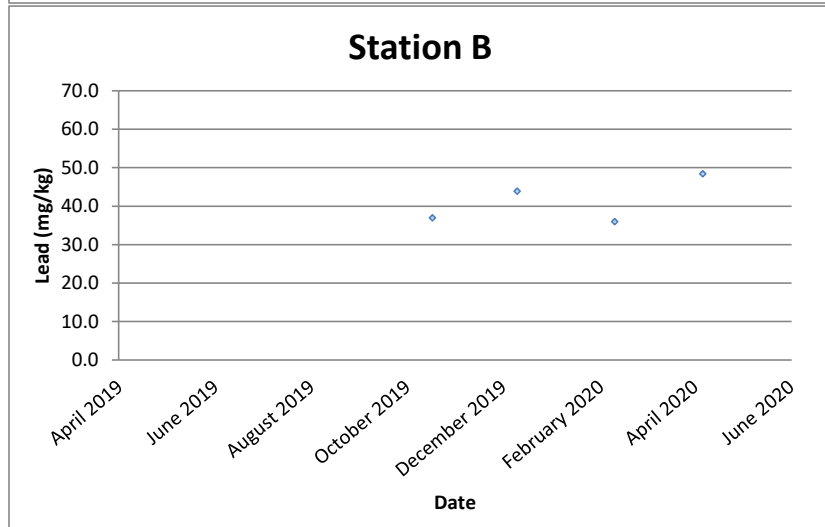
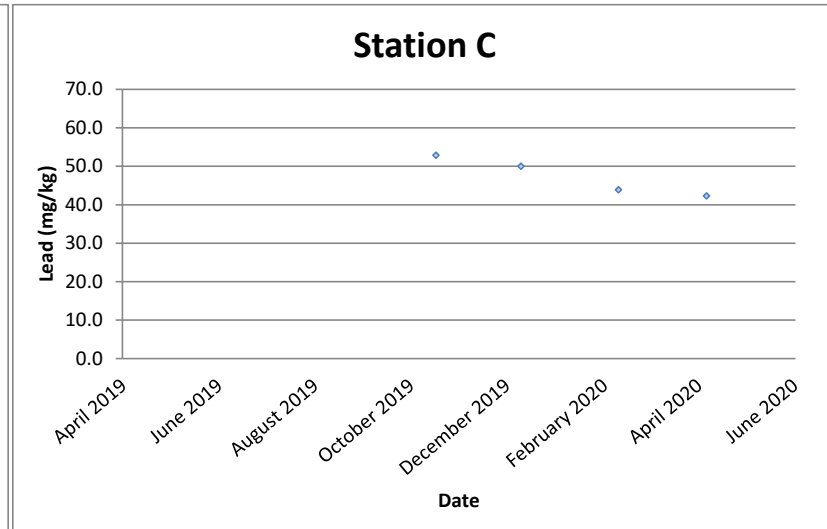
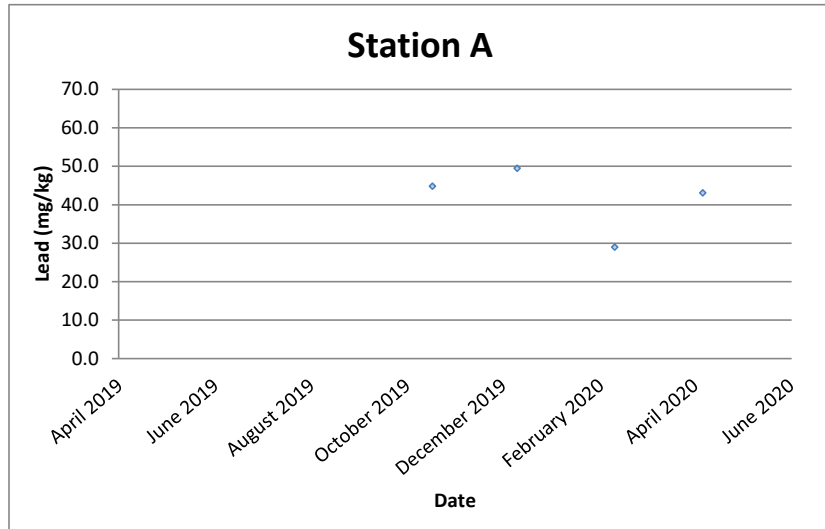
Copper (mg/kg)



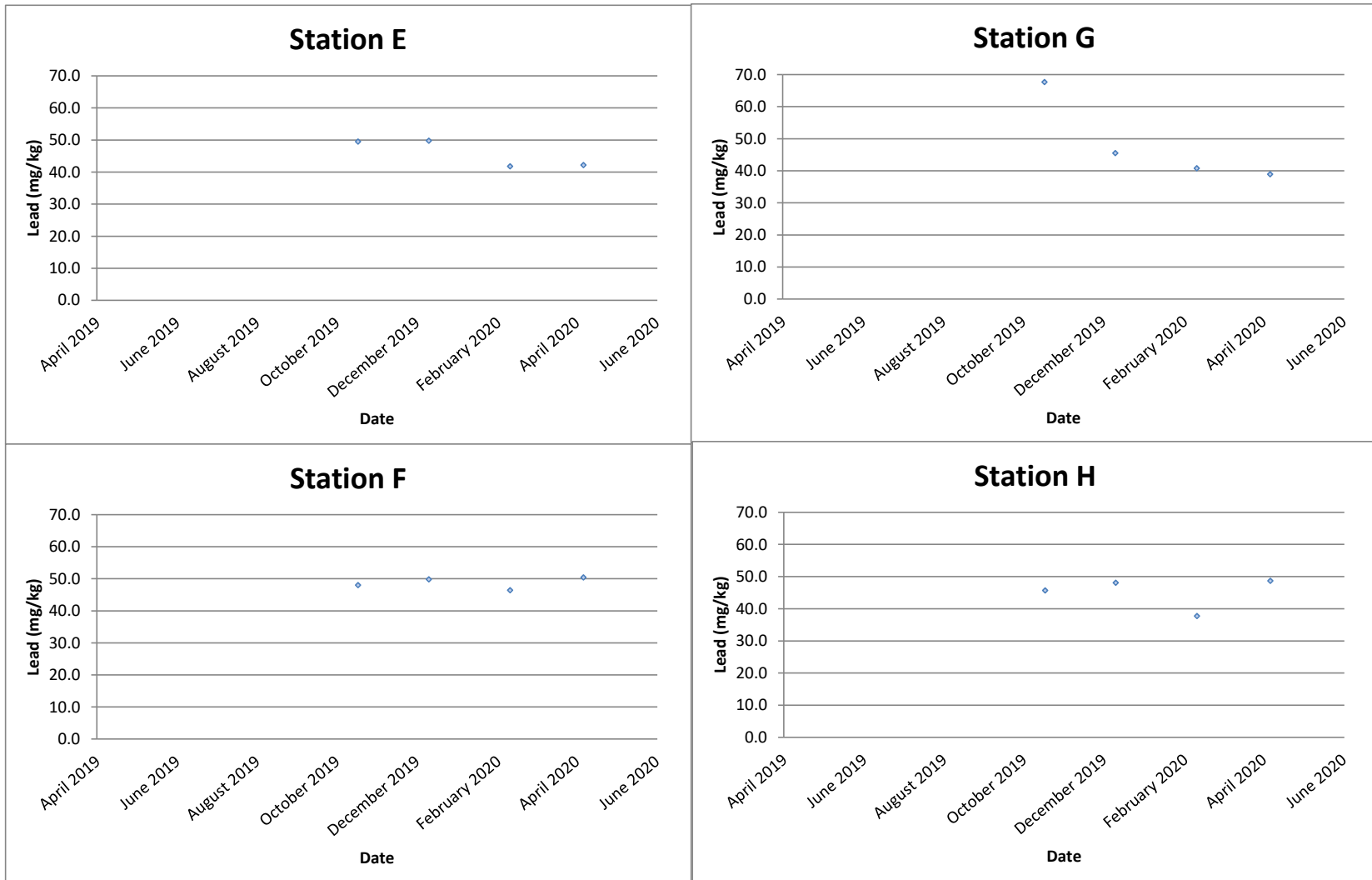
Copper (mg/kg)



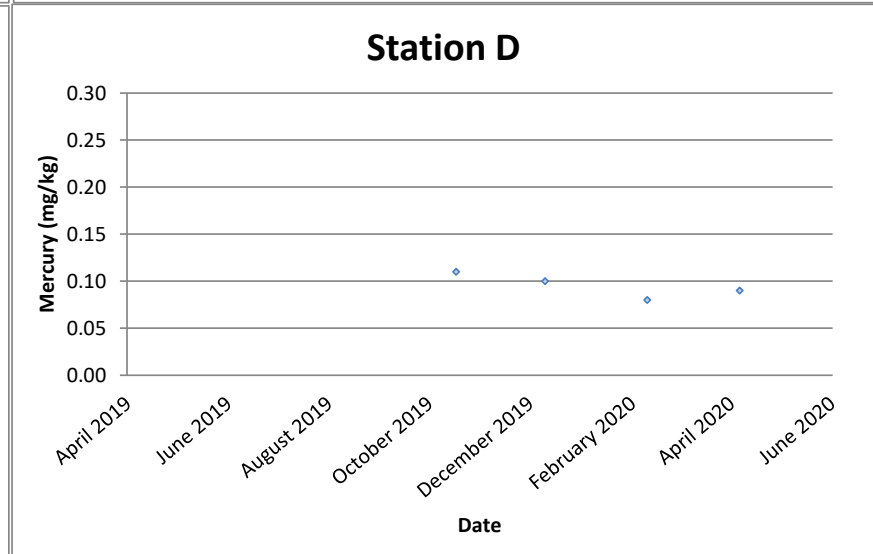
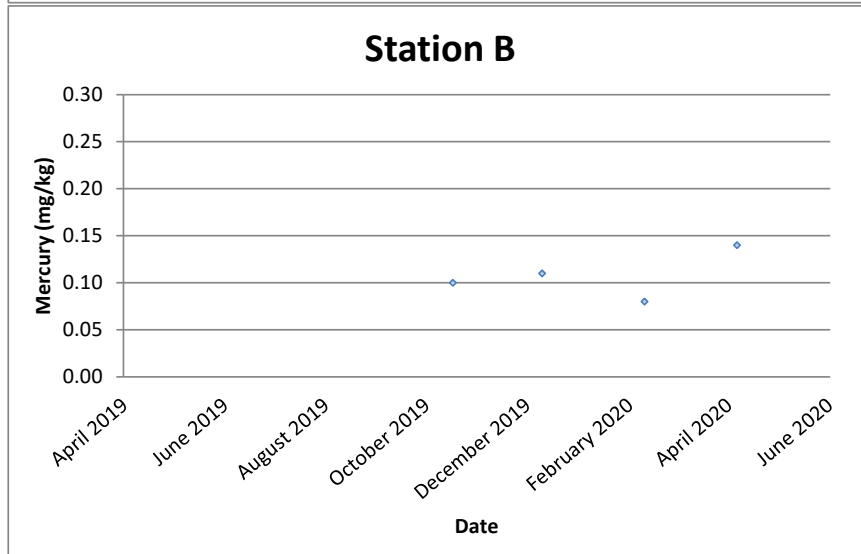
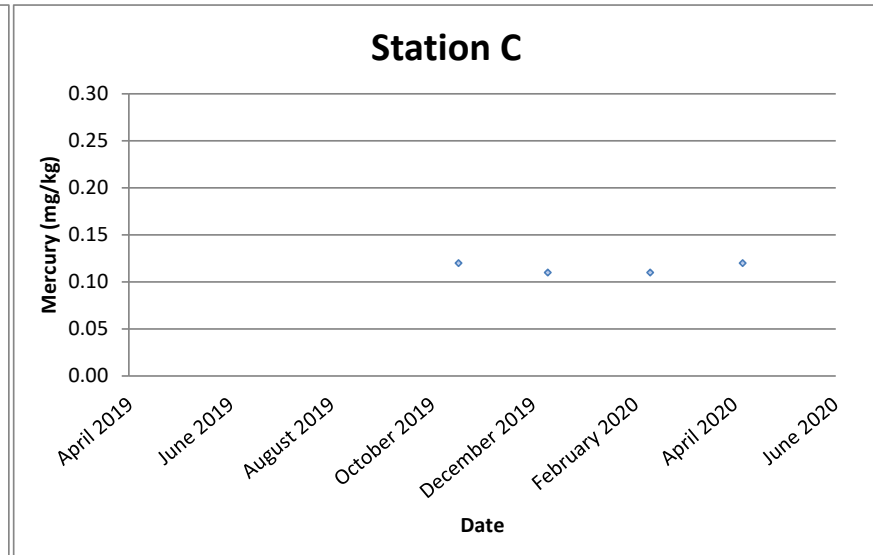
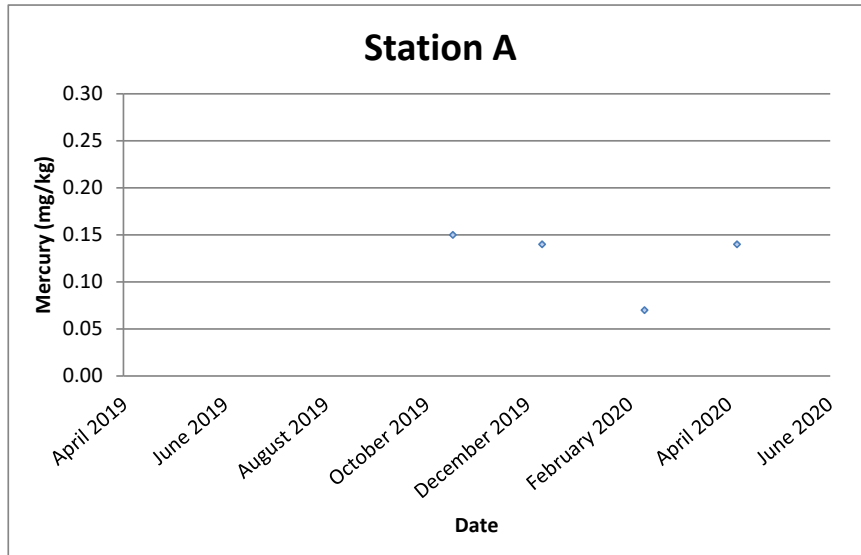
Lead (mg/kg)



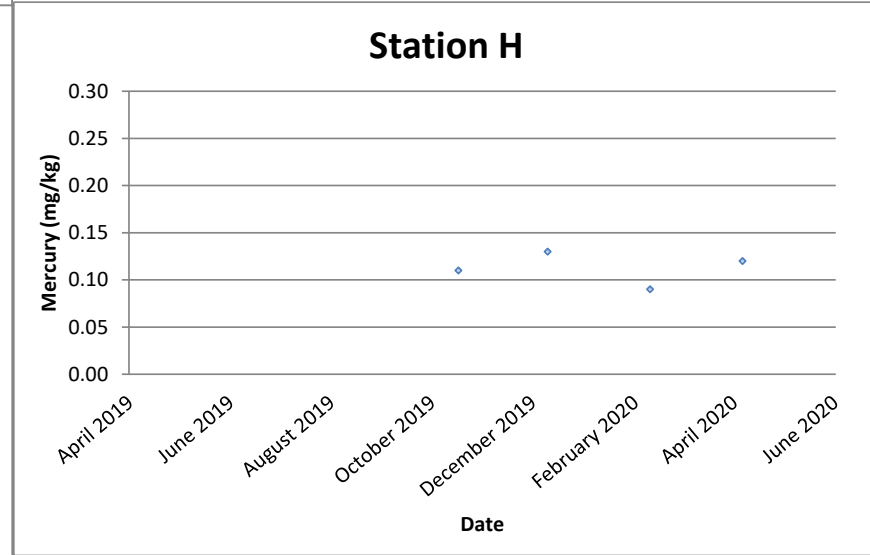
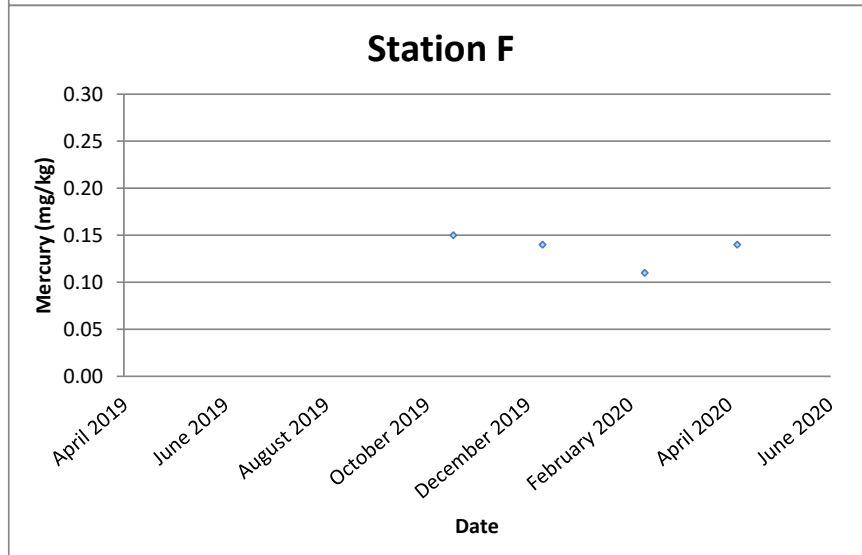
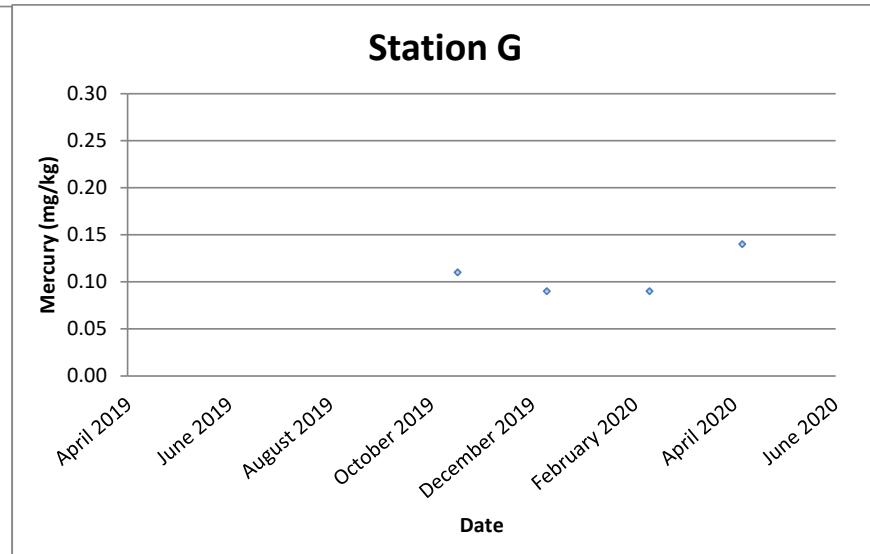
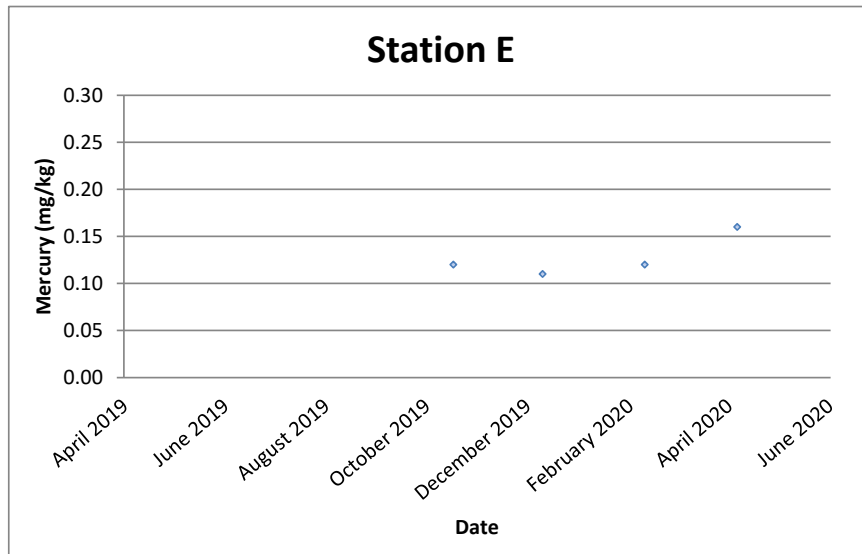
Lead (mg/kg)



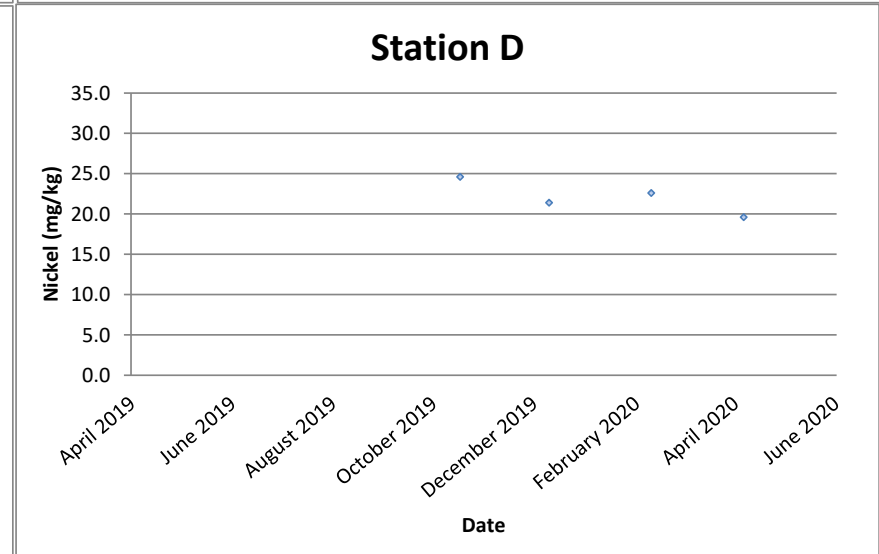
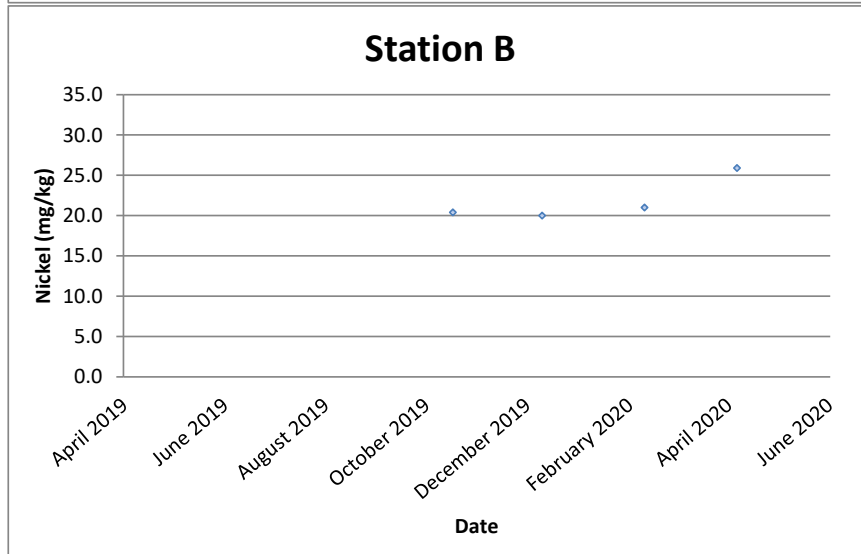
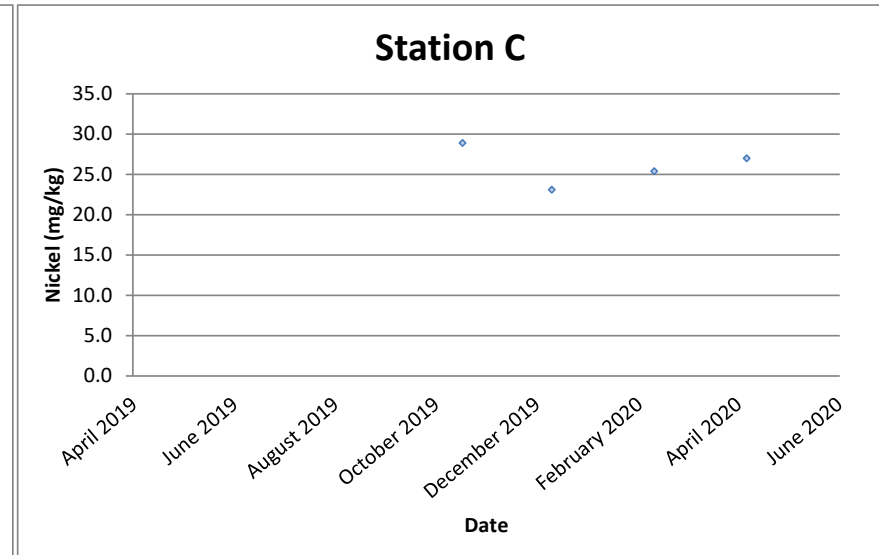
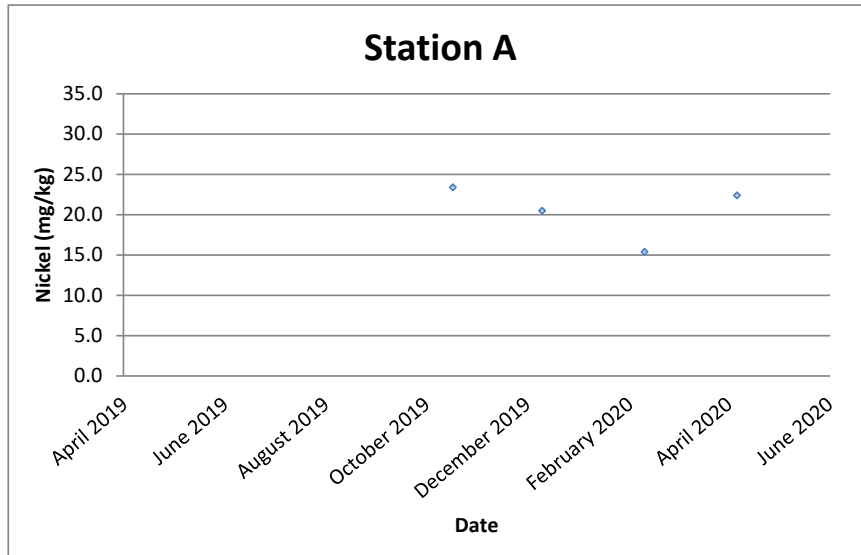
Mercury (mg/kg)



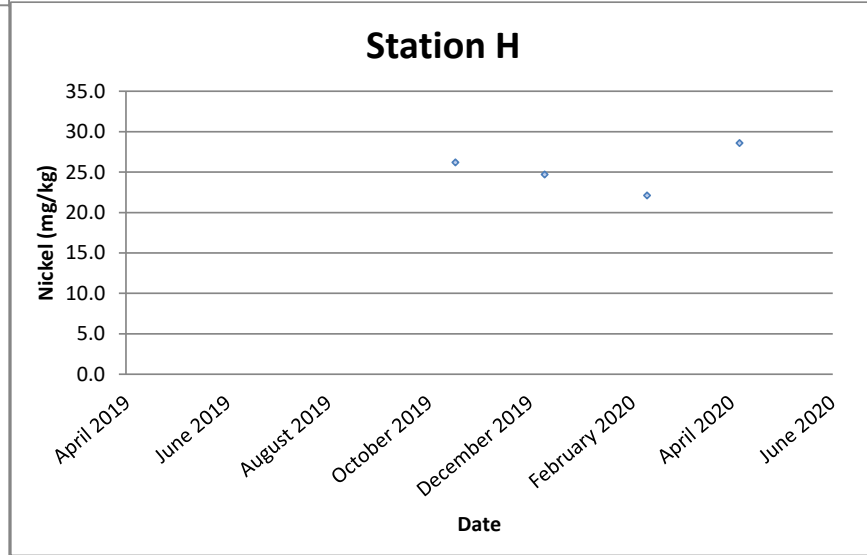
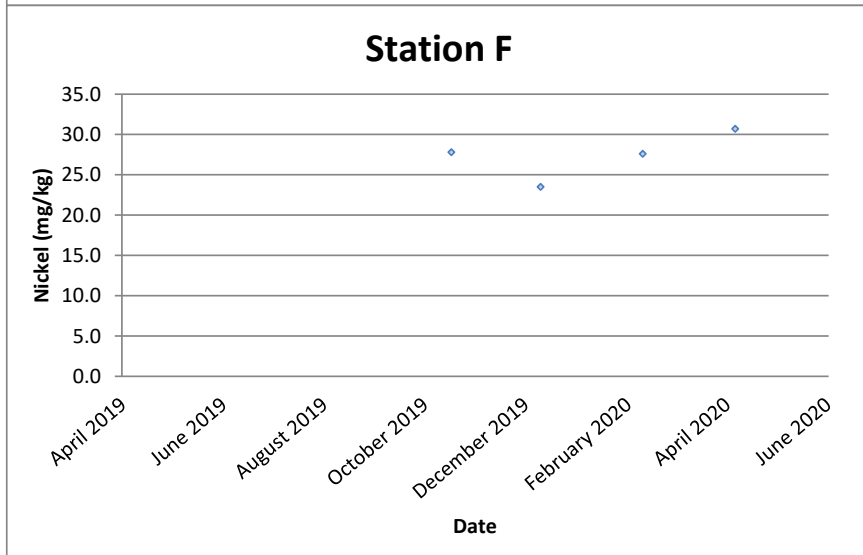
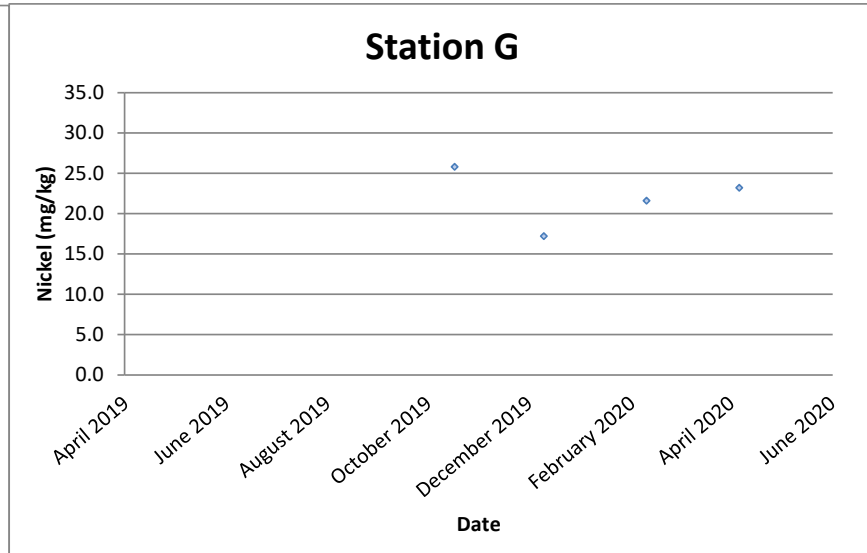
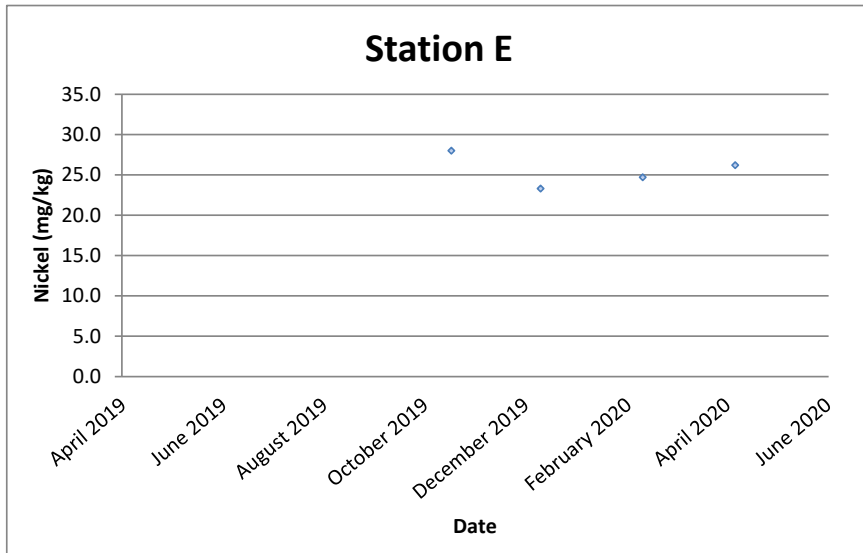
Mercury (mg/kg)



Nickel (mg/kg)

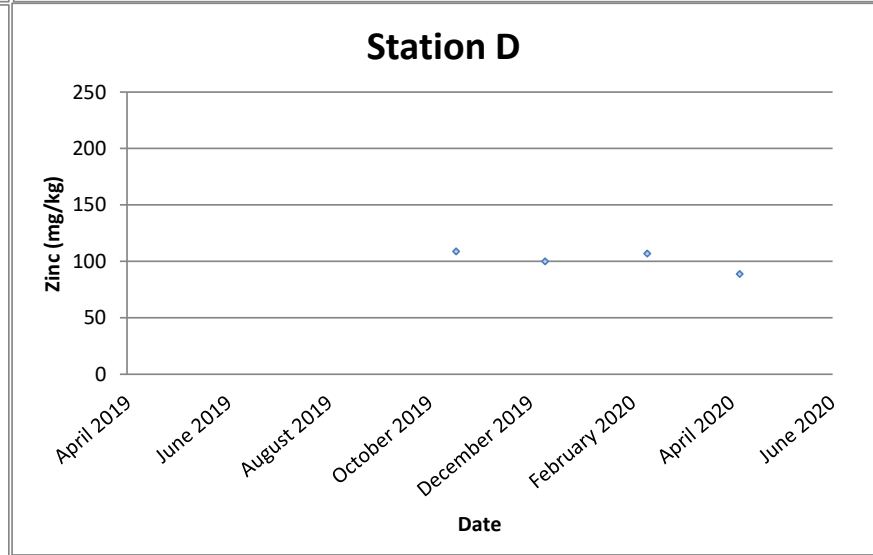
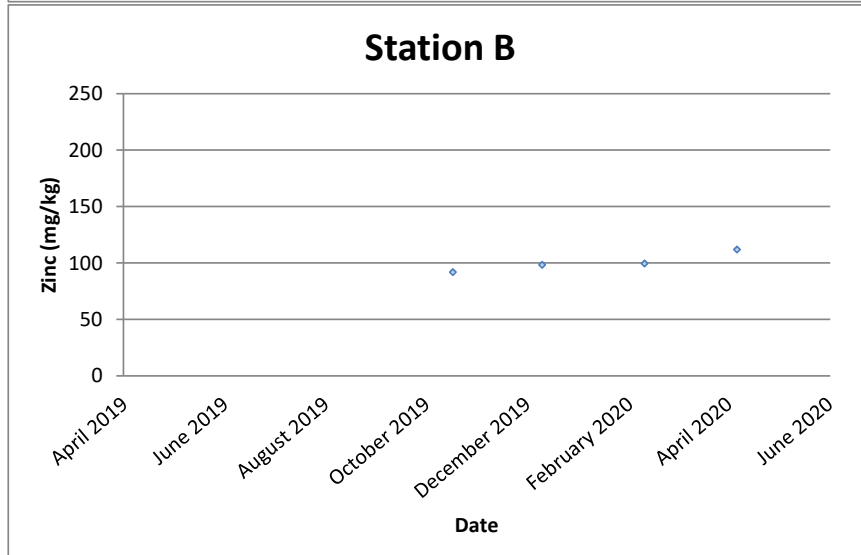
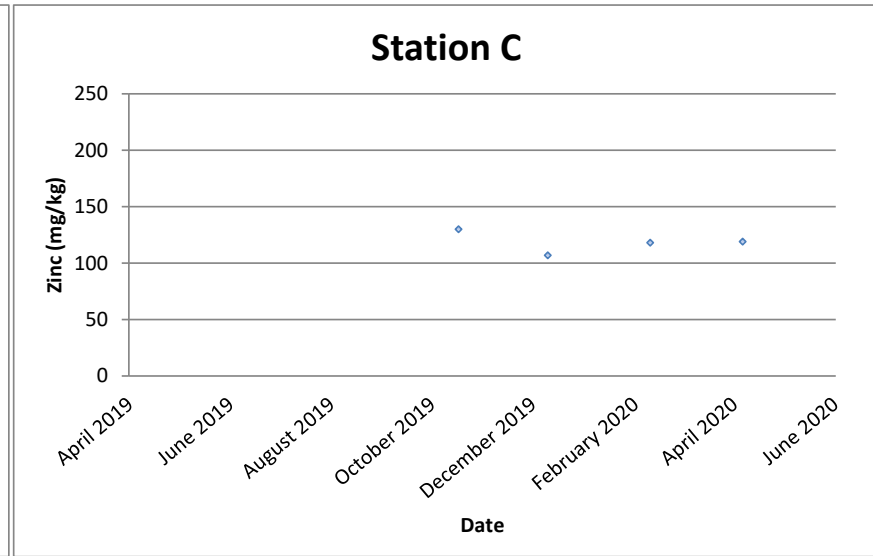
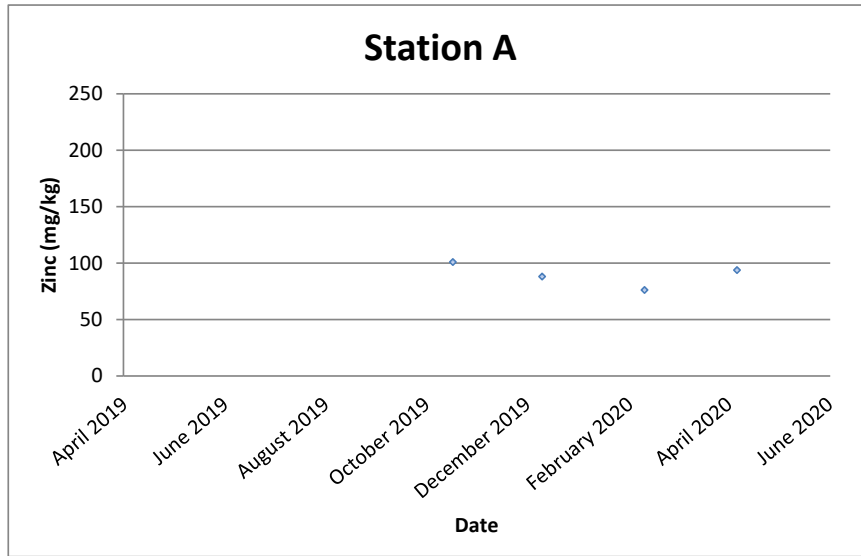


Nickel (mg/kg)

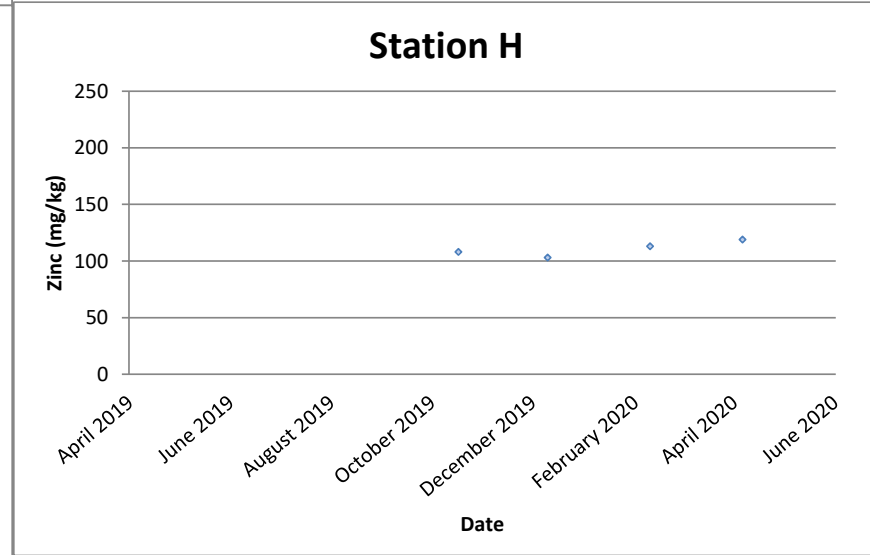
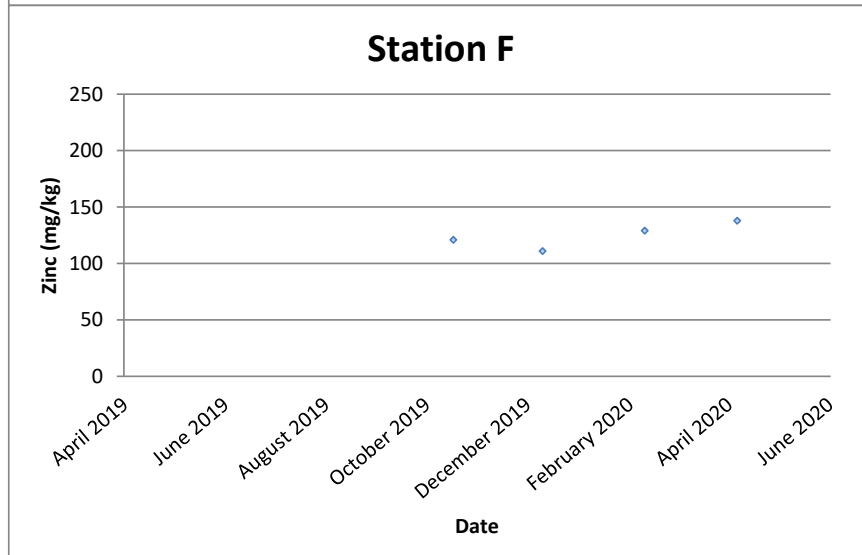
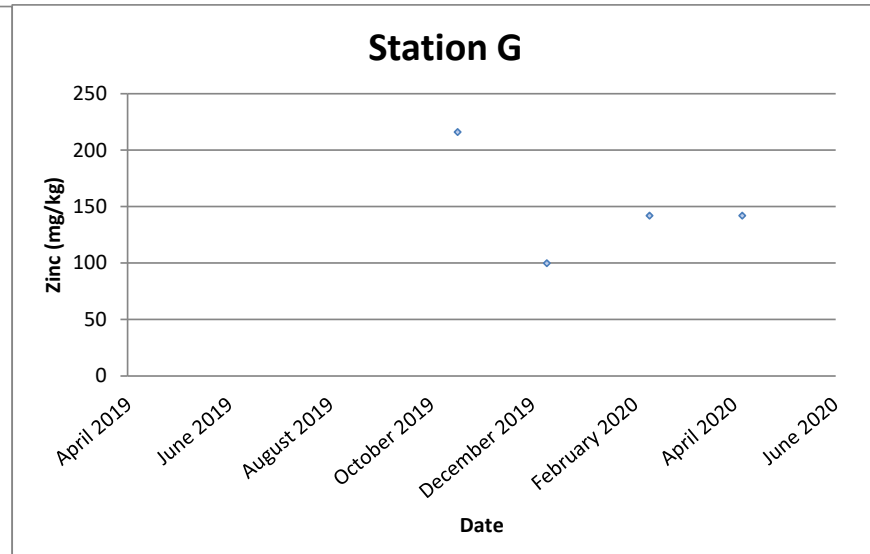
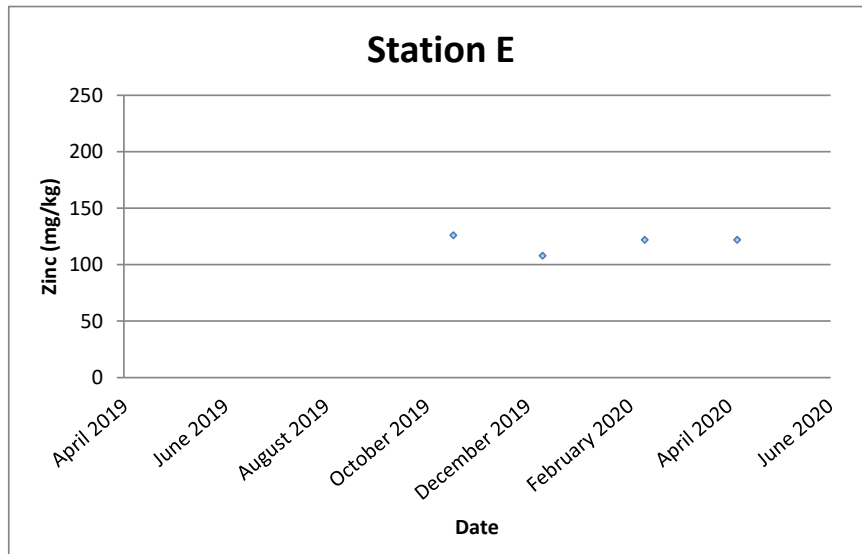




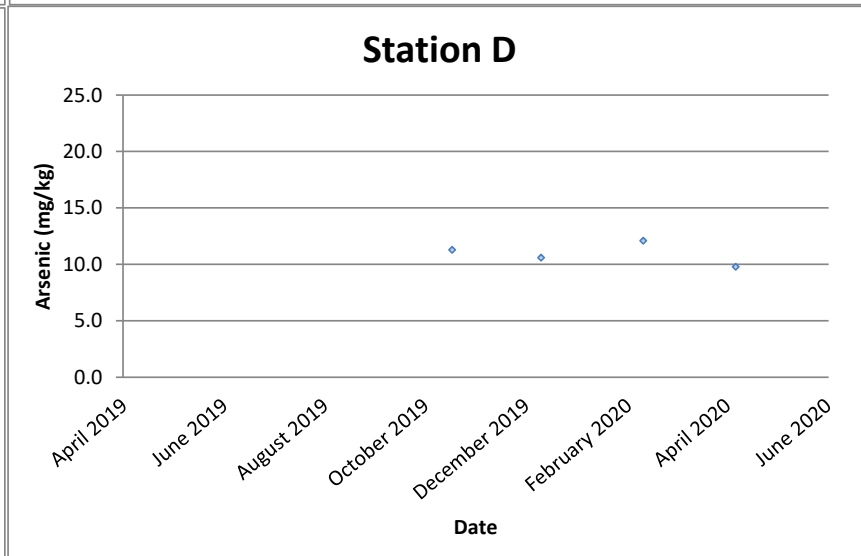
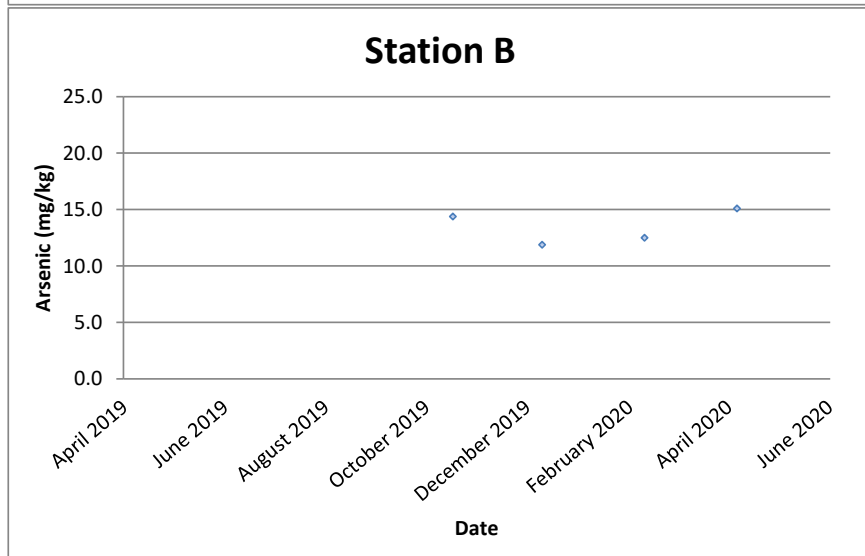
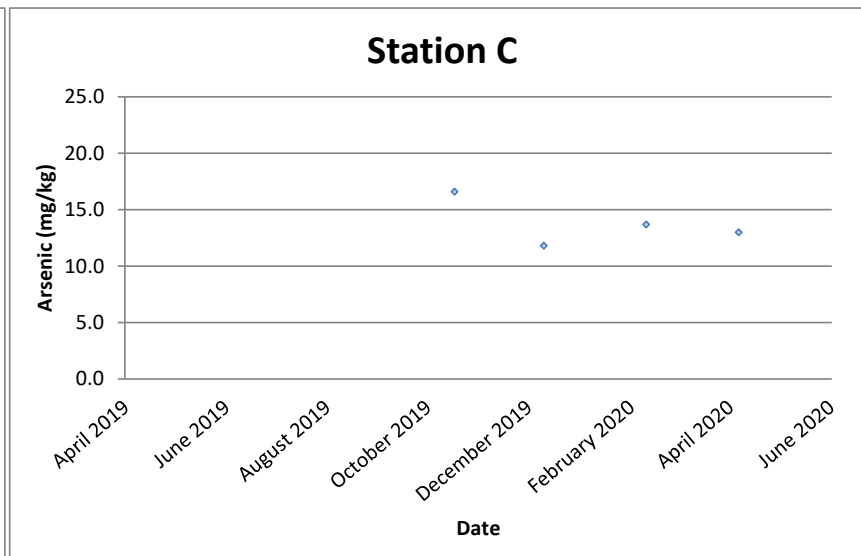
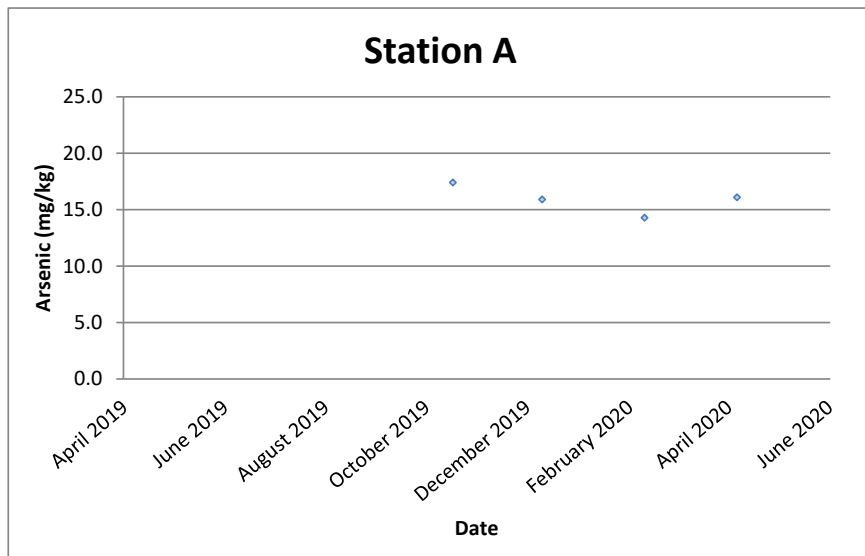
# Zinc (mg/kg)



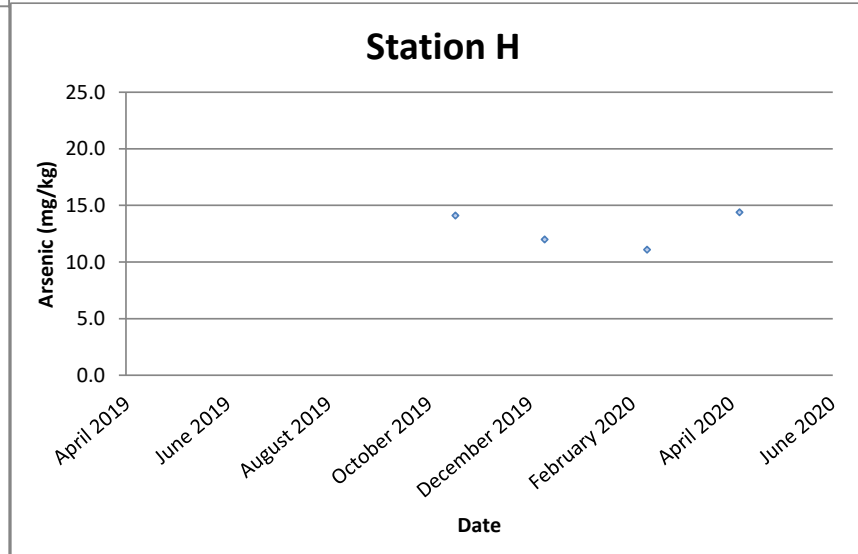
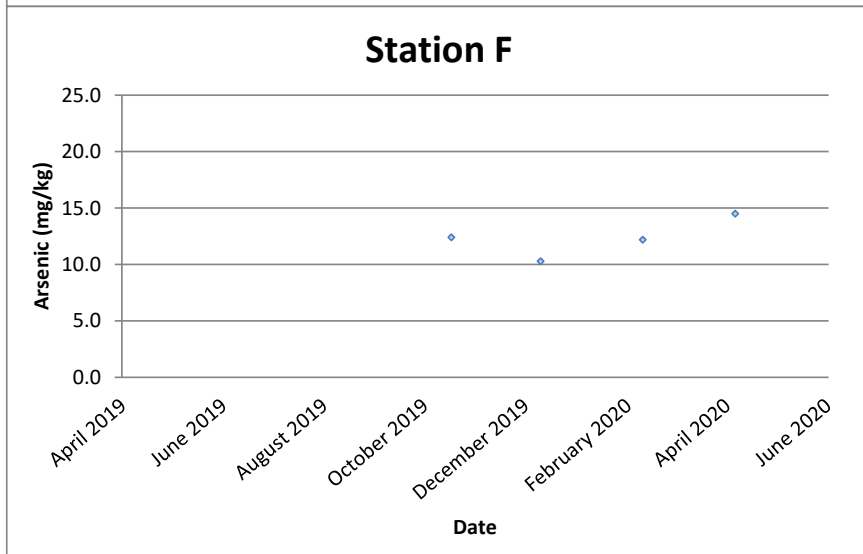
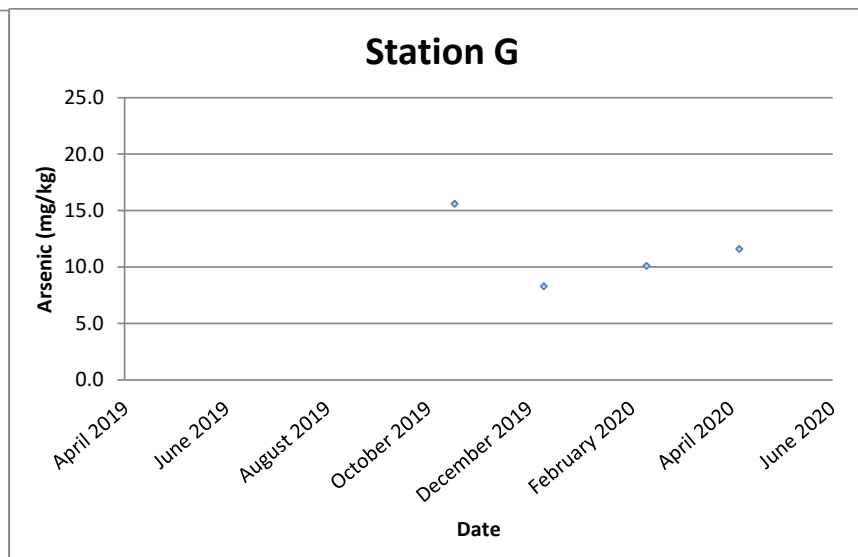
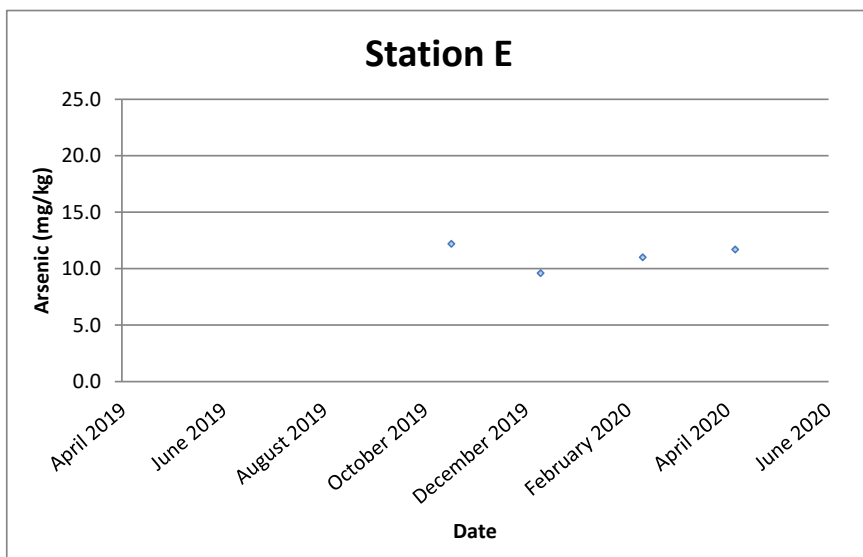
Zinc (mg/kg)



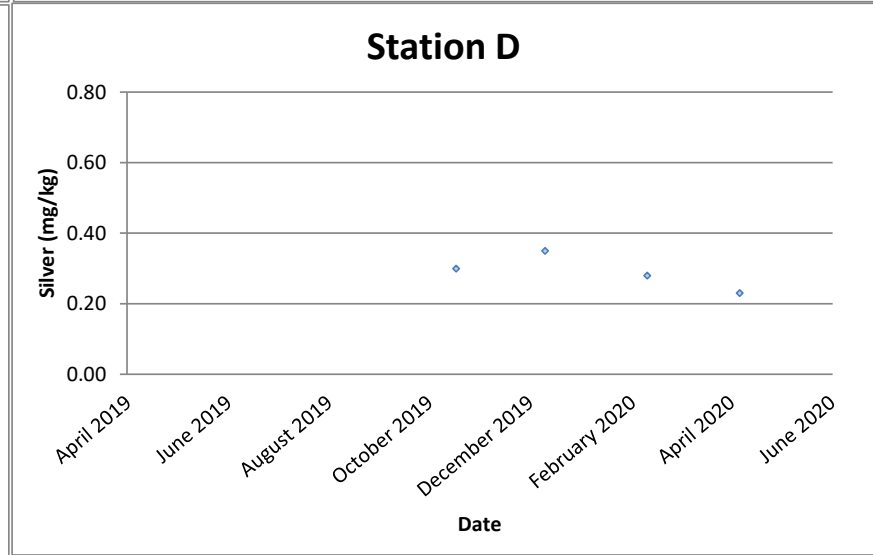
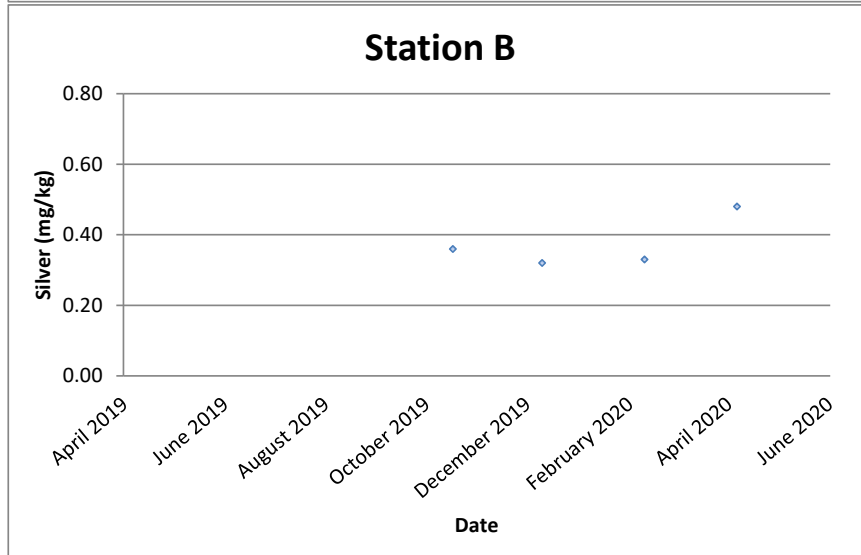
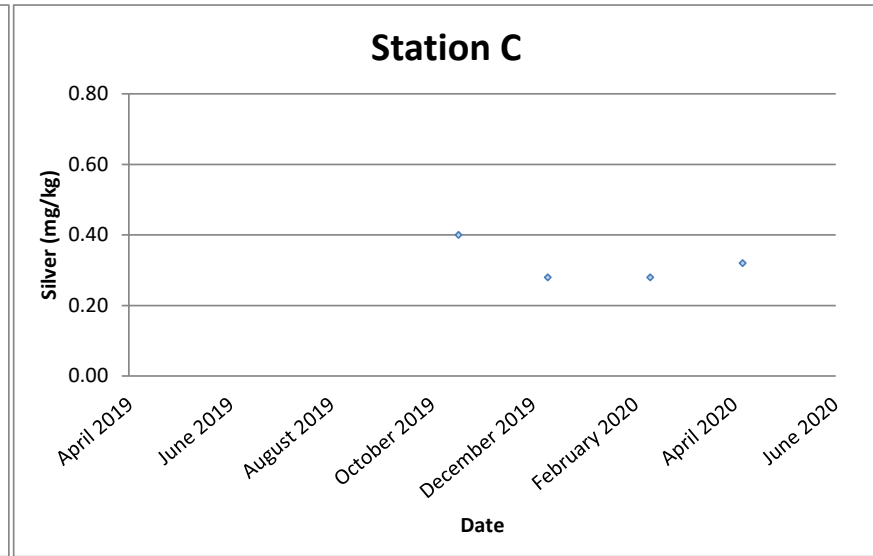
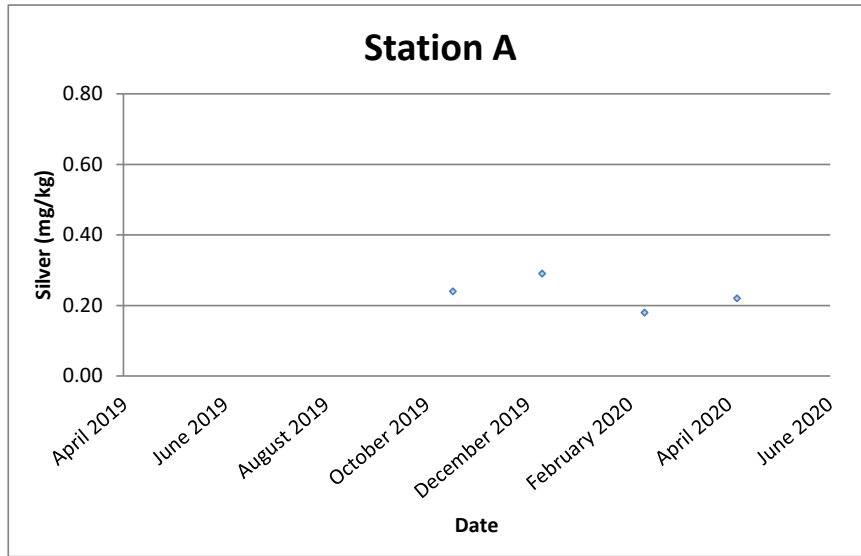
Arsenic (mg/kg)



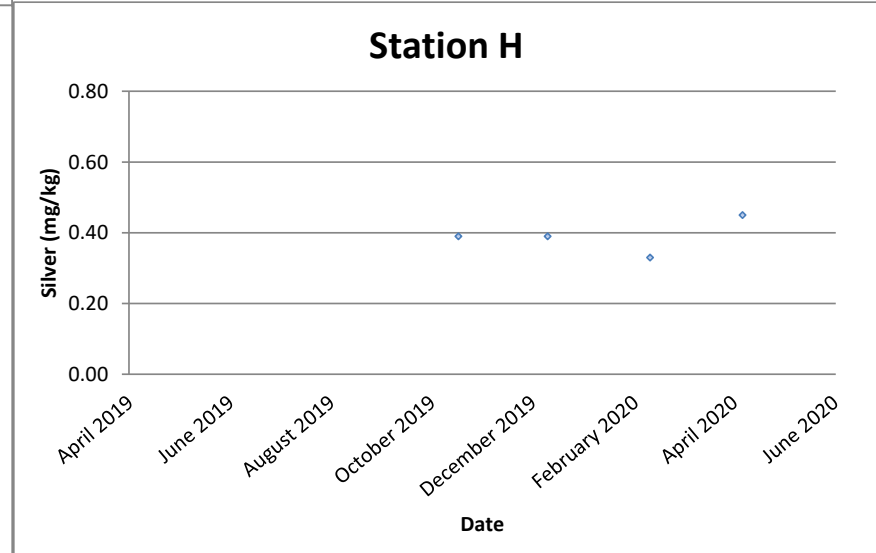
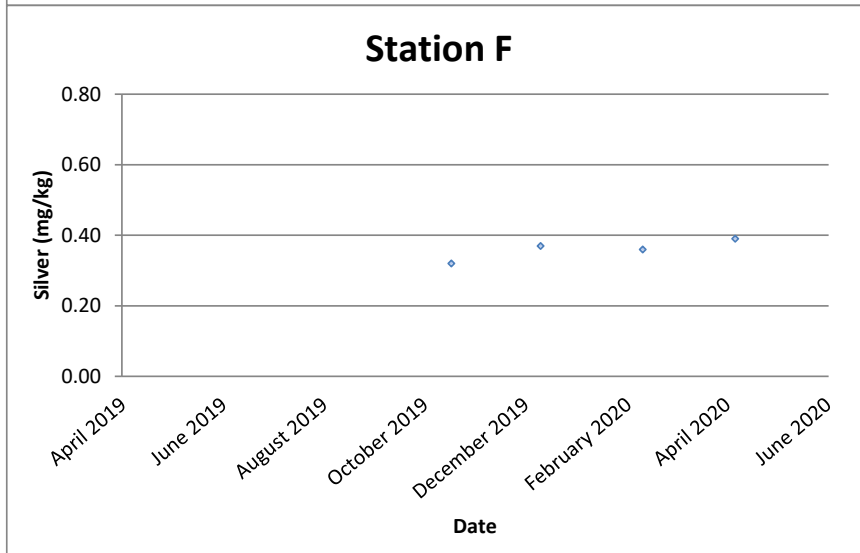
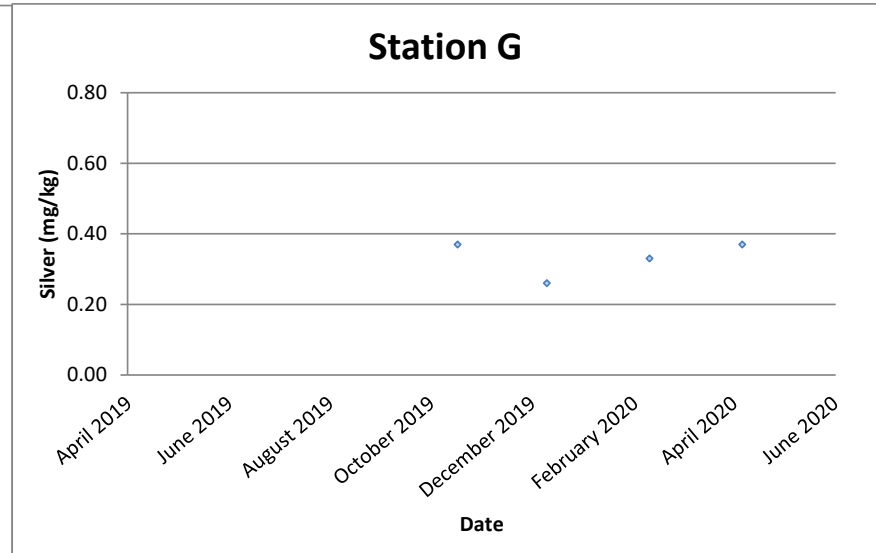
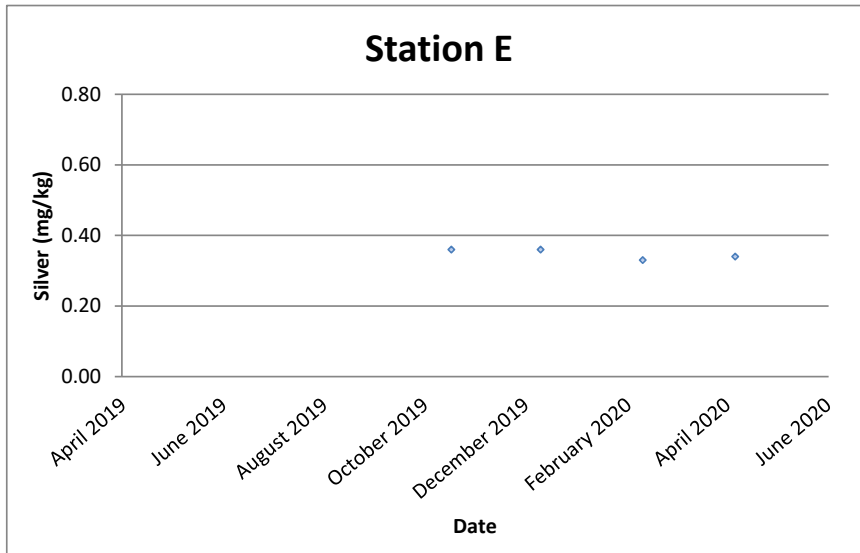
Arsenic (mg/kg)



Silver (mg/kg)



Silver (mg/kg)



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Report No.: 0041/17/ED/0548A

## Appendix G

### Environmental Complaints Log

## FUGRO TECHNICAL SERVICES LIMITED

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Report No.: 0041/17/ED/0548A

### Environmental Complaints Log

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



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## Appendix H

### Environmental Mitigation Implementation Schedule (EMIS)

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Report No.: 0041/17/ED/0548A

EP Ref.	EIA Ref.	WMP Ref.	Environmental Protection Measures	Location of the measures	Implementation Status
<b>Air Quality</b>					
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
<b>Water Quality</b>					
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
<b>Waste Management</b>					
3.6	NA	NA	Transportation of sludge shall be carried out in fully enclosed containers, or be placed in sludge skips with tarpaulin covers	SHWSTW	Implemented
NA	NA	5.02	Trip-ticket system mentioned shall be implemented. Trip-ticket is required for each truckload delivered to the landfills facilities according to WBTC No. 31/2004.	SHWSTW	Implemented
NA	NA	5.02	The acceptance criteria for Landfill disposal should be followed, i.e. solid content of sludge waste should be more than 30%.	SHWSTW	Implemented
NA	NA	5.02	The disposal of grit & debris (if any) generated during primary screening works should follow the requirement set in the WMP Section 4.05.	SHWSTW	Implemented
NA	NA	5.03	The wet sludge should be temporarily stored at the sludge buffer tank. It should then be transported to the centrifuge building for dewatering and discharged to the container for disposal. The whole process should be managed by the automatic electronic electronic system and monitored by the operators during operation.	SHWSTW	Implemented
NA	NA	5.04	The other solid waste material such as sediment and grit, refuse containers or collection bags should be temporarily stored in slips at designated area. Operators should ensure sufficient space is identified and provided for temporary storage of waste materials to facilitate collection. Storage of waste material on site will be kept to a minimum to avoid nuisance to local residents.	SHWSTW	Implemented
NA	NA	5.05	Chemical wastes which likely to be generated by activities arise from the maintenance, shall followed the Waste Disposal (Chemical Waste) (General) Regulation, includes Schedule 1 of the Regulation.	SHWSTW	Implemented
NA	NA	5.06	In case of unlikely occurred chemical spillage, procedures should be followed as according to the WMP Section 5.06.	SHWSTW	Implemented
NA	NA	5.07	Temporary storage areas should be identify and provided for the temporary storage of general	SHWSTW	Implemented

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EP Ref.	EIA Ref.	WMP Ref.	Environmental Protection Measures	Location of the measures	Implementation Status
			refuse to facilitate collection		
NA	NA	5.07	Domestics wastes refuse generated on-site will be stored in enclosed bins or compaction units separately	SHWSTW	Implemented
NA	NA	5.07	Sufficient dustbins should be provided for domestic waste if required.	SHWSTW	Implemented
NA	NA	5.07	Domestics wastes should be cleared daily and will be disposed off to the nearest licensed landfill or refuse transfer station.	SHWSTW	Implemented
NA	NA	5.07	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 and submitted to the Chief Technical Officer for review on the following day. Any deficiency should be rectified promptly.	SHWSTW	Implemented

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

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