環境保護署
Environmental Protection Department

Contract No. EP/SP/66/12
Integrated Waste Management Facilities, Phase 1
Monthly EM&A Report No.18

Keppel Seghers

吉寶西格斯－振華聯營公司
KEPPEL SEGHERS - ZHEN HUA JOINT VENTURE

Monthly EM&A Report No.18
(Period from 1 December to 31 December 2019)

(Clause 3.3, Further Environmental Permit FEP-01/429/2012/A)

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B	Updated Appendix Q	24 February 2020
A	First Submission	14 January 2020
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CONTENTS

EXECUTIVE SUMMARY

Introduction

A1. The Project, Integrated Waste Management Facility (IWMF), is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO) and is currently governed by a Further Environmental Permit (FEP No. FEP-01/429/2012/A) for the construction and operation of the Project.

A2. In accordance with the Updated Environmental Monitoring and Audit (EM&A) Manual for the Project, EM&A works for marine water quality, noise, waste management and ecology should be carried out by Environmental Team (ET), Acuity Sustainability Consulting Limited (ASCL), during the construction phase of the Project.

A3. This is the 18th Monthly EM&A Report, prepared by ASCL, for the Project summarizing the monitoring results and audit findings of the EM&A programme at and around Shek Kwu Chau (SKC) during the reporting period from 1 December 2019 to 31 December 2019.

Summary of Main Works Undertaken & Key Mitigation Measures Implemented

A4. Key activities carried out in this reporting period for the Project included the following:

- Sand Blanket Laying
- Cone Penetration Test
- DCM Installation Works
- Coring of DCM cluster
- Installation of Caisson
- Dredging and Sediment Disposal

A5. The major environmental impacts brought by the above construction activities include:

- Water quality impact from DCM installation
- Disturbance and possible trapping of Finless Porpoise by silt curtains

A6. The key environmental mitigation measures implemented for the Project in this reporting period associated with the construction activities include:

- Reduction of noise from equipment and machinery on-site;
- Installation of silt curtains for DCM installation;
- Installation process of silt curtain according to approved Silt Curtain Deployment Plan;
- Sorting, recycling, storage and disposal of general refuse and construction waste;
- Management of chemicals and avoidance of oil spillage on-site;
- Implementation of cluster MMEZ (Marine Mammal Exclusion Zone) and inspection of enclosed environment within silt curtains as per DMPFP (Detailed Monitoring Programme of Finless Porpoise);

- Daily site audit and monitoring by ET during dredging work as stipulated in FEP Clause 2.21A;
- Regulation on rate and means for dredging works as stipulated in FEP Clause 2.17 – 2.21 or the approved Supporting Document for Reviewing Dredging Rate and Filling Rate, whichever is applicable;
- Storage, handling and disposal of dredged materials according to Dumping At Sea Ordinance (DASO);
- Confirmation of the absence of silt content in the rock filling material and the filling work is properly conducted.

Summary of Exceedance & Investigation & Follow-up

A7. The EM&A works for construction noise, water quality, construction waste, coral, marine mammal and White-Bellied Sea Eagle (WBSE) were conducted during the reporting period in accordance with the Updated EM&A Manual.

A8. No exceedance of the Action or Limit Levels in relation to the construction noise, coral, construction waste and WBSE monitoring was recorded in the reporting month.

A9. Eighteen (18) of the General & Regular DCM water quality monitoring results of suspended solids (SS) obtained during the reporting period had exceeded Action Level. Twenty-two (22) of SS monitoring results had exceeded the relevant Limit Level during the reporting period. Twenty-four (24) of the General & Regular DCM water quality monitoring results of dissolved oxygen (DO) obtained during the reporting period had exceeded Action Level. None (0) of DO monitoring results had exceeded the relevant Limit Level during the reporting period. Investigation was immediately carried out accordingly. The exceedances were found to be unrelated to the Project. Investigation was immediately carried out accordingly. The exceedances were found to be unrelated to the Project.

A10. No project-related Action Level & Limit Level exceedance was recorded from 1 December to 31 December 2019.

A11. Weekly site inspections of the construction work by ET were carried out on 4, 10, 18, 23 & 30 December 2019 to audit the mitigation measures implementation status. Monthly joint site inspection was carried out on 18 December 2019 by ET and IEC. Observations were recorded in the site inspection checklists and provided to the contractors together with the appropriate follow-up actions where necessary.

Complaint Handling and Prosecution

A12. No project-related environmental complaint was received during the reporting period.

A13. Neither notifications of summons nor prosecution was received for the Project.

Reporting Change

A14. There was no change to be reported that may affect the on-going EM&A programme.

Summary of Upcoming Key Issues and Key Mitigation Measures

A15. Key activities anticipated in the next reporting period for the Project will include the following:

- DCM Installation Works;
- Coring of DCM samples;
- Cone Penetration Test;
- Dredging Works and Sediment Disposal;
- Rock Filling of Foundation;
- Leveling Works for the Foundation of Seawall and Berth Area;
- Caisson Laying;
- Rubble Mound Laying;
- Sand Blanket and Geotextile Laying.

A16. The major environmental impacts brought by the above construction activities will include:

- Water quality impact from the DCM installation, laying of sand blanket and dredging operation;
- Disturbance and possible trapping of Finless Porpoise by silt curtains.

A17. The key environmental mitigation measures for the Project in the coming reporting period associated with the construction activities will include:

- Reduction of noise from equipment and machinery on-site;
- Installation of silt curtains for DCM installation, sand blanket laying works and dredging works;
- Installation process of floating silt curtain according to approved Silt Curtain Deployment Plan;
- Sorting, recycling, storage and disposal of general refuse and construction waste;
- Management of chemicals and avoidance of oil spillage on-site, especially under heavy rains and adverse weather;
- Implementation of cluster MMEZ and inspection of enclosed environment within silt curtains as per DMPFP;
- Regulation on rate and means for dredging works as stipulated in FEP Clause 2.17 – 2.21 or the approved Supporting Document for Reviewing Dredging Rate and Filling Rate, whichever is applicable;
- Daily site audit and monitoring by ET during dredging work as stipulated in FEP Clause 2.21A;
- Storage, handling and disposal of dredged materials according to Dumping At Sea Ordinance (DASO);

- Confirmation of the absence of silt content in the rock filling material and the filling work is properly conducted.

1. BASIC PROJECT INFORMATION

1.1 Background

1.1.1 The Government of Hong Kong SAR will develop the Integrated Waste Management Facilities (IWMF) Phase 1 (hereafter "the Project") with incineration to achieve substantial bulk reduction of unavoidable municipal solid waste (MSW) and to recover energy from the incineration process. The IWMF will be on an artificial island to be formed by reclamation at the south-western coast of Shek Kwu Chau. Keppel Seghers – Zhen Hua Joint Venture (KSZHJV) was awarded the contract under Contract No. EP/SP/66/12 Integrated Waste Management Facilities Phase 1 to construct and operate the Project.

1.1.2 An environmental impact assessment (EIA) study for the Project has been conducted and the EIA Report was approved under the Environmental Impact Assessment Ordinance on 17 January 2012. An Environmental Permit (EP) (EP No.: EP-429/2012) was granted to EPD on 19 January 2012 for the construction and operation of the Project. Subsequently, the EP was amended (EP No.: EP-429/2012/A) and a further EP (FEP) (EP No.: FEP-01/429/2012/A) was granted to the Keppel Seghers – Zhen Hua Joint Venture (KSZHJV) on 27 December 2017.

1.1.3 The key design and construction elements of the Project include the Design and the Works including but not limited to the design, engineering procurement, construction, testing and commissioning of the Facility including:

- Ground Treatment works;
- Seawall and Breakwater construction;
- Non-dredged Reclamation;
- Other Marine works and Harbour and Port Facilities;
- Site formation;
- Municipal Solid Waste (MSW) Treatment Processes;
- Energy Recovery for Power Generation and Surplus Electricity export;
- Wastewater treatment process;
- Desalination and water treatment process;
- Civil works;
- Building and Structural works;
- Electrical and Mechanical works;
- Building Services;
- Architectural and Landscaping works; and
- All other design and works required for the operation and maintenance of the Facility according to the Contract requirements.

1.1.4 The location of the IWMF near Shek Kwu Chau (SKC) and general layout of IWMF are shown in **Figure 1.1** and **Figure 1.2** respectively.

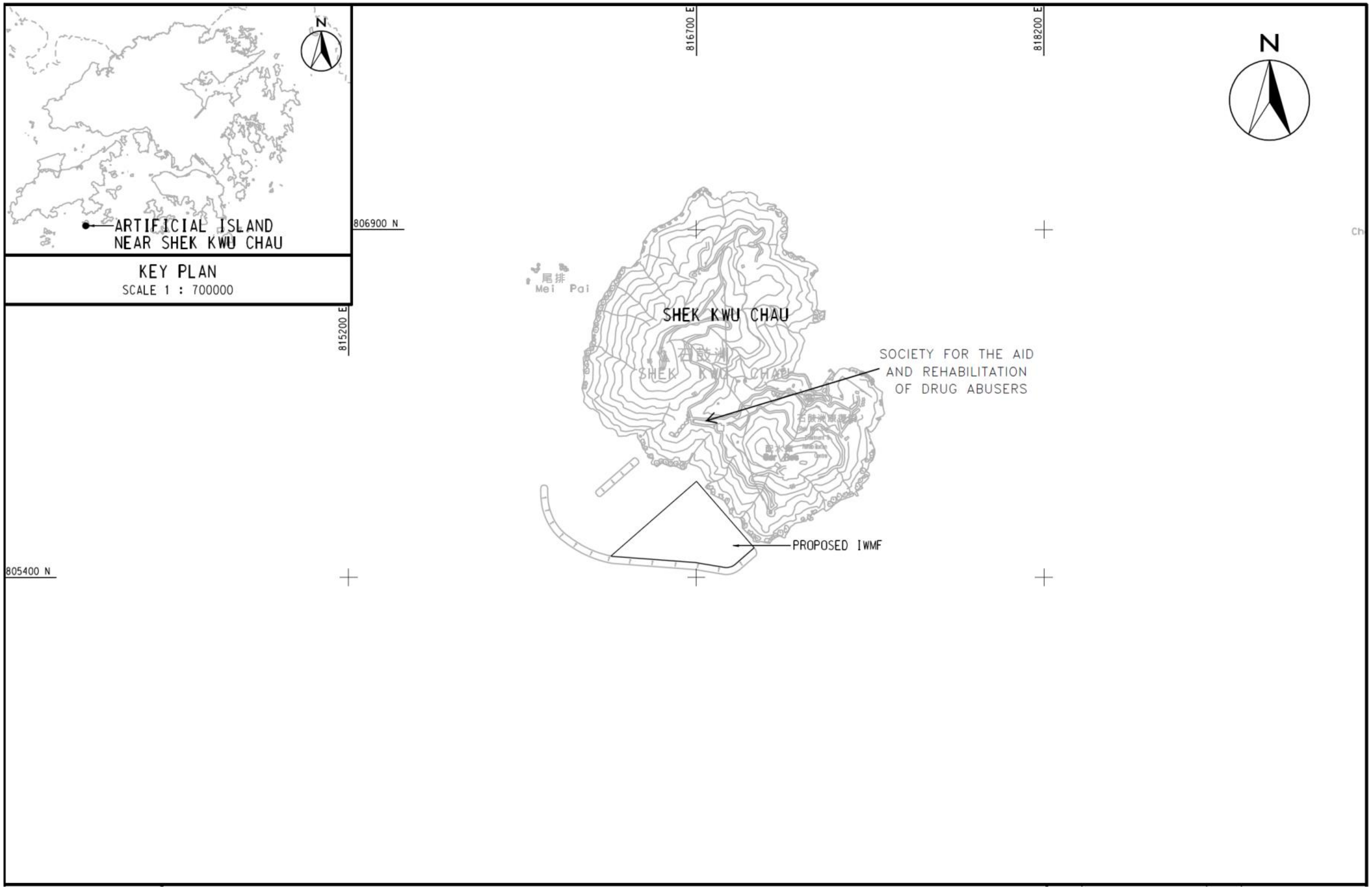


Figure 1.1 Location of the IWMF at the Artificial Island near SKC

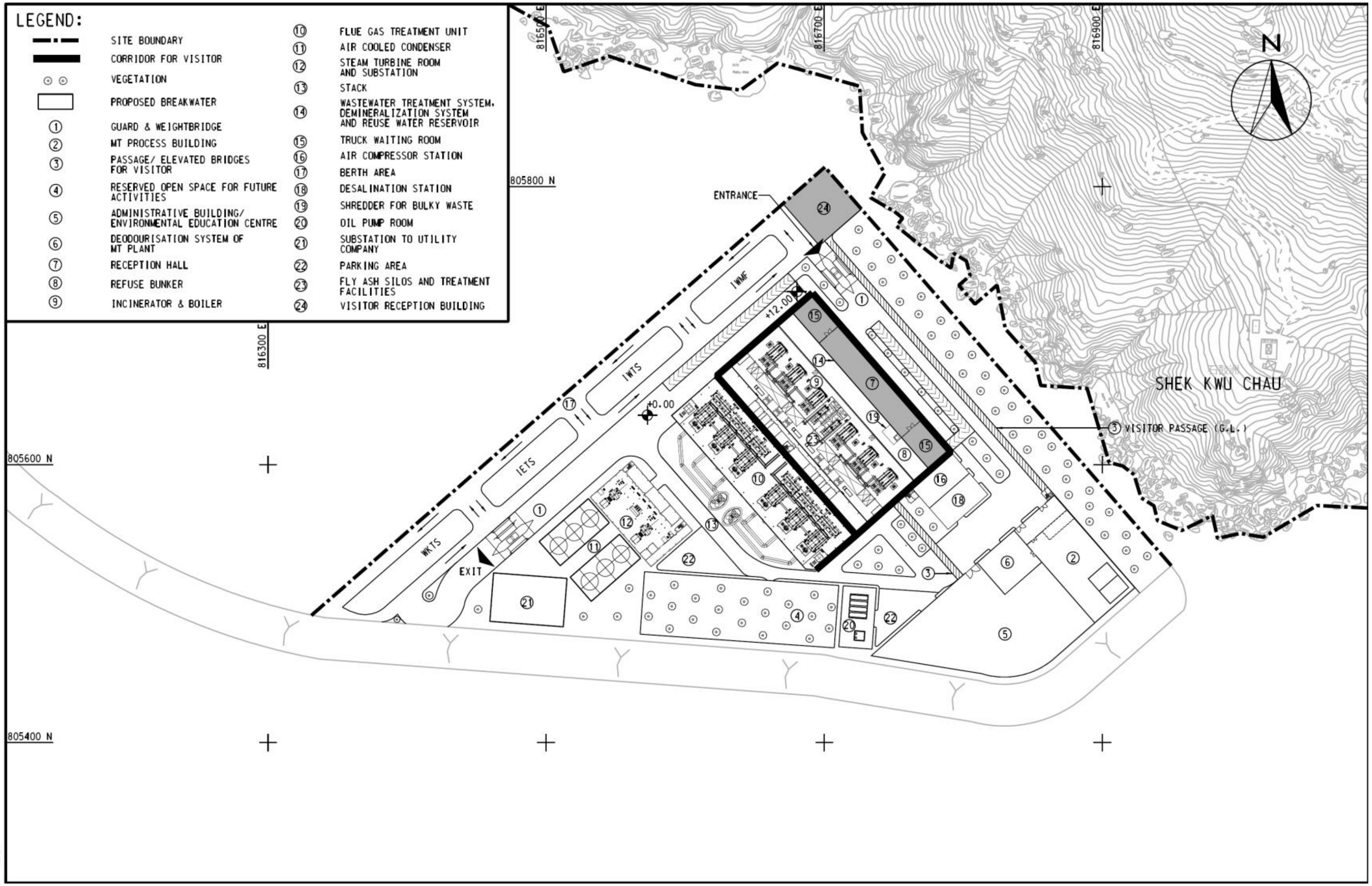


Figure 1.2 General Layout of the IWMF at the Artificial Island near SKC

1.2 The Reporting Scope

1.2.1 This is the 18th Monthly EM&A Report for the Project which summarizes the key findings of the EM&A programme during the reporting period from 1 December to 31 December 2019.

1.3 Project Organization

1.3.1 The Project Organization structure for Construction Phase is presented in **Figure 1.3**.

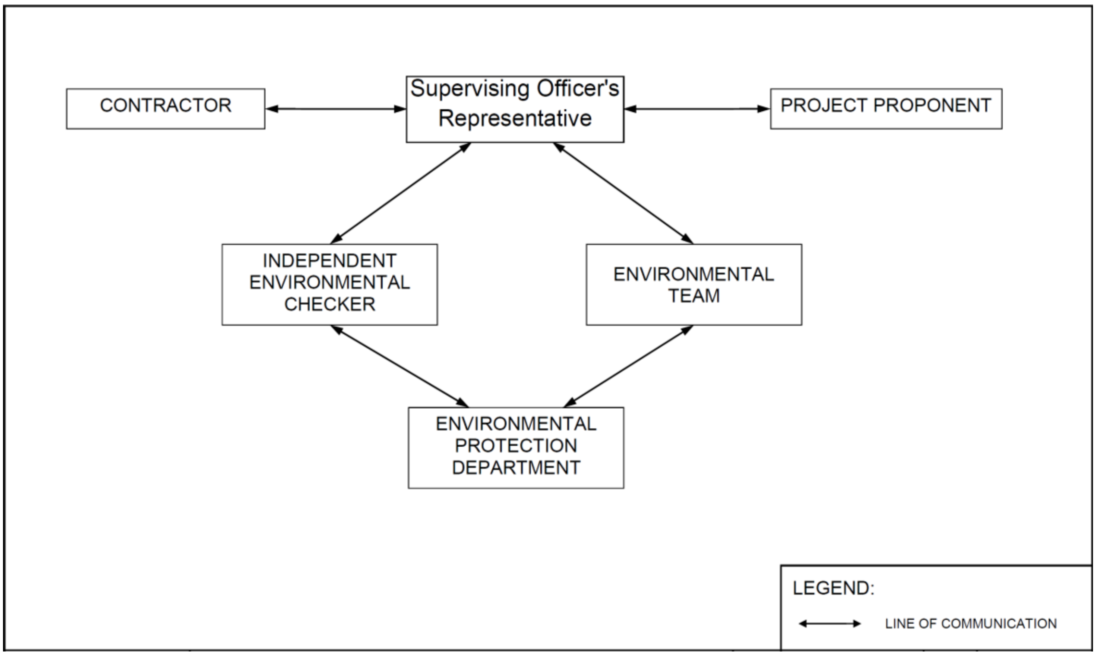


Figure 1.3 Project Organization Chart

1.3.2 Contact details of the key personnel are presented in **Table 1.1** below:

Table 1.1 Contact Details of Key Personnel

Party	Position	Name	Telephone no.
Keppel Seghers – Zhen Hua Joint Venture	Project Manager	Kenny Yu	2192-0606
Acuity Sustainability Consulting Limited	Environmental Team Leader	Robin Ho	2698-6833
ERM-Hong Kong, Limited	Independent Environmental Checker	Mandy To	2271-3000

1.4 Summary of Construction Works

1.4.1 Details of the major construction activities undertaken in this reporting period are shown in **Table 1.2** and **Figure 1.4** below. The construction programme is presented in **Appendix A**.

Table 1.2 Summary of the Construction Activities Undertaken during the Reporting Month

Location of works	Construction activities undertaken	Remarks on progress
Breakwater	• Sand blanket laying • DCM installation	• On-going • On-going
Reclamation area	• Sand blanket laying	• On-going
Seawall portion	• DCM installation • Coring for DCM cluster • Dredging and Sediment Disposal • Cone Penetration Test • Installation of caisson	• Completed • On-going • 39,172.8842 m^3 of dredged sediment in bulk quantity was dumped at relevant dumping site in total up to 31 December 2019. • On-going • On-going

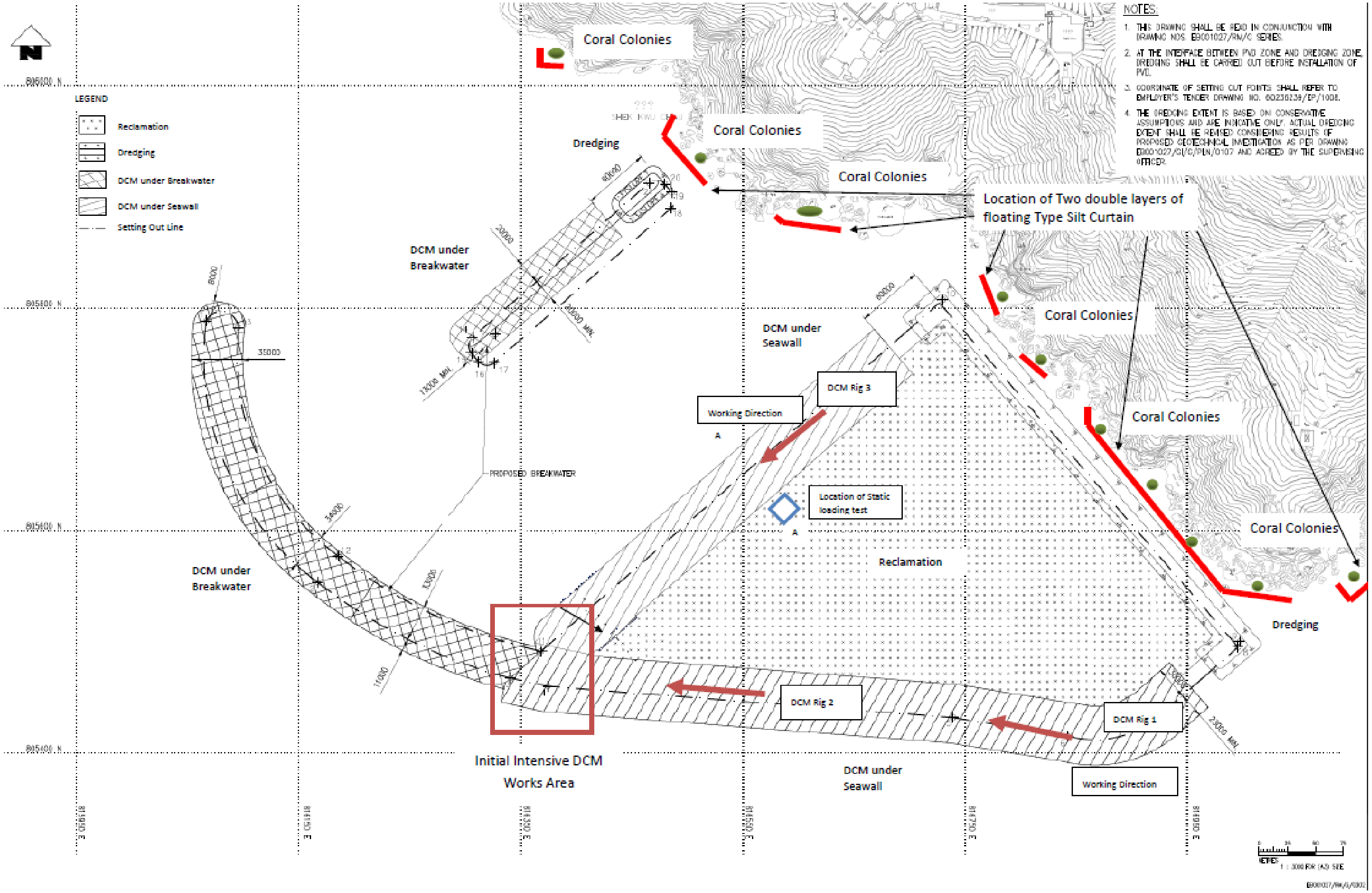


Figure 1.4 Location of Major Construction Activities Undertaken during the Reporting Month

1.5 Summary of Environmental Status

1.5.1 A summary of the valid permits, licences, and /or notifications on environmental protection for this Project is presented in **Table 1.3**

Table 1.3 Summary of the Status of Valid Environmental Licence, Notification, Permit and Documentations

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Variation of Environmental Permit	EP-429/2012/A	Throughout the Contract	
Further Environmental Permit	FEP-01/429/2012/A	Throughout the Contract	
Notification of Construction Works under the Air Pollution Control (Construction Dust) Regulation (Form NA)	Ref No.: 428778	15/12/2017 – 22/09/2024	
Wastewater Discharge Licence	WT00033787-2019	22/08/2019 – 31/08/2024	
Chemical Waste Producer Registration	WPN0017-933-K3301-01	Throughout the Contract	
	WPN5213-961-K3301-02	Throughout the Contract	
Construction Noise Permit (24 hours)	GW-RS0938-19	29/10/2019 – 27/04/2020	GW-RS0938-19 was superseded by GW-RS1113-19 from 20/12/2019.
	GW-RS1113-19	20/12/2019 – 19/06/2020	
Billing Account for Disposal of Construction Waste	A/C No.:7029768	Throughout the Contract	
Marine Dumping Permit	EP/MD/20-051	20/08/2019 – 19/02/2020	

1.5.2 The status for all environmental aspects is presented in **Table 1.4**.

Table 1.4 Summary of Status for Key Environmental Aspects under the Updated EM&A Manual

Parameters	Status
Water Quality	
Baseline Monitoring under Updated EM&A Manual and Detailed Plan on DCM	The baseline water quality monitoring result has been reported in Baseline Monitoring Report and submitted to EPD under FEP Condition 3.4
Impact Monitoring	On-going
Regular DCM Monitoring	On-going

Parameters	Status
Initial Intensive DCM Monitoring	Conducted from 11 February 2019 to 10 March 2019, to be resumed whenever DCM related parameter exceeded the AL/LL
Baseline Water Quality of wet season	Completed over 13 August 2018 to 7 September 2018
Noise	
Baseline Monitoring	The baseline noise monitoring result has been reported in Baseline Monitoring Report and submitted to EPD under FEP Condition 3.4
Impact Monitoring	On-going
Waste Management	
Mitigation Measures in Waste Monitoring Plan	On-going
Coral	
Pre-translocation Survey and Coral Mapping	The Coral Translocation Plan was submitted and approved by EPD under EP Condition 2.12
Coral Translocation	Completed on 28 March 2018
Post-Translocation Coral Monitoring	Survey affected by missing of translocated and tagged coral colonies after typhoons in September 2018, completed on 28 March 2019.
Pre-construction Coral Survey and Tagging	Completed on 26 June 2018
Tagged Coral Monitoring	Survey obstructed due to missing of tagged coral colonies after typhoons in September 2018
Coral Survey and Re-tagging	Re-tagging at Indirect Impact Site was conducted on 23 November and Re-tagging at Control Site was conducted on 3 December 2018.
Post Re-tagging Coral Monitoring	On-going
Marine Mammal	
Vessel-based Line-transect Survey Baseline Monitoring	The baseline marine mammal monitoring result has been reported in Baseline Monitoring Report and submitted to EPD under FEP Condition 3.4
Vessel-based Line-transect Survey Impact Monitoring	On-going
Land-based Theodolite Tracking	30 days of theodolite surveys were started at 21 Feb 2019 and completed in May 2019.
Passive Acoustic Monitoring	30 days of PAM surveys were started at 1 May 2019 and completed until the end of May 2019.
White-bellied Sea Eagle	
Baseline Monitoring	The baseline WBSE monitoring result has been reported in Baseline Monitoring Report and submitted to EPD under FEP Condition 3.4
Impact Monitoring	On-going
Environmental Audit	
Site Inspection covering Measures of Air Quality, Noise Impact, Water Quality, Waste, Ecological Quality,	On-going

Parameters	Status
Fisheries, Landscape and Visual	
Mitigation Measures in Marine Mammal Watching Plan (MMWP)	On-going
Mitigation Measures in Detailed Monitoring Programme on Finless Porpoise (DMPFP)	On-going
Mitigation Measures in Vessel Travel Details	On-going
Daily Site Audit and Monitoring for Dredging Work	On-going

1.5.3 Other than the EM&A work by ET, environmental briefings, trainings and regular environmental management meetings were conducted, in order to enhance environmental awareness and closely monitor the environmental performance of the contractors.

1.5.4 The EM&A programme has been implemented in accordance with the recommendations presented in the approved EIA Report and the Updated EM&A Manual. A summary of implementation status of the environmental mitigation measures for the construction phase of the Project during the reporting period is provided in **Appendix B**.

2. MARINE WATER QUALITY MONITORING

2.1 Water Quality Requirements

2.1.1 To ensure no adverse water quality impact, water quality monitoring is recommended to be carried out at the nearby water sensitive receivers (WSRs) during construction phase including proposed reclamation, breakwater construction, etc.

2.1.2 In accordance with the Updated EM&A Manual, impact water quality monitoring were conducted 3 days per week at mid-flood and mid-ebb tide to obtain impact water quality levels at the eleven monitoring stations during general water quality monitoring and fourteen monitoring stations during regular DCM monitoring for the construction period.

2.2 Water Quality Parameters, Time, Frequency

2.2.1 Dissolved Oxygen (DO), Turbidity, Suspended Solids (SS), Salinity and pH have been undertaken at the eleven monitoring stations during general water quality monitoring. Besides the above parameters, monitoring for Total Alkalinity, Current Velocity and Current Direction have been undertaken at all fourteen monitoring stations (including S1, S2A and S3) during regular DCM monitoring. While the same parameters monitored during regular DCM monitoring would be undertaken at twelve immediate upstream and downstream area to the DCM works location during intensive DCM monitoring. Intensive DCM monitoring was not undertaken during the reporting period.

2.2.2 Current velocity and direction, DO, temperature, salinity, turbidity and pH have been measured in-situ and the SS, Total Alkalinity have been assayed in a HOKLAS laboratory.

2.2.3 In associate with the water quality parameters, other relevant data were also measured, such as monitoring location/position, time, water depth, sampling depth, tidal stages, weather conditions and any special phenomena or work underway nearby were also recorded. The monitoring schedule is provided in **Appendix C**.

2.2.4 Impact water quality monitoring was conducted 3 days per week in the reporting period. All parameters were monitored during mid-flood and mid-ebb tides at three water depths for general water quality monitoring. The interval between two sets of monitoring has not been less than 36 hours.

2.2.5 **Table 2.1** summarizes the monitoring parameters, frequency and duration of the impact water quality monitoring during construction phase.

Table 2.1 Water Quality Monitoring Parameters, Frequency and Duration

Parameter, unit	Frequency	No. of Depths
• Water Depth (m) • Temperature (ºC) • Salinity (ppt) • pH (pH unit) • Dissolved Oxygen (DO) (mg/L and % of saturation) • Turbidity (NTU) • Suspended Solids (SS), mg/L • Total alkalinity (mg/L) • Current velocity (m/s) • Direction	General water quality monitoring and Regular DCM monitoring: 3 days per week, at mid-flood and mid-ebb tides	3 water depths: 1m below sea surface, mid-depth and 1m above sea bed. If the water depth is less than 3m, mid-depth sampling only. If water depth less than 6m, mid-depth may be omitted.

2.3 Water Quality Monitoring Locations

2.3.1 Impact water quality monitoring was conducted at eleven monitoring locations (B1-B4, H1, C1, C2, F1, CR1, CR2 & M1) during general water quality monitoring and was conducted at fourteen water monitoring locations (B1-B4, H1, C1, C2, F1, S1-S3, CR1, CR2 & M1) during regular DCM monitoring, as shown in **Figure 2.1**. As per the relocation proposal verified by IEC and approved by EPD, the monitoring location C1, C2, S2, F1 are relocated at C1A, C2A, S2A, F1A as equivalent points respectively to clear up the concerns from stakeholders.

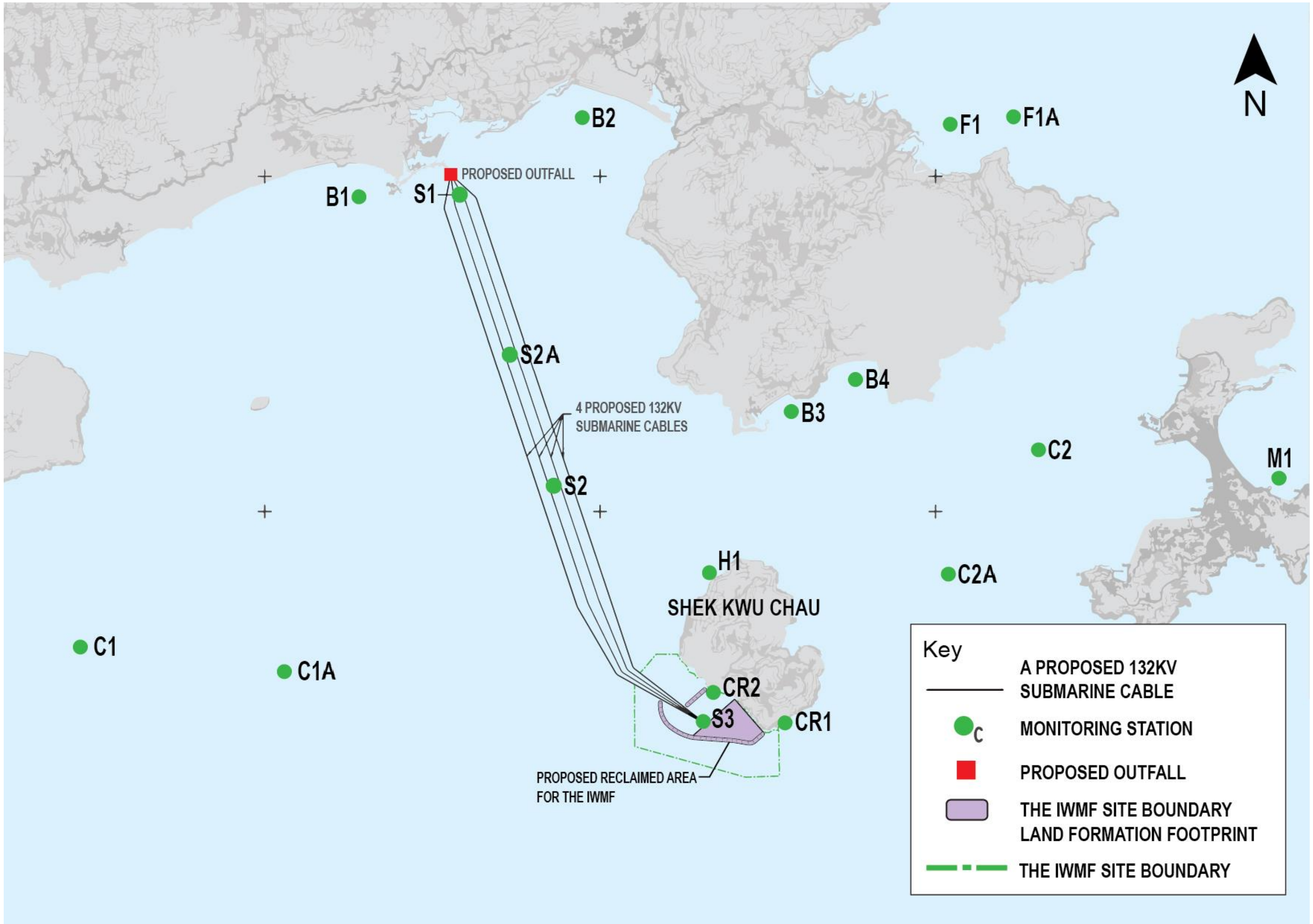


Figure 2.1 Water monitoring locations at Artificial Island near SKC

2.3.2 B1 to B4 are located at 4 beaches respectively at the southern shore of Lantau Island. Monitoring station H1 is located at the horseshoe crab habitat at northern SKC, while CR1 and CR2 are located at the coral communities at southwestern shore of SKC. Monitoring station F1 is located at the Cheung Sha Wan Fish Culture Zone while monitoring station M1 is located at Tung Wan at Cheung Chau. Monitoring station F1A is relocated for F1 at the Cheung Sha Wan Fish Culture Zone. S1, S2 and S3 are located at the northern landing site, midway and southern landing site of the proposed submarine cable, respectively. S2A is the relocated monitoring station of S2 which represents the midway landing site of the proposed submarine cable. S1, S2/S2A and S3 are required for monitoring due to the laying of submarine cable. Control stations C1 and C2 at far field locations are for comparison. Control stations C1A and C2A are relocated for C1 and C2 respectively as equivalent far field locations for comparison.

2.3.3 Fourteen monitoring stations are listed in **Table 2.2**:

Table 2.2 - Locations of Marine Water Quality Stations

Monitoring station	Description	Easting	Northing
B1	Beach - Cheung Sha Lower	813342	810316
B2	Beach - Pui O	815340	811025
B3	Beach - Yi Long Wan	817210	808395
B4	Beach - Tai Long Wan	817784	808682
H1	Horseshoe Crab - Shek Kwu Chau	816477	806953
C1	Control Station (note i)	810850	806288
C1A	Relocated Control Station	812823	806300
C2	Control Station (note ii)	819421	808053
C2A	Relocated Control Station	818869	806808
F1	Cheung Sha Wan Fish Culture Zone (note iii)	818631	810966
F1A	Cheung Sha Wan Fish Culture Zone	819109	810924
S1	Submarine Cable Landing Site	814245	810335
S2	Submarine Cable (note iv)	815076	807747
S2A	Submarine Cable	814808	808515
S3	Submarine Cable Landing Site	816420	805621
CR1	Coral	817144	805597
CR2	Coral	816512	805882
M1	Tung Wan	821572	807799

Note:

i. Relocated to C1A in Mar 2019
ii. Relocated to C2A in Mar 2019
iii. Relocated to S2A in Mar 2019
iv. Relocated to F1A in Mar 2019

2.4 Impact Monitoring Methodology

2.4.1 General and regular DCM water quality monitoring was conducted three days per week, at mid-flood and mid-ebb tides, at the designated water quality monitoring stations during the reporting period.

2.4.2 The interval between 2 sets of monitoring was not less than 36 hours. Sampling was collected at three water depths, namely, 1m below water surface, mid-depth and 1m above seabed, except where the water depth is less than 6m, the mid-depth was omitted. If the water depth was less than 3m, only the mid-depth station was monitored.

2.4.3 All observations and results were recorded in the data record sheets in **Appendix D**. Duplicate in-situ measurements and water sampling were carried out in each sampling event. The monitoring probes were retrieved out of water after the first measurement and then redeployed for the second measurement. When the difference in value between the first and second readings of DO or turbidity is more than 25% of the value of the first reading, the reading would be discarded and further readings would be taken.

In-situ Measurement

2.4.4 Levels of DO, pH, temperature, turbidity and salinity would be measured in-situ by portable and weatherproof measuring instrument, e.g. YSI ProDSS and Horiba U-53 Multiparameter complete with cable and sensor. (Refer to http://www.ysi.com/ProDSS for YSI ProDSS technical specification and http://www.horiba.com/process-environmental/products/water-treatment-environment/details/u-50-multiparameter-water-quality-checker-368/ for Horiba U-53 technical specification). Water current velocity and Water Current direction would be measured by portable and weatherproof current meter, e.g. SonTek Hydrosurveyor (Refer to https://www.sontek.com/media/pdfs/riversurveyor-s5-m9-brochure.pdf for SonTek Hydrosurveyor M9 technical specification). Parameters measured by in-situ measurement is tabulated in **Table 2.3**

Table 2.3 - Parameters Measured by In-situ Measurement

Parameter	Resolution	Range
Temperature	0.1 °C	-5-70 °C
Dissolved Oxygen (DO)	0.01 mg/L	0-50.0 mg/L
Turbidity	0.1 NTU	0-1000 NTU
pH	pH 0.01	pH 0-14
Salinity	0.01 ppt	0-40 ppt
Water Current Velocity	0.001m/s	±20m/s
Water Current Direction	±1°	±2°

Laboratory Analysis

2.4.5 Analysis of Total Alkalinity and SS shall be carried out in a HOKLAS accredited laboratory, as shown in **Appendix E**. Sufficient water samples shall be collected at the monitoring stations for carrying out the laboratory determinations. The determination work shall be started within 24 hours after collection of the water samples. Analytical methods and detection limits for SS and total alkalinity are presented in **Table 2.4**.

Table 2.4 - Analytical Methods Applied to Water Quality Samples

Parameter	Analytical method	Detection Level
Suspended Solids, SS	APHA 2540 D[i]	1 mg/L
Total Alkalinity	APHA 2320	0.01 mg/L

Footnote:
i. "APHA 2540 D" stands for American Public Health Association Standard Methods for the Examination of Water and Wastewater, 23rd Edition.

Field Log

2.4.6 Other relevant data was recorded, such as: monitoring location / position, time, water depth, weather conditions and any special phenomena underway near the monitoring station.

2.5 Monitoring Equipment

2.5.1 Equipment used in the impact water quality monitoring programme is summarized in **Table 2.5** below. Calibration certificates for the water quality monitoring equipment are attached in **Appendix F**.

Table 2.5 Impact Water Quality Monitoring Equipment

Monitored Parameter	Equipment	Brand and Model
DO, Temperature, Salinity, pH and Turbidity	Multi-functional Meter	YSI ProDSS Horiba U-53
Coordinates	Positioning Equipment	Garmin GPSMAP 78s
Water depth	Water Depth Detector	Hummingbird 160 Portable
SS	Water Sampler	Wildco 2 L Water Sampler with messenger

2.5.2 Dissolved Oxygen and Temperature Measuring Equipment

The instrument is a portable and weatherproof DO probe mounted on the multi-functional meter complete with cable and sensor and is powered by a DC supply source. The equipment was capable of measuring:

- A DO level in the range of 0 - 50 mg/L; and
- Temperature of -5 - 70 degree Celsius.

2.5.3 Turbidity Measurement Instrument

The instrument is a portable and weatherproof turbidity-measuring probe mounted on the multi-functional meter and is powered by a DC supply source. The instrument is equipped with a photoelectric sensor which is capable of measuring turbidity between 0 - 1000 NTU.

2.5.4 pH Measurement Instrument

The probe consists of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device mounted on the multi-functional meter. It is readable to 0.1 pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 were used for calibration of the instrument before and after use.

2.5.5 Salinity Measurement Instrument

A portable salinometer mounted on the multi-functional meter capable of measuring salinity in the range of 0-40 parts per thousand (ppt) was provided for measuring salinity of the water at each monitoring location.

2.5.6 Sampler

The water sampler comprises a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler has a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth.

2.5.7 Sample Containers and Storage

Water samples for SS were stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and delivered to the laboratory and analysed as soon as possible after collection. Sufficient volume of samples was collected to achieve the detection limit stated in **Table 2.4**.

2.5.8 Water Depth Detector

A portable, battery-operated echo sounder was used for the determination of water depth at each designated monitoring station. This unit could either be hand-held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

2.5.9 Monitoring Position Equipment

Hand-held digital Differential Global Positioning System (DGPS) with way point bearing indication and Radio Technical Commission for maritime (RTCM) Type 16 error message 'screen pop-up' facilities (for real-time auto-display of error messages and DGPS corrections from the Hong Kong Hydrographic Office) was provided and used to ensure that the water sampling locations were correct during the water quality monitoring work.

2.6 Maintenance and Calibration

2.6.1 The multi-functional meters were checked and calibrated before use. Multi-functional meters were certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes were checked with certified standard solutions before each use. Wet bulb calibration for a DO meter was carried out before commencement of monitoring and after completion of all measurements each day. Calibration was not conducted at each monitoring location as daily calibration is adequate for the type of DO meter employed.

2.6.2 Sufficient stocks of spare parts were provided and maintained for replacements when necessary. Backup monitoring equipment was prepared for uninterrupted monitoring during equipment maintenance or calibration during monitoring.

2.7 Action and Limit Levels

2.7.1 The Action and Limit Levels have been set based on the derivation criteria specified in the Updated EM&A Manual and Detailed DCM Plan, as shown in **Table 2.6** below.

Table 2.6 Criteria of Action and Limit Levels for Water Quality

Parameters	Action	Limit
Construction Phase Impact Monitoring		
DO in mg/L	≤ 5 %-ile of baseline data	≤ 4
SS in mg/L	≥ 95 %-ile of baseline data or 120% of control station’s SS at the same tide of the same day of measurement, whichever is higher	≥ 99 %-ile of baseline data or 130% of control station's SS at the same tide of the same day of measurement, whichever is higher
Turbidity in NTU	≥ 95 %-ile of baseline data or 120% of control station’s turbidity at the same tide of the same day of measurement, whichever is higher	≥ 99 %-ile of baseline data or 130% of control station's turbidity at the same tide of the same day of measurement, whichever is higher
Temperature in°C	1.8°C above the temperature recorded at representative control station at the same tide of the same day	2°C above the temperature recorded at representative control station at the same tide of the same day
Total Alkalinity in mg/L	≥ 95 %-ile of baseline data or 120% of representative control station at the same tide of the same day, whichever is higher	≥ 99 %-ile of baseline data or 130% of representative control station at the same tide of the same day, whichever is higher

2.7.2 Based on the baseline monitoring data and the derivation criteria specified above, the Action/Limit Levels have been derived and are presented in **Table 2.7** and **Table 2.8** for both dry seasons (October – March) and wet seasons (April – September).

Table 2.7 Derived Action and Limit Levels for Water Quality Monitoring (Dry Season)

Parameters	Action	Limit
Construction Phase Impact Monitoring		
DO in mg/L	≤ 7.13	≤ 4
SS in mg/L	≥ 8 or 120% of control station’s SS at the same tide of the same day of measurement, whichever is higher	≥ 10 or 130% of control station's SS at the same tide of the same day of measurement, whichever is higher

Parameters	Action	Limit
Turbidity in NTU	≥ 5.6 or 120% of control station's turbidity at the same tide of the same day of measurement, whichever is higher	≥ 12.8 or 130% of control station's turbidity at the same tide of the same day of measurement, whichever is higher
Temperature in°C	1.8°C above the temperature recorded at representative control station at the same tide of the same day	2°C above the temperature recorded at representative control station at the same tide of the same day
Total Alkalinity in mg/L	≥116 or 120% of control station's Total Alkalinity at the same tide of the same day of measurement, whichever is higher	≥ 118 or 130% of control station's Total Alkalinity at the same tide of the same day of measurement, whichever is higher

Notes:
i. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
ii. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
iii. For turbidity, SS and Salinity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table 2.8 Derived Action and Limit Levels for Water Quality (Wet Season)

Parameters	Action	Limit
Construction Phase Impact Monitoring		
DO in mg/L	≤ 5.28	≤ 4
SS in mg/L	≥ 12 or 120% of control station's SS at the same tide of the same day of measurement, whichever is higher	≥ 14 or 130% of control station's SS at the same tide of the same day of measurement, whichever is higher
Turbidity in NTU	≥ 4.0 or 120% of control station's turbidity at the same tide of the same day of measurement, whichever is higher	≥ 4.3 or 130% of control station's turbidity at the same tide of the same day of measurement, whichever is higher
Temperature in°C	1.8°C above the temperature recorded at representative control station at the same tide of the same day	2°C above the temperature recorded at representative control station at the same tide of the same day
Total Alkalinity in mg/L	≥ 116 mg/L or 120% of representative control station at the same tide of the same day, whichever is higher	≥ 118 mg/L or 130% of representative control station at the same tide of the same day, whichever is higher

Notes:
i. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
ii. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

iii. For turbidity, SS and Salinity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

2.7.3 If exceedances were found during water quality monitoring, the actions in accordance with the Event and Action Plan shall be carried out according to **Appendix G**.

2.8 Monitoring Results and Observations

2.8.1 During the reporting period, general water quality monitoring at all the eleven monitoring stations and regular DCM monitoring including monitoring stations S1, S2A and S3 were conducted on 2, 4, 6, 9, 11, 13, 16, 18, 20, 22, 24, 27 & 30 December 2019. Monitoring results of 7 key parameters: Salinity, DO, turbidity, SS, pH, temperature and total alkalinity in this reporting month, are summarized in **Table 2.9**, and details results are presented in **Appendix D**.

Table 2.9 Summary of Impact Water Quality Monitoring Results

Locations		Parameters							
		Salinity (ppt)	Dissolved Oxygen (mg/L)		pH	Turbidity (NTU)	Suspended Solids (mg/L)	Temp. (°C)	Total Alkalinity (mg/L) note ii
			Surface & Middle	Bottom					
B1	Avg.	30.03	7.79	7.70	8.18	3.0	7.07	22.4	113.4
	Min.	29.00	6.86	6.67	7.85	2.3	2.00	20.6	112.0
	Max.	31.64	8.63	8.55	8.73	4.2	17.00	24.7	116.0
B2	Avg.	30.04	7.76	7.77	8.17	3.0	7.66	22.4	113.4
	Min.	29.07	6.78	6.68	7.95	2.4	2.00	20.8	112.0
	Max.	31.71	8.56	8.58	8.65	4.2	19.00	24.8	116.0
B3	Avg.	30.06	7.78	7.72	8.17	3.1	8.35	22.4	113.3
	Min.	29.13	6.59	6.66	7.89	2.4	2.00	20.8	111.0
	Max.	31.93	8.79	8.60	8.71	4.1	26.00	24.6	116.0
B4	Avg.	30.05	7.74	7.78	8.18	3.0	7.68	22.4	113.5
	Min.	29.05	6.65	6.65	7.89	2.4	2.00	20.8	112.0
	Max.	31.91	8.54	8.76	8.72	4.1	18.00	24.5	116.0
C1A	Avg.	30.08	7.74	7.76	8.16	3.0	7.98	22.3	113.5
	Min.	29.02	6.63	6.83	7.88	2.3	2.00	20.5	112.0
	Max.	31.92	8.58	8.61	8.74	4.0	25.00	24.6	116.0
C2A	Avg.	30.05	7.73	7.71	8.17	3.0	7.78	22.4	113.6
	Min.	29.01	6.62	6.77	7.86	2.3	2.00	20.5	111.0
	Max.	31.91	8.59	8.52	8.69	4.1	23.00	24.6	116.0
CR1	Avg.	30.04	7.75	7.75	8.16	2.9	7.70	22.3	113.7
	Min.	29.08	6.61	6.77	7.95	2.3	2.00	20.8	112.0
	Max.	31.92	8.60	8.57	8.73	4.2	16.00	25.0	116.0
CR2	Avg.	30.06	7.77	7.69	8.15	3.0	7.47	22.4	113.9
	Min.	29.12	6.61	6.60	7.85	2.3	2.00	20.8	112.0
	Max.	31.78	8.60	8.54	8.71	4.5	18.00	25.0	120.0
F1A	Avg.	30.07	7.78	7.76	8.17	3.0	8.35	22.4	113.5
	Min.	29.02	6.73	6.66	7.90	2.3	2.00	20.8	111.0
	Max.	31.87	8.50	8.59	8.70	4.2	22.00	24.8	116.0
H1	Avg.	30.07	7.77	7.77	8.16	3.0	7.85	22.4	113.4
	Min.	29.19	6.76	6.60	7.91	2.3	2.00	20.6	111.0
	Max.	31.71	8.74	8.78	8.61	4.3	23.00	24.5	116.0
M1	Avg.	30.08	7.74	7.74	8.18	2.9	7.41	22.4	113.7
	Min.	29.01	6.69	6.78	7.85	2.3	2.00	20.9	112.0
	Max.	31.84	8.51	8.43	8.73	4.1	18.00	24.9	116.0
S1	Avg.	30.09	7.70	7.71	8.19	3.0	8.35	22.4	113.6
	Min.	29.12	6.71	6.75	7.89	2.3	2.00	20.8	112.0
	Max.	31.95	8.57	8.46	8.68	4.2	22.00	24.8	116.0
S2A	Avg.	30.07	7.73	7.72	8.16	3.0	8.14	22.4	113.5
	Min.	29.02	6.64	6.72	7.86	2.3	2.00	20.8	112.0
	Max.	31.91	8.54	8.35	8.64	4.2	23.00	24.8	116.0
S3	Avg.	30.09	7.78	7.74	8.16	3.0	7.63	22.4	113.5
	Min.	29.20	6.71	6.71	7.89	2.4	2.00	20.8	111.0
	Max.	31.90	8.74	8.65	8.67	4.5	22.00	24.9	116.0

Notes:

i. "Avg", "Min" and "Max" is the average, minimum and maximum respectively of the data from measurements conducted under mid-flood and mid-ebb tides at three water depths, except that of DO where the data for "Surface & Middle" and "Bottom" are calculated separately.

ii. Total alkalinity test is only conducted on DCM working day with reference to master programme in **Appendix A**.

iii. Monitoring at S1, S2A and S3 shall only be conducted during DCM work period referring to master programme in **Appendix A**.

2.8.2 The weather conditions during the monitoring period were mainly sunny and cloudy. Sea conditions for the majority of monitoring days were mainly moderate. No major pollution source and extreme weather which might affect the results were observed during the impact monitoring.

2.8.3 During the impact monitoring period for December 2019, eighteen (18) of the General & Regular DCM water quality monitoring results of suspended solids (SS) obtained during the reporting period had exceeded Action Level. Twenty-two (22) of monitoring results had exceeded the relevant Limit Level of suspended solids (SS) during the reporting period.

2.8.4 Twenty-four (24) of the General & Regular DCM water quality monitoring results of dissolved oxygen (DO) obtained during the reporting period had exceeded Action Level. None (0) of DO monitoring results had exceeded the relevant Limit Level during the reporting period.

2.8.5 Investigation was carried out immediately for the exceedance case. The finding had shown that the exceedances were unrelated to the Project. However, environmental deficiencies of the Contractor on the implementation of silt curtain deployment system were spotted. Details of the exceedance are presented in **Section 8**.

2.8.6 Mitigation measures minimizing the adverse impacts on water implemented are listed in the implementation schedule given in **Appendix B.**

3. NOISE MONITORING

3.1 Monitoring Requirements

3.1.1 To ensure no adverse noise impact, noise monitoring is recommended to be carried out at the nearby noise sensitive receivers (NSRs) during construction phase.

3.1.2 In accordance with the Updated EM&A Manual, baseline noise level at the noise monitoring stations was established as presented in the Baseline Monitoring Report. Impact noise monitoring was conducted once per week in the form of 30-minutes measurements Leq, L10 and L90 levels recorded at each monitoring station between 0700 and 1900 hours on normal weekdays.

3.1.3 In accordance with the Updated EM&A Manual, additional weekly impact monitoring should be carried out during respective restricted hours period (1900 – 0700 hours) if the construction works were conducted at evening and night time. Additional weekly noise monitoring was conducted once per week in the form of 5-minutes measurements Leq, L10 and L90 levels recorded at each monitoring station between 1900 and 0700 hours as well as public holidays and Sundays.

3.2 Noise Monitoring Parameters, Time, Frequency

3.2.1 Impact noise monitoring was conducted weekly in the reporting period between 0700-1900 hours on normal weekdays. Additional impact noise monitoring was conducted weekly in the reporting period between 1900-0700 hours on all days as well as public holidays and Sundays.

3.2.2 Construction noise level measured in terms of the A-weighted equivalent continuous sound pressure level (LAeq). Leq_{30min} was used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays. Leq_{5mins} was used as the monitoring parameter for the time period between 1900 and 0700 hours as well as public holidays and Sundays. **Table 3.1** summarizes the monitoring parameters, frequency and duration of the impact noise monitoring and additional impact noise monitoring. The monitoring schedule is provided in **Appendix C**.

Table 3.1 Noise Monitoring Parameters, Time, Frequency and Duration

Monitoring Station	Time	Duration	Parameters
M1/ N_S1, M2/ N_S2, M3/ N_S3	Day time: 0700-1900 hrs (during normal weekdays)	Once per week $L_{eq\ 5min}$/$L_{eq\ 30min}$ (average of 6 consecutive $L_{eq\ 5min}$)	L_{eq}, L_{10} & L_{90}
M1/ N_S1, M2/ N_S2, M3/ N_S3	Evening time: 1900-2300 hrs (including normal weekdays, also public holidays and Sundays)	Once per week $L_{eq\ 5min}$ (3 sets of $L_{eq\ 5min}$)	L_{eq}, L_{10} & L_{90}
M1/ N_S1, M2/ N_S2, M3/ N_S3	Night time: 2300-0700 hrs (including normal weekdays, also public holidays and Sundays)	Once per week $L_{eq\ 5min}$ (3 sets of $L_{eq\ 5min}$)	L_{eq}, L_{10} & L_{90}

3.3 Noise Monitoring Locations

3.3.1 Three noise monitoring locations for impact monitoring and additional impact monitoring at the nearby sensitive receivers are shown in **Figure 3.1.**

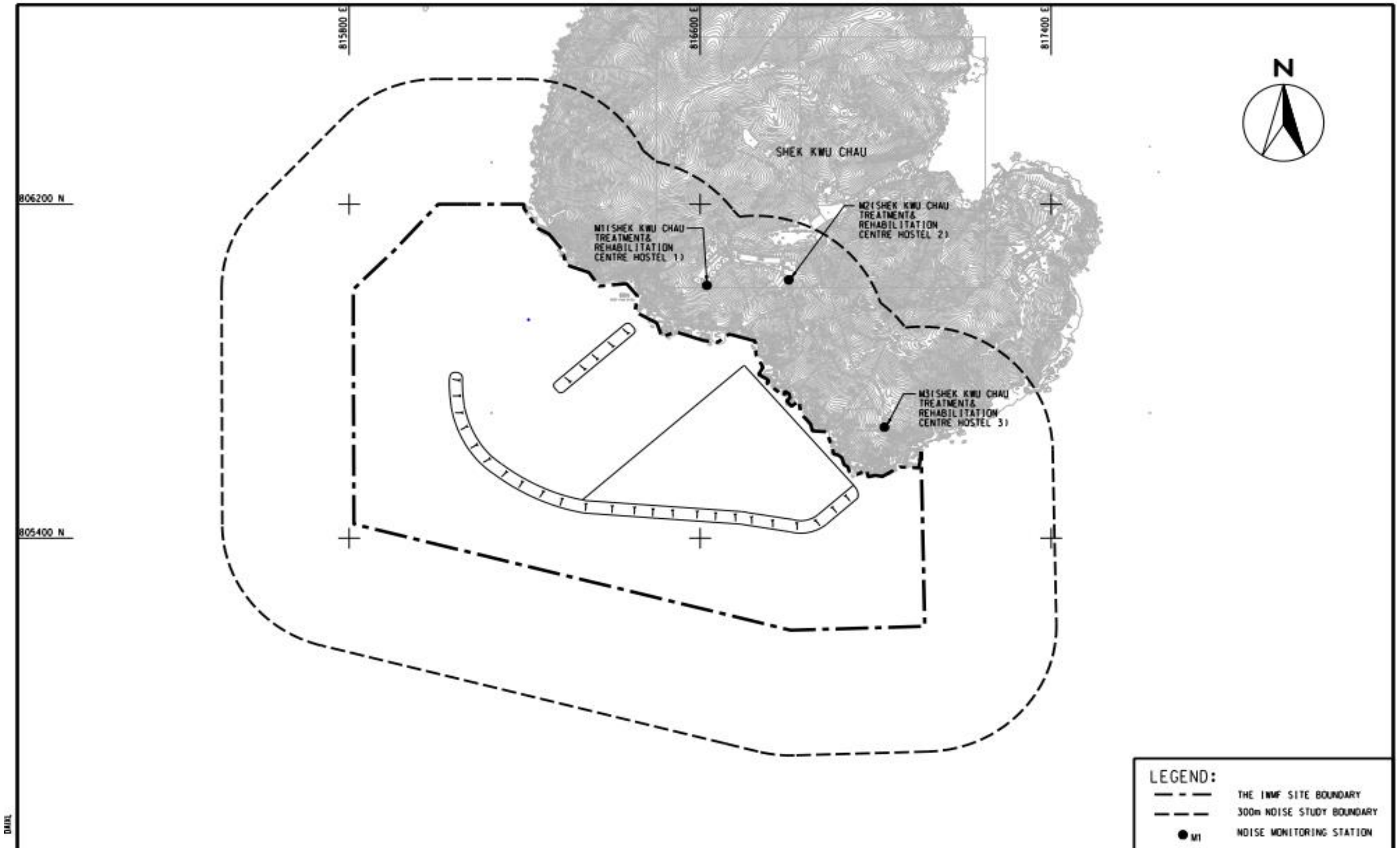


Figure 3.1 Noise monitoring locations at SKC

3.3.2 M1, M2 and M3 are Shek Kwu Chau Treatment and Rehabilitation Centre Hostel 1, 2 and 3 respectively of The Society for the Aid and Rehabilitation of Drug Abusers (SARDA) located at southern part of Shek Kwu Chau.

3.3.3 Measurements at M1 & M3 were conducted at a point 1m from the exterior of the sensitive receivers building façade and at a position 1.2m above the ground. Measurement setup at M3 has been varying with minor adjustment to minimize the disturbance to the users of Treatment Centre. Measurement at M2 was conducted at a point 1m from building façade of the ceiling of 1st floor level for avoidance of mutual disturbance with users of Treatment Centre. The minor adjustment of monitoring locations, which were in favour to mutual convenience with the users of Treatment Centre, were found with no effect on monitoring result based on on-site observation and experience from the Baseline monitoring of the Project. The noise monitoring stations are summarized in **Table 3.2** below.

Table 3.2 Noise Monitoring Location

Station	NSR ID in EIA Report	Noise Monitoring Location	Type of sensitive receiver(s)	Measurement Type
M1	N_S1	Shek Kwu Chau Treatment & Rehabilitation Centre Hostel 1	Residential	Façade
M2	N_S2	Shek Kwu Chau Treatment & Rehabilitation Centre Hostel 2	Residential	Façade
M3	N_S3	Shek Kwu Chau Treatment & Rehabilitation Centre Hostel 3	Residential	Façade

3.4 Impact Monitoring Methodology

3.4.1 At each designated monitoring location, measurements of six 5-minutes A-weighted equivalent sound pressure level ["$L_{eq\ 5min}$"] was carried out between 0700 and 1900 hours for daytime measurements on a normal weekdays (exclude Sunday or general holiday). The measured six impact noise levels at each monitoring location shall then be averaged in logarithmic scale and expressed in terms of the 30 minutes A-weighted equivalent continuous sound pressure level ($L_{eq\ 30min}$) for the time period between 0700 and 1900 hours on normal weekdays.

3.4.2 At each designated monitoring location, measurements of three 5-minutes A-weighted equivalent sound pressure level ["$L_{eq\ 5min}$"] was carried out between 1900 and 0700 hours for evening time and night time measurements.

3.4.3 The monitoring procedures are as follows:

- The microphone head of the lead level meter was normally positioned 1m exterior of the noise sensitive façade and lowered sufficiently so that the building's external wall acts as a reflecting surface.
- The battery condition was checked to ensure good functioning of the meter.
- Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:
  - Frequency weight: A
  - Time weighting: Fast
  - Measurement time: 5 minutes
- Prior to and after noise measurement, the meter was calibrated using the calibrator for 94.0 dB at 1000Hz. If the difference in the calibration level before and after measurement is more than 1.0 dB, the measurement was considered invalid and repeat of noise measurement was required after re-calibration or repair of the equipment.

- For Noise monitoring was carried out for 30 mins by sound level meter. At the end of the monitoring period, noise levels in terms of L_{eq}, L_{10} and L_{90} were recorded. In addition, site conditions and noise sources were recorded when the equipment were checked and inspected.
- All the monitoring data within the sound level meter system was downloaded through the computer software.

3.5 Monitoring Equipment

3.5.1 Integrated sound level meter was used for the noise monitoring. The meter shall comply with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications.

3.5.2 Equipment used in the impact noise monitoring programme is summarized in **Table 3.3** below. Calibration certificates for the noise monitoring equipment are attached in **Appendix H**.

Table 3.3 Impact Noise Monitoring Equipment

Equipment	Brand and Model
Sound Level Meter	NTi XL2 SVAN 971
Sound Level Meter Calibrator	SvanTek SV33B

3.6 Maintenance and Calibration

3.6.1 The maintenance and calibration procedures were as follows:

- The microphone head of the sound level meter and calibrator were cleaned with a soft cloth at quarterly intervals.
- The sound level meter and calibrator were checked and calibrated at yearly intervals
- Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration levels from before and after the noise measurement agree to within 1.0dB.

3.7 Action and Limit Levels

3.7.1 The Action/Limit Levels in line with the criteria of Practice Note for Professional Persons (ProPECC PN 2/93) “Noise from Construction Activities – Non-statutory Controls” and Technical Memorandum on Environmental Impact Assessment Process issued by HKSAR Environmental Protection Department [“EPD”] under the Environmental Impact Assessment Ordinance, Cap 499, S.16 is presented in **Table 3.4**.

Table 3.4 Action and Limit Levels for Noise per Updated EM&A Manual

Time Period	Action	Limit (dB(A))
0700-1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A)

Notes: If works are to be carried out during restricted hours, the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.

3.7.2 If exceedances were found during noise monitoring. The actions in accordance with the Event and Action Plan shall be carried out according to **Appendix I**.

3.8 Monitoring Results and Observations

3.8.1 Impact monitoring for noise impact for daytime was carried out on 2, 9, 16, 23 & 30 December 2019. Impact monitoring for noise impact for evening time and night time was carried out on 2&3, 9&10, 16&17, 23&24, 30&31 December 2019. The impact noise levels at Noise Monitoring Stations at SKC (i.e. M1/ N_S1 to M3/ N_S3) are summarized in **Table 3.6, Table 3.7** and **Table 3.8** respectively. Details of noise monitoring results are presented in **Appendix J**.

3.8.2 Major construction activity, major noise source and extreme weather which might affect the results were recorded during the impact monitoring.

3.8.3 According to our field observations, the major noise source identified at the designated noise monitoring station in the reporting month are summarised in **Table 3.5**. No noticeable noise source was found near the monitoring stations M1, M2 & M3.

Table 3.5 Summary of Field Observation

Monitoring Station	Major Noise Source
M1	Nil
M2	Nil
M3	Nil

No data from impact monitoring during daytime has exceeded the stipulated limit level at 75 dB(A).

Table 3.6 Summary of Impact Noise Monitoring Results during Daytime (0700 – 1900 hours)

Location	Measured Noise Level in dB(A)		
	Range of $L_{eq\ 30min}$	Range of $L_{10\ 5min}$	Range of $L_{90\ 5min}$
M1	55.4 – 59.5	55.9 – 63.8	50.4 – 55.5
M2	53.4 – 58.8	53.9 – 62.8	49.8 – 57.5
M3	51.6 – 58.0	52.2 – 62.2	49.1 – 55.3

Applicable mitigation measures for construction works are fully implemented as shown in **Appendix B**, where double-glazed windows and air conditioning system were also installed and confirmed operable for the NSRs (N_S1, N_S2 & N_S3).

During the noise monitoring event, frontline staff of ET had inquired the treatment centre users on any noise disturbance from the construction activities at evening and night time, where no complaint and adverse opinions was received.

Data from impact monitoring during evening time and night time were compared with the NCO criteria. Where site inspection and auditing on Contractor's record have shown that the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority for construction works during restricted hours were followed. No inappropriate practice was spotted during evening time and night time construction works, thus the stipulated requirement on noise impact control during night time and evening time was achieved.

Table 3.7 Summary of Additional Impact Noise Monitoring Results during Evening Time (1900 – 2300 hours)

Location	Measured Noise Level in dB(A)		
	Range of $L_{eq\ 5min}$	Range of $L_{10\ 5min}$	Range of $L_{90\ 5min}$
M1	51.1 – 59.6	51.8 – 61.2	50.4 – 57.7
M2	51.4 – 58.1	52.5 – 58.6	50.4 – 56.5
M3	50.9 – 59.6	52.6 – 61.7	48.9 – 57.7

Table 3.8 Summary of Additional Impact Noise Monitoring Results during Night Time (2300 – 0700 hours)

Location	Measured Noise Level in dB(A)		
	Range of $L_{eq\ 5min}$	Range of $L_{10\ 5min}$	Range of $L_{90\ 5min}$
M1	47.3 – 57.3	48.2 – 58.5	46.5 – 56.4
M2	49.1 – 60.1	50.0 – 61.1	47.3 – 59.4
M3	45.6 – 54.2	46.5 – 55.7	45.0 – 52.6

4. WASTE

4.1 The waste generated from this Project includes inert construction and demolition (C&D) materials, and non-inert C&D materials. Non-inert C&D materials are made up of general refuse, vegetative wastes and recyclable wastes such as plastics and paper/cardboard packaging waste. Steel materials generated from the project are also grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials.

4.2 As advised by the Contractor, 0 m^3 of C&D material was generated on site in the reporting month. For C&D waste, no metals were generated and collected by registered recycling collector. 0 kg of paper was generated on site and collected by the registered recycling collector. No plastic waste was collected by registered recycling collector. 0 L of chemical waste was collected by the licensed chemical waste collector. 91 m^3 of other types of wastes (e.g. general refuse) were generated on site and disposed of at designated landfill. 26,980.7 m^3 of fill rock and 54,346.9 m^3 of fill sand were imported during the reporting period.

4.3 2,381 m^3 of dredged sediment in bulk quantity was dumped according to its dumping permit (EP/MD/20-051) during the reporting period.

4.4 Chemical waste generated from the cleaning of oil stain and leakage on deck of barges was stored in the chemical waste storage area on the barges.

4.5 With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in **Table 4.1**. Details of cumulative waste management data are presented as a waste flow table in **Appendix K**.

Table 4.1 Quantities of Waste Generated from the Project during December 2019

Reporting Month	Actual Quantities of Inert C&D Materials Generated Monthly								Actual Quantities of C&D Wastes Generated Monthly					
	Total Quantity Generated	Hard Rock and Large Broken Concrete (see Note 1)	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill			Metals	Paper / cardboard packaging	Plastics (see Note 2)	Chemical Waste		Others, e.g. general refuse (see Note 3)
						Sand	Public Fill	Rock						
	(in ,000m^3)	(in ,000m^3)	(in ,000m^3)	(in ,000m^3)	(in ,000m^3)	(in ,000m^3)			(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000L)	(in ,000m^3)
December 2019	0	0	0	0	0	54.3469	0	26.9807	0	0	0	0	0	0.091

Notes: (1) Broken concrete for recycling into aggregates.
(2) Plastics refer to plastic bottles/ containers, plastic sheets/ foam from packaging materials.
(3) Use the conversion factor: 1 full load of dumping truck being equivalent to 6.5m^3 by volume.

4.6 Although there is not much waste generation anticipated in the coming month from the Project, the Contractor is advised to sort and store any solid and liquid waste on-site properly prior to disposal.

5. CORAL

5.1 Coral Monitoring Requirements

5.1.1 To monitor the health condition of corals during different phases, corals located within areas likely to be affected by the Project, corals located at control sites (areas unlikely to be affected by the Project), the trans-located coral colonies as well as the tagged natural coral colonies at the recipient site were chosen, in order to identify any adverse indirect impact from the marine works. The size, percentage cover and health condition of corals (i.e. any sign of abnormal appearance, such as layer of mucus, bleaching, partial mortality etc.) at representative transects should be recorded during each monitoring.

5.2 Coral Monitoring Parameters, Time, Frequency

5.2.1 Rapid Ecological Assessment (REA) survey was conducted on 26 June 2018 at the suggested control site and indirect impact site within two weeks before commencement of the construction work which was 29 June 2018. 10 selected hard coral colonies with the similar species were tagged at both control and indirect impact sites. Following coral translocation in the recipient site R3, 16 coral colonies attached to rocks less than 50 cm in diameter were translocated and tagged, as well as 10 selected natural coral colonies, at the recipient site. One additional REA survey was conducted in December 2018 to further assess the seabed condition at Indirect Impact Site after Typhoon Mangkhut.

5.2.2 Tagged coral colonies at the suggested control site and indirect impact site are being monitored weekly for the first month and followed by monthly monitoring for two months. Quarterly monitoring will be carried out after the first three-months monthly monitoring for until the end of the construction phase. The selected Control Site is located at Yuen Kong Chau of Soko Islands about 7 km away from the project area. Tagged coral colonies at the proposed recipient site are being monitored quarterly for one year. The selected recipient site R3 is located at the opposite side of the Project area at about 2 km away. The detailed survey of the Control Site and Impact Site were conducted before the commencement of the Construction Phase.

5.2.3 Monitoring recorded the following parameters (using the same methodology adopted during the pre-translocation survey); the size, presence, health conditions (percentage of mortality/bleaching) and percentage of sediment of each tagged coral colony. The general environmental conditions including weather, sea, and tidal conditions of impact site, control site and recipient site were monitored.

5.2.4 **Table 5.1** summarizes the monitoring locations, time and frequency of the tagged coral colonies monitoring. The monitoring schedule is provided in **Appendix C**.

Table 5.1 Tagged Coral Monitoring Locations, Time and Frequency

<table>
<tr><th>Monitoring Location</th><th>Monitoring Month/Year</th><th>Frequency</th><th>No. of Monitoring Survey</th></tr>
<tr><td rowspan="3">10 selected hard coral colonies at control site / indirect impact site</td><td>1st Month</td><td>Weekly Survey</td><td>4</td></tr>
<tr><td>2nd to 3th Months</td><td>Monthly Survey</td><td>2</td></tr>
<tr><td>4th Month (postponed to 5th month due to diver accident in Shek Kwu Chau in October 2018)</td><td colspan="2">Re-tagging of Coral Colonies in Indirect Impact Site after Typhoon Mangkhut</td></tr>
</table>

Monitoring Location	Monitoring Month/Year	Frequency	No. of Monitoring Survey
	4^{th} Month (postponed to 5^{th} month due to diver accident in Shek Kwu Chau in October 2018 and further postpone to 6^{th} month due to adverse weather)	Re-tagging of Coral Colonies in Control Site after Typhoon Mangkhut	
	5^{th} Month (postponed to 6^{th} month due to diver accident in Shek Kwu Chau and further postponed to 7^{th} month due to delay of re-tagging activities at both Indirect Impact Site and Control Site)	Post Re-tagging Monthly Survey	1
	7^{th} to 76^{th} Months (postponed to 8^{th} to 76^{th} month due to diver accident in Shek Kwu Chau in October 2018)	Quarterly Survey	23
16 translocated hard coral colonies and 10 selected natural hard coral colonies at recipient site R3	1^{st} Year	Quarterly Survey	4

5.3 Coral Monitoring Locations

5.3.1 Location of the ten tagged coral colonies at each of the proposed indirect impact site (re-tagging after typhoon Mangkhut), control site (baseline) and recipient site R3 (translocation) are shown in **Figure 5.1**, **Figure 5.2** and **Figure 5.3** respectively:

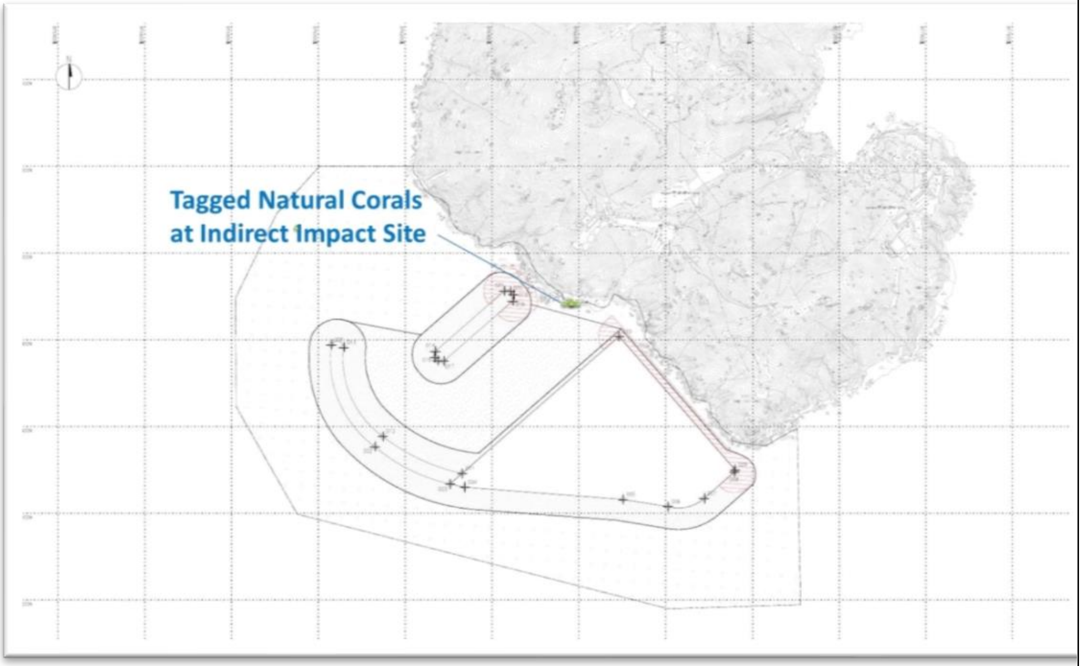


Figure 5.1 Tagged Natural Corals at Indirect Impact Site Near SKC for re-tagging after typhoon Mangkhut

Figure 5.2 Tagged Natural Corals at Control Site Near Yuen Kong Chau for re-tagging after typhoon Mangkhut

Figure 5.3 Tagged Translocation Corals at Recipient Site R3 near SKC

5.3.2 The GPS coordinates of the tagged coral colonies, retagged coral colonies and recipient site were shown in **Table 5.2**, **Table 5.3** and **Table 5.4** respectively.

Table 5.2 Tagged Natural Corals during Baseline and Re-tagged Natural Corals after Typhoon Manghkut at Control Site near Yuen Long Chau

Coral #	GPS Coordinates	
1	N22°09'45.96"	E113°54'57.81"
2R	N22°11'29.12"	E113°59'09.01"
3	N22°09'45.81"	E113°54'57.78"
4	N22°09'45.70"	E113°54'57.95"
5R	N22°11'29.10"	E113°59'09.18"
6	N22°09'45.75"	E113°54'58.02"
7R	N22°11'29.17"	E113°59'08.86"
7	N22°09'45.65"	E113°54'57.94"
8	N22°09'45.53"	E113°54'57.90"
9	N22°09'46.23"	E113°54'54.70"
10R	N22°11'29.18"	E113°59'08.91"

Notes:
i. The re-tagged corals were marked as ##**R**.

Table 5.3 Re-tagged Natural Corals after Typhoon Manghkut at Indirect Impact Site near SKC

Coral # note i	GPS Coordinates	
11R	N22°11'29.14"	E113°59'08.92"
12R	N22°11'29.12"	E113°59'09.01"
13R	N22°11'29.11"	E113°59'09.07"
14R	N22°11'29.13"	E113°59'09.12"
15R	N22°11'29.10"	E113°59'09.18"
16R	N22°11'29.07"	E113°59'09.23"

Coral # note i	GPS Coordinates	
17R	N22°11’29.17”	E113°59’08.86”
18R	N22°11’29.14”	E113°59’08.94”
19R	N22°11’29.20”	E113°59’08.81”
20R	N22°11’29.18”	E113°59’08.91”

Notes:
i. The re-tagged corals were marked as ##**R**.

Table 5.4 GPS Coordinates of Recipient Site R3

Site	GPS Coordinates	
R3	N22°11’43.69”	E113°28.99”

5.4 Impact Monitoring Methodology

5.4.1 Health status of coral was assessed by the following criteria:

- Hard coral: Percentage of surface area exhibiting partial mortality and blanched/bleached area of each coral colony and degree of sedimentation.

5.5 Action and Limit Levels

5.5.1 Monitoring result was reviewed and compared against the below Action Level and Limit Level (AL/LL) as set with the below **Table 5.5** and **Table 5.6**.

Table 5.5 Action and Limit Levels for Construction Phase Coral Monitoring

Parameter	Action Level	Limit Level
Mortality	If during Impact Monitoring a 15% increase in the percentage of partial mortality on the corals occurs at more than 20% of the tagged indirect impact site coral colonies that is not recorded on the tagged corals at the control site, then the Action Level is exceeded.	If during Impact Monitoring a 25% increase in the percentage of partial mortality on the corals occurs at more than 20% of the tagged indirect impact site coral colonies that is not recorded on the tagged corals at the control site, then the Limit Level is exceeded.

Table 5.6 Action and Limit Levels for Post-Translocation Coral Monitoring

Parameter	Action Level	Limit Level
Mortality	If during Post-Translocation Monitoring a 15% increase in the percentage of partial mortality on the corals occurs at more than 20% of the translocated coral colonies that is not recorded on the original corals in the recipient site, then the Action Level is exceeded.	If during Post-Translocation Monitoring a 25% increase in the percentage of partial mortality on the corals occurs at more than 20% of the translocated coral colonies that is not recorded on the original corals in the recipient site, then the Limit Level is exceeded.

5.5.2 If exceedance was found during coral monitoring. The actions in accordance with the Event and Action Plan should be carried out according to **Appendix L.**

5.6 Monitoring Results and Observations

5.6.1 The 4th quarterly coral monitoring during construction phase at both Indirect Impact Site and Control Site was conducted on 4 Dec 2019 and the weather condition was summarized in **Table 5.7**.

Table 5.7 Weather Condition for the 4th Quarterly Coral Monitoring during Construction Phase at both Indirect Impact Site and Control Site

Date	Condition	Average Underwater Visibility
04 Dec 2019	- North wind force 3 - Sunny period	Less than 0.5m

5.6.2 Ten (10) hard coral colonies were monitored at each Control site and Indirect Impact Site as suggested in the Construction Phase Monitoring Plan. The general health conditions (size, mortality, bleaching and sediment) were recorded and summarized in **Table 5.8** and **Table 5.9**. Photos of each coral colonies were taken during the monitoring activities shown in **Photo Plate 5.1** and **5.2**.

Table 5.8 Sizes, Condition, Mortality, Bleaching and Sediment of 10 Natural Coral Colonies at Control Site during 4th Quarterly Coral Monitoring

Tag #	Species	Size (cm) – Max. Diameter	Condition	Mortality (%)		Bleaching (%)		Sediment (%)	
				Baseline	04/12	Baseline	04/12	Baseline	04/12
1	*Goniopora stutchburyi*	25	Fair	0	0	0	0	0	0
2R	*Goniopora stutchburyi*	10	Good	0	0	0	0	0	0
3	*Psammocora superficialis*	18	Fair	0	0	0	0	0	0
4	*Turbinaria peltata*	13	Good	0	0	0	0	0	0
5R	*Goniopora stutchburyi*	18	Good	0	0	0	0	0	0
6	*Cyphastrea serailia*	43	Fair	0	0	0	0	0	0
7R	*Coscinaraea* sp.	15	Good	0	0	0	0	0	0
8	*Goniopora stutchburyi*	21	Good	0	0	0	0	0	0
9	*Goniopora stutchburyi*	11	Fair	0	0	0	0	0	0
10R	*Goniopora stutchburyi*	20	Good	0	0	0	0	0	0

Notes:

i. The re-tagged corals were marked as ##**R**.

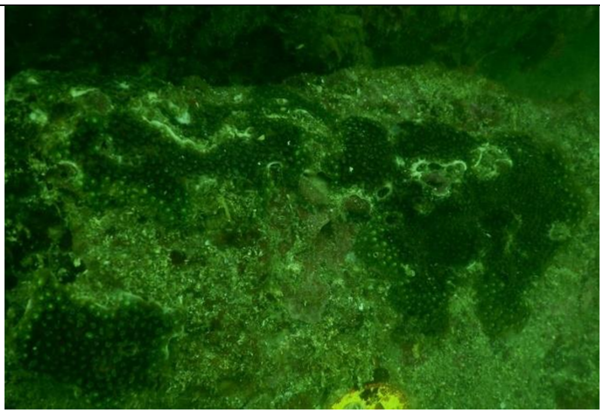
Table 5.9 Sizes, Condition, Mortality, Bleaching and Sediment of 10 Natural Coral Colonies at Indirect Impact Site during 4th Quarterly Coral Monitoring

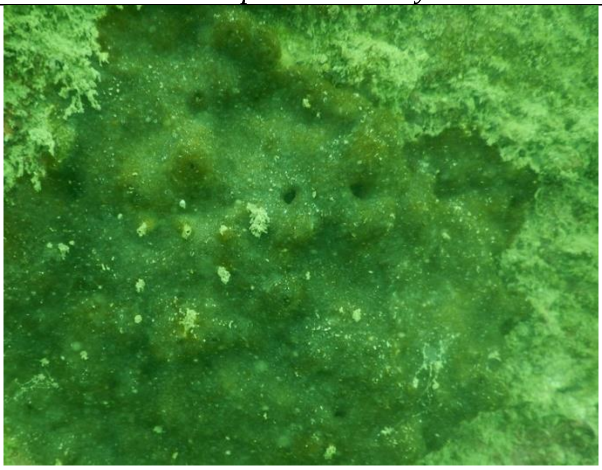
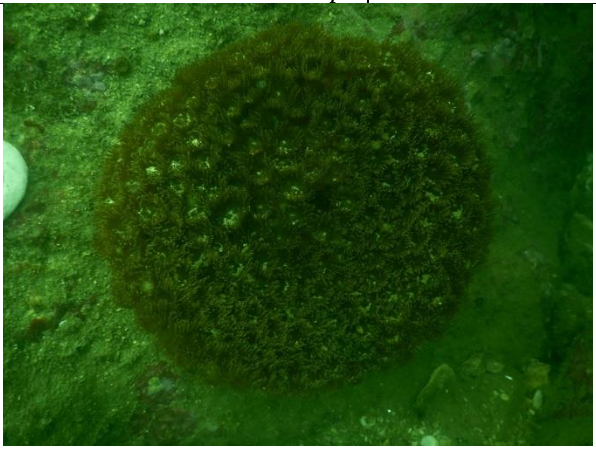
Tag #	Species	Size (cm) – Max. Diameter	Condition	Mortality (%)		Bleaching (%)		Sediment (%)	
				Baseline	04/12	Baseline	04/12	Baseline	04/12
11R	*Cyphastrea serailia*	48	Good	0	0	0	0	0	0
12R	*Favites chinensis*	27	Good	0	0	0	0	0	0
13R	*Turbinaria peltata*	21	Good	0	0	0	0	0	0
14R	*Favites chinensis*	8	Good	0	0	0	0	0	0
15R	*Goniopora stutchburyi*	11	Good	0	0	0	0	0	0
16R	*Psammocora superficialis*	27	Good	0	0	0	0	0	0
17R	*Favites chinensis*	15	Good	0	0	0	0	0	0
18R	*Psammocora superficialis*	39	Good	0	0	0	0	0	0
19R	*Psammocora superficialis*	42	Good	0	0	0	0	0	0
20R	*Psammocora superficialis*	29	Good	0	0	0	0	0	0

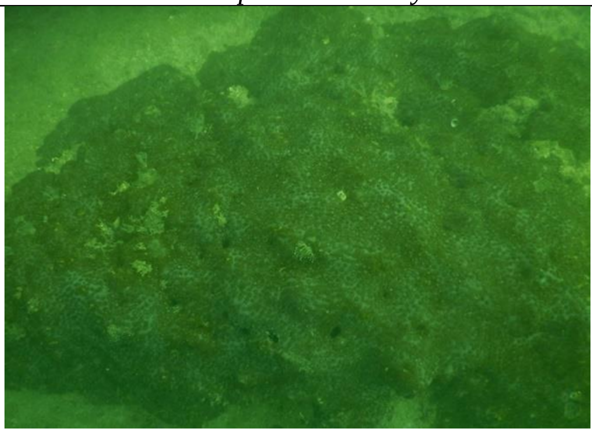
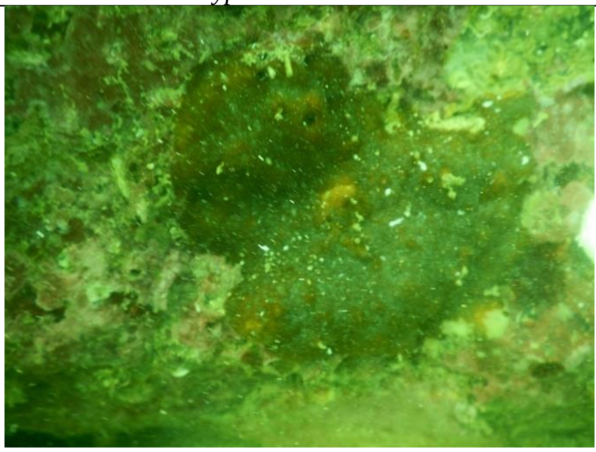
Notes:

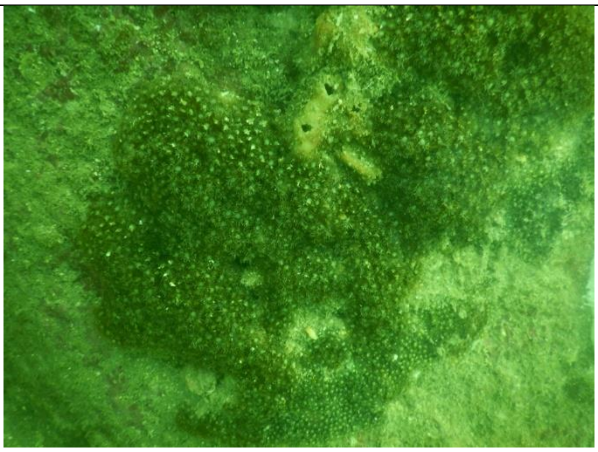
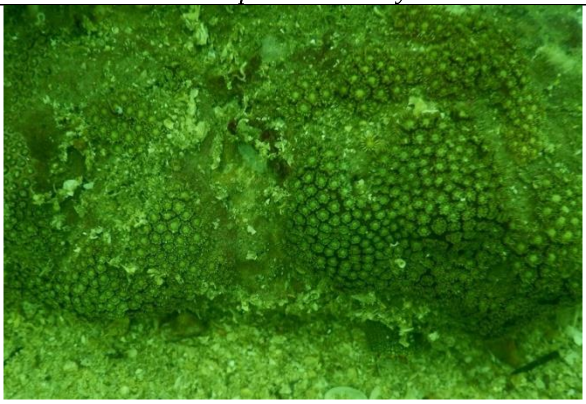
i. The re-tagged corals were marked as ##**R**.

Photo Plate 5.1 Ten (10) Monitored Corals at Control Site

Tag #	04 December 2019
#1	 *Goniopora stutchburyi*

Tag #	04 December 2019
#2R	 *Goniopora stutchburyi*
#3	 *Psammocora superficialis*
#4	 *Turbinaria peltata*

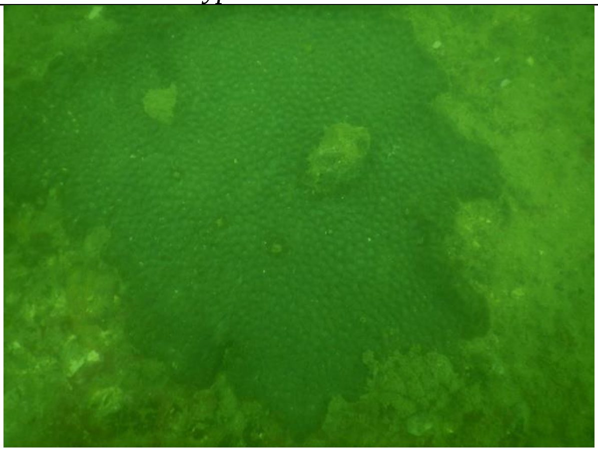
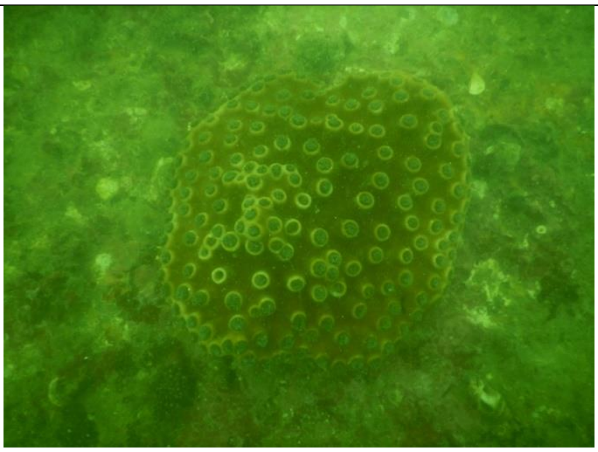
Tag #	04 December 2019
#5R	 *Goniopora stutchburyi*
#6	 *Cyphastrea serailia*
#7R	 *Coscinaraea* sp.

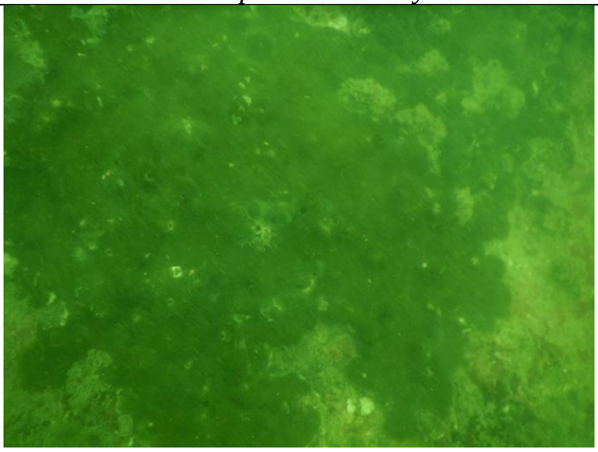
Tag #	04 December 2019
#8	 *Goniopora stutchburyi*
#9	 *Goniopora stutchburyi*
#10R	 *Goniopora stutchburyi*

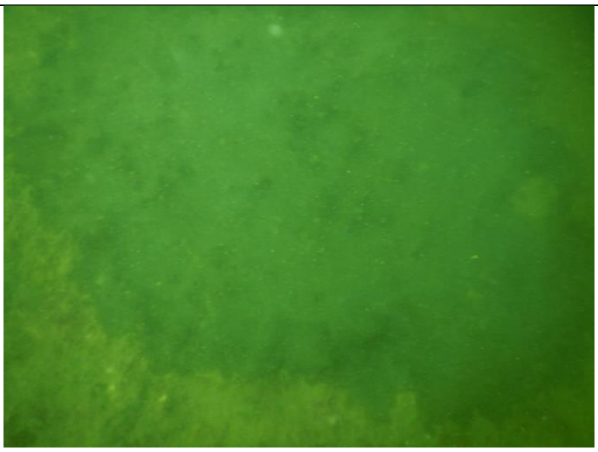
Notes:

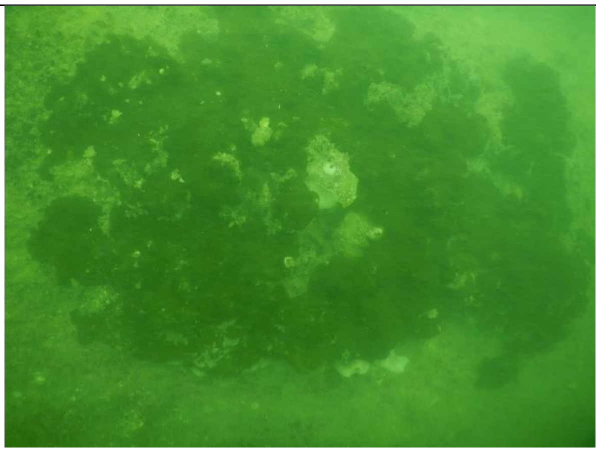
i. The re-tagged corals were marked as ##**R**.

Photo Plate 5.2 Ten (10) Monitored Corals at Indirect Impact Site

Tag #	04 December 2019
#11R	 *Cyphastrea serailia*
#12R	 *Favites chinensis*
#13R	 *Turbinaria peltata*

Tag #	04 December 2019
#14R	 *Favites chinensis*
#15R	 *Goniopora stutchburyi*
#16R	 *Psammocora superficialis*

Tag #	04 December 2019
#17R	 *Favites chinensis*
#18R	 *Psammocora superficialis*
#19R	 *Psammocora superficialis*

Tag #	04 December 2019
#20R	 *Psammocora superficialis*

Notes:

i. The re-tagged corals were marked as ##**R**.

5.6.3 The coral re-tagging activities were carried out in the control site and indirect impact area on 23 November and 3 December 2018. Four and ten hard coral colonies were successfully re-tagged at both control and indirect impact sites respectively. Each re-tagged and remained coral colonies were photographed.

5.6.4 The 4th quarterly coral monitoring during construction phase at both Indirect Impact Site and Control Site was carried out on 04 December 2019. A total of 20 tagged coral colonies (10 at control site and 10 and indirect impact site including the re-tagged coral colonies) were monitored.

5.6.5 All tagged and re-tagged coral colonies showed good health condition during the 4th Quarterly Construction Phase Monitoring. There was no increased level of mortality, bleaching and sediment when compared with the baseline results.

5.6.6 No sediment, bleaching or increased mortality in the general condition of coral colonies were observed during the third construction phase monitoring period. No deterioration of the coral community was observed in the ecological monitoring results when compared with the baseline ecological monitoring results. There is no AL/LL exceedance during the monitoring period0. Photos of each tagged corals colonies were taken and shown in **Photo Plates 5.1** and **5.2**.

6. MARINE MAMMAL

6.1 Monitoring Requirements

6.1.1 The marine mammal monitoring programme would focus on Finless Porpoise, as the study area near Shek Kwu Chau has been identified as a hotspot for this species, while the Chinese White Dolphins rarely occurred there in the past.

6.1.2 The monitoring will verify the predicted impacts on marine mammals, and examine whether the mitigation measures recommended in the EIA report have been effectively implemented to protect marine mammals from negative impacts from construction activities.

6.1.3 The Vessel-based Line-transect Survey, the Passive Acoustic Monitoring and the Land-based Theodolite Tracking will be conducted to provide systematic, quantitative measurements of occurrence, encounter rate, habitat use, movement and behavioural patterns of marine mammals within or near the Project Area during construction and operational phases.

6.1.4 The mammal monitoring works during construction consist of the following three survey methods:

- Vessel-based Line-transect Survey – to monitor the occurrence of Finless Porpoises (and Chinese White Dolphins) in the study area during construction works, by comparing with the findings of the pre-construction marine mammal monitoring;
- Passive Acoustic Monitoring – to study the usage of the Project Area and two control sites in South Lantau Waters by Finless Porpoise during construction works, in reference with the baseline findings of the pre-construction marine mammal monitoring; and
- Land-based Theodolite Tracking – to study the movement and behavioral pattern of Finless Porpoise within and around the Project Area during construction works.

6.1.5 The marine mammal observation works of Marine Mammal Exclusion Zone (MMEZ) and Marine Mammal Watching as two of the specific mitigation measures recommended in the approved EIA report shall be fully and properly implemented for the Project to minimize disturbance on Finless Porpoise during construction and operational phases.

6.2 Survey Methods

6.2.1 Vessel-based Line-transect Survey

6.2.1.1 For the vessel-based marine mammal surveys, the monitoring team adopted the standard line-transect method (Buckland et al. 2001) as same as that adopted during the EIA study and pre-construction phase monitoring to allow fair comparison of marine mammal monitoring results.

6.2.1.2 Eight transect lines are set at Southeast Lantau survey area, including Shek Kwu Chau, waters between Shek Kwu Chau and the Soko Islands, inshore waters of Lantau Island (e.g. Pui O Wan) as well as southwest corner of Cheung Chau as shown in **Figure 6.1** below:

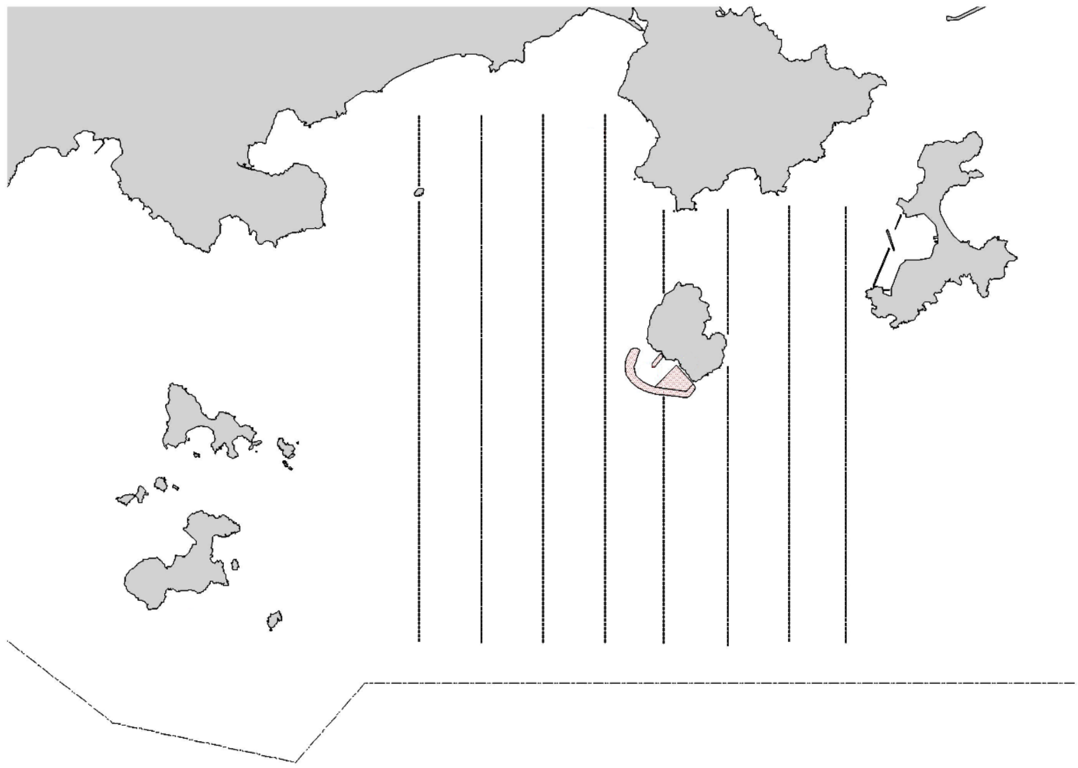


Figure 6.1 Line Transects for Marine Mammal Surveys

6.2.1.3 The surveys should cover all 4 seasons in order to take natural fluctuation and seasonal variations into account for data analysis of distribution, encounter rate, density and habitat use of both porpoises and dolphins (if any). In comparison to the baseline monitoring results, results from the analysed construction phase monitoring data would allow the detection of any changes of their usage of habitat, in response to the scheduled construction works. The monitoring surveys shall be conducted throughout the construction phase involving marine construction work with the frequency shown in **Table 6.1** below:

Table 6.1 Vessel-based Line-transect Survey Frequency

Season	Months	Frequency
Peak Season	December, January, February, March, April & May	Twice per month
Non-peak Season	June, July, August, September, October & November	Once per month

6.2.1.4 For each vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) would be used to make observations from the flying bridge area. Two experienced marine mammal observers (a data recorder and a primary observer) would make up the on-effort survey team, and the survey vessel would transit different transect lines at a constant speed of 13-15 km per hour. The data recorder shall search with unaided eyes and fill out the datasheets, while the primary observer shall search for dolphins and porpoises continuously through 7 x 50 marine binoculars. Both observers shall search the sea ahead of the vessel, between 270^o and 90^o (in relation to the bow, which is defined as 0°). Two additional experienced observers shall be available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers shall be experienced in small cetacean survey techniques and identifying local cetacean species with extensive training by marine mammal specialist of the ET.

6.2.1.5 During on-effort survey periods, the survey team shall record effort data including time, position (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance travelled in each series (a continuous period of search effort) with the assistance of a handheld GPS (Garmin eTrex Legend). Data including time, position and vessel speed would also be automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.

6.2.1.6 When porpoises or dolphins are sighted, the survey team shall end the survey effort, and immediately record the initial sighting distance and angle of the porpoise or dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel shall be diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, behavioural observations, and collection of identification photos (feasible only for Chinese White Dolphin). The perpendicular distance (PSD) of the porpoise or dolphin group to the transect line would then be calculated from the initial sighting distance and angle, which shall be used in the line-transect analysis for density and abundance estimation.

6.2.1.7 The line-transect survey data shall be integrated with a Geographic Information System (GIS) to visualize and interpret different spatial and temporal patterns of porpoise and dolphin distribution using their sighting positions collected from vessel surveys. Location data of porpoise and dolphin groups would be plotted on map layers of Hong Kong using a desktop GIS (e.g. ArcView© 3.1) to examine their distribution patterns in details. The encounter rate could be used as an indicator to determine areas or time periods of importance to porpoises within the study area. For encounter rate analysis of finless porpoises, only survey data collected under Beaufort 2 or below condition would be used for encounter rate analysis.

6.2.1.8 To take into account of the variations of survey effort across different sections within survey area, the quantitative grid analysis of habitat use would be conducted to examine finless porpoise usage among 1-km^2 grids within the Southeast Lantau survey area. For the grid analysis, SPSE (sighting density) and DPSE (porpoise density) values would be deduced for evaluation on level of porpoise usage. First, positions of on-effort porpoise sightings from the study period are plotted onto 68 grids (1 km x 1 km each) within the survey area. Sighting density grids and porpoise density grids shall then be normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid shall be calculated by examining the survey coverage on each line-transect survey to determine how many times the grid had been surveyed during study period. With the amount of survey effort calculated for each grid, the sighting density and porpoise density of each grid shall be further normalized (i.e. divided by the unit of survey effort).

6.2.1.9 The newly-derived unit for sighting density was termed SPSE, representing the number of on-effort sightings per 100 units of survey effort. In addition, the derived unit for actual porpoise density was termed DPSE, representing the number of dolphins/porpoise per 100 units of survey effort. Among the 1-km^2 grids that were partially covered by land, the percentage of sea area was calculated using GIS tools, and their SPSE and DPSE values were adjusted accordingly. The following formulae shall be used to estimate SPSE and DPSE in each 1-km^2 grid within the study area:

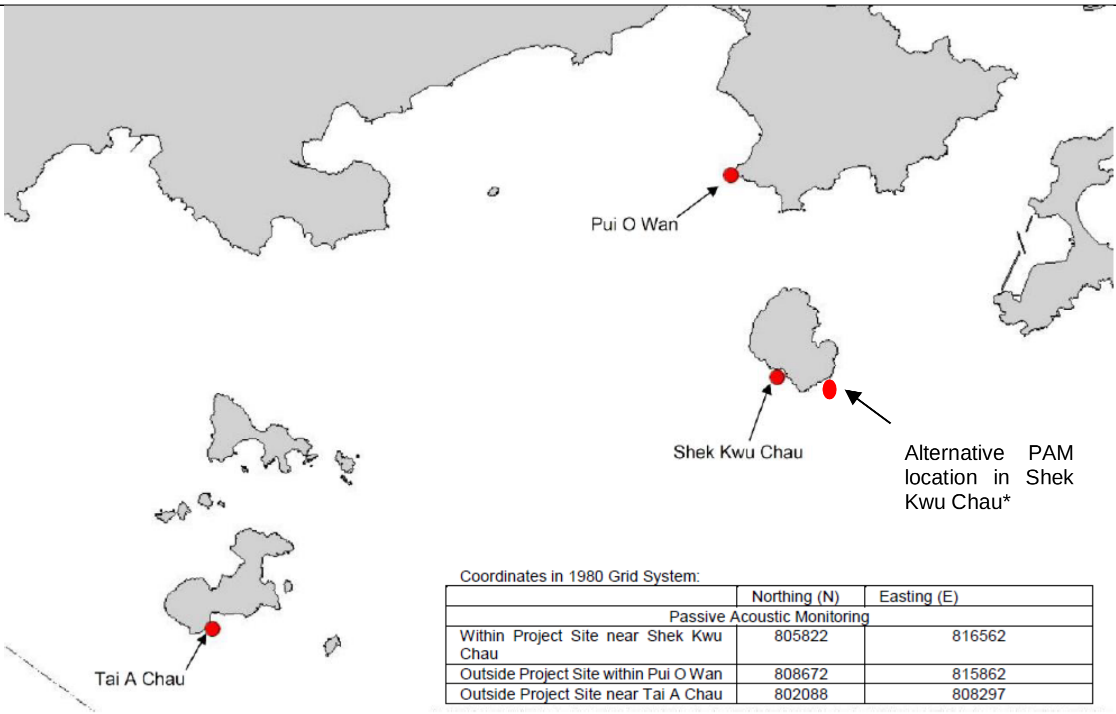
$$SPSE = ((S / E) \times 100) / SA\%$$

$$DPSE = ((D / E) \times 100) / SA\%$$

where S = total number of on-effort sightings
D = total number of dolphins/porpoises from on-effort sightings
E = total number of units of survey effort
SA% = percentage of sea area

6.2.2 Passive Acoustic Monitoring (PAM)

The PAM aims to study the usage of an area by Finless Porpoise by using an array of automated static porpoise detectors (e.g. C-POD) which would be deployed at different locations to detect the unique ultra-high frequency sounds produced by Finless Porpoise. During the construction period, the PAM survey will be conducted including placement of two passive porpoise detectors outside the Project Area as control site (i.e. within Pui O Wan and to the south of Tai A Chau) and one porpoise detector within the Project Area (i.e. near Shek Kwu Chau) as shown in **Figure 6.2** below.



	Northing (N)	Easting (E)
Passive Acoustic Monitoring		
Within Project Site near Shek Kwu Chau	805822	816562
Outside Project Site within Pui O Wan	808672	815862
Outside Project Site near Tai A Chau	802088	808297

Note*: The alternative PAM device adjacent to the Project site was deployed from 5 Mar to 11 Apr 2019, which contained a full 37 days acoustic monitoring data set. After the confirmation of loss of the original PAM within the Project site, this data set was proposed to replace that of the original one, as consulted with AFCD accordingly.

Figure 6.2 Locations of Passive Acoustic Monitoring

6.2.3 These three detectors will be deployed on-site to carry out 24-hours monitoring for a period listed as **Table 6.2** below during the construction phase.

Table 6.2 PAM Deployment Period

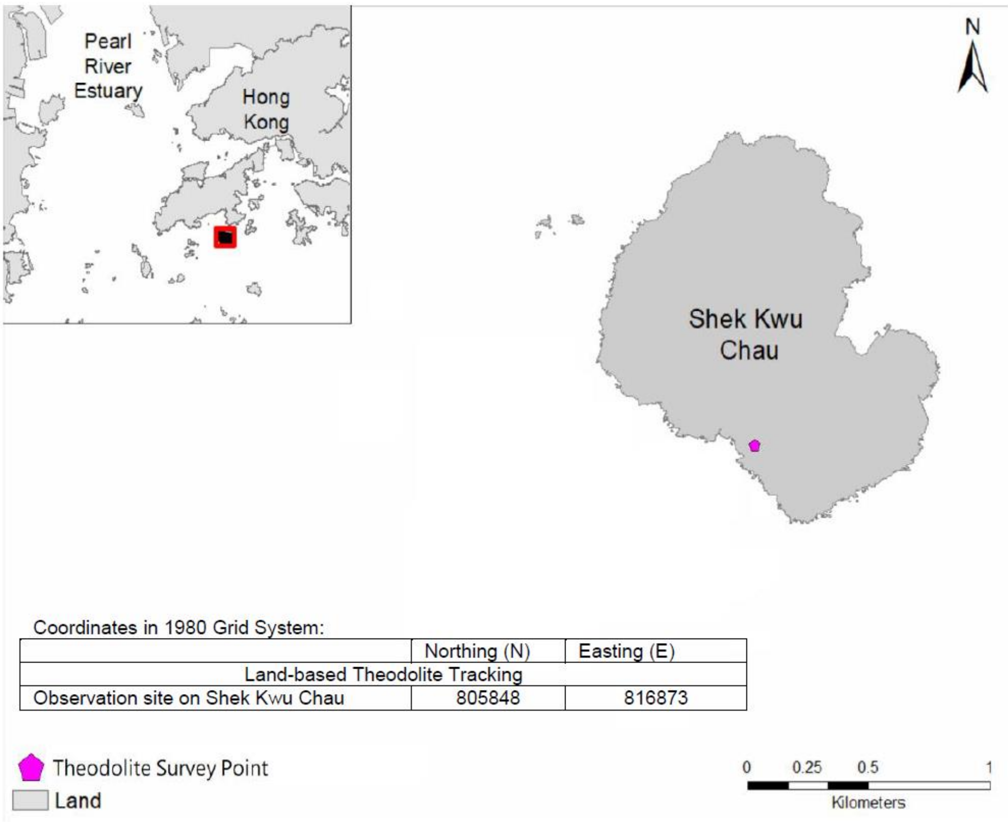
Season	Months	Deployment Period
Peak Season	December, January, February, March, April or May	At least 30 days during the peak months of porpoise occurrence in South Lantau waters

6.2.3.1 The automated static porpoise detectors shall detect the presence and number of finless porpoise and Chinese White Dolphins respectively over the deployment period, with the false signal such as boat sonar and sediment transport noise distinguished and filtered out. The detectors shall be deployed and retrieved by professional dive team on the seabed of the three selected location shown in **Figure 6.2**. During each deployment, the C-POD unit serial numbers as well as the time and date of deployments shall be recorded. Information including the GPS positions and water depth at each of the deployment locations shall also be obtained.

6.2.3.2 The diel patterns (i.e. 24-hour activity pattern) of finless porpoise occurrence among the three sites at Shek Kwu Chau, Tai A Chau and Pui O Wan shall be analyzed. Peaks and troughs of finless porpoise occurrence per hour of day would be identified and compared with the results obtained from pre-construction monitoring.

6.2.4 Land-based Theodolite Tracking

6.2.4.1 The Land-based Theodolite Tracking study would use the same station as in the AFCD monitoring study(same as the baseline monitoring location), which is situated at the southwest side of Shek Kwu Chau (GPS position: 22°11.47' N and 113°59.33' E) as shown in below **Figure 6.3**. The station was selected based on its height above sea level (at least 20 metres), close proximity to shore, and relatively unobstructed views of the entire Project Area to the southwest of Shek Kwu Chau. The height of the Shek Kwu Chau Station established by the HKCRP team is 74.6 m high at mean low water, and only a few hundred metres to the IWMF reclamation site, which is ideal for the purpose for the present behavioural and movement monitoring of finless porpoises as well during construction phase considering there as an un-obstructed vantage point at a height above the Project Site.



Coordinates in 1980 Grid System:

	Northing (N)	Easting (E)
Land-based Theodolite Tracking		
Observation site on Shek Kwu Chau	805848	816873

Figure 6.3 Locations of Land-based Theodolite Tracking

During the construction phase, Land-based Theodolite Tracking will be carried out for approximately six hours of tracking for each day of field work for a period listed as **Table 6.3** below, preferably at the initial stage of the construction period (i.e. December 2018 to May 2019).

Table 6.3 Land-based Theodolite Tracking Survey Period

Season	Months	Survey Period
Peak Season	December, January, February, March, April or May	30 days during the peak months of porpoise occurrence in South Lantau waters

6.2.4.2 The monitoring period for land-based theodolite tracking will be proposed to be overlapped with the PAM. The monitoring team consists of one experienced theodolite operator and at least two field observers for assistance. To conduct theodolite tracking, the observers will search systematically for Finless Porpoise using the unaided eye and 7 x 50 handheld binoculars on each survey day throughout the study area. When an individual or group of porpoises is located, a theodolite tracking session will be initiated and focal follow methods will be used to track the porpoise(s). Behavioural state data (i.e. resting, milling, travelling, feeding and socializing) shall also be recorded every 5 minutes for the focal individual or group. Positions of porpoises and boats shall be measured using a digital theodolite connected to a laptop computer. This tracking survey will be conducted during the peak season between December 2018 and May 2019 for 30 surveys spanning across 15-16 weeks during the peak season to provide good temporal coverage during the initial stage of the construction period.

6.3 Specific Mitigation Measures

6.3.1 Monitored exclusion zones

6.3.1.1 A MMEZ with 250 m distance from silt curtain shall be established during the above situation. If 3 or more construction vessels are required with MMO's duty and operating in close proximity, for the purpose of avoiding accidental entrance to the works area by Marine Mammal, a cluster MMEZ plan will be implemented to form a MMEZ with 250 m distance from the boundary of a work area as indicated in Figure 1 for reference. A team of MMO (i.e. at least two MMOs per day/night shift teams) would be arranged at the out-lying construction vessels to form the cluster MMEZ. The MMEZ serves as a monitoring approach to provide appropriate and immediate actions once finless porpoise or Chinese White Dolphin is sighted within the MMEZ. All MMEZ will be monitored by competent Marine Mammal Observers (MMOs) to be provided by the Environmental Team for the IWMF and trained by the Marine Mammal Monitoring Specialist of the ET who is independent from KSZHJV. The marine mammal observer(s) shall be independent of the construction contractor and shall form part of the Environmental Team and have the power to call-off construction activities.

6.3.1.2 According to the Condition 2.25 of the FEP, MMEZ should be implemented during the installation/re-installation/relocation process of floating type silt curtains in order to avoid the accidental entrance and entrapment of marine mammals within the silt curtains. Also, marine construction works expected to produce underwater acoustic disturbance as per Condition 2.27 of the FEP, especially within December and May, would require the implementation of MMEZ, which currently all those specific construction activities have been replaced by less acoustically disturbing construction methods such as Deep Cement Mixing (DCM) and Precast Concrete Blocks

Installation as discussed in Section 5.3 of the Detailed Monitoring Programme on Finless Porpoise, however, MMEZ would also be implemented for precautionary purpose for DCM works.

6.3.1.3 A MMEZ with 250 m distance from the boundary of a work area shall be established during the above situation. A typical MMEZ is indicated in **Figure 6.4** for reference. The MMEZ serves as a monitoring approach to provide appropriate and immediate actions once finless porpoise or Chinese White Dolphin is sighted within the MMEZ. All MMEZ will be monitored by competent Marine Mammal Observers (MMOs) to be provided by the Environmental Team (ET) for the IWMF and trained by the Marine Mammal Monitoring Specialist of the ET who is independent from KSZHJV.

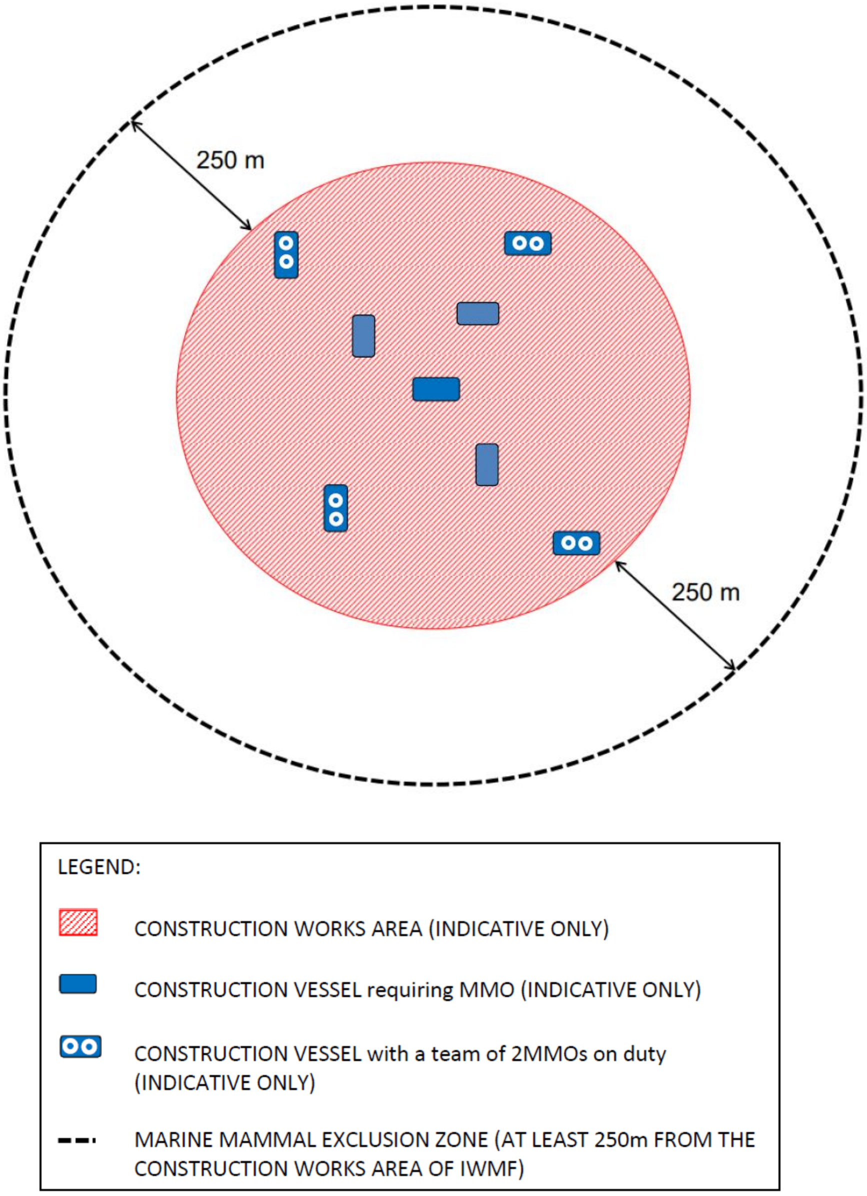


Figure 6.4 Illustration of Typical MMEZ

6.3.1.4 Prior to the commencement of construction activity, our MMOs shall ensure the boundary of a marine work area and setting up of the MMEZ for the work area and get access to the monitoring location on a barge or a lookout point where there is no obstructed views for monitoring the MMEZ during the construction activity. The

MMEZ shall be scanned thoroughly by a MMO for any presence of marine mammal e.g. finless porpoise for an initial period of 30 minutes. Construction activity shall only be commenced after the MMO has confirmed that the MMEZ is clear of the marine mammal for the initial period of 30 minutes. The MMO shall then inform the construction superintendent through mobile phone or handheld transceivers to certify the commencement of construction activity. The MMEZ monitoring shall be carried on throughout the period for all active construction activities requiring implementation of MMEZ.

6.3.1.5 When any mammal marine, e.g. Finless Porpoise, is detected by the MMO within the MMEZ during construction, the MMO shall inform the construction superintendent immediately through mobile phone or handheld transceivers to cease construction activity within the MMEZ. Construction activity shall not be re-commenced until the MMO confirms that the MMEZ is continuously clear of marine mammal for a period of 30 minutes. The MMO shall then inform the construction superintendent through mobile phone or handheld transceivers to certify the re-commencement of construction activity.

6.3.1.6 As there could be a number of Contractors working at the same time within a work area for the IWMF project, a full contact list of MMEZ monitoring team members of the ET and the relevant responsible construction superintendents of the Contractor at the site shall be prepared, updated regularly and circulated to all parties involved in the MMEZ monitoring. With a full contact list, our MMOs shall be able to find out the contacts of corresponding persons in case of marine mammal sighting within and near the MMEZ or emergent occurrence of any unpredictable impact on marine mammal.

6.3.1.7 If a marine mammal is still observed in close vicinity but outside the MMEZ, the MMO shall inform the construction superintendent about the presence of marine mammal. The MMO shall remain in position and closely observe the movement of the marine mammal as well as searching for the appearance of any other marine mammal within the MMEZ. No matter the marine mammal is observed within or in close vicinity but outside the MMEZ, the construction superintendent or relevant persons shall inform all vessel captains involved in construction activities around the MMEZ to pay special attention of the presence of the marine mammal in order to reduce chance of collision with them. In case of injury or live-stranded marine mammal being found within the MMEZ, the marine mammal observer shall immediately inform the construction superintendent to suspend construction activities within the works area and contact AFCD through “1823” marine mammal stranding hotline.

6.3.2 Marine mammal watching plan

6.3.2.1 Upon the completion of silt curtain installation/re-installation/relocation, the marine works would be conducted within an enclosed environment within the silt curtain. Subsequently, Visual Inspection of the Waters Surrounded by Silt Curtains (Section 2.1, MMWP) and Regular Inspection of Deployed Silt Curtain (Section 2.2, MMWP) inspection under Marine Mammal Watching Plan would be implemented (where applicable, Marine Mammal Exclusion Zone shall be conducted at the meantime).

6.3.2.2 Before commencement of dredging/sand blanket laying work at each designated area, a trained MMO shall check whether position frame silt curtains are ready, well prepared and operated without any obvious damage. Also, the MMO shall confirm the presence of the relevant frontline staff of the main contractor or its sub-contractors and engineers on board to ensure the effective communication, coordination and implementation of the response plan in relation to any incidents involving marine mammals within the waters surrounded by the position frame type silt curtains and the work areas. Also, there are lookout points at an elevated level on each barge, clear and safe access at the edges of the derrick lighter/ flag-top barge for inspection during dredging/sand blanket laying works, provision of sufficient lighting is required if working at night.

6.3.2.3 During the operation, the inspection will be conducted daily. The MMO will walk along the edge of derrick lighter (DL) and flag-top barge (FB) along the position frame silt curtain or proper location without obstacles where appropriate to inspect the position frame silt curtain with naked eyes, the MMO will check that the position frame silt curtains are maintained in the correct positions with no obvious defects / entanglement and there is no observable muddy water passing through the position frame silt curtain system. Any floating refuse trapped by the silt curtain shall be removed as part of the regular inspection. For night inspection, spotlight will be used to provide sufficient brightness to assist the inspection in dark condition.

6.3.2.4 For the localized silt curtain re-deployment, MMO will conduct visual inspection to confirm that there is no presence of marine mammal within the localized silt curtain. Visual inspection will be conducted in every hour by MMO till confirming that there is not any marine mammal observed in the surrounding area of the frame type silt curtain. The duration will be subject to various conditions, e.g. weather or angle of observation. The works can only commence after confirming that the surrounding waters of the localized silt curtains has not contain any marine mammal. Thereafter, frontline staff, i.e. foremen, site agent, superintendents and engineers will assist our MMO in implementing the plan from the active work fronts within the waters surrounded by the silt curtains throughout the work period. The MMO will conduct regular check every 60 minutes to observe the presence of any marine mammal around the localized silt curtain or being trapped by the localized silt curtain. The MMOs will also check if the localized silt curtains are in correct positions.

6.3.2.5 The MMO shall fill up our Marine Mammal Sighting Record Sheet. After inspection, those records should be kept properly and submitted to the project team. In case there is any marine mammal being found, the MMO should carry out the response actions and communicate with relevant parties to stop and then resume work after the discovered marine mammal leaves. After lifting up and mobilization of silt curtain, the MMO will repeat the procedures of regular and visual inspection until the end of the construction works.

6.3.2.6 Each lookout point will have an unobstructed view to waters around the DL and FB. The MMO will move around the DL and FB to establish a clear and unobstructed view as much as they can without compromising the safety concern. When appropriate, the lookout point can be replaced by a proper location if unobstructed view can be assured.

6.4 Results and Observations

6.4.1 Vessel-based Line-transect Survey

6.4.1.1 The monthly survey was conducted on 5 & 23 December 2019. As this is the designated peak season (December – May), two surveys were completed. A total of 83.2 km on effort (transects only) survey length was completed, 48.2% of which was conducted at Beaufort Sea State 2 or better (**Table 6.4**). Two finless porpoise sightings were recorded (**Table 6.5**, **Figure 6.5**).

Table 6.4 Summary of Vessel-based Line-transect Survey Effort

Date	Area*	Beaufort	Effort (km)	Season	Vessel	Effort Type**
05 Dec 2019	SEL	1	2.6	WINTER	SMRUHK	P
	SEL	2	12.0	WINTER	SMRUHK	P
	SEL	3	24.1	WINTER	SMRUHK	P
	SEL	4	2.9	WINTER	SMRUHK	P
23 Dec 2019	SEL	1	7.6	WINTER	SMRUHK	P
	SEL	2	17.9	WINTER	SMRUHK	P
	SEL	3	16.1	WINTER	SMRUHK	P

* As shown in **Figure. 6.1**

** P (from AFCD) denotes the ON EFFORT survey on the transect line, not the adjoining passages

Table 6.5 Sightings recorded during December 2019 Vessel-based Line-transect Survey

Date	Species	Sighting No.	Time	Group Size	PSD	Behaviour	Lat.	Long.	Area	Effort	Season
05 Dec 2019	Finless Porpoise	27	14:35	1	31	Unknown	22.1789	113.9443	SEL	ON	WINTER
05 Dec 2019	Finless Porpoise	28	14:47	2	32	Travel	22.1731	113.9534	SEL	ON	WINTER

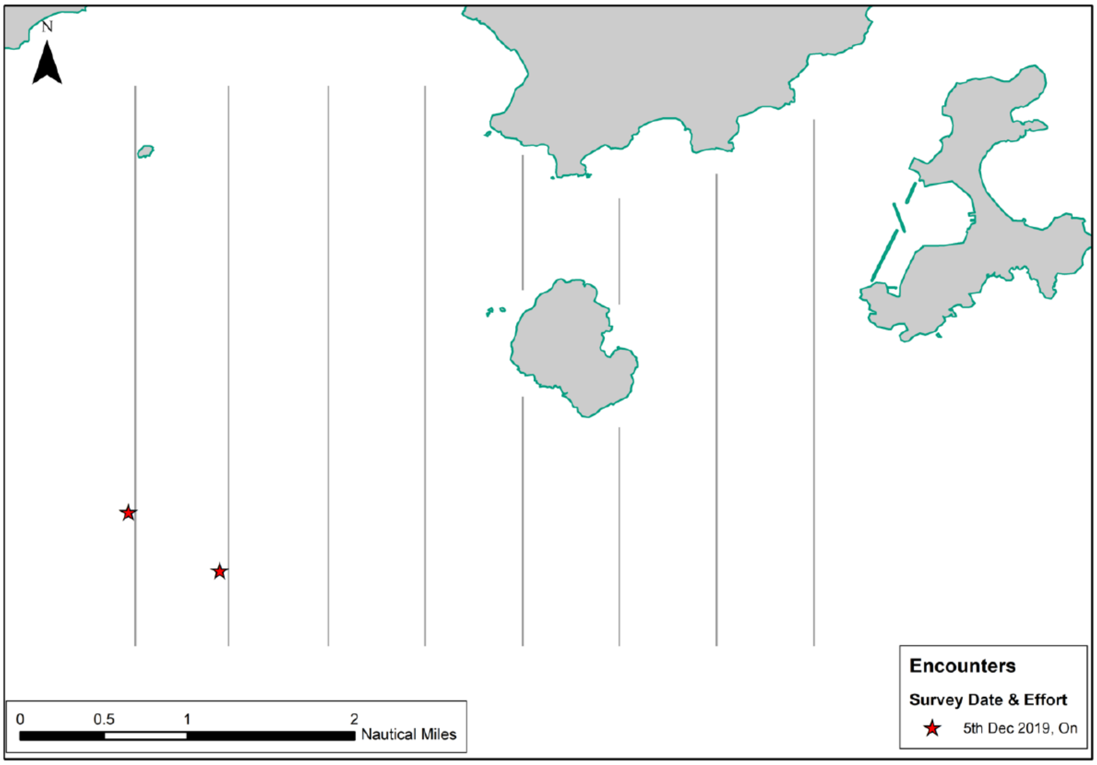


Figure 6.5 Location of sightings recorded during December 2019 Vessel-based Line-transect Survey

6.4.1.2 A review of the long term AFCD marine mammal monitoring programme, the EIA and the pre-construction baseline monitoring report for this project was conducted. Pre-construction baseline monitoring was conducted in Feb - Apr 2018 and the EIA was conducted during the peak porpoise months (Dec 2008 to May 2009). The AFCD long term monitoring data, the EIA information and December 2018 impact survey result can be compared directly to December 2019 Impact Survey results. It is noted that the 6th month of impact monitoring is December 2018 and these data are included.

6.4.1.3 A review of the Beaufort Sea State in December survey conditions between 2009 and 2018 (only data available from AFCD at time of writing; (AFCD 2018[1]; 2017[2]; 2016[3]; 2015[4]; 2014[5]; 2013[6]; 2012[7]; 2011[8]; 2010[9]) and Impact 2018) show that between 33.7% and 100 % of survey effort has been conducted at Beaufort Sea State 2 or better in the past. For this project in December 2019, 48.2 % of the survey was conducted at Beaufort Sea State 2 or better and, as such, survey conditions in December 2019 were typical of previous AFCD surveys.

6.4.1.4 A review of the porpoise sightings in the survey area for December between 2009-2018 indicate that there are fluctuations between the number of sightings usually recorded. 2 years recorded no (0) sightings (2011 and 2012 conducted by AFCD), 2 years recorded 1 sighting (2010 and 2015 conducted by AFCD), 2 years recorded 3 sightings (2013 conducted by AFCD), 1 year recorded 4 sightings (2009 conducted by AFCD) and 1 year recorded 5 sightings (2014 conducted by AFCD). For the Impact 2018 monitoring conducted by ET, 3 on-effort finless porpoise sightings (and 2 off-effort effort sightings) were made. Effort varied considerably between years and the average number of sightings (per km) varied between 0 and 0.06 km^{-1}. For December 2018, during the first year of impact monitoring, the calculated encounter rate was 0.05 sightings km^{-1}. There is no trend in encounter rates recorded by the AFCD long term monitoring programme, i.e., the highest encounter rate was recorded in 2009 and 2014 at 0.06 sightings km^{-1} (4 and 5 sightings, respectively), with encounter rates of 0 sightings km^{-1}, in 2011 and 2012. For December 2019, an encounter rate of 0.04 sightings km^{-1} is calculated, which is slightly less than the highest encounter rate recorded for this month previously, with reference to the AFCD long term marine mammal monitoring data (and higher than the December average 0.03 sightings km^{-1}). It is highlighted that the survey area for this monitoring is very small.

6.4.1.5 The impacts of the Project on marine mammals as predicted in the EIA were that construction activities would cause individuals to move away from the area. With only a small area being surveyed by vessels, with no control area, and as porpoise density is obviously low in such a small area, it is difficult to discern significant changes in sightings occurrence from vessel surveys alone. The sightings data presented in AFCD long term monitoring reports indicate that a sighting rate of 1.7 (per 40 km) for the month of December is not below average. Impact monitoring theodolite tracking data supports baseline monitoring data conclusions that indicate a correlation between construction site activities and porpoise occurrence. This observation is only for daylight hours, and visual detection. The analyses of the static PAM dataset provides detailed information on diurnal occurrence patterns. Each static PAM station records porpoise at each site every day of the PAM study and therefore, shows that the area immediately adjacent to the Project site has not been abandoned during parts of the designated peak season for porpoise. It is noted that the encounter rate for December 2019 is close to the impact monitoring result of December 2018, prior to early construction stage at SKC, however, as sightings are rare in this month it is difficult to draw conclusions about impacts.

6.4.2 PAM and Land-based Theodolite Tracking

6.4.2.1 30 days of PAM surveys were started at 1 May 2019 and completed until the end of May 2019. Multiple PAM systems were deployed at three sites. The PAM system located at the IWMF was lost, however, an alternative data set has been identified. The PAM systems at the two control sites Tai A Chau and Pui O were recovered on 3 August 2019. A summary of marine mammal detections shows that porpoise were recorded every day of deployment at each site, but at varying frequencies. The detailed theodolite result was presented in 17th Monthly EM&A report (November 2019) while detailed PAM report is presented in **Appendix Q**.

6.4.2.2 For the baseline study, the DPM for each site was 11,160 (Shek Kwu Chau), 16,089 (Tai A Chau) and 3645 (Pui O Wan), totalling 30,894 DPM across all three sites, compared to DPMs of 4740 (Shek Kwu Chau), 7725 (Tai A Chau) and 23,986 (Pui O Wan), totalling 36,451 DPM, for the impact phase study. As the impact phase study was longer than the baseline study, it is not appropriate to directly compare total counts of DPM, however, the DPM rate (the average number of detections per day) for each site can be more directly compared. During the baseline study, Shek Kwu Chau averaged 338.2 DPM per day compared to 124.8 DPM per day, during the impact phase study. This showed a decrease in the daily average of porpoise detection at Shek Kwu Chau. During the baseline study, Tai A Chau averaged 487.6 DPM per day compared to 179.7 DPM per day, during the impact phase study. This showed a decrease in the daily average of porpoise detection at Tai A Chau. During the baseline study, Pui O Wan averaged 98.5 DPM per day compared to 557.8 DPM per day, during the impact phase study. This showed a significant increase in the daily average of porpoise detections at Pui O Wan (**Table 6.6**).

6.4.2.3 Overall, the PAM study showed that porpoise continue to consistently utilise the Shek Kwu Chau habitat immediately adjacent to the IWMF construction activities, although to a lesser degree than that prior to construction activities. In addition, the Pui O Wan site, which is 2.5 km away from the IWMF construction area, was also consistently utilised during the impact phase PAM study. A continued assessment of fine scale habitat use, particularly through PAM which yields large quantities of data, would allow a more comprehensive assessment of the EIA predictions.

Table 6.6 Summary Statistic Comparison of Baseline (2018) and Impact Phase (2019) Passive Acoustic Monitoring

Baseline data									
Site	Unit ID	Start	End	Days	DPD % Days	Total DPM	DPM /Day	% False Positive DPM	Time Lost %
Shek Kwu Chau	2891	2018/02/09	2018/03/13	32.11	100	11160	338.2	0.0	1.00
Tai A Chau	2868	2018/02/09	2018/03/13	32.5	100	16089	487.6	1.0	2.00
Pui O Wan	2891	2018/03/13	2018/04/17	34.85	97.3	3645	98.5	2.0	31.87
Total				99.01		30894	312.0		
Impact Phase									
Site	Unit ID	Start	End	Days	DPD % Days	Total DPM	DPM /Day	% False Positive DPM	Time Lost %
Shek Kwu Chau	IWMF_BU_20190305_01	2019/03/05	2019/04/11	37.91	100	4740	124.8	0.0	0
Tai A Chau	IWMF_20190411_02	2019/04/11	2019/05/23	41.94	100	7725	179.7	0.0	0
Pui O Wan	IWMF_20190411_01	2019/04/11	2019/05/23	42.02	100	23986	557.8	0.0	0
Total				121.9		36451	299.1		

6.4.2.4 Theodolite surveys were completed in May 2019. In total, thirty four days of theodolite tracking were completed between February - May 2019, comprising 167 hours and 49 minutes of observation. No Chinese white dolphin was observed and only one finless was recorded. The finless porpoise encounter rate was calculated as 0.006 finless porpoise per hour, in all weather conditions.

6.4.2.5 A total of 2620 vessels of ten different types were observed and tracked within or in the proximity of the IWMF construction site. These comprised fishing boats (236), speed boats (29), container boats (155), government boats (22), high speed ferries (53), others (13) and IWMF-Related construction platforms (974), tug boats(240), transportation boats (363), construction boats (531 and approximately 8 buoys were present marking the site boundary. The detailed Land-based Theodolite Tracking Report was presented in the 17th Monthly EM&A report (November 2019).

6.4.2.6 The baseline theodolite tracking was conducted immediately prior to and during the site preparation activities of the site. The baseline data records a decrease in porpoise sightings as site preparation activities commenced and notes that the decrease was most likely due to the onset of site preparation activities. The impact theodolite tracking conducted for this study records a marked increase in the number of Project related vessels and platforms and, in agreement with baseline conclusions, shows a concomitant decrease in finless porpoise sightings.

6.4.3 Specific Mitigation Measures

Silt curtains were deployed for DCM during the reporting period. Teams of two MMO were on duty for continuous monitoring of the Marine Mammal Exclusion Zone (MMEZ) for DCM works, cluster MMEZ installation/re-installation/relocation process of silt curtains, and the marine mammal trapping checking and silt curtains inspection in accordance with the Detailed Monitoring Programme of Finless Porpoise and Marine Mammal Watching Plan respectively. Trainings for the MMO were provided by the ET prior to the aforementioned works, with a cumulative total of 98 individuals being trained and the training records kept by the ET. From the Marine Mammal Watching observation records and MMEZ monitoring log records, no Finless Porpoise or other marine mammals were observed within or around the MMEZ and silt curtains in the reporting month.

6.4.4 References

1. Agriculture, Fisheries and Conservation Department (AFCD) 2018. *Annual Marine Mammal Monitoring Programme April 2017-March 2018)* The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR. http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

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8. Agriculture, Fisheries and Conservation Department (AFCD) 2011. *Annual Marine Mammal Monitoring Programme April 2010-March 2011*) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR. http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

9. Agriculture, Fisheries and Conservation Department (AFCD) 2010. *Annual Marine Mammal Monitoring Programme April 2009-March 2010*) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR. http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

7. WHITE-BELLIED SEA EAGLE

7.1 Monitoring Requirement

7.1.1 On Shek Kwu Chau Island, a nest of WBSE is located about 60 m above ground within a hillside shrubland habitat, 130 m in-land from shore, about 550 m away from the proposed reclaimed land, with no human access. 3 phases monitoring programme will be comprised of pre-construction phase, construction phase and operation phase.

7.1.2 The Pre-Construction WBSE monitoring was started on 30 January 2018 and the location of WBSE nest was confirmed on 21 February 2018 and it is located at the western part of SKC Island (Figure 7.1). Two adults and two chicks were also recorded on 5th March 2018 survey till the end of the Pre-construction monitoring on 15th May 2018. Construction Phase monitoring were carried out followed by the commencement of the Construction Phase on 28th June 2018.

7.2 WBSE Monitoring Parameters, Time, Frequency

7.2.1 The objective of the construction phase monitoring should be to verify the utilisation of the area by WBSE, their responses to construction disturbance, as well as the effectiveness of the proposed mitigation measures. Throughout the construction phase, field surveys should be conducted twice per month during their core breeding season (from December to May), and once per month outside their core breeding season (from June to November). The monitoring frequency should be increased to weekly during the incubation period of each year. In order to confirm their foraging ground near the construction site, it is necessary to conduct daily monitoring during the first week of nestling period in each year.

7.2.2 Since the location of the WBSE nest was located at the southwest of SKC within the hillside shrubland, it is impossible to observe the eggs during incubation period. Therefore, monitoring with increased frequency during incubation period could not be carried out. Daily monitoring will be carried out once any chick is recorded during the monitoring day. The monitoring schedule during the reporting period is provided in **Appendix C**.

7.3 Monitoring Location

7.3.1 Since there are no suitable land footings along the coast of SKC, only boat surveys were conducted. On Shek Kwu Chau Island, a nest of WBSE is located about 60 m above ground within a hillside shrubland habitat, 130 m in-land from shore, about 550 m away from the proposed reclaimed land, with no human access.

7.4 Monitoring Methodology

7.4.1 Information to be collected included feeding, perching/roosting, preening, soaring, flying, nesting and territorial guarding and the time spent on each activity. The responses and reactions to any disturbance to the WBSEs were also recorded and examined in conjunction with the construction noise and/or other events in the vicinity. Other disturbances such as weather condition, or invasion by other fauna species were also recorded.

7.4.2 Binocular, scope, camera, lens and GPS device used are summarized as **Table 7.1** below:

Table 7.1 List of Equipment Used during Construction Phase Monitoring

Equipment	Quantity
Swarovski EL 8.5 x 42 Binocular	1
Swarovski EL Range 8 x 42 Binocular	1
Swarovski ATX 25-60 x 85 Spotting Scope	1
Canon 1Dx Mark II Camera	1
Canon EF300mm F2.8 Lens with Canon 2x Teleconverter	1
Canon PowerShot G7X Camera	1
Garmin GPSMAP 64S	1

7.4.3 If event such as absence of White-bellied Sea Eagle during a whole day of monitoring was found during WBSE monitoring, the actions in accordance with the Event and Action Plan should be carried out according to **Appendix M.**

7.5 Results and Observations

7.5.1 To verify the utilization of the area by WBSE, their responses to construction disturbance, as well as the effectiveness of the proposed mitigation measures. Since there is no landing point along the western part of SKC, boat survey was used for the monitoring survey. In order to increase the chance of finding the WBSEs, monitoring survey was carried out early in the morning. The weather condition of monitoring survey was shown in **Table 7.2**.

Table 7.2 Weather Conditions during the WBSE Monitoring

Date	Condition	Temperature (℃)
04 Dec 2019	- North wind force 4 to 5 - Sunny	23
13 Dec 2019	- East wind force 4 to 5 - Sunny	22
18 Dec 2019	- Light wind force 2 to 3 - Sunny	24
27 Dec 2019	- East wind force 4 to 5 - Sunny	20

7.5.2 No abnormal behavior of the recorded adults during the December 2019 construction phase monitoring. Two adults of WBSE were recorded having incubation in the nest (**Figure 7.2**). All marine works during the monitoring period did not show any affects to the WBSE.

7.5.3 A weekly construction phase monitoring will be continued during the breeding season (between December to May) in order to monitor the incubation period, utilization of the area by WBSE and their responses to construction disturbance

7.5.4 No disturbances from anthropogenic activities on the island were recorded during the monitoring survey. However, fishing boats moving close to the shore were recorded. Since the nesting tree is about 160m away from the shore and it is not accessible, fishing boat activities didn't show any direct disturbance to the WBSE nest. No invasion of other fauna species was recorded as well.

7.5.5 Since incubation was recorded, construction phase monitoring (twice per month during core breeding season) will be changed to weekly monitoring starting from December 2019 as shown in **Appendix P**. Also, as it is not possible to record the number of eggs in the nest, weekly monitoring will be continued until chick was seen in the nest.

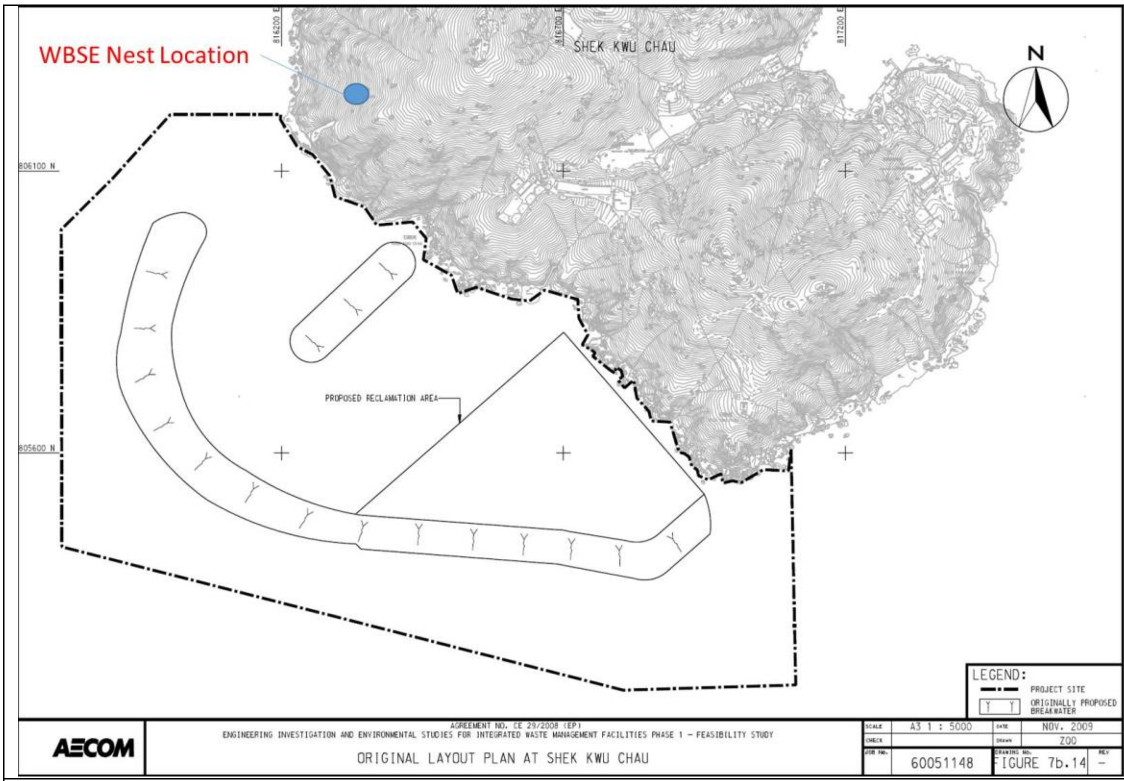


Figure 7.1 Location of WBSE Nest on SKC

7.5.6 Photo record of WBSE from the survey this month is shown below:

Adult WBSE flying over the nest area

Adult WBSEs staying in the nest

Figure 7.2 Photo Records of WBSE on SKC During the Reporting Period

8. Summary of Monitoring Exceedance, Complaints, Notification of Summons and Prosecutions

8.1 The Environmental Complaint Handling Procedure is shown in below **Figure 8.1**:

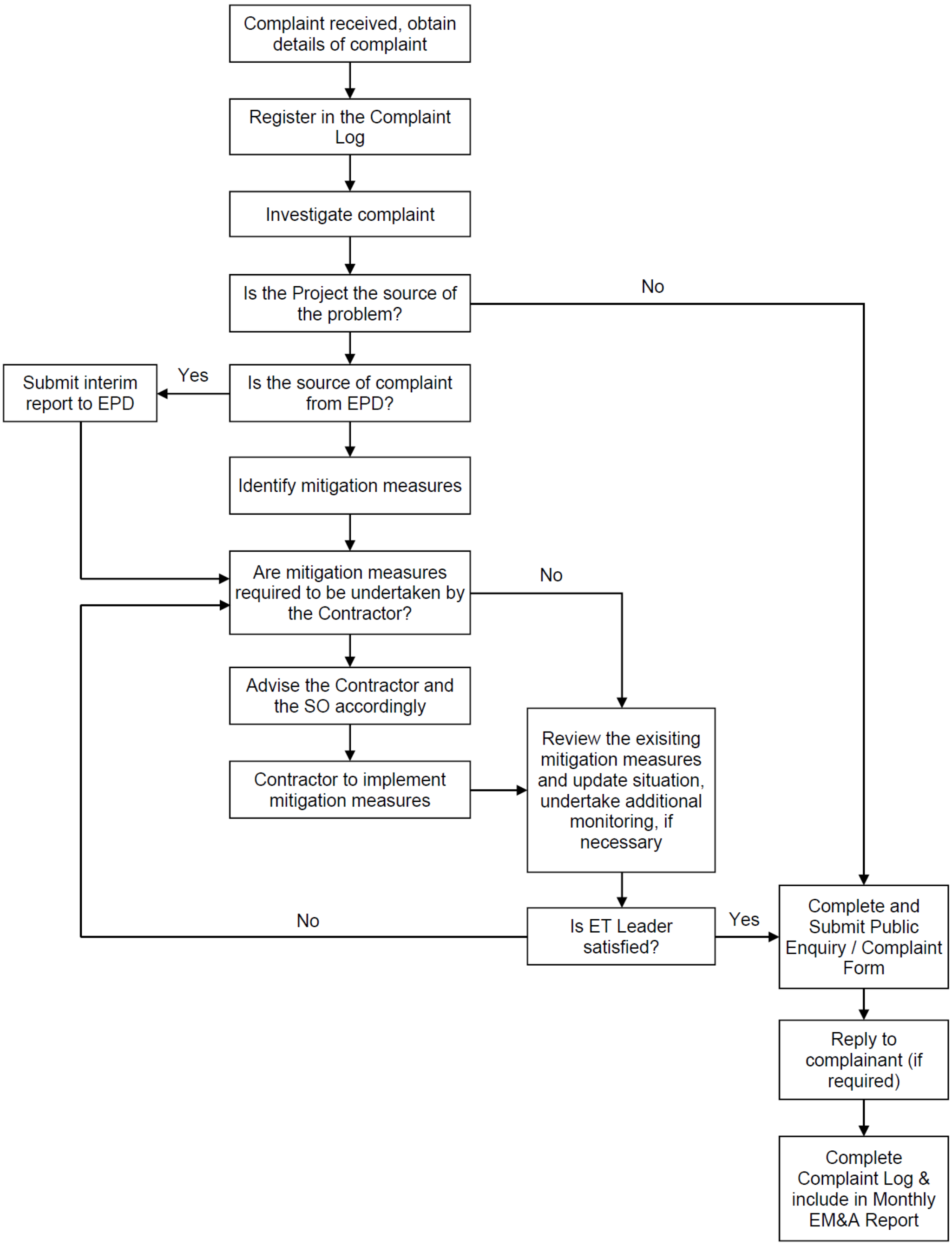


Figure 8.1 Environmental Complaint Handling Procedures

8.2 No exceedance of the Action and Limit Levels of the regular construction noise and WBSE monitoring was recorded during the reporting period.

Table 8.1 Summary of SS Compliance Status at Impact Stations (Mid-Ebb Tide)

Date	B1	B2	B3	B4	CR1	CR2	F1A	H1	S1	S2A	S3	M1
2-12-2019												
4-12-2019												
6-12-2019												
9-12-2019												
11-12-2019												
13-12-2019												
16-12-2019												
18-12-2019												
20-12-2019												
22-12-2019												
24-12-2019												
27-12-2019												
30-12-2019												
No. of SS Exceedances	2	1	3	1	1	2	3	0	2	3	1	1

Note 1: Detailed results are presented in **Appendix D**

Legend:

	No exceedance of Action Level and Limit Level
	Exceedance of Action Level recorded at monitoring station located downstream of the Project based on dominant tidal flow
	Exceedance of Action Level recorded at monitoring station located upstream/unrelated stream (neither upstream nor downstream, far away) of the Project based on dominant tidal flow
	Exceedance of Limit Level recorded at monitoring station located downstream of the Project based on dominant tidal flow
	Exceedance of Limit Level recorded at monitoring station located upstream/unrelated stream of the Project based on dominant tidal flow
	Upstream/unrelated stream station with respect to IWMF Project during the respective tide based on dominant tidal flow
	Downstream station with respect to IWMF Project during the respective tide based on dominant tidal flow/station within the Project site
	NA for measurement
	Cancelled due to incident or adverse weather

Table 8.2 Summary of SS Compliance Status at Impact Stations (Mid-Flood Tide)

Date	B1	B2	B3	B4	CR1	CR2	F1A	H1	S1	S2A	S3	M1
2-12-2019												
4-12-2019												
6-12-2019												
9-12-2019												
11-12-2019												
13-12-2019												
16-12-2019												
18-12-2019												
20-12-2019												
22-12-2019												
24-12-2019												
27-12-2019												
30-12-2019												
No. of SS Exceedances	2	4	4	1	1	2	1	1	0	2	1	1

Note 1: Detailed results are presented in **Appendix D**

Legend:

	No exceedance of Action Level and Limit Level
	Exceedance of Action Level recorded at monitoring station located downstream of the Project based on dominant tidal flow
	Exceedance of Action Level recorded at monitoring station located upstream/unrelated stream (neither upstream nor downstream, far away) of the Project based on dominant tidal flow
	Exceedance of Limit Level recorded at monitoring station located downstream of the Project based on dominant tidal flow
	Exceedance of Limit Level recorded at monitoring station located upstream/unrelated stream of the Project based on dominant tidal flow
	Upstream/unrelated stream station with respect to IWMF Project during the respective tide based on dominant tidal flow
	Downstream station with respect to IWMF Project during the respective tide based on dominant tidal flow/station within the Project site
	NA for measurement
	Cancelled due to incident or adverse weather

Table 8.3 Summary of DO Compliance Status at Impact Stations (Mid-Ebb Tide)

Date	B1	B2	B3	B4	CR1	CR2	F1A	H1	S1	S2A	S3	M1
2-12-2019												
4-12-2019												
6-12-2019												
9-12-2019												
11-12-2019												
13-12-2019												
16-12-2019												
18-12-2019												
20-12-2019												
22-12-2019												
24-12-2019												
27-12-2019												
30-12-2019												
No. of DO Exceedances	1	1	1	1	1	1	1	1	1	1	1	1

Note 1: Detailed results are presented in **Appendix D**

Legend:

	No exceedance of Action Level and Limit Level
	Exceedance of Action Level recorded at monitoring station located downstream of the Project based on dominant tidal flow
	Exceedance of Action Level recorded at monitoring station located upstream/unrelated stream (neither upstream nor downstream, far away) of the Project based on dominant tidal flow
	Exceedance of Limit Level recorded at monitoring station located downstream of the Project based on dominant tidal flow
	Exceedance of Limit Level recorded at monitoring station located upstream/unrelated stream of the Project based on dominant tidal flow
	Upstream/unrelated stream station with respect to IWMF Project during the respective tide based on dominant tidal flow
	Downstream station with respect to IWMF Project during the respective tide based on dominant tidal flow/station within the Project site
	NA for measurement
	Cancelled due to incident or adverse weather

Table 8.4 Summary of DO Compliance Status at Impact Stations (Mid-Flood Tide)

Date	B1	B2	B3	B4	CR1	CR2	F1A	H1	S1	S2A	S3	M1
2-12-2019												
4-12-2019												
6-12-2019												
9-12-2019												
11-12-2019												
13-12-2019												
16-12-2019												
18-12-2019												
20-12-2019												
22-12-2019												
24-12-2019												
27-12-2019												
30-12-2019												
No. of DO Exceedances	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	1	**1**

Note 1: Detailed results are presented in **Appendix D**

Legend:

	No exceedance of Action Level and Limit Level
	Exceedance of Action Level recorded at monitoring station located downstream of the Project based on dominant tidal flow
	Exceedance of Action Level recorded at monitoring station located upstream/unrelated stream (neither upstream nor downstream, far away) of the Project based on dominant tidal flow
	Exceedance of Limit Level recorded at monitoring station located downstream of the Project based on dominant tidal flow
	Exceedance of Limit Level recorded at monitoring station located upstream/unrelated stream of the Project based on dominant tidal flow
	Upstream/unrelated stream station with respect to IWMF Project during the respective tide based on dominant tidal flow
	Downstream station with respect to IWMF Project during the respective tide based on dominant tidal flow/station within the Project site
	NA for measurement
	Cancelled due to incident or adverse weather

8.3 Eighteen (18) of the General & Regular DCM water quality monitoring results of suspended solids (SS) obtained during the reporting period had exceeded Action Level. Twenty-two (22) of monitoring results had exceeded the relevant Limit Level of suspended solids (SS) during the reporting period as summarized in **Table 8.1** & **8.2**, where investigation was carried out immediately for each of the exceedance cases during the reporting period.

8.4 Twenty-four (24) of the General & Regular DCM water quality monitoring results of dissolved oxygen (DO) obtained during the reporting period had exceeded Action Level. None (0) of monitoring results had exceeded the relevant Limit Level of dissolved oxygen (DO) during the reporting period as summarized in **Table 8.3** & **8.4**, where investigation was carried out immediately for each of the exceedance cases during the reporting period.

8.5 No project-related Action Level & Limit Level exceedance was recorded from the reporting period as shown in **Appendix N**. However, environmental deficiencies of the Contactor on the implementation of silt curtain deployment system were spotted.

8.6 The Contractor has been reminded that all measures recommended in the deposited Silt Curtain Deployment Plan shall be fully and properly implemented for the Project as per Clause 2.6A of the FEP.

8.7 No notification of summons and prosecution was received in the reporting period.

8.8 Statistics on complaints, notifications of summons and successful prosecutions are summarized in **Appendix O**.

9. EM&A SITE INSPECTION

9.1 Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract. In the reporting period, site inspections were carried out on 4, 10, 18, 23 & 30 December 2019 at the site portions list in **Table 9.1** below.

Table 9.1 Site Inspection Record

Date	Inspected Site Portion	Time
4 December 2019	Portion 1, 1A & 1B (near SKC)	10:20 – 11:20 AM
10 December 2019	Portion 1, 1A & 1B (near SKC)	10:30 – 11:40 AM
18 December 2019	Portion 1, 1A & 1B (near SKC)	10:30 – 11:20 AM
23 December 2019	Portion 1, 1A & 1B (near SKC)	10:10 – 11:30 AM
30 December 2019	Portion 1, 1A & 1B (near SKC)	10:30 – 11:40 AM

9.2 One joint site inspection with IEC was carried out on 18 December 2019.

9.3 Environmental deficiencies were observed during weekly site inspection. Key observations during the site inspections and during the reporting period are summarized in **Table 9.2**.

Table 9.2 Site Observations

Date	Environmental Observations	Follow-up Status
4 December 2019 (Site inspection)	Observation(s) and Recommendation(s) 1. Small amount of sediment was found on the edge of barge DL-5. 2. On ESC-61, all used paints should be put on drip tray or put into the chemical waste cabinet to prevent leakage. 3. On SHB-305, all used paints should be put on drip tray or put into chemical waste cabinet to prevent leakage.	1. Sediment has been cleaned. 2. All used paint containers have been removed off site and the unused are properly stored in the paint storage area. 3. All chemical containers have been removed off site.
10 December 2019 (Site inspection)	Observation(s) and Recommendation(s) 1. On 港龍 108 & 志富, some sediment was observed at the edge. Sediment should be cleaned regularly to prevent falling into the sea. Tarpaulin or impervious sheeting was recommended to prevent leaking of sediment during transferring. 2. On 853, the height of the bunding of the drip tray was not enough.	1. Sediment has been cleaned on 港龍 108 & 志富. Tarpaulin was installed between 港龍 108 and frame type silt curtain during the operation. 2. Bunding of the drip tray has been heightened.
18 December 2019 (Site inspection)	Observation(s) and Recommendation(s)	1. The silt curtain has been repaired before returning to shipyard on 19 December 2019

Date	Environmental Observations	Follow-up Status
	1. On ESC-62, some broken parts of silt curtain were observed. 2. On ESC-62, a small area of oil stain was observed on barge surface.	for further maintenance. 2. Oil stain has been cleaned..
23 December 2019 (Site inspection)	Observation(s) and Recommendation(s) 1. On FTB-25, oily water on drip tray should be cleaned up and treated as chemical waste. 2. On FTB-25, loose debris on barge surface should be cleaned up. 3. On GD851, drums of chemical were not put on drip tray.	1. Oil water on drip tray has been cleaned. 2. Loose debris has been cleaned. 3. Drip tray has been provided for the chemical containers.
30 December 2019 (Site inspection)	Observation(s) and Recommendation(s) 1. On ESC-61, garbage was observed inside the cage-type silt curtain. Garbage should be collected and disposed of properly. 2. On ESC-61, one of the chemical waste cabinet was found broken. Bag of chemical waste inside another chemical waste cabinet has no label. 3. On jack up barge 永泰, oil water mixture was observed on several drip trays. Oil water mixture should be cleared and treated as chemical waste.	1. Garbage has been cleared up. 2. Chemical waste cabinet has been repaired. Labels have been provided for the chemical waste. 3. Stagnant water inside drip trays have been cleared.

9.4 The Contractor had rectified all the observations identified during environmental site inspections in the reporting period. The Contractor has been reminded to suspend the related works immediately if silt curtain is found any damage in the future, until fixing of damaged silt curtain is completed.

9.5 According to the EIA Study Report, Environmental Permit, contract documents and Updated EM&A Manual, the mitigation measures detailed in the documents are implemented as much as practical during the reporting period. An updated Implementation Status of Environmental Mitigation Measures (EMIS) is provided in **Appendix B**.

10. FUTURE KEY ISSUES

10.1 Works to be undertaken in the next reporting month are:

- DCM Installation Works;
- Coring of DCM samples;
- Cone Penetration Test;
- Dredging Works and Sediment Disposal;
- Rock Filling of Foundation;
- Leveling Works for the Foundation of Seawall and Berth Area;
- Caisson Laying;
- Rubble Mound Laying;
- Sand Blanket and Geotextile Laying.

10.2 Potential environmental impacts arising from the above construction activities are mainly associated with water quality, construction noise, waste management and ecology.

10.3 The key environmental mitigation measures for the Project in the coming reporting period expected to be associated with the construction activities include:

- Reduction of noise from equipment and machinery on-site;
- Installation of silt curtains for DCM installation, sand blanket laying works and dredging works;
- Sorting, recycling, storage and disposal of general refuse and construction waste;
- Management of chemicals and avoidance of oil spillage on-site, especially under heavy rains and adverse weather; and
- Implementation of cluster MMEZ and inspection of enclosed environment within silt curtains as per DMPFP;
- Regulation on rate and means for dredging works as stipulated in FEP Clause 2.17 – 2.21 or the approved Supporting Document for Reviewing Dredging Rate and Filling Rate, whichever is applicable;
- Daily site audit and monitoring by ET during dredging work as stipulated in FEP Clause 2.21A;
- Storage, handling and disposal of dredged materials according to Dumping At Sea Ordinance (DASO);
- Confirmation of the absence of silt content in the rock filling material and the filling work is properly conducted;
- Installation process of floating silt curtain according to approved Silt Curtain Deployment Plan

10.4 The tentative schedule of regular construction noise, water quality and ecology monitoring in the next reporting period is presented in **Appendix P**. The regular construction noise, water quality and ecology monitoring will be conducted at the same monitoring locations in the next reporting period.

11. CONCLUSION AND RECOMMENDATIONS

11.1 This 18th monthly Environmental Monitoring and Audit (EM&A) Report presents the EM&A works undertaken during the period from 1 December to 31 December 2019, in accordance with the Updated EM&A Manual and the requirement under EP-429/2012/A and FEP-01/429/2012/A.

11.2 Construction noise, water quality, construction waste, coral, marine mammal and WBSE monitoring were carried out in the reporting period. No project-related exceedance of the Action and Limit Level was recorded during the reporting period. However, environmental deficiencies of the Contractor on the implementation of silt curtain deployment system were spotted.

11.3 Weekly environmental site inspections were conducted during the reporting period. Environmental deficiencies were observed during site inspection and were rectified.

11.4 According to the environmental site inspections performed in the reporting month, the Contractor was reminded to pay attention on on-site housekeeping, silt curtain maintenance and the proper storage of the chemicals and construction waste.

11.5 According to the field observation by MMO during the reporting period, temporary silt plume floating was observed at close proximity of the outside of silt curtains, moving out from the sand laying working area. The Contractor has ceased the malpractice and no silt plume was observed at the working area within 30 minutes upon discovery. The Contractor is reminded to ensure the proper implementation of mitigation measures as specified in the Updated EM&A Manual and Silt Curtain Deployment Plan.

11.6 Regarding to the deployment of silt curtains as a principal water quality impact mitigation measures on various marine works, the Contractor has been reminded to follow strictly to the design and checking procedure as specified in the Silt Curtain Deployment Plan. As the scale of DCM works will be stepped up in the coming months, the Contractor has been reminded to pay extra attention on the status of deployed silt curtain. The Contractor is reminded that all measures recommended in the deposited silt curtain deployment plan shall be fully and properly implemented for the Project as per EP condition 2.6 of the FEP.

11.7 As dredging works was conducted in the reporting month, the Contractor had been reminded to follow strictly to the design and checking procedure as specified in the Silt Curtain Deployment Plan for the dredging works. The Contractor had been reminded to follow the regulation on rate and means for dredging works as stipulated in FEP Clause 2.17 – 2.21 or the approved Supporting Document for Reviewing Dredging Rate and Filling Rate, whichever is applicable. The Contractor is reminded to follow Dumping At Sea Ordinance (DASO) for the storage, handling and disposal of dredged materials.

11.8 No environmental complaint was received in the reporting period.

11.9 No notification of summon or prosecution was received since commencement of the Contract.

11.10 The ET will keep track of the construction works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Appendix A Master Programme

Keppel Seghers
吉寶西格斯－振華聯營公司
KEPPEL SEGHERS - ZHEN HUA JOINT VENTURE

Contract No. EP/SP/66/12
Integrated Waste Management Facilities, Phase 1

環境保護署 Environmental Protection Department

Activity ID	Activity Name	Remaining Duration	Start	Finish
EP_SP_66_12-WP-2-M0	Programme for Design and Construction Works	2835	22-Nov-17 A	26-Aug-25
EP_SP_66_12-WP-2-M0.01	Key Dates	2496	22-Nov-17	21-Sep-24
EP_SP_66_12-WP-2-M0.02	Contract Preliminaries	2807	19-Dec-17	26-Aug-25
EP_SP_66_12-WP-2-M0.03	Licence/Permit Applications	2252	15-Dec-17	13-Feb-24
EP_SP_66_12-WP-2-M0.04	General Submissions	1320	22-Nov-17	03-Jul-21
EP_SP_66_12-WP-2-M0.05	Design Submissions	1724	22-Nov-17 A	11-Aug-22
EP_SP_66_12-WP-2-M0.06	Procurement of Major Equipment	1903	13-Sep-18	28-Nov-23
EP_SP_66_12-WP-2-M0.07	Environmental Works	1708	05-Jan-18	09-Sep-22
EP_SP_66_12-WP-2-M0.08	Maritime Works	1277	29-Dec-17	27-Jun-21
EP_SP_66_12-WP-2-M0.08.3	Submissions	196	29-Dec-17	12-Jul-18
EP_SP_66_12-WP-2-M0.08.1	Marine Construction	1265	10-Jan-18	27-Jun-21
EP_SP_66_12-WP-2-M0.08.1.1	Phase I - Construction of Perimeter Seawalls	740	10-Jan-18	19-Jan-20
EP_SP_66_12-WP-2-M0.08.1.1.3	Marine Works Preparations	274	10-Jan-18	10-Oct-18
08-0900	Carry out hydrographic survey	14	10-Jan-18	23-Jan-18
08-1005	Ground Investigation for DCM Design	180	13-Feb-18	11-Aug-18
08-1010	Mobilization of DCM Barge for Load Test	30	14-May-18	12-Jun-18
08-1020	Mobilization of Remaining DCM Barge for Construction	30	11-Sep-18	10-Oct-18
08-1340(2)	Sediment Sample collection and testing Dumping Permit Application	21	05-Sep-18*	25-Sep-18
EP_SP_66_12-WP-2-M0.08.1.1.1	Seawall and Berth at DCM Area	676	15-Mar-18	19-Jan-20
08-1030	DCM Mix Trial (incl. Bench-scale testing and Lab Tests)	106	15-Mar-18	28-Jun-18
08-1040	DCM Pre-construction Site Trial and testing	43	29-Jun-18	10-Aug-18
08-1050	Static Load Test Preparation	31	11-Aug-18	10-Sep-18
08-1060	Carry out static loading test	22	11-Sep-18	02-Oct-18
08-1065(2)	Static load test report submission	8	03-Oct-18	10-Oct-18
08-1070	Geotextile Laying	60	11-Aug-18	09-Oct-18
08-1075(2)	Sand Blanket Laying	60	11-Aug-18	09-Oct-18
08-1080	DCM Injection Works (575,000m3, approx 6300 nr.)	120	11-Oct-18	07-Feb-19
08-1090	DCM Final Completion Tests	180	10-Nov-18	08-May-19
08-1100	Rubble Mound Laying (100,000m3 approx, @550m3/d)	180	09-Jan-19	07-Jul-19
08-1105(1)	Prefabrication for Caission	282	24-Nov-18	01-Sep-19
08-1110	Caisson Laying (Total 50nrs, @2 nrs/week)	182	24-Mar-19	21-Sep-19
08-1120	Wave Wall Construction	120	22-Sep-19	19-Jan-20
EP_SP_66_12-WP-2-M0.08.1.1.2	Seawall at Dredging Area	295	25-Dec-18	15-Oct-19
08-1130	Dredging Works (26,000m3 @ 285m3/d avg. to comply EP Conditions 2.18)	110	25-Dec-18	13-Apr-19
08-1140	Lay Rock & Sand Fill	50	15-Mar-19	03-May-19
08-1150	Place Rubble Mound (35,000m3 approx., @550m3/d)	88	30-Mar-19	25-Jun-19
08-1155(2)	Fabrication and delivery of Precast Seawall Blocks (12,000nr. approx)	90	15-Mar-19	12-Jun-19
08-1160	Lay Concrete Block Walls (300m length approx. @4m/d)	80	29-Apr-19	17-Jul-19
08-1170	Insitu Concrete Wall Construction	90	18-Jul-19	15-Oct-19
EP_SP_66_12-WP-2-M0.08.1.2	Phase II - Reclamation, Breakwater and Berth Construction	999	03-Oct-18	27-Jun-21
EP_SP_66_12-WP-2-M0.08.1.2.1	Reclamation	999	03-Oct-18	27-Jun-21
08-1180	Geotextile Laying	100	03-Oct-18	10-Jan-19
08-1185(2)	Sand Blanket Laying	100	03-Oct-18	10-Jan-19
08-1190	Install Vertical Band Drain by Barge	160	10-Feb-19	19-Jul-19
08-1200	Reclamation fill up to +2.5mPD	375	22-Sep-19	30-Sep-20
08-1210	Reclamation fill from +2.5 to Formation Level	120	03-Jul-20	30-Oct-20
08-1220	Lay Surcharge	80	11-Sep-20	29-Nov-20
08-1230	Surcharge Period	180	30-Nov-20	28-May-21
08-1240	Remove Surcharge	85	04-Apr-21	27-Jun-21
EP_SP_66_12-WP-2-M0.08.1.2.2	Breakwater	583	02-Sep-19	06-Apr-21
08-1250	Geotextile and Sand Blanket Laying	45	22-Sep-19	05-Nov-19
08-1260	DCM Injection Works (290,000m3, approx 3200 nr.)	65	06-Nov-19	09-Jan-20
08-1270	DCM Final Completion Test	71	05-Jan-20	15-Mar-20
08-1280	Rubble Mound Laying (100,000m3 approx, @550m3/d)	188	05-Mar-20	08-Sep-20
08-1285(1)	Prefabrication for Caission	411	02-Sep-19	16-Oct-20
08-1290	Caisson Laying (Total 43nrs, @2 nrs/week)	150	11-Jul-20	07-Dec-20
08-1300	Wave Wall Construction	120	08-Dec-20	06-Apr-21
EP_SP_66_12-WP-2-M0.08.1.2.3	Seawall and Berth at Marine Access	150	03-Jul-20	29-Nov-20
08-1310(2)	Prefabrication for Caission (4nrs)	90	03-Jul-20	30-Sep-20
08-1320(2)	Caisson Laying (4nrs)	30	01-Oct-20	30-Oct-20
08-1330(2)	Wave Wall Construction	30	31-Oct-20	29-Nov-20
EP_SP_66_12-WP-2-M0.09	Foundation Works	397	12-Apr-21	13-May-22
EP_SP_66_12-WP-2-M0.09.0	Site Investigation and Preliminary Pile	46	12-Apr-21	27-May-21
EP_SP_66_12-WP-2-M0.09.1	Administration Bld Foundation	138	25-Nov-21	11-Apr-22
EP_SP_66_12-WP-2-M0.09.2	Waste Bunker & Tipping Hall Bld Foundation	203	13-May-21	01-Dec-21
EP_SP_66_12-WP-2-M0.09.3	Boiler & Flue Gas Bld Foundation	331	12-Apr-21	08-Mar-22
EP_SP_66_12-WP-2-M0.09.4	ACC Area Foundation	129	20-Sep-21	26-Jan-22
EP_SP_66_12-WP-2-M0.09.5	Turbine Hall Bld Foundation	142	28-Jun-21	16-Nov-21
EP_SP_66_12-WP-2-M0.09.6	Air Compressor Bld Foundation	28	17-Nov-21	14-Dec-21

Programme for Design and Construction Works
Summary Programme

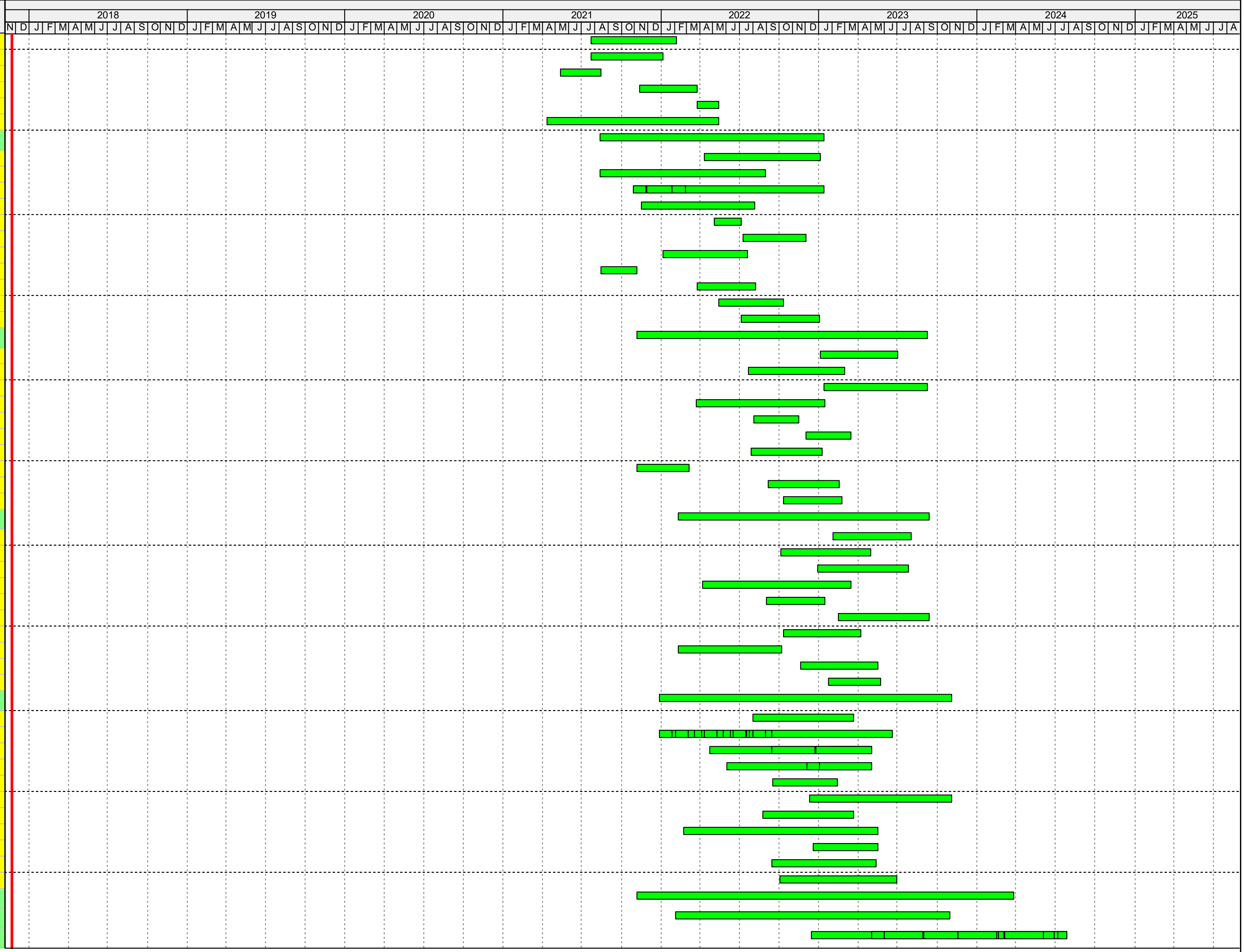
Date	Revision	Checked	Approved
04-Dec-17	Rev. 0 - 1st Issue		
16-Jul-18	Rev. 1 - Revised to SO's comments		
03-Sep-18	Rev. 2 - Revised to SO's comments		

Keppel Seghers
吉寶西格斯－振華聯營公司
KEPPEL SEGHERS - ZHEN HUA JOINT VENTURE

Contract No. EP/SP/66/12
Integrated Waste Management Facilities, Phase 1

環境保護署 Environmental Protection Department

Activity ID	Activity Name	Remaining Duration	Start	Finish
EP_SP_66_12-WP-2-M0.09.7	Chimney Foundation	198	23-Jul-21	05-Feb-22
EP_SP_66_12-WP-2-M0.09.8	MT Plant & Desalination Bld Foundation	168	22-Jul-21	05-Jan-22
EP_SP_66_12-WP-2-M0.09.9	IWMF Substation Building Foundation	94	13-May-21	14-Aug-21
EP_SP_66_12-WP-2-M0.09.10	Access Ramp Bld Foundation	133	13-Nov-21	25-Mar-22
EP_SP_66_12-WP-2-M0.09.11	Reception Bld Foundation	49	26-Mar-22	13-May-22
EP_SP_66_12-WP-2-M0.09.12	Pipe Bridge Foundation	397	12-Apr-21	13-May-22
EP_SP_66_12-WP-2-M0.10	**Superstructural Works**	519	12-Aug-21	12-Jan-23
EP_SP_66_12-WP-2-M0.10.1	Administration Bld Structure	267	12-Apr-22	03-Jan-23
EP_SP_66_12-WP-2-M0.10.2	Waste Bunker & Tipping Hall Bld Sturcture	384	12-Aug-21	30-Aug-22
EP_SP_66_12-WP-2-M0.10.3	Boiler & Flue Gas Treatment Bld Structure	441	29-Oct-21	12-Jan-23
EP_SP_66_12-WP-2-M0.10.5	Turbine Hall Bld Structure	262	17-Nov-21	05-Aug-22
EP_SP_66_12-WP-2-M0.10.6	Air Compressor Bld Structure	63	04-May-22	05-Jul-22
EP_SP_66_12-WP-2-M0.10.7	Chimney Structure	145	10-Jul-22	01-Dec-22
EP_SP_66_12-WP-2-M0.10.8	MT Plant & Desalination Bld Structure	196	06-Jan-22	20-Jul-22
EP_SP_66_12-WP-2-M0.10.9	IWMF Substation Structure	84	15-Aug-21	06-Nov-21
EP_SP_66_12-WP-2-M0.10.10	Access Ramp Bld Structure	135	26-Mar-22	07-Aug-22
EP_SP_66_12-WP-2-M0.10.11	Reception Bld Structure	150	14-May-22	10-Oct-22
EP_SP_66_12-WP-2-M0.10.13	Pipe Bridge Structure	180	06-Jul-22	01-Jan-23
EP_SP_66_12-WP-2-M0.11	**Architectual Builders Works & Finishes**	672	07-Nov-21	09-Sep-23
EP_SP_66_12-WP-2-M0.11.1	Administration Bld ABWF Works	180	04-Jan-23	02-Jul-23
EP_SP_66_12-WP-2-M0.11.2	Weste Bunker & Tipping Hall Bld ABWF Works	225	21-Jul-22	02-Mar-23
EP_SP_66_12-WP-2-M0.11.3	Boiler & Flue Gas Bld ABWF Works	240	13-Jan-23	09-Sep-23
EP_SP_66_12-WP-2-M0.11.5	Turbine Hall Bld ABWF Works	299	23-Mar-22	15-Jan-23
EP_SP_66_12-WP-2-M0.11.6	Air Compress Bld ABWF Works	105	03-Aug-22	15-Nov-22
EP_SP_66_12-WP-2-M0.11.7	Chimney ABWF Works	105	02-Dec-22	16-Mar-23
EP_SP_66_12-WP-2-M0.11.8	MT Plant & Desalination Bld ABWF Works	165	28-Jul-22	08-Jan-23
EP_SP_66_12-WP-2-M0.11.9	IWMF Substation ABWF Works	120	07-Nov-21	06-Mar-22
EP_SP_66_12-WP-2-M0.11.10	Access Ramp Bld ABWF Works	165	05-Sep-22	16-Feb-23
EP_SP_66_12-WP-2-M0.11.11	Reception Bld ABWF Works	135	11-Oct-22	22-Feb-23
EP_SP_66_12-WP-2-M0.12	**Building Services Installation**	581	09-Feb-22	12-Sep-23
EP_SP_66_12-WP-2-M0.12.1	Administration Bld BS Works	180	03-Feb-23	01-Aug-23
EP_SP_66_12-WP-2-M0.12.2	Weste Bunker & Tipping Hall Bld BS Works	210	04-Oct-22	01-May-23
EP_SP_66_12-WP-2-M0.12.3	Boiler & Flue Gas Bld BS Works	210	29-Dec-22	26-Jul-23
EP_SP_66_12-WP-2-M0.12.5	Turbine Hall Bld BS Works	344	07-Apr-22	16-Mar-23
EP_SP_66_12-WP-2-M0.12.6	Air Compressor Bld BS Works	135	02-Sep-22	14-Jan-23
EP_SP_66_12-WP-2-M0.12.4	Chimney BS Works	210	15-Feb-23	12-Sep-23
EP_SP_66_12-WP-2-M0.12.8	MT Plant & Desalination Bld BS Works	180	11-Oct-22	08-Apr-23
EP_SP_66_12-WP-2-M0.12.9	IWMF Substation BS Works	241	09-Feb-22	07-Oct-22
EP_SP_66_12-WP-2-M0.12.10	Access Ramp Bld BS Works	180	19-Nov-22	17-May-23
EP_SP_66_12-WP-2-M0.12.11	Reception Bld BS Works	120	24-Jan-23	23-May-23
EP_SP_66_12-WP-2-M0.13	**Process Equipment Installation**	677	28-Dec-21	04-Nov-23
EP_SP_66_12-WP-2-M0.13.2	Waste Bunker & Tipping Hall Bld Process Equipment Installation	233	01-Aug-22	21-Mar-23
EP_SP_66_12-WP-2-M0.13.3	Boiler House & Flue Gas Treatment Bld Process Equipment Installation	539	28-Dec-21	19-Jun-23
EP_SP_66_12-WP-2-M0.13.4	ACC Area Equipment Installation	375	23-Apr-22	02-May-23
EP_SP_66_12-WP-2-M0.13.5	Turbine Hall Bld Equipment Installation	335	02-Jun-22	02-May-23
EP_SP_66_12-WP-2-M0.13.6	Air Compressor Bld Equipment Installation	150	17-Sep-22	13-Feb-23
EP_SP_66_12-WP-2-M0.13.8a	MT Process Bld Process Equipment Installation	330	10-Dec-22	04-Nov-23
EP_SP_66_12-WP-2-M0.13.8b	Desalination Bld Process Equipment Installation	210	24-Aug-22	21-Mar-23
EP_SP_66_12-WP-2-M0.13.09	IWMF Substation Bld Equipment Installation	450	22-Feb-22	17-May-23
EP_SP_66_12-WP-2-M0.13.10	Ramp & Storage Bld Process Equipment Installation	150	19-Dec-22	17-May-23
EP_SP_66_12-WP-2-M0.13.12	Equipment Installaion at External Area	240	15-Sep-22	12-May-23
EP_SP_66_12-WP-2-M0.13.13	External Process Pipe Works	271	03-Oct-22	30-Jun-23
EP_SP_66_12-WP-2-M0.14	**Landscape, External Road and Drains Works**	872	07-Nov-21	27-Mar-24
EP_SP_66_12-WP-2-M0.15	**Works By CLP**	633	04-Feb-22	30-Oct-23
EP_SP_66_12-WP-2-M0.16	**Testing & Commissioning**	591	15-Dec-22	27-Jul-24



Progarmme for Design and Construction Works
Summary Programme

Date	Revision	Checked	Approved
04-Dec-17	Rev. 0 - 1st Issue		
16-Jul-18	Rev. 1 - Revised to SO's comments		
03-Sep-18	Rev. 2 - Revised to SO's comments		

Appendix B Summary of Implementation Status of Environmental Mitigation

Appendix B

Table B.1 Implementation Schedule for Air Quality Measures for the IWMF at the artificial island near SKC

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
S3b.8.1	Air Pollution Control (Construction Dust) Regulation & Good Site Practices • Use of regular watering, with complete coverage, to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather. • Use of frequent watering for particularly dusty construction areas and areas close to ASRs. • Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines. • Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs. • Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations. • Establishment and use of vehicle wheel and body washing facilities at the exit points of the site.	Work site / During the construction period	Contractor		✓			Air Pollution Control (Construction Dust) Regulation	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	• Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading points, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods. • Imposition of speed controls for vehicles on unpaved site roads. Ten kilometers per hour is the recommended limit. • Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs • Instigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.								
S3b.6.3	<u>Odour Removal by Deodorizers</u> • Deodorizers with 95% odour removal efficiency would be installed for the air ventilated from the mechanical treatment plant before discharge to the atmosphere	Waste reception halls, the waste storage area,	IWMF Operator	✓		✓		EIAO-TM	N/A
S3b.8.2	<u>Air Pollution Control and Stack Monitoring</u> • Air pollution control and stack monitoring system will be installed for the IWMF to ensure that the	IWMF stack emissions / During design &	IWMF Operator	✓		✓		EIAO-TM, Supporting Document for Application for	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	emissions from the IWMF stack will meet the proposed target emission limits. • Voluntary Enhancement Measures in Flue Gas Cleaning and Emission Monitoring: 1. Two-stage bag filter system with reagent recirculation; 2. In addition to SCR, provide SNCR for removal of NO_x; tighten emission limit for half-hourly and daily NO_x to 160 mg/m^3 and 80 mg/m_3 respectively; 3. Well-mixed feed waste: to minimize the fluctuation of pollutant loading on the flue gas treatment system; 4. Two more AQMSs would be set up at South Lantau and Shek Kwu Chau respectively; 5. Limit levels will be set under the IWMF DBO contract to require that waste feed shall cease if any of the air pollutant has exceeded 95% of the emission concentration limit as stipulated in the Special Process license; and 6. Each incineration chamber shall be fitted with auxiliary burners to ensure complete burn out of the combustion gases.	operation phase						Variation of Environmental Permit (EP-429/2012)	
-	<u>Treated Fly Ash and Air Pollution Control Residues:</u>	IWMF stack emissions /	IWMF Operator	✓		✓		Supporting Document for	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	• During testing and commissioning, the Contractor shall sample and test every container of treated fly ash and air pollution control residues for conformance to the Incineration Residue Pollution Control Limits and leachability criteria shown in Table 2 of the Environmental Permit. If a test result confirms that any one of the samples does not conform to the limits and the criteria, the Contractor shall be required to sample and test every container of treated fly ash and air pollution control residues for conformance to the Incineration Residue Pollution Control Limits and leachability criteria for the next six months. • During the first six months of operation, if the requirements in (a) could be fully conformed with, the Contractor shall sample and test every shipload of treated fly ash and air pollution control residues for conformance to the Incineration Residue Pollution Control Limits and leachability criteria shown in Table 2 of the Environmental Permit. The Contractor shall take two samples from each shipload for testing and the Contractor shall not dispose of any of that shipload of treated fly ash and air pollution control residues until the test	During design & operation phase						Application for Variation of Environmental Permit (EP-429/2012)	

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	results confirm that the two samples conform to the limits and the criteria. If a test result confirms that any one of the two samples does not conform to the limits and the criteria, the Contractor shall be required to sample and test every shipload of treated fly ash and air pollution control residues for conformance to the Incineration Residue Pollution Control Limits and leachability criteria for the next six months. The Contractor shall make due allowance in the Design and the Operation for the time to sample and test treated fly ash and air pollution control residues before disposal. • Provided that there is no non-conformance to the Incineration Residue Pollution Control Limits and leachability criteria shown in Table 2 of the Environmental Permit throughout a continuous sixmonth period in the Operation Period, the testing frequency shall be reduced to monthly interval.Two samples from one shipload of treated fly ash and air pollution control residues shall be collected and tested for conformance to the Incineration Residue Pollution Control Limits and leachability criteria. The Contractor shall not dispose of any of the treated fly ash and air pollution control residues in the								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	shipload which the samples are taken until the test results confirm that the samples conform to the limits and the criteria. If the test result confirm that any one of the samples does not conform to the limits and the criteria, the Contractor shall be required to sample and test every shipload of treated fly ash and air pollution control residues for conformance to the Incineration Residue Pollution Control Limits and leachability criteria shown in Table 2 of the Environmental Permit for the next six months.								
-	<u>Bottom Ash:</u> • During testing and commissioning, the Contractor shall sample and test every container of bottom ash for conformance to the leachability criteria shown in Table 2 of the Environmental Permit. If a test result confirms that any one of the samples does not conform to the criteria, the Contractor shall be required to sample and test every container of bottom ash for conformance to the leachability criteria for the next six months. • During the first six months of operation, if the requirements in (d) could be fully conformed with, the Contractor shall sample and test one shipload of bottom ash each month	IWMF stack emissions / During design & operation phase	IWMF Operator	✓		✓		Supporting Document for Application for Variation of Environmental Permit (EP-429/2012)	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	for conformance to the leachability criteria shown in Table 2 of the Environmental Permit. The Contractor shall take two samples from the shipload for testing and the Contractor shall not dispose of any of that shipload of bottom ash until the test results confirm that the two samples conform to the criteria. If a test result confirms that any one of the two samples does not conform to the criteria, the Contractor shall be required to sample and test each shipload of bottom ash for conformance to the leachability criteria for the next six months. The Contractor shall make due allowance in the Design and the Operation for the time to sample and test bottom ash before disposal. • Provided that there is no non-conformance to the leachability criteria shown in Table 2 of the Environmental Permit throughout a continuous six month period in the Operation Period, the Contractor shall be allowed to take two samples from any one shipload of bottom ash once every six months for conformance to the leachability criteria. The Contractor shall not dispose of any of the bottom ash in the shipload which the samples are								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	taken until the test results confirm that the samples conform to the criteria. If the test result confirm that any one of the samples does not conform to the criteria, the Contractor shall be required to sample and test one shipload of bottom ash each month for conformance to the leachability criteria shown in Table 2 of the Environmental Permit for the next six months as stipulated above.								

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table B.2 Implementation Schedule for Noise Impact Measures for the IWMF at the artificial island near SKC

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
S4b.8	Good site practices to limit noise emissions at source and use of quiet plant and working methods, whenever practicable.	Work Sites / Construction Period	EPD and its contractors		✓			EIAO-TM	Implemented
S4b.6 & S4b.8	All the ventilation fans installed in the below will be provided with silencers or acoustics treatment. (i) Stack of the incinerator (ii) Ventilation systems within the IWMF Enclosure and discharge silencer or other acoustic treatment equipment should be installed in the air-cooled chillers Other than provision of silencer or other acoustic treatment equipment for the stack of the incinerator and ventilation system, the detailed design should incorporate the following good practice in order to minimize the nuisance on the neighboring NSRs. (i) The exhaust of the ventilation system and any opening of the building should be located facing away from any NSRs; and (ii) Louver or other acoustic treatment equipment could also be applied to the exhaust of the ventilation system.	Within IWMF area / Construction Period	EPD and its contractors	✓		✓		EIAO-TM	N/A

-	Voluntary Enhancement Measure • Provision of air-conditioner and double glazed windows to nearby NSR at Shek Kwu Chau (i.e. SARDA) as precautionary measures.	IWMF site	Design team, contractor, IWMF operator	✓	✓			Supporting Document for Application for Variation of Environmental Permit (EP-429/2012)	Implemented

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table B.3 Implementation Schedule for Water Quality Measures for the Artificial Island near SKC

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
S5b.8.1.1	<u>Drainage and Construction Site Runoff</u> The site practices outlined in ProPECC PN 1/94 "Construction Site Drainage" should be followed as far as practicable in order to minimise surface runoff and the chance of erosion. These practices include the following items: • At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented to the commencement of construction. • Boundaries of earthworks should be surrounded by dykes or embankments for flood protection, as necessary. • Sand/silt removal facilities such as sand/silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the TM-DSS. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. The detailed design of the sand/silt traps shall be undertaken by the contractor • Water pumped out from foundation	Work site / During the construction period	Contractor		✓			EIAO-TM; ProPECC PN 1/94; WPCO	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	piles must be discharged into silt removal facilities. • Measures should be taken to minimize the ingress of site runoff and drainage into excavations. Drainage water pumped out from excavations should be discharged into storm drains via silt removal facilities. • During rainstorms, exposed slope/soil surfaces should be covered by a tarpaulin or other means, as far as practicable. Other measures that need to be implemented before, during and after rainstorms are summarized in ProPECC PN 1/94. • Exposed soil areas should be minimized to reduce potential for increased siltation and contamination of runoff. • Earthwork final surfaces should be well compacted and subsequent permanent work or surface protection should be immediately performed. • Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric during rainstorms.								
S5b.8.1.2	General Construction Activities Construction solid waste should be collected, handled and disposed of properly to avoid entering to the nearby watercourses and public drainage	Work site / During the construction period	Contractor		✓			EIAO-TM; ProPECC PN 1/94; WPCO	Reminders provided to the Contractor

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	system. Rubbish and litter from construction sites should also be collected to prevent spreading of rubbish and litter from the site area.								
S5b.8.1.3	There is a need to apply to EPD for a discharge license for discharge of effluent from the construction site under the WPCO. The discharge quality must meet the requirements specified in the discharge license. All the run-off and wastewater generated from the works areas should be treated so that it satisfies all the standards listed in the TM-DSS. The beneficial uses of the treated effluent for other on-site activities such as dust suppression and general cleaning etc., can minimize water consumption and reduce the effluent discharge volume. If monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project, the monitoring should be carried out in accordance with the relevant WPCO license which is under the ambit of regional office of EPD.	Work site / During the construction period	Contractor		✓			EIAO-TM; ProPECC PN 1/94; WPCO	Discharge License was issued on 22/08/2019.
S5b.8.1.4	Accidental Spillage Contractor must register as a chemical waste producer if chemical wastes would be produced from construction activities. The Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied with for control of chemical wastes.	Work site / During the construction period	Contractor		✓			EIAO-TM; ProPECC PN 1/94; WPCO; WDO	Implemented

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
S5b.8.1.5	Maintenance of vehicles and equipment involving activities with potential for leakage and spillage should only be undertaken within the areas which appropriately equipped to control these discharges.	Work site / During the construction period	Contractor		✓			EIAO-TM; ProPECC PN 1/94; WPCO; WDO	Deficiency of Mitigation Measures but rectified by the Contractor.
S5b.8.1.6	Oils and fuels should only be used and stored in designated areas which have pollution prevention facilities. All fuel tanks and storage areas should be sited on sealed areas in order to prevent spillage of fuels and solvents to the nearby watercourses. All waste oils and fuels should be collected in designated tanks prior to disposal.	Work site / During the construction period	Contractor		✓			EIAO-TM; ProPECC PN 1/94; WPCO; WDO	Deficiency of Mitigation Measures but rectified by the Contractor.
S5b.8.1.7	Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance. The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published under the Waste Disposal Ordinance details the requirements to deal with chemical wastes. General requirements are given as follows: • Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport. • Chemical waste containers should be suitably labelled, to notify and warn the personnel who are handling the wastes, to avoid accidents. • Storage area should be selected at a safe location on site and adequate space should be allocated to the	Work site / During the construction period	Contractor		✓			EIAO-TM; ProPECC PN 1/94; WPCO; WDO	Deficiency of Mitigation Measures but rectified by the Contractor.

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	storage area.								
S5b.8.1.8	Sewage Effluent Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site where necessary to handle sewage from the workforce. A licensed contractor would be responsible.	Work site / During the construction period	Contractor		✓			EIAO-TM; ProPECC PN 1/94; WPCO	N/A
S5b.8.1.9	Reclamation and Construction of Breakwaters • The proposed dredging and reclamation should be commenced in phases. The breakwaters and seawalls should be constructed and the reclamation should be started within the enclosed breakwaters after the completion of the breakwater. Silt curtain should be applied around caissons / blockwork during the filling of the cell to prevent the loss of fine in the filling material. • The maximum production rate for dredging for the anti-scouring protection layer shall not exceed the permitted maximum daily dredging rate and carried out within its respective distance from the nearest non-translocatable coral community by the dredging contractor as specified in S.2.18 of the Further Environmental Permit (no.:FEP-01/429/2012/A). It is recommended to employ closed grab with small capacity of 2 m^3 to control the dredging rate. • Any gap that may need to be provided for marine access will be located at the middle of the North Western seawall, away from the identified coral communities and will be shielded by silt curtains systems to control	Work site / During the marine construction period	Contractor		✓			EIAO-TM; WPCO, Supporting Document for Application for Variation of Environmental Permit (EP-429/2012) Further Environmental Permit No. FEP-01/429/2012/A	Deficiency of Mitigation Measures but rectified by the Contractor.

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	sediment plume dispersion. • The silt curtain system at marine access opening should be closed as soon as the barges passes through the marine access opening in order to minimize the period of curtain opening. Filling should only be carried out behind the silt curtain when the silt curtain is completely closed. • To enhance the effectiveness of the silt curtain at the marine access, the northern breakwater would be built before the commencement of the reclamation to reduce the current velocity towards the marine access opening. • The silt curtain system at marine access opening should be regularly checked and maintained to ensure proper functioning. • Where public fill is proposed for filling below +2.5mPD, the fine content in the public fill will be controlled to 25% which is in line with the CEDD's General Specification; • The filling for reclamation should be carried out behind the seawall. The filling material should only consist of public fill, rock and sand. The filling composition and filling rates at each filling area should follow those delineated in Table 1 of the FEP-01/429/2012/. The filling above high watermark is not restricted; • No dredging should be carried out within 16m to the nearest non-translocatable coral community;								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	• Daily site audit including full-time on-site monitoring by the ET is recommended during the dredging for anti-scouring protection layer for checking the compliance with the permitted no. of grab; • Closed grab dredger should be used to minimize the loss of sediment during the raising of the loaded grabs through the water column; • Frame-type silt curtains should be deployed around the dredging operations; • Floating-type silt curtains should be used to surround the circular cell during the sheetpiling work; • The descent speed of grabs should be controlled to minimize the seabed impact speed; • Barges should be loaded carefully to avoid splashing of material; • All barges used for the transport of dredged materials should be fitted with tight bottom seals in order to prevent leakage of material during loading and transport; • No concurrence works between laying of submarine cables and dredging/reclamation works within the same location is allowed. For works close to each other, the construction program should be arranged so that the dredging/reclamation works within area bounded by the breakwaters and the laying of cables would not operate within a								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	distance of 80m from each other to avoid any accumulative impact on the environment (in case if such tight schedule is necessary). • All barges should be filled to a level which ensures that material does not spill over during loading and transport to the disposal site and that adequate freeboard is maintained to ensure that the decks are not washed by wave action. • No DCM works should be carried out within 100m to the nearest non-translocatable coral colony / colonies. • Silt curtains should be employed to enclose DCM field trial and any full scale DCM work to minimize the potential impacts on water aspect. • A sand blanket is to be placed on top of the marine deposit using tremie pipes prior to the DCM ground treatment to avoid seabed sediment disturbance.								
S5b.8.2.3	Operational Phase Discharges A pipeline drainage system will serve the development area collecting surface runoff from paved areas, roof, etc. Sustainable drainage principle would be adopted in the drainage system design to minimize peak surface runoff, maximize permeable surface and maximize beneficial use of rainwater.	Within IWMF site / During the operational phase	IWMF Operator	✓		✓		WPCO	N/A
S5b.8.2.4	Oil interceptors should be provided in the drainage system of any potentially contaminated areas (such as truck parking area and maintenance workshop) and	Within IWMF site / During the operational	IWMF Operator	✓		✓		WPCO; WDO	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	regularly cleaned to prevent the release of oil products into the storm water drainage system in case of accidental spillages. Accidental spillage should be cleaned up as soon as practicable and all waste oils and fuels should be collected and handled in compliance with the Waste Disposal Ordinance.	phase							
S5b.8.2.5	Refuse Entrapment Collection and removal of floating refuse should be performed at regular intervals for keeping the water within the Project site boundary and the neighboring water free from rubbish.	Within the Project site / During the operational phase	IWMF Operator			✓		WPCO	N/A
S5b.8.2.6	Transportation of bottom ash, fly ash and APC residues to WENT Landfill for disposal Covered container should be used in the shipping of the incineration waste to limit the contact between the incineration waste and the marine water. A comprehensive emergency response plan for any accidental spillage should be submitted by the operation contractor to the EPD for agreement before the operation of the facilities. Salvage and cleanup action to recover the spilled incineration waste containers following the spillage should be carried out according to the emergency response plan to mitigate the environmental impact in case of spillage.	Transportation of Incineration Ash / During the operational phase	IWMF Operator			✓			N/A

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table B.4 Implementation Schedule for Waste Management Measures for the IWMF at the artificial island near SKC

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
6b.5.1.2	Good Site Practices Adverse environmental impacts in relation to waste management are not expected, provided that good site practices are strictly followed. Recommendations for good site practices during the construction activities would include: • Obtain relevant waste disposal permits from appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354) and subsidiary Regulations and the Land (Miscellaneous Provisions) Ordinance (Cap. 28); • Provide staff training for proper waste management and chemical handling procedures; • Provide sufficient waste disposal points and regular waste collection; • Provide appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers; and • Carry out regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; • Separate chemical wastes for special handling and disposed of to licensed facility for treatment; and • Employ licensed waste collector to collect waste.	Work Site/ During Construction Period	Contractor		✓			WDO; LDO; ETWB TCW No. 19/2005; EIAO-TM	Deficiency of Mitigation Measures but rectified by the Contractor.

<table>
<tr><th rowspan="2">EIA Ref</th><th rowspan="2">Environmental Protection Measures / Mitigation Measures</th><th rowspan="2">Location / Timing</th><th rowspan="2">Implementation Agent</th><th colspan="4">Implementation Stages*</th><th rowspan="2">Relevant Legislation and Guidelines</th><th rowspan="2">Implementation Status and Remarks</th></tr>
<tr><th>Des</th><th>C</th><th>O</th><th>Dec</th></tr>
<tr><td>6b.5.1.3</td><td><u>Waste Reduction Measures</u>

Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices.

Recommendations to achieve waste reduction include:
• Design foundation works that could minimize the amount of excavated material to be generated.
• Provide training to workers on the importance of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling;
• Sort out demolition debris and excavated materials from demolition works to recover reusable/recyclable portions (i.e. soil, broken concrete, metal etc.);
• Segregate and store different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;
• Encourage the collection of aluminum cans by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the work force;
• Proper storage and site practices to minimize the potential for damage or contamination of construction materials; and</td><td>Work Site/ During Design & Construction Period</td><td>Contractor</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td>Implemented; N/A for foundation and demolition items</td></tr>
</table>

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	• Plan and stock construction materials carefully to minimize amount of waste to be generated and to avoid unnecessary generation of waste.								
6b.5.1.7	Dredged Sediment – Application of Dumping Permit The project proponent should agree in advance with MFC of CEDD on the site allocation. The project proponent or contractor for the dredging works shall then apply for the site allocations of marine sediment disposal based on the prior agreement with MFC/CEDD. The project proponent or contractor should also be responsible for the application of all necessary permits from relevant authorities, including the dumping permit as required under DASO from EPD, for the disposal of dredged sediment prior to the commencement of the dredging works.	Seawall and Reclamation site / Construction Period	EPD and its contractor	✓	✓			DASO ETWB TCW 34/2002	Implemented
6b.5.1.8	Dredged Sediment – Sediment Quality Report The project proponent or contractor will need to satisfy the appropriate authorities that the quality of the marine sediment to be dredged has been identified according to the requirements of ETWB TCW 34/2002. This should be completed well before the dredging works and would include at least the submission of a formal Sediment Quality Report under Tier I of ETWB TCW No. 34/2002 to DEP for approval. Subject to advice from DEP, it is possible that further marine SI in accordance with ETWB TCW 34/2002	Seawall and Reclamation site / Construction Period	EPD and its contractor	✓				DASO ETWB TCW 34/2002	Implemented

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
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	might be necessary for the application of dumping permit under DASO. In such case, a sediment sampling and testing proposal shall be submitted to and approved by DEP before the additional marine SI works.								
6b.5.1.9	<u>Dredged Sediment – Sediment Transportation</u> The barge transporting the sediments to the designated disposal sites should be equipped with tight fitting seals to prevent leakage and should not be filled to a level that would cause overflow of materials or laden water during loading or transportation. In addition, monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels shall be equipped with automatic self-monitoring devices as specified by the DEP.	Seawall and Reclamation site / Construction Period	EPD and its contractor		✓			DASO ETWB TCW 34/2002	Implemented
6b.5.1.10	<u>Construction and Demolition Materials</u> In order to minimize the impact resulting from collection and transportation of C&D materials for off-site disposal, the excavated material arising from site formation and foundation works should be reused on-site as backfilling material and for landscaping works as far as practicable. Other mitigation requirements are listed below: • A Waste Management Plan (WMP), which becomes part of the Environmental Management Plan (EMP), should be prepared in accordance with ETWB TCW No.19/2005;	Work Site/ During Design & Construction Period	Contractor	✓	✓			ETWB TCW No. 19/2005	Implemented

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	• A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be adopted for easy tracking; and • In order to monitor the disposal of C&D materials at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be adopted (refer to *ETWB TCW No. 31/2004*).								
6b.5.1.11 – 6b.5.1.12	The Contactor should prepare and implement an EMP in accordance with ETWB TCW No.19/2005, which describes the arrangements for avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal of different categories of waste to be generated from construction activities. Such a management plan should incorporate site specific factors, such as the designation of areas for segregation and temporary storage of reusable and recyclable materials. The EMP should be submitted to the Engineer for approval. The Contractor All surplus C&D materials arising from or in connection with construction works should become the property of the Contractor when it is removed unless otherwise stated. The Contractor would be responsible for devising a system to work for on-site sorting of C&D materials and promptly removing all sorted and process materials arising from the construction activities to minimize temporary stockpiling on-site. The system should be	Work Site/ During Design & Construction Period	Contractor	✓	✓			ETWB TCW No. 19/2005	Implemented

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	included in the EMP identifying the source of generation, estimated quantity, arrangement for on-site sorting, collection, temporary storage areas and frequency of collection by recycling Contractors or frequency of removal off-site.								
6b.5.1.13	Chemical Wastes Should chemical wastes be produced at the construction site, the Contractor would be required to register with EPD as a Chemical Waste Producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used, and incompatible corrosive). The Contractor should employ a licensed collector to transport and dispose of the chemical wastes, to either the Chemical Waste Treatment Centre at Tsing Yi, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.	Work Site/ During Construction Period	Contractor		✓			Waste Disposal (Chemical Waste) (General) Regulation	Implemented
6b.5.1.14	General Refuse General refuse should be stored in enclosed bins or compaction units separate from C&D materials. A licensed waste collector should be employed by the Contractor to remove general refuse from the site, separately from C&D materials. Preferably an enclosed and covered area should be provided to reduce the occurrence of ‘wind blown’ light material.	Work Site/ During Construction Period	Contractor		✓			Public Health and Municipal Services Ordinance	Deficiency of Mitigation Measures but rectified by the Contractor.

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
6b.5.1.16 – 6b.5.1.33	Biogas Generation The Contractor shall review the data and analysis results, and the data from further Site Investigation, if any. Subject to the review findings, the following gas protection measures may be considered if necessary: - gas monitoring after reclamation; - passive ventilation; - gas impermeable membrane; - ventilation with "at risk" rooms; - protection of utilities or below ground services; - precautions during construction works; - precautions prior to entry of belowground services	Reclamation site (if dredging at the reclamation site is not required) / Design & Construction Period	Designer and/or contractor	✓	✓			EPD/TR8/97	N/A
6b.5.2.1	Good Site Practices It is recommended that the following good operational practices should be adopted to minimise waste management impacts: • Obtain the necessary waste disposal permits from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354) and Waste Disposal (Chemical	IWMF Site/During Operation Period	IWMF Operator			✓		Waste Disposal Ordinance (Cap.354); Waste Disposal (Chemical Waste) (General) Regulation; ETWB TCW No. 1/2004	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	Waste) (General) Regulation; • Nomination of an approved person to be responsible for good site practice, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site; • Use of a waste haulier licensed to collect specific category of waste; • A trip-ticket system should be included as one of the contractual requirements and implemented by the Environmental Team to monitor the disposal of solid wastes at landfills, and to control fly tipping. Reference should be made to ETWB TCW No. 31/2004. • Training of site personnel in proper waste management and chemical waste handling procedures; • Separation of chemical wastes for special handling and appropriate treatment at a licensed facility; • Routine cleaning and maintenance programme for drainage systems, sumps and oil interceptors; • Provision of sufficient waste disposal points and regular collection for disposal; • Adoption of appropriate measures to minimize windblown litter and dust during transportation of waste, such as covering trucks or transporting wastes in enclosed containers; and • Implementation of a recording system for the amount of wastes generated, and disposed of (including recycled								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	the disposal sites).								
6b.5.2.2	Waste Reduction Measures Good management and control can prevent the generation of significant amounts of waste. It is recommended that the following good operational practices should be adopted to ensure waste reduction: • Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal; • Encourage collection of aluminum cans, plastic bottles and packaging material (e.g. carton boxes) and office paper by individual collectors. Separate labelled bins should be provided to help segregate this waste from other general refuse generated by the work force; and • Any unused chemicals or those with remaining functional capacity should be reused as far as practicable.	IWMF Site/ During Operation Period	IWMF Operator			✓			Implemented
6b.5.2.3	Storage, Handling, Treatment, Collection and Disposal of Incineration By-Products The following measures are recommended for the storage, handling and collection of the incineration by-products: • Ash should be stored in storage silos; • Ash should be handled and conveyed in closed systems fully	IWMF Site/ During Operation Period	IWMF Operator			✓		Incineration Residue Pollution Control Limits	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	segregated from the ambient environment; • Ash should be wetted with water to control fugitive dust, where necessary; • All fly ash and APC residues should be treated, e.g. by cement solidification or chemical stabilization, for compliance with the proposed Incineration Residue Pollution Control Limits and leachability criteria prior to disposal; • The ash should be transported in covered trucks or containers to the designated landfill site. The Contractor should provide EPD with chemical analysis results of the bottom ash, and treated fly ash and APC residues to confirm that the ash/residue can comply with the proposed Incineration Residue Pollution Control Limits before disposal.								
6b.6.3.1	<u>Fuel Oil Tank Construction and Test</u> • The fuel tank to be installed should be of specified durability. • Double skin tanks are preferred. • Underground fuel storage tank should be placed within a concrete pit. • The concrete pit shall be accessible	Fuel Oil Storage Tank/ During Design, Construction and Operation Periods	IWMF Contractor	✓	✓	✓			N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	to allow regular tank integrity tests to be carried out at regular intervals. • Tank integrity tests should be conducted by an independent qualified surveyor or structural engineer. • Any potential problems identified in the test should be rectified as soon as possible.								
6b.6.3.1	Fuel Oil Pipeline Construction and Test • Installation of aboveground fuel oil pipelines is preferable; if underground pipelines are unavoidable, concrete lined trenches should be constructed to contain the pipelines. • Double skin pipelines are preferred. • Distance between the fuel oil refuelling points and the fuel oil storage tank shall be minimized. • Integrity tests for the pipelines should be conducted by an independent qualified surveyor or structural engineer at regular intervals. • Any potential problems identified in the test should be rectified as soon as possible.	Fuel Oil Pipelines/ During Design, Construction and Operation Periods	IWMF Contractor	✓	✓	✓			N/A
6b.6.3.1	Fuel Oil Leakage Detection • Installation of leak detection device at storage tank and pipelines.	Fuel Oil Storage Tank and Pipelines/	IWMF Contractor	✓	✓	✓			N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	• Installation and use of pressure gauges (e.g. at the two ends of a filling line) in fuel filling, which allows unexpected pressure drop or difference and sign of leakage to be detected.	During Design, Construction and Operation Periods							
6b.6.3.1	Fuel Oil Storage Tank Refuelling • Storage tank refuelling (from road tanker) should only be conducted by authorized staff of the oil company using the company's standard procedures.	Fuel Oil Refuelling Point/ During Operation Period	IWMF Operator			✓			N/A
6b.6.3.1	Fuel Oil Spillage Response An Oil Spill Response Plan should be prepared by the operator to document the appropriate response procedures for oil spillage incidents in detail. General procedures to be taken in case of fuel oil spillage are presented below. • Training - Training on oil spill response actions should be given to relevant staff. The training shall cover the followings: ➢Tools & resources to combat oil spillage and fire, e.g. locations of oil spill handling equipment and fire fighting equipment; ➢General methods to deal with oil spillage and fire incidents; ➢Procedures for emergency drills in the event of oil spills and fire; and	IWMF Site/ During Operation Period	IWMF Operator			✓			N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	➢Regular drills shall be carried out. • Communication -Establish communication channel with the Fire Services Department (FSD) and EPD to report any oil spillage incident so that necessary assistance from relevant department can be quickly sought. • Response Procedures -Any fuel oil spillage within the IWMF site should be immediately reported to the Plant Manager with necessary details including location, source, possible cause and extent of the spillage. -Plant Manager should immediately attend to the spillage and initiate any appropriate action to confine and clean up the spillage. The response procedures shall include the following: ➢Identify and isolate the source of spillage as soon as possible. ➢Contain the oil spillage and avoid infiltration into soil/ groundwater and discharge to storm water channels. ➢Remove the oil spillage. ➢Clean up the contaminated area. ➢If the oil spillage occurs during storage tank refuelling, the refueling operation should immediately be								

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	stopped. ➢Recovered contaminated fuel oil and the associated material to remove the spilled oil should be considered as chemical waste. The handling and disposal procedures for chemical wastes are discussed in the following paragraphs.								
6b.6.3.2	Chemicals and Chemical Wastes Handling & Storage • Chemicals and chemical wastes should only be stored in suitable containers in purpose-built areas. • The storage of chemical wastes should comply with the requirements of the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • The storage areas for chemicals and chemical wastes shall have an impermeable floor or surface. The impermeable floor/ surface shall possess the following properties: - Not liable to chemically react with the materials and their containers to be stored. - Able to withstand normal loading and physical damage caused by container handling - The integrity and condition of the impermeable floor or surface should	Chemicals and Chemical Wastes Storage Area / During Operation Period	IWMF Operator			✓			N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	be inspected at regular intervals to ensure that it is satisfactorily maintained ➢ For liquid chemicals and chemical wastes storage, the storage area should be bunded to contain at least 110% of the storage capacity of the largest containers or 20% of the total quantity of the chemicals/chemical wastes stored, whichever is the greater. ➢ Storage containers shall be checked at regular intervals for their structural integrity and to ensure that the caps or fill points are tightly closed. ➢ Chemical handling shall be conducted by trained workers under supervision.								
6b.6.3.2	<u>Chemicals and Chemical Wastes Spillage Response</u> A Chemicals and/ or Chemical Wastes Spillage Response Plan shall be prepared by the operator to document in detail the appropriate response procedures for chemicals or chemical wastes spillage incidents. General procedures to be undertaken in case of chemicals/ chemical waste spillages are presented below. • Training - Training on spill response actions	IWMF Site/ During Operation Period	IWMF Operator			✓			N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	should be given to relevant staff. The training shall cover the followings: ➢ Tools & resources to handle spillage, e.g. locations of spill handling equipment; ➢ General methods to deal with spillage; and ➢ Procedures for emergency drills in the event of spills. • Communication - Establish communication channel with FSD and EPD to report the spillage incident so that necessary assistance from relevant department can be quickly sought. • Response Procedures - Any spillage within the IWMF site should be reported to the Plant Manager. - Plant Manager shall attend to the spillage and initiate any appropriate actions needed to confine and clean up the spillage. The response procedures shall include the followings: ➢ Identify and isolate the source of spillage as soon as possible; ➢ Contain the spillage and avoid infiltration into soil/								

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				Des	C	O	Dec		
	groundwater and discharge to storm water channels (in case the spillage occurs at locations out of the designated storage areas); ➢ Remove the spillage; the removal method/ procedures documented in the Material Safety Data Sheet (MSDS) of the chemicals spilled should be observed; ➢ Clean up the contaminated area (in case the spillage ➢ The waste arising from the cleanup operation should be considered as chemical wastes.								
6b.6.3.3	<u>Preventive Measures for Incineration By-products Handling</u> The recommended measures listed below can minimize the potential contamination to the surrounding environment due to the incineration by-products: • Ash should be stored in storage silos; • Ash should be handled and conveyed in closed systems fully • Ash should be wetted with water to control fugitive dust, where necessary; • All fly ash and APC residues should be treated, e.g. by cement solidification or chemical	Storage, Handling & Collection of Incineration Ash at IWMF/ During Operation Period	IWMF Operator			✓			N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	stabilization, for compliance with the proposed Incineration Residue Pollution Control Limits and leachability criteria prior to disposal; • The ash should be transported in covered trucks or containers to the designated landfill site.								
6b.6.3.4 - 6b.6.3.6	<u>Incident Record</u> After any spillage, an incident report should be prepared by the Plant Manager. The incident report should contain details of the incident including the cause of the incident, the material spilled and estimated spillage amount, and also the response actions undertaken. The incident record should be kept carefully and able to be retrieved when necessary. The incident report should provide sufficient details for the evaluation of any environmental impacts due to the spillage and assessment of the effectiveness of measures taken. In case any spillage or accidents results in significant land contamination, EPD should be informed immediately and the IWMF operator should be responsible for the cleanup of the affected area. The responses procedures described in **Section 6b.6.3.1** and **Section 6b.6.3.2** of EIA report should be followed accordingly together with the land contamination assessment and remediation guidelines	IWMF Site/ During Operation Period	IWMF Operator			✓		Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management and the Guidance Note for Contaminated Land and Remediation.	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
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	stipulated in the *Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management and the Guidance Note for Contaminated Land and Remediation.*								

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table B.5 Implementation Schedule for Ecological Quality Measures for the IWMF at the artificial island near SKC

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
7b.8.2.1	Measures to avoid direct loss of intertidal habitat • The site boundary has been proposed to avoid direct contact with the intertidal natural rocky shore of Shek Kwu Chau. It avoids direct loss of intertidal communities and the existing natural rocky shore habitat, where Reef Egret and White-bellied Sea Eagle have been recorded within and in the vicinity of this habitat.	IWMF site	Design team	✓				EIAO-TM	N/A
7b.8.2.2	Measures to minimise loss of coastal subtidal habitat • Extensive coral colonies were recorded at the coastal hard bottom habitat at Shek Kwu Chau. To avoid and minimise the extensive direct impact on the coral colonies, the proposed reclamation area has been moved further offshore to minimise loss of subtial habitat near shore.	IWMF site	Design team	✓				EIAO-TM	N/A
7b.8.2.3	Zero Discharge Scheme • The design scheme of the Project has avoided discharge of wastewater into the marine environment. mechanical treatment plant, or for onsite washdown and landscape.	IWMF site	Design team, IWMF operator	✓		✓		WPCO	N/A
7b.8.2.4	Measures to avoid loss of plant species of conservation importance • Landing portal construction works would not cause direct lost to the recorded individual of protected plant species,	Cheung Sha landing portal	Design team, Contractor	✓	✓		✓	EIAO-TM	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	• *Aquilaria sinensis*, at the coastal shrubland habitat at Cheung Sha. As a precautionary measure, the plant should be tagged with eye-catching tape and fenced off prior to works, in order to avoid any damage by workers.								
7b.8.3.1-7b.8.3.15	Measures to minimise water quality impact • Measures for water quality as recommended in **Section 5b** of the EIA Report should be implemented.	Work site	Design team, contractor, IWMF operator	✓	✓	✓	✓	EIAO-TM; ProPECC PN 1/94; WPCO	Implemented
7b.8.3.16 - 7b.8.3.30	Measures to minimise disturbance on Finless Porpoise *Minimisation of Habitat Loss for Finless Porpoise* • Substantial revision has been made on the layout plan and form of the breakwater, in order to minimise the potential loss of important habitat for Finless Porpoise. The revision has greatly reduced the size of the embayment area, as well as the Project footprint. As a result, the size of habitat loss for Finless Porpoise has reduced from the original ~50 ha, down to ~31 ha. *Avoidance of peak season for finless porpoise occurrence* • To minimise potential acoustic disturbance from construction activities	IWMF site,	Design team, contractor, IWMF operator	✓	✓	✓	✓	EIAO-TM, Supporting Document for Application for Variation of the Environmental Permit (EP-429/2012)	Implemented for avoidance of construction works that may produce underwater acoustic disturbance, Vessel Travel Route implementation, training of staff, MMEZ and marine mammal watching works during deployment of silt curtain; N/A for others

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	on Finless Porpoise, construction works that may produce underwater acoustic disturbance should be scheduled outside the months with peak Finless Porpoise occurrence (December to May), including: - sheet piling works for construction of cofferdam surrounding the reclamation area (Phase 1); - sheet piling works for construction of the shorter section of breakwater (Phase 1); - sheet piling works for construction of the remaining section of breakwater (Phase 3); - bored piling works for berth area (Phase 3); and - submarine cable installation works between Shek Kwu Chau and Cheung Sha. Such works should be restricted within June to November. This approach would not only avoid the peak season for Finless Porpoise occurrence, the magnitude of impacts arise from acoustic disturbance would also be minimised. • Submarine cable installation works • Since the DCM ground treatment and the installation of precast seawalls and								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	breakwaters should generate no underwater acoustic disturbance to Finless Porpoise, no specific mitigation measures are required. *Opt for quieter construction methods and plants* • Considering the sensitivity of marine mammals to underwater acoustic disturbance, instead of the previously proposed conventional breakwater and reclamation peripheral structure, which requires noisy piling works, the current circular cells structure for breakwater and reclamation peripheral structure is proposed. A quieter sheet piling method using vibratory hammer or hydraulic impact hammer, should be adopted for the installation of circular cells for cellular cofferdam and northern breakwater during Phase 1, and southern breakwater Phase 3; • Non-percussive bore piling method would be adopted for the installation of tubular piles for the berth construction during Phase 3. *Monitored exclusion zones* • During the installation/re-installation/relocation process of floating type silt curtains, in order to avoid the accidental entrance and entrapment of marine								

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	mammals within the silt curtains, a monitored exclusion zone of 250 m radius from silt curtain should be implemented. The exclusion zone should be closely monitored by an experienced marine mammal observer at least 30 minutes before the start of installation/re-installation/relocation process. If a marine mammal is noted within the exclusion zone, all marine works should stop immediately and remain idle for 30 minutes, or until the exclusion zone is free from marine mammals. • The experienced marine mammal observer should be well trained to detect marine mammals. Binoculars should be used to search the exclusion zone from an elevated platform with unobstructed visibility. The observer should also be independent from the project proponent and has the power to call-off construction activities. • In addition, as marine mammals cannot be effectively monitored within the proposed monitored exclusion zone at night, or during adverse weather conditions (i.e. Beaufort 5 or above, visibility of 300 meters or below), marine works should be avoided under weather conditions with low visibility.								

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	Marine mammal watching plan • Upon the completion of the installation/re-installation/relocation of floating type silt curtain, all marine works would be conducted within a fully enclosed environment within the silt curtain, hence exclusion zone monitoring would no longer be required. Subsequently, a marine mammal watching plan should be implemented. The plan should include regular inspection of silt curtains, and visual inspection of the waters surrounded by the curtains. Special attention should be paid to Phase 2 (reclamation) where the floating type still curtain would be opened occasionally for vessel access, leaving a temporary 50 m opening. An action plan should be devised to cope with any unpredicted incidents such as the case when marine mammals are found within the waters surrounded by the silt curtains. *Small openings at silt curtains* • The openings for vessel access at the silt curtains should be as small as possible to minimise the risk of accidental entrance. *Adoption of regular travel route*								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	• During construction and operation, captains of all vessels should adopt regular travel route, in order to minimize the chance of vessel collision with marine mammals, which may otherwise result in damage to health or mortality. The regular travel route should avoid areas with high sighting density of Finless Porpoise as much as possible. *Vessel speed limit* • The frequent vessel traffic in the vicinity of works area may increase the chance of mammal mammals being killed or seriously injured by vessel collision. A speed limit of ten knots should be strictly enforced within areas with high density of Finless Porpoise. • Passive acoustic monitoring and land-based theodolite monitoring surveys should be adopted to verify the predicted impacts and effectiveness of the proposed mitigation measures. *Training of Staff* • Staff, including captains of vessels, should be aware of the guidelines for safe vessel operations in the presence of cetaceans during construction and								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	operation phases. Adequate trainings should be provided								
7b.8.3.31 - 7b.8.3.34	<u>Measures to minimise impact on corals</u> *Coral translocation* • Coral communities within and in proximity to the proposed dredging sites would be disturbed by the Project due to the dredging operations. In order to minimise direct loss of coral communities, translocation of corals that are attached to movable rocks with diameter less than 50 cm are recommended. In order to avoid disturbance to corals during the spawning period, the spawning season of corals (June to August) should be avoided; and that translocation should be carried out during the winter season (November-March). • The REA survey results suggest that the 198 directly affected coral colonies were attached to movable rocks (less than 50 cm in diameter). It is technically feasible to translocate them to avoid direct loss. • Prior to coral translocation, a more detailed baseline survey, including event / action plan for coral monitoring should be submitted upon approval of this Project, prior to commencement of	IWMF site	Design team, contractor, IWMF operator	✓	✓	✓	✓	EIAO-TM	Implemented, tagged coral found missing after hitting by typhoons Re-tagging of 10 coral colonies at indirect impact site and control site were conducted in November and December 2018 respectively.

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	construction works. Advice from relevant governmental departments (i.e. AFCD) and professionals would be sought after, in order to identify a desirable location for the relocation of coral communities. Post-translocation monitoring on the translocated corals should also be considered. *Coral monitoring programme* • A coral monitoring programme is recommended to assess any adverse and unacceptable impacts to the coral communities at the coasts of Shek Kwu Chau during construction of the Project. *Phasing of Works* • To minimize environmental impacts, the proposed phasing of construction works has been carefully designed to reduce the amount of concurrent works, hence minimize SS elevation and the associated impacts on corals.								
7b.8.3.35 - 7b.8.3.41	<u>Specific measures to minimize disturbance on breeding White-bellied Sea Eagle</u> *Avoidance of noisy works during the breeding season of White-bellied Sea Eagle* • To minimize potential noise disturbance	IWMF site, marine traffic route	Design Team, Contractor, IWMF operator	✓	✓	✓	✓	EIAO-TM	Implemented

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	from construction activities on WBSE, noisy construction works should be scheduled outside their breeding season (December to May) to minimise potential degradation in breeding ground quality and breeding activities, including: - sheet piling works for construction of cofferdam surrounding the reclamation area (Phase 1); - sheet piling works for construction of the shorter section of breakwater (Phase 1); - sheet piling works for construction of the remaining section of breakwater (Phase 3); and - bored piling works for berth area (Phase 3). *Opt for quieter construction methods and plants* • To minimise potential construction noise disturbance on WBSE, quieter construction methods and plants should be adopted. The recommended noise mitigation measures in the **Noise** chapter (**Section 4b.8** of the EIA Report) should be implemented to minimise potential noise disturbance to acceptable levels. *Restriction on vessel access near the nest of White-bellied Sea Eagle*								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	• During construction and operation, in order to minimize disturbance on the existing WBSE nest, a pre-defined practical route to restrict vessel access near the nest should be adopted to keep vessels and boats as far away from the nest as possible. *White-bellied Sea Eagle monitoring programme* • A WBSE monitoring programme is recommended to assess any adverse and unacceptable impacts to the breeding activities of WBSE during construction and operation of the Project. Monitoring surveys for WBSE would include pre-construction phase (twice per month for duration of three months during their breeding season -between December and May, immediately before the commencement of works), construction phase, and operation phase (two years after the completion of construction works). • Surveys should be conducted twice per month during their breeding season (from December to May); and once per month outside breeding season (June to November). More details on monitoring for WBSE are presented in the EM&A Manual.								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	Education of staff • Staff, including captains of all vessels during construction and operation phases, should be aware of the ecological importance of WBSE. Awareness should be raised among staff to minimise any intentional or unintentional disturbance to the nest. *Minimisation of Glare Disturbance* • To minimise glare disturbance on WBSE, which may cause disorientation of birds by interfering with their magnetic compass, and disruption in behavioural patterns such as reproduction, fat storage and foraging pattern, any un-necessary outdoor lighting should be avoided, and in-ward and down-ward pointing of lights should be adopted.								
-	Construction of Seawall/Breakwaters • To widen the open channel between the Artificial Island and Shek Kwu Chau. • To design the precast concrete seawall with environmental friendly features.	IWMF site	Design team, contractor, IWMF operator	✓	✓			Supporting Document for Application for Variation of Environmental Permit (EP-429/2012)	N/A
7b.8.3.42	Opt for Quieter Construction Methods and Plants • Quieter construction methods and plants	Work site	Design team, contractor, IWMF operator	✓	✓	✓	✓	EIAO-TM	Implemented

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	should be used to minimise disturbance to the nearby terrestrial habitat and the associated wildlife.								
7b.8.3.43	Measures to minimize impacts from artificial lighting • Unnecessary lighting should be avoided, and shielding of lights should be provided to minimize disturbance from light pollution on fauna groups.	IWMF site	Design team, contractor, IWMF operator	✓	✓	✓		EIAO-TM	Implemented
7b.8.3.44 - 7b.8.3.45	Measures to minimize accidental spillage • Regular maintenance of vessels, vehicles and equipment that may cause leakage and spillage should only be undertaken within pre-designated areas, which are appropriately equipped to control the associated discharges. • Oils, fuels and chemicals should be contained in suitable containers, and only be used and stored in designated areas which have pollution prevention facilities. All fuel tanks and storage areas should be sited on sealed areas in order to prevent spillage of fuels and solvents to the nearby watercourses. All waste oils and fuels should be collected in designated tanks prior to disposal.	Work site	Contractor, IWMF operator		✓	✓	✓	EIAO-TM	Implemented
7b.8.3.46	Measures to minimise sewage effluent • Temporary sanitary facilities, such as	Work site	Contractor		✓			EIAO-TM	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	portable chemical toilets, should be employed on-site where necessary to handle sewage from the workforce.								
7b.8.3.47	Measures to minimise drainage and construction runoff • Potential ecological impacts resulted from potential degradation of water quality due to unmitigated surface runoff could be minimised via the detailed mitigation measures in **Section 5b.8** of the EIA Report. The following presents some of the mitigation measures: - On-site drainage system with implemented sedimentation control facilities. - Channels, earth bunds or sand bag barriers should be provided on site to direct storm water to silt removal facilities. - Provision of embankment at boundaries of earthworks for flood protection. - Water pumped out from foundation piles must be discharged into silt removal facilities. - During rainstorms, exposed slope/soil surfaces should be covered by tarpaulin or other means, as far as practicable. - Exposed soil surface should be minimized to reduce siltation and runoff. - Earthwork final surfaces should be	Work site	Contractor		✓		✓	EIAO-TM	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	well compacted. Subsequent permanent surface protection should be immediately performed. - Open stockpiles of construction materials, and construction wastes on-site should be covered with tarpaulin or similar fabric during rainstorms.								
7b.8.3.48	<u>Measures to minimise impacts from general construction activities</u> • To avoid the entering of construction solid waste into the nearby habitats, construction solid waste should be collected, handled and disposed of properly to avoid entering to the nearby habitats. It is recommended to clean the construction sites on a regular basis.	Work site	Contractor		✓			EIAO-TM	Implemented
7b.8.3.49	<u>Pest Control</u> Good waste management practices should be adopted at the IWMF in order to minimise the risk of introduction of pest to the island: - Transportation of wastes in enclosed containers - Waste storage area should be well maintained and cleaned - Waste should only be disposed of at designated areas - Timely removal of the newly arrived waste - Removal of items that are capable of	IWMF site	IWMF operator			✓			N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	retaining water - Rapid clean up of any waste spillages - Maintenance of a tidy and clean site environment - Regular application of pest control - Education of staff the importance of site cleanliness								
7b.8.3.50	<u>Control of Marine Habitat Quality during Operation Phase</u> • Depending on the seabed condition of the approach channel for marine vessels during operation phase of the IWMF, maintenance dredging may be required to ensure safe access. In order to avoid degradation in water quality due to elevation in SS and dispersion of sediment plume due to dredging works, it is recommended that any future maintenance dredging works should not be carried out within 100 m from the shore, similar to that of the dredging for anti-scouring protection layer during construction phase. All maintenance dredging works should be carried out with the implementation of silt curtain to control the dispersion of SS. The production rate should comply with the permit dredging rate and number of grab per hour.	IWMF site	IWMF operator			✓		EIAO-TM; WPCO	N/A
7b.8.4.1 – 7b.8.4.8	<u>Compensation of loss of important habitat of Finless Porpoise</u>	Waters between Shek Kwu Chau and Soko Islands	Project Proponent	✓		✓		EIAO-TM	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	Designation of Marine Park • The Project Proponent has made a firm commitment to seek to designate a marine park of approximately 700 ha in the waters between Soko Islands and Shek Kwu Chau, in accordance with the statutory process stipulated in the Marine Parks Ordinance, as a compensation measure for the habitat loss arising from the construction of the IWMF at the artificial island near SKC. • The Project Proponent shall seek to complete the designation by 2018 to tie in with the operation of the IWMF at the artificial island near SKC. • A further study should be carried out to review relevant previous studies and collate available information on the ecological characters of the proposed area for marine park designation; and review available survey data for Finless Porpoise, water quality, fisheries, marine traffic and planned development projects in the vicinity. Based on the findings, ecological profiles of the proposed area for marine park designation should be established, and the extent and location of the proposed marine park be determined. The adequacy of enhancement measures should also be reviewed.								

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
	• In addition, a management plan for the proposed marine park should be proposed, covering information on the responsible departments for operation and management (O&M) of the marine park, as well as the O&M duties of each of the departments involved. Consultation with relevant government departments and stakeholders should be conducted under the study. The study should be submitted to Director of Environmental Protection (DEP) for approval before the commencement of construction works. • The Project Proponent should provide assistance to AFCD during the process of the marine park designation. .								
7b.8.5.1 – 7b.8.5.4	Additional Enhancement or Precautionary Measures *Deployment of Artificial Reefs* • Deployment of artificial reefs (ARs) is an enhancement measure for the marine habitats. ARs are proposed to be deployed within the proposed marine park under this Project. The exact location, dimension and type of ARs to be deployed are to be further investigated along with the further study of the proposed marine park under this Project. The proposed ARs would be deployed at the same time as the complete	Within the proposed marine park under this study	Project Proponent	✓		✓		EIAO-TM	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
	designation of marine park. *Release of Fish Fry at Artificial Reefs and Marine Park* • Release of fish fry at the proposed ARs, as well as the proposed marine park under this study, should enhance the fish resources in the nearby waters, and subsequently food sources for Finless Porpoise. The proposed ARs with various micro-habitats would have the potential to provide shelter and nursery ground for the released fish fry. The frequency and quantity of fry to be released should be agreed by AFCD.								

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table B.6 Implementation Schedule for Fisheries Measures for the IWMF at the artificial island near SKC

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
8b.8.1.2	Measure to minimize loss of and disturbance on fisheries resources • Alteration to the phasing of works, construction method, and layout plan of the IWMF at the artificial island near SKC has been made. The total fishing ground to be permanently lost due to the project has been significantly reduced from ~50 ha to ~31 ha. By adopting the current circular cells instead of the conventional seawall construction method, SS elevation would be greatly reduced, minimizing adverse impact on the health of fisheries resources.	IWMF site	Design team, contractor	✓	✓		✓	EIAO-TM	N/A
8b.8.1.3	Measure to minimize impingement and entrainment • Provision of a screen at the water intake point for desalination plant would be essential to minimize the risk of impingement and entrainment of fisheries resources (including fish, larvae and egg) through the intake point.	IWMF site	Design team, contractor, IWMF operator	✓	✓	✓		EIAO-TM	N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
8b.8.1.4-8b.8.1.6	Measures to control water quality • No wastewater effluent, anti-fouling agent, heavy metals and other contaminants would be released during operation phase of the Project. • Mitigation measures recommended in the water quality impact assessment during construction and operation would serve to protect fisheries resources from indirect impacts resulted from the Project	Work site, IWMF site	Design team, contractor, IWMF operator	✓	✓	✓	✓	EIAO-TM	Implemented
8b.8.1.7 – 8b.8.1.8	Additional Enhancement / Precautionary Measures • Artificial Reefs (ARs) are proposed to be deployed within the proposed marine park under this Project as an enhancement measure for the marine habitats. This enhancement feature would bring positive impacts to the previously identified important spawning and nursery ground for fisheries resources. *Release of Fish Fry at Artificial Reefs* • Release of fish fry has been proposed under this Project. The proposed deployment of ARs within the proposed marine park would provide shelter and nursery ground for the released fish fry. The frequency and quantity of fry to be released should be agreed by AFCD.	Within the proposed marine park in the waters between Soko Islands and Shek Kwu Chau	Project Proponent	✓		✓		EIAO-TM	N/A

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table B.7 Implementation Schedule for Landscape and Visual Measures for the IWMF at the artificial island near SKC

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages* Des	C	O	Dec	Relevant Legislation and Guidelines	Implementation Status and Remarks
S10b.10 MLVC- 01	Grass-hydroseeded bare soil surface and stock pile area	Work site / During construction phase	Contractor		✓				N/A
S10b.10 MLVC-02	Landscape Design 1) Early planting using fast grow trees and tall shrubs at strategic locations within site as buffer to block view corridors to the site from the VSRs, and to locally screen haul roads, excavation works and site preparation works. 2) Use of tree species of dense tree crown to serve as visual barrier. 3) Hard and soft landscape treatment (e.g. trees and shrubs) of open areas within development to provide a background for the outdoor containers from open view, shade and shelter, and a green appearance from surrounding viewpoints. 4) Planting strip along the periphery of the project site. 5) Selected tree species suitable for the coastal condition.	Work site / During design & construction phases	Contractor	✓	✓				N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
S10b.10 MLVC-03	<u>Adoption of Natural Features of the Existing Shoreline</u> 1) Use of boulders in different sizes and with the similar textures of the existing rocky shores for the construction of breakwater and artificial shoreline in order to blend into the existing natural shoreline. 2) Use of cellular cofferdam together with the natural boulders to form a curvature shoreline for the reclamation area to echo with the natural shoreline of SKC.	Work site / During construction phase	Contractor		✓				N/A
S10b.10 MLVC-04	<u>Greening Design (Rooftop & Vertical Greening)</u> 1) Implementation of rooftop and vertical greening (vertical building envelope) along the periphery of each building block to increase the amenity value of the work, moderate temperature extremes and enhance building energy performance. The greening appearance of the building shall enhance its visual harmony with the natural surroundings as well as reduce the apparent visual mass of the structure. 2) Sufficient space between concrete enclosure and stack to minimize heat transfer. 3) Introduction of landscape decks at the stack to further enhance the overall natural and green concept unique for this site.	Work site / During design & construction phases	Contractor	✓	✓				N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
S10b.10 MVC-01	Visual Mitigation and Aesthetic Design 1) Use of natural materials with recessive color to minimize the bulkiness of the building. 2) Adoption of innovative aesthetic design to the chimney to minimize or visually mitigate the massing of the chimney so as to reduce its visual impact to the surroundings. 3) Color of the chimney in a gradual changing manner to match with the color of the sky. 4) Provision of observation deck for public enjoyment at the top of the chimney to diminish the feeling of chimney. 5) Provision of sky gardens between the two stacks to allow additional greening for enhancing the aesthetic quality. Maintenance access (elevator and staircase) from the ground floor to the sky gardens will be provided to allow maintenance of the sky gardens. 6) Integration of the visitor's walkway with different material façade design of incinerator plant to enhance the aesthetic quality.	Structures in IWMF / During design & construction phases	Contractor	✓	✓				N/A
S10b.10 MVC-02	Control of the security floodlight for construction areas at night to avoid excessive glare to the surrounding receiver.	Work site / During construction phase	Contractor		✓				Implemented

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
S10b.10 MVC-03	Optimization of the construction sequence and construction programme to minimize the duration of impact.	Work site / During design & construction phases	Contractor	✓	✓				Implemented
S10b.10 MVC-04	Storage of the backfilling materials for site formation & construction materials / wastes on site at a maximum height of 2m, covered with an impermeable material of visually un-obtrusive material (in earth tone).	Work site / During construction phase	Contractor		✓				N/A
S10b.10 MVC-05	Reduction of the number of construction traffic at the site to practical minimum.	Work site / During construction phase	Contractor		✓				Implemented
S10b.10 MLVO-01	<u>Planting Maintenance</u> Provision of proper planting maintenance and replacement of defective plant species on the new planting areas to enhance aesthetic and landscape quality.	Project site / During Operation phase	Contractor			✓			N/A
S10b.10 MVO-01	<u>Environmental Education Centre</u> Development of an Environmental Education Center, in which regular exhibitions and lectures to promote environmental awareness and waste reduction concept would be provided, as a part of the IWMF for the general public to alleviate negative public perceptions of the development.	Project site / During Operation phase	Contractor			✓			N/A
S10b.10 MVO-02	<u>Control of Light</u> Control the numbers of lights and their intensity to a level that is good enough to meet the safety requirements at night but not excessive.	Project site / During Operation phase	Contractor			✓			N/A

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines	Implementation Status and Remarks
				Des	C	O	Dec		
S10b.10 MVO-03	Control of Operation Time Minimization of the frequency of waste transportation to practical minimum (e.g. limit the reception of MSW from 8 am to 8 pm)	Project site / During Operation phase	Contractor			✓			N/A

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Appendix C Impact Monitoring Schedule of the Reporting Month

Impact Monitoring Schedule for IWMF

Dec-19

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 15:00 - 18:00 Flood Tide: 08:00 - 15:00 Monitoring Time: $# Mid-ebb: 15:09 - 17:51 Mid-flood: 09:45 - 13:15 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 00:44 - 10:00 Flood Tide: 10:00 - 18:00 Monitoring Time: *# Mid-ebb: 08:00 - 10:00 Mid-flood: 12:15 - 15:45 Ecology monitoring for WBSE 4th Quarterly Coral Monitoring at Indirect Impact Site and Control Site	Impact Ecology monitoring for Marine Mammals by Vessel-based Line-Transect Survey	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 13:34 - 17:14 Flood Tide: 06:10 - 13:34 Monitoring Time: Mid-ebb: 13:39 - 17:09 Mid-flood: 08:07 - 11:37	
8	9	10	11	12	13	14
	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 07:44 - 12:45 Flood Tide: 12:45 - 19:43 Monitoring Time: Mid-ebb: 08:29 - 11:59 Mid-flood: 14:29 - 17:59 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 09:22 - 13:50 Flood Tide: 13:50 - 20:19 Monitoring Time: Mid-ebb: 09:51 - 13:21 Mid-flood: 15:19 - 18:49		Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 10:54 - 14:46 Flood Tide: 14:46 - 20:56 Monitoring Time: Mid-ebb: 11:05 - 14:35 & Mid-flood: 15:04 - 18:34 Ecology monitoring for WBSE	
15	16	17	18	19	20	21
	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 13:48 - 16:22 Flood Tide: 06:32 - 13:48 Monitoring Time: Mid-ebb: 13:20 - 16:50 Mid-flood: 08:25 - 11:55 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 15:48 - 19:04 Flood Tide: 08:18 - 15:48 Monitoring Time: &# Mid-ebb: 15:57 - 19:00 Mid-flood: 10:18 - 13:48 Ecology monitoring for WBSE		Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 08:00 - 10:08 Flood Tide: 10:08 - 17:37 Monitoring Time: *# Mid-ebb: 08:00 - 10:08 Mid-flood: 12:07 - 15:37	
22	23	24	25	26	27	28
Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 06:29 - 11:48 Flood Tide: 11:48 - 18:49 Monitoring Time: *Mid-ebb: 08:00 - 11:30 Mid-flood: 13:33 - 17:03	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3 Ecology monitoring for Marine Mammals by Vessel-based Line-Transect Survey	Impact Impactg for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 09:07 - 13:15 Flood Tide: 13:15 - 19:49 Monitoring Time: Mid-ebb: 09:26 - 12:56 Mid-flood: 14:47 - 18:17 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3			Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 11:39 - 15:11 Flood Tide: 15:11 - 21:30 Monitoring Time: Mid-ebb: 11:40 - 15:10 & Mid-flood: 15:29 - 18:59 Ecology monitoring for WBSE	
29	30	31				
	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 13:45 - 16:56 Flood Tide: 06:30 - 13:45 Monitoring Time: $# Mid-ebb: 13:54 - 16:46 Mid-flood: 08:22 - 11:52 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3				

Remarks:
1. Daytime Noise Monitoring (07:00-1900), Evening Time Noise Monitoring (1900-2300), Night Time Noise Monitoring (2300-0700)
2. Water Quality Monitoring for S1,S2 and S3 will only conduct during DCM works, refer to Detailed DCM Plan

Note:
* - as per Marine Department Notice No 107 of 2018, all vessels employed for the works should stay in the works area outside the hours of works (0700 to 2300). Due to safty concern, Water Quality Monitoring would start at 0800.
# - Prioritized routing: Mid-Ebb: C1→S3→CR2→CR1→H1→Remaining stations and Mid-Flood: C2→CR1→S3→CR2→H1→Remaining stations
$ - Since predicted tide is shorter than 3.5 hours, method of 90% tidal period as monitoring time is approached.
& - Due to safety concern for sampling event in night-time, method of 90% tidal period as monitoring time is approached and end at 1900.

Appendix D Water Quality Monitoring Data

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B1	20191202	Sunny	Moderate	Mid-Flood	B	4.4	11:38	7.31	8.32	29.04	22.43	3.15	9	114	0.301	W
B1	20191202	Sunny	Moderate	Mid-Flood	B	4.4	11:38	7.25	8.29	29	22.45	3.37	8	113	0.187	W
B1	20191202	Sunny	Moderate	Mid-Flood	S	1	11:39	7.93	8.08	29.62	22.7	2.6	7	113	0.273	W
B1	20191202	Sunny	Moderate	Mid-Flood	S	1	11:39	7.45	8.27	29.64	22.53	2.47	8	113	0.175	W
B2	20191202	Sunny	Moderate	Mid-Flood	B	3.4	11:58	7.86	8.22	29.22	22.29	2.91	10	114	0.162	W
B2	20191202	Sunny	Moderate	Mid-Flood	B	3.4	11:58	8.08	8.15	29.24	22.48	3.37	9	112	0.281	W
B2	20191202	Sunny	Moderate	Mid-Flood	S	1	11:59	7.25	8	29.07	22.53	2.53	8	112	0.147	W
B2	20191202	Sunny	Moderate	Mid-Flood	S	1	11:59	7.77	8.18	29.43	22.46	2.47	7	113	0.274	W
B3	20191202	Sunny	Moderate	Mid-Flood	B	4	10:56	8.2	8.05	29.51	22.39	3.36	6	114	0.143	W
B3	20191202	Sunny	Moderate	Mid-Flood	B	4	10:56	7.35	8.21	29.13	22.66	3.11	7	113	0.203	W
B3	20191202	Sunny	Moderate	Mid-Flood	S	1	10:57	7.98	8.03	29.42	22.63	2.6	5	112	0.279	W
B3	20191202	Sunny	Moderate	Mid-Flood	S	1	10:57	7.76	8.27	29.76	22.47	2.48	6	113	0.314	W
B4	20191202	Sunny	Moderate	Mid-Flood	B	3.9	11:08	7.89	8.03	29.72	22.7	3.57	7	112	0.223	W
B4	20191202	Sunny	Moderate	Mid-Flood	B	3.9	11:08	8.06	8.19	29.05	22.47	3.16	8	112	0.178	W
B4	20191202	Sunny	Moderate	Mid-Flood	S	1	11:09	7.16	8	29.66	22.62	2.51	7	113	0.294	W
B4	20191202	Sunny	Moderate	Mid-Flood	S	1	11:09	8.13	8.15	29.59	22.54	2.68	8	113	0.216	W
C1A	20191202	Sunny	Moderate	Mid-Flood	B	10.5	11:07	7.77	7.96	29.81	22.61	3.14	13	113	0.146	W
C1A	20191202	Sunny	Moderate	Mid-Flood	B	10.5	11:07	8.15	8.04	29.04	22.28	3.1	12	112	0.154	W
C1A	20191202	Sunny	Moderate	Mid-Flood	M	5.75	11:08	7.82	8.07	29.02	22.37	2.87	14	112	0.211	W
C1A	20191202	Sunny	Moderate	Mid-Flood	M	5.75	11:08	7.63	8.03	29.21	22.38	3.08	14	113	0.286	W
C1A	20191202	Sunny	Moderate	Mid-Flood	S	1	11:09	7.99	8.01	29.63	22.45	2.74	13	113	0.256	W
C1A	20191202	Sunny	Moderate	Mid-Flood	S	1	11:09	7.55	8.05	29.93	22.76	2.85	14	113	0.169	W
C2A	20191202	Sunny	Moderate	Mid-Flood	B	10.8	9:45	7.7	8.04	29.85	22.21	2.94	13	113	0.178	W
C2A	20191202	Sunny	Moderate	Mid-Flood	B	10.8	9:45	8.04	8.01	29.48	22.29	3.04	13	113	0.312	NW
C2A	20191202	Sunny	Moderate	Mid-Flood	M	5.9	9:46	7.37	8.16	29.04	22.17	2.59	12	113	0.154	W
C2A	20191202	Sunny	Moderate	Mid-Flood	M	5.9	9:46	7.28	8.1	29.69	22.56	2.83	13	113	0.253	W
C2A	20191202	Sunny	Moderate	Mid-Flood	S	1	9:47	8.06	8.08	29.23	22.48	2.36	14	112	0.179	W
C2A	20191202	Sunny	Moderate	Mid-Flood	S	1	9:47	7.62	8.05	29.01	22	2.65	13	113	0.298	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR1	20191202	Sunny	Moderate	Mid-Flood	B	11.1	10:06	7.33	8.29	29.92	22.51	3.31	12	113	0.221	W
CR1	20191202	Sunny	Moderate	Mid-Flood	B	11.1	10:06	8.2	7.96	29.47	22.39	3.09	13	113	0.154	W
CR1	20191202	Sunny	Moderate	Mid-Flood	M	6.05	10:07	7.48	8.12	29.08	22.48	2.79	15	113	0.308	W
CR1	20191202	Sunny	Moderate	Mid-Flood	M	6.05	10:07	7.29	8.13	29.69	22.09	2.63	15	113	0.303	W
CR1	20191202	Sunny	Moderate	Mid-Flood	S	1	10:08	7.78	8.13	29.47	22.01	2.74	14	113	0.308	W
CR1	20191202	Sunny	Moderate	Mid-Flood	S	1	10:08	7.57	8.25	29.86	22.08	2.64	16	113	0.236	W
CR2	20191202	Sunny	Moderate	Mid-Flood	B	9.9	12:43	7.52	8.01	29.12	22.67	3.46	18	113	0.321	W
CR2	20191202	Sunny	Moderate	Mid-Flood	B	9.9	12:43	7.28	7.95	29.81	22.34	3.08	16	112	0.242	W
CR2	20191202	Sunny	Moderate	Mid-Flood	M	5.45	12:44	8.18	8.32	29.23	22.76	2.68	17	113	0.294	W
CR2	20191202	Sunny	Moderate	Mid-Flood	M	5.45	12:44	8.04	8.05	29.43	22.35	3.01	17	113	0.181	W
CR2	20191202	Sunny	Moderate	Mid-Flood	S	1	12:45	7.81	8.3	29.91	22.28	2.41	12	113	0.252	W
CR2	20191202	Sunny	Moderate	Mid-Flood	S	1	12:45	7.45	8.11	29.77	22.74	2.45	12	113	0.304	NW
F1A	20191202	Sunny	Moderate	Mid-Flood	B	7.4	11:43	7.42	8.08	29.04	22.64	3.37	13	114	0.239	W
F1A	20191202	Sunny	Moderate	Mid-Flood	B	7.4	11:43	8.19	8.03	29.54	22.71	3.23	12	112	0.262	W
F1A	20191202	Sunny	Moderate	Mid-Flood	M	4.2	11:44	8.03	8.33	29.02	22.58	3.06	13	114	0.283	W
F1A	20191202	Sunny	Moderate	Mid-Flood	M	4.2	11:44	7.89	8.05	29.76	22.55	2.94	14	114	0.264	W
F1A	20191202	Sunny	Moderate	Mid-Flood	S	1	11:45	7.87	8.05	29.47	22.34	2.63	14	113	0.207	W
F1A	20191202	Sunny	Moderate	Mid-Flood	S	1	11:45	7.7	8.2	29.93	22.57	2.47	12	112	0.212	W
H1	20191202	Sunny	Moderate	Mid-Flood	B	6.7	10:34	7.26	8.11	29.9	22.56	3.05	6	112	0.204	W
H1	20191202	Sunny	Moderate	Mid-Flood	B	6.7	10:34	8.06	8.05	29.26	22.38	3.16	7	113	0.179	W
H1	20191202	Sunny	Moderate	Mid-Flood	M	3.85	10:35	8.03	8.23	29.22	22.64	2.67	8	113	0.239	W
H1	20191202	Sunny	Moderate	Mid-Flood	M	3.85	10:35	7.7	8.02	29.19	22.46	3	8	113	0.308	W
H1	20191202	Sunny	Moderate	Mid-Flood	S	1	10:36	7.83	8.16	29.39	22.57	2.76	8	112	0.217	W
H1	20191202	Sunny	Moderate	Mid-Flood	S	1	10:36	7.33	8.28	29.48	22.56	2.59	7	112	0.286	W
M1	20191202	Sunny	Moderate	Mid-Flood	B	7.4	12:18	7.45	8.29	29.34	22.47	2.96	17	113	0.157	W
M1	20191202	Sunny	Moderate	Mid-Flood	B	7.4	12:18	7.58	8.18	29.48	22.54	2.97	16	113	0.238	W
M1	20191202	Sunny	Moderate	Mid-Flood	M	4.2	12:19	7.16	8.05	29.15	22.72	2.96	18	112	0.217	W
M1	20191202	Sunny	Moderate	Mid-Flood	M	4.2	12:19	7.57	7.99	29.67	22.31	3.1	17	112	0.292	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
M1	20191202	Sunny	Moderate	Mid-Flood	S	1	12:20	7.59	8.32	29.01	22.49	2.69	17	112	0.279	W
M1	20191202	Sunny	Moderate	Mid-Flood	S	1	12:20	8.2	8.23	29.02	22.73	2.87	18	113	0.143	W
S1	20191202	Sunny	Moderate	Mid-Flood	B	4.8	11:47	7.24	8.31	29.66	22.42	2.94	13	113	0.316	NW
S1	20191202	Sunny	Moderate	Mid-Flood	B	4.8	11:47	7.31	8.15	29.76	22.48	3.17	12	113	0.19	NW
S1	20191202	Sunny	Moderate	Mid-Flood	S	1	11:48	8.13	8.03	29.93	22.65	2.93	16	113	0.164	NW
S1	20191202	Sunny	Moderate	Mid-Flood	S	1	11:48	7.48	8.28	29.12	22.72	2.41	14	112	0.154	W
S2A	20191202	Sunny	Moderate	Mid-Flood	B	8.1	12:20	7.53	8.08	29.55	22.35	3.29	13	112	0.204	W
S2A	20191202	Sunny	Moderate	Mid-Flood	B	8.1	12:20	7.21	8.03	29.91	22.6	3.35	13	113	0.303	W
S2A	20191202	Sunny	Moderate	Mid-Flood	M	4.55	12:21	7.25	8.08	29.28	22.33	3.01	13	112	0.222	W
S2A	20191202	Sunny	Moderate	Mid-Flood	M	4.55	12:21	7.98	8.22	29.19	22.47	2.95	12	112	0.185	W
S2A	20191202	Sunny	Moderate	Mid-Flood	S	1	12:22	7.34	7.99	29.9	22.53	2.59	13	114	0.3	W
S2A	20191202	Sunny	Moderate	Mid-Flood	S	1	12:22	7.79	8.02	29.02	22.34	2.74	13	114	0.157	W
S3	20191202	Sunny	Moderate	Mid-Flood	B	8.4	12:54	7.57	8.09	29.56	22.7	3.04	12	112	0.172	W
S3	20191202	Sunny	Moderate	Mid-Flood	B	8.4	12:54	7.4	8.03	29.25	22.62	3.17	13	114	0.215	W
S3	20191202	Sunny	Moderate	Mid-Flood	M	4.7	12:55	7.66	8.04	29.52	22.67	2.62	12	112	0.308	W
S3	20191202	Sunny	Moderate	Mid-Flood	M	4.7	12:55	7.42	8.13	29.83	22.63	2.64	13	112	0.309	W
S3	20191202	Sunny	Moderate	Mid-Flood	S	1	12:56	7.74	8.14	29.93	22.55	2.52	14	112	0.167	W
S3	20191202	Sunny	Moderate	Mid-Flood	S	1	12:56	7.42	8.25	29.49	22.48	2.67	12	113	0.166	W
B1	20191202	Sunny	Moderate	Mid-Ebb	B	3.7	15:39	7.27	8.23	29.45	22.58	3.44	17	113	0.185	SE
B1	20191202	Sunny	Moderate	Mid-Ebb	B	3.7	15:39	7.47	8.21	29.39	22.05	3.21	17	113	0.162	SE
B1	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:40	7.43	8.09	29.63	22.13	2.83	15	112	0.13	SE
B1	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:40	7.67	8.12	29.38	22.37	2.52	16	113	0.273	SE
B2	20191202	Sunny	Moderate	Mid-Ebb	B	4.1	15:59	7.15	8	29.57	22.51	2.96	17	113	0.156	SE
B2	20191202	Sunny	Moderate	Mid-Ebb	B	4.1	15:59	7.17	8.09	29.53	22.45	3.34	19	113	0.133	E
B2	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:00	7.32	8.13	29.69	22.09	2.85	18	113	0.278	E
B2	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:00	7.45	8.11	29.59	22.37	2.74	17	113	0.26	SE
B3	20191202	Sunny	Moderate	Mid-Ebb	B	4	16:24	7.68	8.18	29.77	22.48	3.19	18	112	0.172	E
B3	20191202	Sunny	Moderate	Mid-Ebb	B	4	16:24	7.63	8.08	29.83	22.58	3.28	13	112	0.139	E

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B3	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:25	7.82	8.17	29.7	22.34	2.89	18	112	0.131	E
B3	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:25	7.73	8.2	29.45	22.42	2.77	17	113	0.201	E
B4	20191202	Sunny	Moderate	Mid-Ebb	B	3.7	16:35	7.31	7.99	29.84	22.37	3.26	10	113	0.154	E
B4	20191202	Sunny	Moderate	Mid-Ebb	B	3.7	16:35	7.62	8.22	29.49	22.03	3	9	112	0.273	SE
B4	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:36	7.77	7.99	29.88	22.08	2.63	10	113	0.204	E
B4	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:36	7.76	8.06	29.49	22.14	2.61	9	112	0.238	SE
C1A	20191202	Sunny	Moderate	Mid-Ebb	B	8.5	15:09	7.98	8.2	29.8	22.57	3.36	7	113	0.124	SE
C1A	20191202	Sunny	Moderate	Mid-Ebb	B	8.5	15:09	7.57	8.03	29.96	22.06	3.13	8	113	0.136	E
C1A	20191202	Sunny	Moderate	Mid-Ebb	M	4.75	15:10	7.32	7.99	29.51	22.41	2.69	8	113	0.149	SE
C1A	20191202	Sunny	Moderate	Mid-Ebb	M	4.75	15:10	7.65	7.97	29.65	22	2.8	9	113	0.178	SE
C1A	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:11	7.12	7.99	29.71	22.02	2.65	9	113	0.169	SE
C1A	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:11	7.38	8.15	29.72	22.34	2.46	10	112	0.137	SE
C2A	20191202	Sunny	Moderate	Mid-Ebb	B	10.9	15:14	7.86	8.19	29.66	22.49	3.03	11	112	0.273	SE
C2A	20191202	Sunny	Moderate	Mid-Ebb	B	10.9	15:14	7.27	8.21	29.6	22.38	3.22	12	113	0.124	SE
C2A	20191202	Sunny	Moderate	Mid-Ebb	M	5.95	15:15	7.71	8.17	29.68	22.25	2.53	10	114	0.264	E
C2A	20191202	Sunny	Moderate	Mid-Ebb	M	5.95	15:15	7.49	8.18	29.71	22.5	2.88	11	113	0.224	SE
C2A	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:16	7.63	8.19	29.49	22.07	2.7	8	113	0.121	SE
C2A	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:16	7.81	8.21	29.77	22.21	2.75	9	112	0.232	SE
F1A	20191202	Sunny	Moderate	Mid-Ebb	B	7.9	17:12	7.88	8.05	29.9	22.42	2.94	12	113	0.241	E
F1A	20191202	Sunny	Moderate	Mid-Ebb	B	7.9	17:12	7.16	8.06	29.62	22.02	3.16	11	112	0.215	SE
F1A	20191202	Sunny	Moderate	Mid-Ebb	M	4.45	17:13	7.52	8.05	29.56	22.09	2.59	12	113	0.248	E
F1A	20191202	Sunny	Moderate	Mid-Ebb	M	4.45	17:13	7.51	7.98	29.54	22.14	2.59	13	113	0.117	E
F1A	20191202	Sunny	Moderate	Mid-Ebb	S	1	17:14	7.89	8.04	29.86	22.21	2.81	14	112	0.132	SE
F1A	20191202	Sunny	Moderate	Mid-Ebb	S	1	17:14	7.63	8.15	29.35	22.14	2.85	13	112	0.132	SE
H1	20191202	Sunny	Moderate	Mid-Ebb	B	7.7	16:05	7.81	8.07	29.36	22.57	3.1	8	112	0.222	E
H1	20191202	Sunny	Moderate	Mid-Ebb	B	7.7	16:05	7.67	7.99	29.7	22.45	3.4	8	112	0.25	SE
H1	20191202	Sunny	Moderate	Mid-Ebb	M	4.35	16:06	7.16	8.2	29.44	22.39	2.64	10	113	0.224	SE
H1	20191202	Sunny	Moderate	Mid-Ebb	M	4.35	16:06	7.52	8.21	29.44	22.12	2.76	9	113	0.239	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
H1	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:07	7.95	8.19	29.65	22.32	2.5	12	113	0.133	SE
H1	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:07	7.81	7.96	29.71	22.16	2.74	11	113	0.201	E
M1	20191202	Sunny	Moderate	Mid-Ebb	B	8.1	17:46	7.23	8.21	29.93	22.01	3.34	11	113	0.162	SE
M1	20191202	Sunny	Moderate	Mid-Ebb	B	8.1	17:46	7.21	8.11	29.43	22.12	3.19	12	112	0.154	E
M1	20191202	Sunny	Moderate	Mid-Ebb	M	4.55	17:47	7.91	8.08	29.76	22.18	2.57	7	113	0.158	SE
M1	20191202	Sunny	Moderate	Mid-Ebb	M	4.55	17:47	7.87	8.09	29.85	22.41	2.59	8	112	0.191	E
M1	20191202	Sunny	Moderate	Mid-Ebb	S	1	17:48	7.66	7.99	29.34	22.46	2.78	7	113	0.252	SE
M1	20191202	Sunny	Moderate	Mid-Ebb	S	1	17:48	7.8	8.1	29.42	22.14	2.78	6	113	0.251	SE
CR1	20191202	Sunny	Moderate	Mid-Ebb	B	12.8	15:37	7.24	8.21	29.96	22.08	2.89	8	112	0.198	SE
CR1	20191202	Sunny	Moderate	Mid-Ebb	B	12.8	15:37	7.14	8.07	29.72	22.01	2.93	9	113	0.129	SE
CR1	20191202	Sunny	Moderate	Mid-Ebb	M	6.9	15:38	7.54	8.12	29.66	22.1	2.39	8	114	0.262	E
CR1	20191202	Sunny	Moderate	Mid-Ebb	M	6.9	15:38	7.28	8.21	29.32	22.58	2.89	9	113	0.116	SE
CR1	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:39	7.83	8.07	29.37	22.12	2.66	9	112	0.254	SE
CR1	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:39	7.49	8	29.89	22.34	2.48	10	113	0.264	E
CR2	20191202	Sunny	Moderate	Mid-Ebb	B	10.3	16:44	7.76	8.06	29.57	22.32	3.04	6	113	0.158	SE
CR2	20191202	Sunny	Moderate	Mid-Ebb	B	10.3	16:44	7.33	8.03	29.76	22.31	3.02	7	113	0.194	E
CR2	20191202	Sunny	Moderate	Mid-Ebb	M	5.65	16:45	7.41	7.99	29.68	22.24	2.66	8	113	0.188	SE
CR2	20191202	Sunny	Moderate	Mid-Ebb	M	5.65	16:45	7.47	8.14	29.63	22.3	2.5	8	113	0.235	SE
CR2	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:46	7.58	8.06	29.45	22.39	2.65	8	112	0.139	E
CR2	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:46	7.92	8.03	29.71	22.28	2.35	9	113	0.119	SE
S1	20191202	Sunny	Moderate	Mid-Ebb	B	3.9	15:49	7.18	8.13	29.88	22.18	2.96	12	113	0.239	SE
S1	20191202	Sunny	Moderate	Mid-Ebb	B	3.9	15:49	7.13	8.24	29.67	22.48	3.42	11	113	0.116	E
S1	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:50	7.77	8.02	29.45	22.04	2.71	13	114	0.268	SE
S1	20191202	Sunny	Moderate	Mid-Ebb	S	1	15:50	7.33	8.21	29.8	22.55	2.42	12	113	0.186	SE
S2A	20191202	Sunny	Moderate	Mid-Ebb	B	8.2	16:21	7.46	8.04	29.91	22.35	2.97	13	114	0.234	SE
S2A	20191202	Sunny	Moderate	Mid-Ebb	B	8.2	16:21	7.96	8.16	29.51	22.48	3.2	13	113	0.208	SE
S2A	20191202	Sunny	Moderate	Mid-Ebb	M	4.6	16:22	7.31	8.19	29.39	22.4	2.7	11	113	0.142	SE
S2A	20191202	Sunny	Moderate	Mid-Ebb	M	4.6	16:22	7.95	8.15	29.64	22.37	2.81	12	113	0.275	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S2A	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:23	7.26	8.18	29.68	22.05	2.79	12	113	0.137	SE
S2A	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:23	7.75	8.05	29.56	22.51	2.31	10	112	0.139	E
S3	20191202	Sunny	Moderate	Mid-Ebb	B	9.3	16:55	7.45	8.06	29.6	22.37	3.21	8	113	0.161	SE
S3	20191202	Sunny	Moderate	Mid-Ebb	B	9.3	16:55	7.69	8.19	29.93	22.19	3.32	7	113	0.207	E
S3	20191202	Sunny	Moderate	Mid-Ebb	M	5.15	16:56	7.47	8.19	29.76	22.13	2.55	8	114	0.16	SE
S3	20191202	Sunny	Moderate	Mid-Ebb	M	5.15	16:56	7.38	8.05	29.87	22.52	2.44	8	113	0.234	E
S3	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:57	7.2	7.97	29.74	22.41	2.44	11	113	0.128	E
S3	20191202	Sunny	Moderate	Mid-Ebb	S	1	16:57	7.29	8.18	29.4	22.34	2.61	10	114	0.133	SE
B1	20191204	Sunny	Moderate	Mid-Ebb	B	3.9	8:40	8.16	8.73	29.31	22.06	3.21	10	113	0.145	SE
B1	20191204	Sunny	Moderate	Mid-Ebb	B	3.9	8:40	8.05	8.3	29.63	21.96	3.29	10	113	0.225	SE
B1	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:41	7.89	8.5	29.38	21.97	2.32	6	113	0.15	SE
B1	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:41	8.23	8.53	29.44	22	2.55	11	113	0.193	E
B2	20191204	Sunny	Moderate	Mid-Ebb	B	4.2	8:59	7.47	8.45	29.68	22.2	3.38	4	113	0.275	SE
B2	20191204	Sunny	Moderate	Mid-Ebb	B	4.2	8:59	7.54	8.19	29.49	22.28	2.93	5	113	0.116	SE
B2	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:00	8.14	8.65	29.58	22.15	2.67	8	113	0.127	SE
B2	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:00	7.58	8.45	29.81	22	2.54	9	114	0.149	SE
B3	20191204	Sunny	Moderate	Mid-Ebb	B	4.2	9:37	7.59	8.23	29.86	22.37	3.11	26	114	0.24	SE
B3	20191204	Sunny	Moderate	Mid-Ebb	B	4.2	9:37	7.81	8.35	29.45	22.59	3.46	25	113	0.233	SE
B3	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:38	7.97	8.62	29.75	22.32	2.54	6	112	0.274	SE
B3	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:38	7.63	8.71	29.36	22.48	2.95	7	113	0.258	SE
B4	20191204	Sunny	Moderate	Mid-Ebb	B	3.2	9:47	7.56	8.72	29.6	22.59	3.13	16	114	0.244	SE
B4	20191204	Sunny	Moderate	Mid-Ebb	B	3.2	9:47	7.97	8.69	29.45	22.51	3.47	18	113	0.259	E
B4	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:48	7.89	8.56	29.75	22.64	2.49	16	113	0.229	SE
B4	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:48	7.81	8.7	29.79	22.48	2.95	16	113	0.241	SE
C1A	20191204	Sunny	Moderate	Mid-Ebb	B	9.3	8:09	8.29	8.46	29.53	21.85	3.06	24	114	0.121	SE
C1A	20191204	Sunny	Moderate	Mid-Ebb	B	9.3	8:09	7.43	8.25	29.45	21.67	2.89	24	114	0.187	SE
C1A	20191204	Sunny	Moderate	Mid-Ebb	M	5.15	8:10	8.22	8.49	29.67	21.64	2.43	25	114	0.245	E
C1A	20191204	Sunny	Moderate	Mid-Ebb	M	5.15	8:10	8.02	8.34	29.73	21.88	2.72	25	113	0.156	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
C1A	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:11	8.16	8.74	29.34	21.6	2.89	18	114	0.241	E
C1A	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:11	7.87	8.52	29.69	21.7	2.55	20	113	0.277	SE
C2A	20191204	Sunny	Moderate	Mid-Ebb	B	10.3	9:19	7.56	8.43	29.33	22.42	3.3	18	113	0.149	SE
C2A	20191204	Sunny	Moderate	Mid-Ebb	B	10.3	9:19	7.82	8.69	29.79	22.36	3.07	20	113	0.131	E
C2A	20191204	Sunny	Moderate	Mid-Ebb	M	5.65	9:20	8.15	8.32	29.36	22.4	2.62	21	114	0.126	SE
C2A	20191204	Sunny	Moderate	Mid-Ebb	M	5.65	9:20	7.46	8.29	29.69	22.21	2.88	19	115	0.267	SE
C2A	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:21	7.71	8.46	29.37	22.16	2.71	23	114	0.145	SE
C2A	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:21	7.96	8.23	29.4	22.32	2.4	21	114	0.215	E
CR1	20191204	Sunny	Moderate	Mid-Ebb	B	11.4	9:03	8.28	8.43	29.85	22.26	3.24	4	114	0.165	SE
CR1	20191204	Sunny	Moderate	Mid-Ebb	B	11.4	9:03	7.39	8.57	29.77	22.15	3.44	5	114	0.154	SE
CR1	20191204	Sunny	Moderate	Mid-Ebb	M	6.2	9:04	7.3	8.61	29.6	22.06	2.67	6	114	0.226	SE
CR1	20191204	Sunny	Moderate	Mid-Ebb	M	6.2	9:04	7.88	8.23	29.87	22.19	2.49	6	114	0.127	SE
CR1	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:05	7.65	8.73	29.31	22.09	2.76	5	114	0.201	E
CR1	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:05	7.84	8.56	29.73	22.12	2.76	6	114	0.268	SE
CR2	20191204	Sunny	Moderate	Mid-Ebb	B	10.7	8:38	7.79	8.71	29.89	21.95	3.36	4	113	0.281	E
CR2	20191204	Sunny	Moderate	Mid-Ebb	B	10.7	8:38	7.97	8.33	29.47	22.15	3.11	5	114	0.265	SE
CR2	20191204	Sunny	Moderate	Mid-Ebb	M	5.85	8:39	8.25	8.2	29.74	22	2.38	5	114	0.184	E
CR2	20191204	Sunny	Moderate	Mid-Ebb	M	5.85	8:39	7.71	8.43	29.55	22.13	2.88	6	113	0.238	E
CR2	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:40	7.99	8.47	29.81	22	2.73	5	115	0.216	SE
CR2	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:40	7.83	8.47	29.78	22.06	2.57	6	113	0.239	SE
F1A	20191204	Sunny	Moderate	Mid-Ebb	B	7.1	9:57	8.2	8.27	29.44	22.75	2.94	16	114	0.235	E
F1A	20191204	Sunny	Moderate	Mid-Ebb	B	7.1	9:57	7.41	8.21	29.73	22.62	3.26	18	114	0.232	SE
F1A	20191204	Sunny	Moderate	Mid-Ebb	M	4.05	9:58	8.25	8.23	29.78	22.63	2.35	21	113	0.18	SE
F1A	20191204	Sunny	Moderate	Mid-Ebb	M	4.05	9:58	7.39	8.7	29.37	22.72	2.51	20	113	0.251	SE
F1A	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:59	7.58	8.34	29.31	22.46	2.86	20	114	0.142	SE
F1A	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:59	8.28	8.62	29.33	22.64	2.52	22	114	0.255	SE
H1	20191204	Sunny	Moderate	Mid-Ebb	B	7.3	8:12	8.09	8.61	29.33	21.88	3.24	14	113	0.226	SE
H1	20191204	Sunny	Moderate	Mid-Ebb	B	7.3	8:12	7.41	8.17	29.71	21.92	3.4	16	113	0.137	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
H1	20191204	Sunny	Moderate	Mid-Ebb	M	4.15	8:13	8.25	8.43	29.37	21.93	2.39	23	114	0.138	SE
H1	20191204	Sunny	Moderate	Mid-Ebb	M	4.15	8:13	7.6	8.38	29.64	21.61	2.62	20	113	0.182	SE
H1	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:14	8.12	8.21	29.61	21.83	2.35	22	114	0.132	E
H1	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:14	7.8	8.56	29.67	21.88	2.68	21	115	0.244	SE
M1 note 4	20191204	Sunny	Moderate	Mid-Ebb	B	7.9	10:34	7.72	8.22	29.37	22.71	3.36	5	113	0.185	SE
M1 note 4	20191204	Sunny	Moderate	Mid-Ebb	B	7.9	10:34	8.14	8.55	29.79	22.66	3.06	4	113	0.177	SE
M1 note 4	20191204	Sunny	Moderate	Mid-Ebb	M	4.45	10:35	7.63	8.55	29.85	22.72	2.39	6	114	0.15	E
M1 note 4	20191204	Sunny	Moderate	Mid-Ebb	M	4.45	10:35	7.4	8.73	29.68	22.58	2.45	5	113	0.216	E
M1 note 4	20191204	Sunny	Moderate	Mid-Ebb	S	1	10:36	7.68	8.44	29.48	22.79	2.7	6	114	0.179	SE
M1 note 4	20191204	Sunny	Moderate	Mid-Ebb	S	1	10:36	7.89	8.73	29.34	22.65	2.69	7	113	0.212	SE
S1	20191204	Sunny	Moderate	Mid-Ebb	B	3.8	8:49	7.31	8.68	29.56	22.22	3.01	20	113	0.189	SE
S1	20191204	Sunny	Moderate	Mid-Ebb	B	3.8	8:49	7.36	8.17	29.36	21.97	2.94	22	113	0.149	SE
S1	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:50	7.53	8.67	29.55	22.13	2.69	19	114	0.24	SE
S1	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:50	7.57	8.65	29.43	21.99	2.48	21	113	0.204	SE
S2A	20191204	Sunny	Moderate	Mid-Ebb	B	8	9:16	7.45	8.58	29.83	22.48	3.08	23	113	0.125	SE
S2A	20191204	Sunny	Moderate	Mid-Ebb	B	8	9:16	7.78	8.17	29.34	22.47	2.98	21	114	0.221	SE
S2A	20191204	Sunny	Moderate	Mid-Ebb	M	4.5	9:17	8.28	8.64	29.78	22.25	2.7	14	114	0.214	E
S2A	20191204	Sunny	Moderate	Mid-Ebb	M	4.5	9:17	7.48	8.52	29.71	22.41	2.86	16	114	0.156	SE
S2A	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:18	7.32	8.39	29.65	22.54	2.88	21	113	0.139	SE
S2A	20191204	Sunny	Moderate	Mid-Ebb	S	1	9:18	7.32	8.64	29.73	22.49	2.81	15	114	0.28	SE
S3	20191204	Sunny	Moderate	Mid-Ebb	B	10.5	8:49	7.98	8.3	29.63	22.2	3.06	6	113	0.117	SE
S3	20191204	Sunny	Moderate	Mid-Ebb	B	10.5	8:49	7.97	8.67	29.76	22.06	3.17	7	114	0.272	SE
S3	20191204	Sunny	Moderate	Mid-Ebb	M	5.75	8:50	7.52	8.52	29.48	22.18	2.63	6	114	0.144	SE
S3	20191204	Sunny	Moderate	Mid-Ebb	M	5.75	8:50	8.01	8.28	29.66	22	2.62	6	114	0.191	E
S3	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:51	7.75	8.62	29.42	22.16	2.51	20	114	0.243	SE
S3	20191204	Sunny	Moderate	Mid-Ebb	S	1	8:51	7.68	8.44	29.33	22.19	2.97	22	114	0.246	SE
B1	20191204	Sunny	Moderate	Mid-Flood	B	4.6	12:41	7.93	8.28	29.31	23.42	3.3	14	113	0.276	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B1	20191204	Sunny	Moderate	Mid-Flood	B	4.6	12:41	7.89	8.24	29.86	23.22	3.3	16	113	0.18	NW
B1	20191204	Sunny	Moderate	Mid-Flood	S	1	12:42	7.87	8.14	29.66	23.38	2.62	11	113	0.315	W
B1	20191204	Sunny	Moderate	Mid-Flood	S	1	12:42	8.07	8.3	29.52	23.48	2.66	12	113	0.146	W
B2	20191204	Sunny	Moderate	Mid-Flood	B	3.8	13:00	8.09	7.99	29.51	23.5	3.08	13	113	0.322	W
B2	20191204	Sunny	Moderate	Mid-Flood	B	3.8	13:00	8.33	8.11	29.78	23.42	3.44	12	113	0.297	W
B2	20191204	Sunny	Moderate	Mid-Flood	S	1	13:01	7.89	8.05	29.33	23.39	2.57	12	112	0.29	W
B2	20191204	Sunny	Moderate	Mid-Flood	S	1	13:01	8.16	8.22	29.87	23.42	2.86	12	112	0.268	NW
B3	20191204	Sunny	Moderate	Mid-Flood	B	3.8	13:38	8.19	8.09	29.83	23.48	3.13	13	112	0.312	W
B3	20191204	Sunny	Moderate	Mid-Flood	B	3.8	13:38	8.15	7.96	29.5	23.56	3.33	14	112	0.268	W
B3	20191204	Sunny	Moderate	Mid-Flood	S	1	13:39	8.07	8.32	29.73	23.59	2.8	10	113	0.276	NW
B3	20191204	Sunny	Moderate	Mid-Flood	S	1	13:39	7.92	7.99	29.44	23.58	2.45	11	112	0.228	W
B4	20191204	Sunny	Moderate	Mid-Flood	B	4.4	13:48	8.37	8.01	29.56	23.62	3.14	17	113	0.191	W
B4	20191204	Sunny	Moderate	Mid-Flood	B	4.4	13:48	8.16	8.1	29.2	23.61	3.35	15	114	0.169	NW
B4	20191204	Sunny	Moderate	Mid-Flood	S	1	13:49	8	7.97	29.27	23.71	2.73	13	113	0.302	W
B4	20191204	Sunny	Moderate	Mid-Flood	S	1	13:49	8.2	8.03	29.57	23.61	2.55	12	113	0.185	NW
C1A	20191204	Sunny	Moderate	Mid-Flood	B	11	12:15	8.22	8.15	29.58	23.32	3.44	14	112	0.158	NW
C1A	20191204	Sunny	Moderate	Mid-Flood	B	11	12:15	8.22	8.12	29.43	23.38	3.32	14	112	0.296	W
C1A	20191204	Sunny	Moderate	Mid-Flood	M	6	12:16	7.88	8.24	29.34	23.39	2.72	16	112	0.287	NW
C1A	20191204	Sunny	Moderate	Mid-Flood	M	6	12:16	7.87	8	29.54	23.41	2.74	14	113	0.233	W
C1A	20191204	Sunny	Moderate	Mid-Flood	S	1	12:17	8.13	8.26	29.27	23.17	2.4	16	113	0.301	W
C1A	20191204	Sunny	Moderate	Mid-Flood	S	1	12:17	8.03	8.07	29.49	23.34	2.85	18	113	0.164	W
C2A	20191204	Sunny	Moderate	Mid-Flood	B	10.1	12:15	8.17	8.12	29.92	23.21	3.39	16	113	0.164	W
C2A	20191204	Sunny	Moderate	Mid-Flood	B	10.1	12:15	8.34	8.11	29.83	23.29	3.27	15	112	0.311	NW
C2A	20191204	Sunny	Moderate	Mid-Flood	M	5.55	12:16	8.41	8.1	29.65	23.34	2.73	15	114	0.266	W
C2A	20191204	Sunny	Moderate	Mid-Flood	M	5.55	12:16	7.87	8.08	29.33	23.42	3.05	16	112	0.282	W
C2A	20191204	Sunny	Moderate	Mid-Flood	S	1	12:17	7.89	8.03	29.29	23.29	2.77	17	113	0.19	W
C2A	20191204	Sunny	Moderate	Mid-Flood	S	1	12:17	7.88	8.21	29.86	23.21	2.8	16	112	0.281	W
CR1	20191204	Sunny	Moderate	Mid-Flood	B	11.9	12:34	7.85	7.98	29.2	23.42	3.24	10	114	0.227	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR1	20191204	Sunny	Moderate	Mid-Flood	B	11.9	12:34	8.1	8.28	29.37	23.27	2.97	11	113	0.169	NW
CR1	20191204	Sunny	Moderate	Mid-Flood	M	6.45	12:35	8.05	8.26	29.36	23.26	3.13	13	113	0.145	W
CR1	20191204	Sunny	Moderate	Mid-Flood	M	6.45	12:35	8.04	8.26	29.3	23.46	3.1	12	113	0.144	W
CR1	20191204	Sunny	Moderate	Mid-Flood	S	1	12:36	8.3	8.07	29.7	23.49	2.7	13	113	0.297	W
CR1	20191204	Sunny	Moderate	Mid-Flood	S	1	12:36	8.17	8.06	29.37	23.21	2.42	14	113	0.237	NW
CR2	20191204	Sunny	Moderate	Mid-Flood	B	10.9	13:03	7.86	8.07	29.32	23.35	3.36	7	113	0.228	W
CR2	20191204	Sunny	Moderate	Mid-Flood	B	10.9	13:03	8.3	8.15	29.26	23.49	3.01	7	113	0.154	W
CR2	20191204	Sunny	Moderate	Mid-Flood	M	5.95	13:04	8.17	8	29.42	23.59	2.84	7	113	0.284	W
CR2	20191204	Sunny	Moderate	Mid-Flood	M	5.95	13:04	8.33	8.29	29.63	23.56	2.93	6	113	0.197	W
CR2	20191204	Sunny	Moderate	Mid-Flood	S	1	13:05	8.02	7.97	29.59	23.63	2.6	12	114	0.234	W
CR2	20191204	Sunny	Moderate	Mid-Flood	S	1	13:05	8.12	8.21	29.92	23.47	2.54	7	114	0.318	NW
F1A	20191204	Sunny	Moderate	Mid-Flood	B	7.6	14:08	7.98	8.24	29.72	23.54	2.89	16	113	0.221	W
F1A	20191204	Sunny	Moderate	Mid-Flood	B	7.6	14:08	8.12	7.95	29.48	23.63	3.14	16	113	0.3	W
F1A	20191204	Sunny	Moderate	Mid-Flood	M	4.3	14:09	7.9	8.22	29.33	23.79	2.6	17	112	0.185	W
F1A	20191204	Sunny	Moderate	Mid-Flood	M	4.3	14:09	7.87	8.07	29.65	23.5	2.57	16	113	0.29	W
F1A	20191204	Sunny	Moderate	Mid-Flood	S	1	14:10	8.29	8.06	29.43	23.83	2.86	16	113	0.237	W
F1A	20191204	Sunny	Moderate	Mid-Flood	S	1	14:10	7.94	8.11	29.53	23.85	2.63	16	112	0.282	W
H1	20191204	Sunny	Moderate	Mid-Flood	B	6.6	13:24	8.39	7.96	29.2	23.54	3.15	14	113	0.299	W
H1	20191204	Sunny	Moderate	Mid-Flood	B	6.6	13:24	8.38	8.04	29.76	23.81	3.32	16	113	0.258	W
H1	20191204	Sunny	Moderate	Mid-Flood	M	3.8	13:25	8.11	8.2	29.63	23.88	2.98	16	113	0.163	W
H1	20191204	Sunny	Moderate	Mid-Flood	M	3.8	13:25	8	8.27	29.5	23.61	2.93	14	112	0.163	W
H1	20191204	Sunny	Moderate	Mid-Flood	S	1	13:26	8.05	8.17	29.92	23.78	2.69	20	113	0.178	W
H1	20191204	Sunny	Moderate	Mid-Flood	S	1	13:26	7.99	8.22	29.73	23.85	2.77	18	113	0.191	W
M1	20191204	Sunny	Moderate	Mid-Flood	B	6.4	14:49	7.97	7.99	29.3	23.67	3.11	6	113	0.139	W
M1	20191204	Sunny	Moderate	Mid-Flood	B	6.4	14:49	8.19	8.23	29.8	23.86	2.92	7	113	0.313	NW
M1	20191204	Sunny	Moderate	Mid-Flood	M	3.7	14:50	8.34	8.04	29.82	23.6	2.64	7	113	0.231	W
M1	20191204	Sunny	Moderate	Mid-Flood	M	3.7	14:50	8.01	8.24	29.8	23.87	2.7	6	112	0.272	W
M1	20191204	Sunny	Moderate	Mid-Flood	S	1	14:51	8.02	8.23	29.86	23.83	2.67	12	112	0.321	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
M1	20191204	Sunny	Moderate	Mid-Flood	S	1	14:51	7.89	7.99	29.74	23.68	2.86	11	113	0.14	W
S1	20191204	Sunny	Moderate	Mid-Flood	B	4.1	12:50	8.17	8.19	29.93	23.4	3.12	16	113	0.235	NW
S1	20191204	Sunny	Moderate	Mid-Flood	B	4.1	12:50	8.27	8.1	29.39	23.5	3.08	19	113	0.182	NW
S1	20191204	Sunny	Moderate	Mid-Flood	S	1	12:51	7.97	8.28	29.95	23.32	2.35	17	113	0.237	W
S1	20191204	Sunny	Moderate	Mid-Flood	S	1	12:51	7.87	8.09	29.32	23.27	2.74	16	113	0.304	W
S2A	20191204	Sunny	Moderate	Mid-Flood	B	8.2	13:17	8.35	8.21	29.78	23.55	3.19	16	112	0.309	W
S2A	20191204	Sunny	Moderate	Mid-Flood	B	8.2	13:17	8.14	8.26	29.33	23.57	2.95	15	113	0.204	NW
S2A	20191204	Sunny	Moderate	Mid-Flood	M	4.6	13:18	8.23	8.11	29.62	23.55	2.66	16	113	0.308	W
S2A	20191204	Sunny	Moderate	Mid-Flood	M	4.6	13:18	8.02	8.31	29.81	23.38	3.12	17	112	0.169	W
S2A	20191204	Sunny	Moderate	Mid-Flood	S	1	13:19	7.86	8.29	29.47	23.33	2.61	18	113	0.258	W
S2A	20191204	Sunny	Moderate	Mid-Flood	S	1	13:19	8.15	8.21	29.49	23.51	2.37	18	113	0.211	W
S3	20191204	Sunny	Moderate	Mid-Flood	B	8.9	12:53	7.93	8.11	29.95	23.56	3.16	11	112	0.161	W
S3	20191204	Sunny	Moderate	Mid-Flood	B	8.9	12:53	8.18	8.19	29.28	23.49	3.18	10	113	0.283	W
S3	20191204	Sunny	Moderate	Mid-Flood	M	4.95	12:54	8.37	8.09	29.47	23.49	2.95	11	113	0.17	W
S3	20191204	Sunny	Moderate	Mid-Flood	M	4.95	12:54	8.01	8.27	29.57	23.36	2.76	12	113	0.244	W
S3	20191204	Sunny	Moderate	Mid-Flood	S	1	12:55	8.24	8.26	29.95	23.37	2.66	13	113	0.27	W
S3	20191204	Sunny	Moderate	Mid-Flood	S	1	12:55	8.4	8.28	29.76	23.52	2.64	13	112	0.163	W
B1	20191206	Cloudy	Moderate	Mid-Flood	B	4.5	9:14	7.6	8.22	29.93	21.98	3.29	7	112	0.257	W
B1	20191206	Cloudy	Moderate	Mid-Flood	B	4.5	9:14	7.31	8.41	29.55	21.8	3.45	8	112	0.313	W
B1	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:15	7.56	8.16	29.46	21.75	2.8	7	113	0.318	W
B1	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:15	7.41	8.31	29.33	21.92	2.89	6	112	0.293	W
B2	20191206	Cloudy	Moderate	Mid-Flood	B	3.6	9:34	7.35	8.53	29.61	21.74	3.15	10	112	0.203	W
B2	20191206	Cloudy	Moderate	Mid-Flood	B	3.6	9:34	7.79	8.44	29.61	22	3.37	11	112	0.154	W
B2	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:35	7.76	8.21	29.38	21.98	2.65	9	112	0.29	W
B2	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:35	7.43	8.39	29.86	22.01	2.44	10	112	0.256	NW
B3	20191206	Cloudy	Moderate	Mid-Flood	B	4	10:11	7.57	8.33	29.81	22	3.4	9	112	0.246	NW
B3	20191206	Cloudy	Moderate	Mid-Flood	B	4	10:11	7.63	8.34	29.78	22.19	3.54	9	113	0.216	W
B3	20191206	Cloudy	Moderate	Mid-Flood	S	1	10:12	7.69	8.31	29.38	21.89	2.59	9	113	0.144	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B3	20191206	Cloudy	Moderate	Mid-Flood	S	1	10:12	7.71	8.19	29.91	21.73	2.9	8	112	0.185	W
B4	20191206	Cloudy	Moderate	Mid-Flood	B	3.9	10:21	7.88	8.38	29.74	21.94	3.17	9	112	0.153	W
B4	20191206	Cloudy	Moderate	Mid-Flood	B	3.9	10:21	7.88	8.36	29.45	21.72	3.41	9	113	0.255	W
B4	20191206	Cloudy	Moderate	Mid-Flood	S	1	10:22	7.78	8.44	29.66	21.91	2.85	8	113	0.18	W
B4	20191206	Cloudy	Moderate	Mid-Flood	S	1	10:22	7.6	8.44	29.52	22.05	2.46	9	113	0.138	NW
C1A	20191206	Cloudy	Moderate	Mid-Flood	B	10.8	8:46	7.36	8.29	29.75	21.48	3.3	8	113	0.168	W
C1A	20191206	Cloudy	Moderate	Mid-Flood	B	10.8	8:46	7.31	8.5	29.56	21.77	3.14	9	112	0.149	W
C1A	20191206	Cloudy	Moderate	Mid-Flood	M	5.9	8:47	7.71	8.24	29.48	21.59	3.12	8	112	0.198	W
C1A	20191206	Cloudy	Moderate	Mid-Flood	M	5.9	8:47	7.61	8.22	29.31	21.48	2.76	9	112	0.197	W
C1A	20191206	Cloudy	Moderate	Mid-Flood	S	1	8:48	7.57	8.32	29.41	21.47	2.55	8	112	0.281	NW
C1A	20191206	Cloudy	Moderate	Mid-Flood	S	1	8:48	7.53	8.25	29.67	21.64	2.64	8	112	0.192	W
C2A	20191206	Cloudy	Moderate	Mid-Flood	B	10.8	8:11	7.55	8.3	29.76	21.52	3.43	9	112	0.195	NW
C2A	20191206	Cloudy	Moderate	Mid-Flood	B	10.8	8:11	7.48	8.15	29.93	21.76	3.27	8	112	0.223	W
C2A	20191206	Cloudy	Moderate	Mid-Flood	M	5.9	8:12	7.44	8.3	29.27	21.53	3.08	7	112	0.19	W
C2A	20191206	Cloudy	Moderate	Mid-Flood	M	5.9	8:12	7.61	8.25	29.92	21.61	2.56	8	111	0.168	W
C2A	20191206	Cloudy	Moderate	Mid-Flood	S	1	8:13	7.69	8.16	29.88	21.51	2.51	6	112	0.146	W
C2A	20191206	Cloudy	Moderate	Mid-Flood	S	1	8:13	7.8	8.46	29.56	21.39	2.54	7	113	0.281	NW
CR1	20191206	Cloudy	Moderate	Mid-Flood	B	12	8:32	7.45	8.26	29.57	21.53	3.13	8	114	0.178	W
CR1	20191206	Cloudy	Moderate	Mid-Flood	B	12	8:32	7.72	8.17	29.2	21.44	3.24	9	113	0.235	W
CR1	20191206	Cloudy	Moderate	Mid-Flood	M	6.5	8:33	7.7	8.5	29.27	21.31	3.07	9	112	0.282	W
CR1	20191206	Cloudy	Moderate	Mid-Flood	M	6.5	8:33	7.85	8.24	29.74	21.65	2.81	8	113	0.143	W
CR1	20191206	Cloudy	Moderate	Mid-Flood	S	1	8:34	7.53	8.47	29.84	21.45	2.6	10	112	0.189	W
CR1	20191206	Cloudy	Moderate	Mid-Flood	S	1	8:34	7.58	8.39	29.71	21.48	2.83	9	113	0.301	W
CR2	20191206	Cloudy	Moderate	Mid-Flood	B	10.3	9:07	7.51	8.45	29.72	21.65	3.32	9	113	0.277	NW
CR2	20191206	Cloudy	Moderate	Mid-Flood	B	10.3	9:07	7.6	8.23	29.24	21.63	3.31	8	114	0.208	NW
CR2	20191206	Cloudy	Moderate	Mid-Flood	M	5.65	9:08	7.81	8.3	29.46	21.92	2.64	8	113	0.198	W
CR2	20191206	Cloudy	Moderate	Mid-Flood	M	5.65	9:08	7.74	8.24	29.91	21.77	3.01	7	113	0.302	W
CR2	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:09	7.64	8.24	29.28	21.73	2.6	8	113	0.215	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR2	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:09	7.4	8.17	29.64	21.89	2.46	7	113	0.264	W
F1A	20191206	Cloudy	Moderate	Mid-Flood	B	7.7	10:13	7.35	8.47	29.93	21.73	3.32	9	112	0.248	W
F1A	20191206	Cloudy	Moderate	Mid-Flood	B	7.7	10:13	7.88	8.28	29.77	22.15	3.34	8	113	0.314	NW
F1A	20191206	Cloudy	Moderate	Mid-Flood	M	4.35	10:14	7.46	8.37	29.74	21.94	2.72	9	112	0.189	W
F1A	20191206	Cloudy	Moderate	Mid-Flood	M	4.35	10:14	7.38	8.15	29.5	22.08	2.63	9	112	0.204	NW
F1A	20191206	Cloudy	Moderate	Mid-Flood	S	1	10:15	7.27	8.4	29.22	22	2.74	8	112	0.281	NW
F1A	20191206	Cloudy	Moderate	Mid-Flood	S	1	10:15	7.84	8.33	29.65	21.82	2.9	7	111	0.279	W
H1	20191206	Cloudy	Moderate	Mid-Flood	B	7.4	9:27	7.67	8.23	29.67	21.73	3.1	7	113	0.244	W
H1	20191206	Cloudy	Moderate	Mid-Flood	B	7.4	9:27	7.51	8.25	29.89	21.93	3.01	8	112	0.3	W
H1	20191206	Cloudy	Moderate	Mid-Flood	M	4.2	9:28	7.76	8.25	29.66	21.99	2.69	8	112	0.294	W
H1	20191206	Cloudy	Moderate	Mid-Flood	M	4.2	9:28	7.7	8.45	29.86	21.94	3.08	9	112	0.236	NW
H1	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:29	7.45	8.33	29.29	21.76	2.41	8	112	0.197	NW
H1	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:29	7.32	8.22	29.53	21.72	2.58	8	112	0.283	W
M1	20191206	Cloudy	Moderate	Mid-Flood	B	6.9	10:51	7.75	8.31	29.8	22.54	2.9	9	113	0.299	W
M1	20191206	Cloudy	Moderate	Mid-Flood	B	6.9	10:51	7.51	8.43	29.85	22.26	2.91	10	112	0.172	W
M1	20191206	Cloudy	Moderate	Mid-Flood	M	3.95	10:52	7.29	8.29	29.42	22.52	3.08	9	113	0.203	W
M1	20191206	Cloudy	Moderate	Mid-Flood	M	3.95	10:52	7.73	8.52	29.64	22.53	2.99	8	113	0.159	NW
M1	20191206	Cloudy	Moderate	Mid-Flood	S	1	10:53	7.34	8.52	29.23	22.49	2.41	6	112	0.19	NW
M1	20191206	Cloudy	Moderate	Mid-Flood	S	1	10:53	7.77	8.31	29.73	22.35	2.82	6	113	0.149	W
S1	20191206	Cloudy	Moderate	Mid-Flood	B	4.7	9:24	7.71	8.19	29.2	21.87	2.91	9	112	0.322	W
S1	20191206	Cloudy	Moderate	Mid-Flood	B	4.7	9:24	7.55	8.38	29.33	21.84	3.46	9	112	0.295	W
S1	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:25	7.66	8.18	29.42	21.96	2.44	8	112	0.225	NW
S1	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:25	7.43	8.36	29.87	21.77	2.78	9	112	0.18	W
S2A	20191206	Cloudy	Moderate	Mid-Flood	B	8.3	9:51	7.83	8.28	29.61	22.15	3.37	9	112	0.14	W
S2A	20191206	Cloudy	Moderate	Mid-Flood	B	8.3	9:51	7.57	8.42	29.45	22.14	2.96	8	112	0.303	NW
S2A	20191206	Cloudy	Moderate	Mid-Flood	M	4.65	9:52	7.26	8.28	29.75	21.81	2.76	11	112	0.14	W
S2A	20191206	Cloudy	Moderate	Mid-Flood	M	4.65	9:52	7.77	8.44	29.33	21.76	2.9	12	112	0.188	W
S2A	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:53	7.39	8.29	29.79	21.91	2.93	11	112	0.215	W

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S2A	20191206	Cloudy	Moderate	Mid-Flood	S	1	9:53	7.6	8.4	29.42	21.74	2.87	11	112	0.158	W
S3	20191206	Cloudy	Moderate	Mid-Flood	B	8.4	8:54	7.42	8.15	29.56	21.55	3.1	11	113	0.295	W
S3	20191206	Cloudy	Moderate	Mid-Flood	B	8.4	8:54	7.46	8.45	29.3	21.75	3.07	10	113	0.234	W
S3	20191206	Cloudy	Moderate	Mid-Flood	M	4.7	8:55	7.25	8.21	29.68	21.7	2.93	8	112	0.186	W
S3	20191206	Cloudy	Moderate	Mid-Flood	M	4.7	8:55	7.7	8.5	29.59	21.49	2.73	9	112	0.3	W
S3	20191206	Cloudy	Moderate	Mid-Flood	S	1	8:56	7.39	8.19	29.7	21.7	2.84	8	112	0.297	NW
S3	20191206	Cloudy	Moderate	Mid-Flood	S	1	8:56	7.52	8.23	29.59	21.63	2.66	9	111	0.277	W
B1	20191206	Cloudy	Moderate	Mid-Ebb	B	3.9	14:13	7.29	8.11	29.55	23.29	3.17	7	112	0.198	E
B1	20191206	Cloudy	Moderate	Mid-Ebb	B	3.9	14:13	7.44	8.23	29.58	23.21	2.99	8	113	0.16	SE
B1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:14	7.55	8.11	29.4	23.18	2.85	7	113	0.157	SE
B1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:14	7.47	8.11	29.32	23.1	2.48	7	113	0.232	SE
B2	20191206	Cloudy	Moderate	Mid-Ebb	B	4.8	14:33	7.65	8.15	29.75	23.22	2.88	8	113	0.238	SE
B2	20191206	Cloudy	Moderate	Mid-Ebb	B	4.8	14:33	7.27	8.36	29.9	23.15	3.09	9	114	0.209	SE
B2	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:34	7.68	8.15	29.76	23.26	2.4	8	113	0.269	SE
B2	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:34	7.55	8.28	29.49	23.14	2.59	7	113	0.231	SE
B3	20191206	Cloudy	Moderate	Mid-Ebb	B	3.8	15:10	7.61	8.34	29.41	23.36	3.38	7	113	0.174	SE
B3	20191206	Cloudy	Moderate	Mid-Ebb	B	3.8	15:10	7.34	8.06	29.4	23.46	3.34	8	112	0.236	E
B3	20191206	Cloudy	Moderate	Mid-Ebb	S	1	15:11	7.38	8.4	29.63	23.38	2.84	6	113	0.196	SE
B3	20191206	Cloudy	Moderate	Mid-Ebb	S	1	15:11	7.68	8.2	29.76	23.5	2.57	7	113	0.131	SE
B4	20191206	Cloudy	Moderate	Mid-Ebb	B	4	15:20	7.27	8.11	29.89	23.28	3.55	5	114	0.147	SE
B4	20191206	Cloudy	Moderate	Mid-Ebb	B	4	15:20	7.31	8.4	29.32	23.39	3.13	6	112	0.243	E
B4	20191206	Cloudy	Moderate	Mid-Ebb	S	1	15:21	7.7	8.18	29.46	23.38	2.68	8	113	0.217	E
B4	20191206	Cloudy	Moderate	Mid-Ebb	S	1	15:21	7.66	8.35	29.53	23.37	2.63	7	114	0.169	E
C1A	20191206	Cloudy	Moderate	Mid-Ebb	B	10.1	13:45	7.6	8.23	29.62	23.3	3.14	8	113	0.277	E
C1A	20191206	Cloudy	Moderate	Mid-Ebb	B	10.1	13:45	7.29	8.2	29.73	23.3	3.38	8	113	0.179	SE
C1A	20191206	Cloudy	Moderate	Mid-Ebb	M	5.55	13:46	7.72	8.29	29.87	23.25	2.34	7	113	0.177	E
C1A	20191206	Cloudy	Moderate	Mid-Ebb	M	5.55	13:46	7.57	8.16	29.47	23.33	2.84	8	113	0.263	SE
C1A	20191206	Cloudy	Moderate	Mid-Ebb	S	1	13:47	7.69	8.06	29.71	23.25	2.85	7	114	0.143	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
C1A	20191206	Cloudy	Moderate	Mid-Ebb	S	1	13:47	7.47	8.24	29.83	23.24	2.35	6	113	0.244	SE
C2A	20191206	Cloudy	Moderate	Mid-Ebb	B	11.5	13:59	7.56	8.16	29.31	23.29	3.06	7	112	0.25	SE
C2A	20191206	Cloudy	Moderate	Mid-Ebb	B	11.5	13:59	7.57	8.29	29.73	23.28	3.3	8	112	0.194	E
C2A	20191206	Cloudy	Moderate	Mid-Ebb	M	6.25	14:00	7.58	8.34	29.65	23.33	2.91	6	113	0.197	SE
C2A	20191206	Cloudy	Moderate	Mid-Ebb	M	6.25	14:00	7.36	8.27	29.31	23.21	2.61	7	114	0.248	SE
C2A	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:01	7.61	8.16	29.63	23.13	2.66	6	114	0.156	E
C2A	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:01	7.31	8.18	29.75	23.29	2.4	6	113	0.274	SE
CR1	20191206	Cloudy	Moderate	Mid-Ebb	B	12.5	14:20	7.29	8.29	29.81	23.31	3.26	9	113	0.165	E
CR1	20191206	Cloudy	Moderate	Mid-Ebb	B	12.5	14:20	7.63	8.12	29.76	23.21	2.89	8	113	0.166	SE
CR1	20191206	Cloudy	Moderate	Mid-Ebb	M	6.75	14:21	7.58	8.26	29.35	23.09	2.68	9	113	0.235	SE
CR1	20191206	Cloudy	Moderate	Mid-Ebb	M	6.75	14:21	7.38	8.44	29.31	23.23	2.73	9	113	0.125	SE
CR1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:22	7.63	8.36	29.57	23.21	2.52	7	113	0.164	SE
CR1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:22	7.46	8.1	29.57	23.13	2.84	7	113	0.208	E
CR2	20191206	Cloudy	Moderate	Mid-Ebb	B	11.1	14:49	7.54	8.3	29.56	23.28	2.92	6	113	0.182	E
CR2	20191206	Cloudy	Moderate	Mid-Ebb	B	11.1	14:49	7.52	8.07	29.68	23.15	3.43	7	113	0.241	E
CR2	20191206	Cloudy	Moderate	Mid-Ebb	M	6.05	14:50	7.64	8.23	29.54	23.25	2.79	6	113	0.159	SE
CR2	20191206	Cloudy	Moderate	Mid-Ebb	M	6.05	14:50	7.41	8.39	29.54	23.39	2.71	6	112	0.206	SE
CR2	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:51	7.56	8.39	29.61	23.21	2.77	8	113	0.188	E
CR2	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:51	7.23	8.33	29.7	23.09	2.47	9	112	0.15	SE
F1A	20191206	Cloudy	Moderate	Mid-Ebb	B	7.6	15:59	7.5	8.42	29.37	23.15	3.42	8	113	0.147	SE
F1A	20191206	Cloudy	Moderate	Mid-Ebb	B	7.6	15:59	7.31	8.18	29.38	23.37	3.35	7	112	0.136	SE
F1A	20191206	Cloudy	Moderate	Mid-Ebb	M	4.3	16:00	7.7	8.35	29.56	23.3	2.9	8	112	0.128	SE
F1A	20191206	Cloudy	Moderate	Mid-Ebb	M	4.3	16:00	7.61	8.18	29.64	23.28	2.41	7	113	0.172	SE
F1A	20191206	Cloudy	Moderate	Mid-Ebb	S	1	16:01	7.22	8.14	29.6	23.35	2.32	6	113	0.143	E
F1A	20191206	Cloudy	Moderate	Mid-Ebb	S	1	16:01	7.6	8.09	29.61	23.23	2.81	6	113	0.154	SE
H1	20191206	Cloudy	Moderate	Mid-Ebb	B	7	15:12	7.34	8.1	29.65	23.44	3.32	8	113	0.217	E
H1	20191206	Cloudy	Moderate	Mid-Ebb	B	7	15:12	7.26	8.12	29.66	23.35	3.22	7	112	0.143	SE
H1	20191206	Cloudy	Moderate	Mid-Ebb	M	4	15:13	7.28	8.13	29.56	23.49	2.38	7	113	0.226	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
H1	20191206	Cloudy	Moderate	Mid-Ebb	M	4	15:13	7.49	8.13	29.67	23.32	2.76	8	114	0.193	SE
H1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	15:14	7.51	8.25	29.38	23.31	2.34	8	113	0.128	SE
H1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	15:14	7.33	8.11	29.67	23.3	2.51	7	113	0.228	E
M1	20191206	Cloudy	Moderate	Mid-Ebb	B	8	16:34	7.56	8.28	29.7	23.19	3.11	7	113	0.16	SE
M1	20191206	Cloudy	Moderate	Mid-Ebb	B	8	16:34	7.42	8.22	29.57	23.21	3.06	8	113	0.248	E
M1	20191206	Cloudy	Moderate	Mid-Ebb	M	4.5	16:35	7.22	8.35	29.72	23.2	2.82	6	113	0.226	E
M1	20191206	Cloudy	Moderate	Mid-Ebb	M	4.5	16:35	7.47	8.19	29.51	23.37	2.57	7	113	0.224	SE
M1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	16:36	7.67	8.13	29.89	23.13	2.45	7	114	0.274	E
M1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	16:36	7.38	8.16	29.68	23.08	2.59	6	113	0.147	SE
S1	20191206	Cloudy	Moderate	Mid-Ebb	B	4	14:23	7.48	8.44	29.89	23.26	3.1	6	113	0.193	SE
S1	20191206	Cloudy	Moderate	Mid-Ebb	B	4	14:23	7.28	8.33	29.46	23.2	2.94	5	113	0.197	SE
S1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:24	7.3	8.43	29.65	23.11	2.77	6	113	0.253	E
S1	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:24	7.37	8.35	29.61	23.31	2.4	7	113	0.117	SE
S2A	20191206	Cloudy	Moderate	Mid-Ebb	B	7.9	14:50	7.32	8.42	29.82	23.13	3	7	114	0.206	SE
S2A	20191206	Cloudy	Moderate	Mid-Ebb	B	7.9	14:50	7.23	8.08	29.71	23.09	3.22	6	113	0.262	E
S2A	20191206	Cloudy	Moderate	Mid-Ebb	M	4.45	14:51	7.63	8.34	29.33	23.15	2.44	5	113	0.13	SE
S2A	20191206	Cloudy	Moderate	Mid-Ebb	M	4.45	14:51	7.27	8.41	29.49	23.36	2.37	6	113	0.194	SE
S2A	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:52	7.36	8.12	29.39	23.4	2.74	5	114	0.215	SE
S2A	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:52	7.59	8.23	29.59	23.34	2.58	6	114	0.203	SE
S3	20191206	Cloudy	Moderate	Mid-Ebb	B	9.4	14:35	7.58	8.07	29.74	23.32	3.07	8	114	0.221	E
S3	20191206	Cloudy	Moderate	Mid-Ebb	B	9.4	14:35	7.35	8.36	29.46	23.29	3.34	7	113	0.254	E
S3	20191206	Cloudy	Moderate	Mid-Ebb	M	5.2	14:36	7.28	8.36	29.53	23.16	2.83	9	113	0.139	E
S3	20191206	Cloudy	Moderate	Mid-Ebb	M	5.2	14:36	7.65	8.07	29.86	23.29	2.6	8	113	0.276	SE
S3	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:37	7.63	8.27	29.45	23.38	2.44	8	113	0.271	SE
S3	20191206	Cloudy	Moderate	Mid-Ebb	S	1	14:37	7.54	8.36	29.68	23.37	2.42	9	114	0.245	E
B1	20191209	Cloudy	Moderate	Mid-Ebb	B	4.2	9:13	7.52	8.24	30.34	21.39	2.88	9	113	0.18	W
B1	20191209	Cloudy	Moderate	Mid-Ebb	B	4.2	9:13	7.39	8.19	30.77	21.19	2.41	10	114	0.259	W
B1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:14	7.08	8.23	30.72	21.19	2.77	9	114	0.23	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:14	7.48	8.28	30.36	21.13	2.8	9	113	0.194	W
B2	20191209	Cloudy	Moderate	Mid-Ebb	B	4.2	9:42	7.31	8.31	30.36	21.32	2.58	6	113	0.24	SW
B2	20191209	Cloudy	Moderate	Mid-Ebb	B	4.2	9:42	7.77	8.17	30.64	21.39	2.46	5	113	0.283	NW
B2	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:43	7.61	8.07	30.58	21.52	3.26	5	113	0.254	W
B2	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:43	7.21	7.98	30.85	21.51	3.25	6	113	0.216	W
B3	20191209	Cloudy	Moderate	Mid-Ebb	B	4.2	10:09	7.63	8.07	30.8	21.52	2.6	9	114	0.167	W
B3	20191209	Cloudy	Moderate	Mid-Ebb	B	4.2	10:09	7.22	8.04	30.56	21.43	2.36	9	114	0.261	SW
B3	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:10	7.16	8.36	30.73	21.5	3.12	7	113	0.236	W
B3	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:10	7.58	8.17	30.23	21.26	2.77	8	113	0.281	W
B4	20191209	Cloudy	Moderate	Mid-Ebb	B	3.8	9:56	7.38	8.1	30.38	21.57	2.56	6	114	0.158	W
B4	20191209	Cloudy	Moderate	Mid-Ebb	B	3.8	9:56	7.74	7.95	30.29	21.38	2.62	6	114	0.205	SW
B4	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:57	7.9	8.04	30.31	21.55	3.11	10	114	0.249	NW
B4	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:57	7.43	8.36	30.67	21.25	3.1	10	113	0.173	W
C1A	20191209	Cloudy	Moderate	Mid-Ebb	B	9.6	8:41	7.46	8.03	30.33	21.28	2.91	6	113	0.183	SW
C1A	20191209	Cloudy	Moderate	Mid-Ebb	B	9.6	8:41	7.14	8.31	30.48	21.29	2.54	7	114	0.206	SW
C1A	20191209	Cloudy	Moderate	Mid-Ebb	M	5.3	8:42	7.14	8.37	30.3	21.19	2.69	7	113	0.223	W
C1A	20191209	Cloudy	Moderate	Mid-Ebb	M	5.3	8:42	7.28	8.03	30.27	21.1	2.74	6	114	0.185	SW
C1A	20191209	Cloudy	Moderate	Mid-Ebb	S	1	8:43	7.24	8.1	30.31	21.42	2.72	10	114	0.232	SW
C1A	20191209	Cloudy	Moderate	Mid-Ebb	S	1	8:43	7.59	8.28	30.31	21.15	3.25	10	114	0.284	W
C2A	20191209	Cloudy	Moderate	Mid-Ebb	B	10.9	10:41	7.35	8.35	30.22	21.51	2.9	7	113	0.283	SW
C2A	20191209	Cloudy	Moderate	Mid-Ebb	B	10.9	10:41	7.34	8.02	30.32	21.4	2.32	6	113	0.162	W
C2A	20191209	Cloudy	Moderate	Mid-Ebb	M	5.95	10:42	7.16	8.06	30.62	21.5	3	8	114	0.18	W
C2A	20191209	Cloudy	Moderate	Mid-Ebb	M	5.95	10:42	7.08	8.31	30.26	21.56	2.82	8	114	0.239	W
C2A	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:43	7.19	8.11	30.64	21.56	2.91	9	113	0.253	W
C2A	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:43	7.65	8.09	30.37	21.5	3.26	8	113	0.154	W
CR1	20191209	Cloudy	Moderate	Mid-Ebb	B	11.9	11:30	7.62	8.2	30.51	21.41	2.37	8	114	0.174	W
CR1	20191209	Cloudy	Moderate	Mid-Ebb	B	11.9	11:30	7.67	8.26	30.35	21.64	2.84	7	113	0.221	SW
CR1	20191209	Cloudy	Moderate	Mid-Ebb	M	6.45	11:31	7.18	8.14	30.65	21.39	3.07	9	114	0.256	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR1	20191209	Cloudy	Moderate	Mid-Ebb	M	6.45	11:31	7.61	8.12	30.28	21.42	3.11	8	114	0.189	W
CR1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	11:32	7.79	8.11	30.42	21.58	2.88	8	114	0.203	SW
CR1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	11:32	7.85	8.31	30.59	21.52	2.71	8	114	0.21	W
CR2	20191209	Cloudy	Moderate	Mid-Ebb	B	9.8	10:49	7.13	8.33	30.43	21.51	2.64	5	114	0.229	SW
CR2	20191209	Cloudy	Moderate	Mid-Ebb	B	9.8	10:49	7.5	8.27	30.48	21.61	2.7	4	114	0.279	W
CR2	20191209	Cloudy	Moderate	Mid-Ebb	M	5.4	10:50	7.6	8.35	30.32	21.43	2.69	5	114	0.23	NW
CR2	20191209	Cloudy	Moderate	Mid-Ebb	M	5.4	10:50	7.86	7.96	30.37	21.47	2.55	5	113	0.213	SW
CR2	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:51	7.06	8.35	30.34	21.43	2.98	7	114	0.154	SW
CR2	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:51	7.81	7.95	30.5	21.37	2.7	7	114	0.213	NW
F1A	20191209	Cloudy	Moderate	Mid-Ebb	B	7.3	9:07	7.89	8.27	30.63	21.12	2.7	7	113	0.215	SW
F1A	20191209	Cloudy	Moderate	Mid-Ebb	B	7.3	9:07	7.76	8.25	30.79	21.15	2.38	6	114	0.273	SW
F1A	20191209	Cloudy	Moderate	Mid-Ebb	M	4.15	9:08	7.12	8.07	30.53	21.45	2.58	6	113	0.212	W
F1A	20191209	Cloudy	Moderate	Mid-Ebb	M	4.15	9:08	7.31	8.34	30.83	21.45	2.95	7	113	0.206	W
F1A	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:09	7.45	8.16	30.24	21.19	3.25	6	113	0.281	NW
F1A	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:09	7.4	8.24	30.76	21.45	3.1	6	114	0.22	NW
H1	20191209	Cloudy	Moderate	Mid-Ebb	B	7.2	10:23	7.79	8.32	30.27	21.51	2.77	8	113	0.208	W
H1	20191209	Cloudy	Moderate	Mid-Ebb	B	7.2	10:23	7.07	8.12	30.76	21.36	2.42	8	114	0.291	SW
H1	20191209	Cloudy	Moderate	Mid-Ebb	M	4.1	10:24	7.59	8.35	30.71	21.28	2.91	8	113	0.205	SW
H1	20191209	Cloudy	Moderate	Mid-Ebb	M	4.1	10:24	7.78	8.05	30.68	21.42	2.98	8	113	0.159	W
H1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:25	7.74	8.36	30.41	21.4	3.02	10	113	0.178	W
H1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:25	7.13	8.36	30.75	21.38	2.8	10	113	0.187	W
M1	20191209	Cloudy	Moderate	Mid-Ebb	B	6.5	9:32	7.66	8.28	30.67	21.39	2.33	7	113	0.225	W
M1	20191209	Cloudy	Moderate	Mid-Ebb	B	6.5	9:32	7.44	8.29	30.82	21.29	2.32	7	114	0.264	W
M1	20191209	Cloudy	Moderate	Mid-Ebb	M	3.75	9:33	7.24	7.96	30.28	21.5	2.91	7	114	0.282	W
M1	20191209	Cloudy	Moderate	Mid-Ebb	M	3.75	9:33	7.41	8.24	30.73	21.44	2.83	6	113	0.16	W
M1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:34	7.78	8.21	30.42	21.34	2.74	6	113	0.286	W
M1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:34	7.85	8.35	30.39	21.19	3.06	7	114	0.291	SW
S1	20191209	Cloudy	Moderate	Mid-Ebb	B	4.4	9:25	7.66	8.22	30.45	21.52	2.67	9	113	0.17	SW

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S1	20191209	Cloudy	Moderate	Mid-Ebb	B	4.4	9:25	7.84	8.35	30.36	21.45	2.66	8	114	0.173	W
S1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:26	7.64	8.14	30.58	21.34	2.93	10	114	0.191	W
S1	20191209	Cloudy	Moderate	Mid-Ebb	S	1	9:26	7.64	8.06	30.29	21.43	3.16	9	113	0.249	W
S2A	20191209	Cloudy	Moderate	Mid-Ebb	B	8.2	10:19	7.54	8.04	30.79	21.39	2.6	7	114	0.187	NW
S2A	20191209	Cloudy	Moderate	Mid-Ebb	B	8.2	10:19	7.42	8.02	30.76	21.26	2.39	6	113	0.216	SW
S2A	20191209	Cloudy	Moderate	Mid-Ebb	M	4.6	10:20	7.31	8.07	30.3	21.22	2.81	5	113	0.235	NW
S2A	20191209	Cloudy	Moderate	Mid-Ebb	M	4.6	10:20	7.89	7.98	30.65	21.53	3.05	6	114	0.25	W
S2A	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:21	7.38	8.33	30.58	21.59	2.94	6	113	0.242	W
S2A	20191209	Cloudy	Moderate	Mid-Ebb	S	1	10:21	7.88	8.01	30.44	21.42	2.68	5	113	0.19	SW
S3	20191209	Cloudy	Moderate	Mid-Ebb	B	9.4	11:00	7.15	7.95	30.29	21.34	2.67	7	114	0.242	NW
S3	20191209	Cloudy	Moderate	Mid-Ebb	B	9.4	11:00	7.88	8.27	30.71	21.49	2.85	8	113	0.209	NW
S3	20191209	Cloudy	Moderate	Mid-Ebb	M	5.2	11:01	7.81	8.05	30.82	21.41	2.57	7	113	0.274	W
S3	20191209	Cloudy	Moderate	Mid-Ebb	M	5.2	11:01	7.51	8.28	30.85	21.26	2.8	8	113	0.169	W
S3	20191209	Cloudy	Moderate	Mid-Ebb	S	1	11:02	7.61	7.95	30.28	21.47	3.05	9	113	0.24	SW
S3	20191209	Cloudy	Moderate	Mid-Ebb	S	1	11:02	7.13	8.15	30.63	21.47	2.91	8	113	0.166	SW
B1	20191209	Cloudy	Moderate	Mid-Flood	B	3.9	15:12	7.79	8.14	30.39	22.98	2.67	6	113	0.175	S
B1	20191209	Cloudy	Moderate	Mid-Flood	B	3.9	15:12	7.41	8.27	30.66	22.95	2.62	6	113	0.195	SE
B1	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:13	7.77	8.26	30.5	23.03	3.12	6	114	0.174	S
B1	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:13	8.09	8.3	30.41	22.87	2.87	6	113	0.227	SE
B2	20191209	Cloudy	Moderate	Mid-Flood	B	4	15:40	8.16	8.22	30.65	22.86	2.59	8	113	0.214	S
B2	20191209	Cloudy	Moderate	Mid-Flood	B	4	15:40	8.14	8.31	30.68	23	3.02	9	113	0.222	S
B2	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:41	7.82	8.15	30.49	23.02	3.13	7	112	0.25	SE
B2	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:41	7.98	8.26	30.36	22.95	2.74	8	113	0.151	S
B3	20191209	Cloudy	Moderate	Mid-Flood	B	4.4	15:15	7.4	8.2	30.44	23.08	2.81	7	112	0.18	SE
B3	20191209	Cloudy	Moderate	Mid-Flood	B	4.4	15:15	7.4	8.22	30.44	22.92	2.67	7	112	0.225	E
B3	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:16	7.71	8.18	30.41	22.94	3.14	7	113	0.198	SE
B3	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:16	7.52	8.28	30.51	22.86	2.91	7	113	0.197	SE
B4	20191209	Cloudy	Moderate	Mid-Flood	B	3.5	15:24	7.65	8.19	30.41	22.81	2.43	7	114	0.213	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B4	20191209	Cloudy	Moderate	Mid-Flood	B	3.5	15:24	8.16	8.07	30.52	22.96	2.49	7	113	0.233	S
B4	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:25	7.6	8.33	30.33	22.89	2.83	8	112	0.215	SE
B4	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:25	8.03	8.28	30.42	23.02	2.75	7	113	0.211	SE
C1A	20191209	Cloudy	Moderate	Mid-Flood	B	9	14:44	7.64	8.12	30.65	23.05	2.61	8	113	0.177	SE
C1A	20191209	Cloudy	Moderate	Mid-Flood	B	9	14:44	7.61	8.11	30.46	23.27	2.69	9	113	0.221	E
C1A	20191209	Cloudy	Moderate	Mid-Flood	M	5	14:45	7.38	8.08	30.51	23.15	3.09	10	113	0.158	SE
C1A	20191209	Cloudy	Moderate	Mid-Flood	M	5	14:45	7.69	8.07	30.58	23.3	2.56	10	113	0.244	S
C1A	20191209	Cloudy	Moderate	Mid-Flood	S	1	14:46	8.08	8.25	30.46	23.08	2.81	10	113	0.203	SE
C1A	20191209	Cloudy	Moderate	Mid-Flood	S	1	14:46	7.84	8.32	30.38	23.27	3.19	11	113	0.166	SE
C2A	20191209	Cloudy	Moderate	Mid-Flood	B	11.5	14:35	7.55	8.18	30.53	23.22	2.74	11	113	0.164	SE
C2A	20191209	Cloudy	Moderate	Mid-Flood	B	11.5	14:35	7.88	8.08	30.46	23.19	2.49	10	113	0.243	SE
C2A	20191209	Cloudy	Moderate	Mid-Flood	M	6.25	14:36	7.72	8.09	30.52	23.27	2.8	9	113	0.205	E
C2A	20191209	Cloudy	Moderate	Mid-Flood	M	6.25	14:36	7.78	8.28	30.67	23.23	2.91	10	113	0.199	SE
C2A	20191209	Cloudy	Moderate	Mid-Flood	S	1	14:37	7.75	8.35	30.56	23.22	3.04	9	114	0.199	SE
C2A	20191209	Cloudy	Moderate	Mid-Flood	S	1	14:37	8.14	8.13	30.68	23.06	2.91	10	114	0.175	S
CR1	20191209	Cloudy	Moderate	Mid-Flood	B	12.2	17:28	7.66	8.32	30.3	22.27	2.53	6	113	0.19	S
CR1	20191209	Cloudy	Moderate	Mid-Flood	B	12.2	17:28	7.44	8.3	30.46	22.01	2.54	7	113	0.158	SE
CR1	20191209	Cloudy	Moderate	Mid-Flood	M	6.6	17:29	8.28	8.15	30.31	22.2	2.61	7	113	0.157	S
CR1	20191209	Cloudy	Moderate	Mid-Flood	M	6.6	17:29	8.04	8.08	30.5	22.11	3.12	7	112	0.145	E
CR1	20191209	Cloudy	Moderate	Mid-Flood	S	1	17:30	8.1	8.07	30.46	22.14	2.71	8	114	0.177	SE
CR1	20191209	Cloudy	Moderate	Mid-Flood	S	1	17:30	7.82	8.21	30.44	22.05	3.12	7	112	0.19	SE
CR2	20191209	Cloudy	Moderate	Mid-Flood	B	11.2	16:48	7.57	8.1	30.35	22.64	2.82	9	113	0.144	S
CR2	20191209	Cloudy	Moderate	Mid-Flood	B	11.2	16:48	7.71	8.12	30.62	22.83	2.7	9	113	0.213	SE
CR2	20191209	Cloudy	Moderate	Mid-Flood	M	6.1	16:49	7.32	8.34	30.62	22.66	3.11	8	120	0.198	SE
CR2	20191209	Cloudy	Moderate	Mid-Flood	M	6.1	16:49	7.76	8.13	30.67	22.9	2.97	8	119	0.212	SE
CR2	20191209	Cloudy	Moderate	Mid-Flood	S	1	16:50	8.01	8.24	30.65	22.78	3.25	8	113	0.14	SE
CR2	20191209	Cloudy	Moderate	Mid-Flood	S	1	16:50	7.94	8.1	30.51	22.71	2.93	7	113	0.25	S
F1A	20191209	Cloudy	Moderate	Mid-Flood	B	8	15:53	8.09	8.13	30.59	23.01	2.75	10	113	0.154	E

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
F1A	20191209	Cloudy	Moderate	Mid-Flood	B	8	15:53	7.73	8.19	30.38	23.11	2.62	11	113	0.149	S
F1A	20191209	Cloudy	Moderate	Mid-Flood	M	4.5	15:54	7.86	8.12	30.46	23.06	2.92	10	113	0.205	S
F1A	20191209	Cloudy	Moderate	Mid-Flood	M	4.5	15:54	7.83	8.15	30.41	22.89	3.13	10	114	0.158	SE
F1A	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:55	8.28	8.2	30.35	22.84	2.77	10	114	0.211	SE
F1A	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:55	7.34	8.18	30.4	22.81	2.75	11	113	0.17	S
H1	20191209	Cloudy	Moderate	Mid-Flood	B	7.8	14:57	7.79	8.25	30.4	22.96	2.69	6	113	0.172	S
H1	20191209	Cloudy	Moderate	Mid-Flood	B	7.8	14:57	7.4	8.25	30.49	23.02	2.87	6	113	0.207	SE
H1	20191209	Cloudy	Moderate	Mid-Flood	M	4.4	14:58	8.05	8.31	30.6	22.91	2.96	7	113	0.175	S
H1	20191209	Cloudy	Moderate	Mid-Flood	M	4.4	14:58	7.45	8.27	30.49	23.09	2.66	6	113	0.138	S
H1	20191209	Cloudy	Moderate	Mid-Flood	S	1	14:59	7.41	8.06	30.5	23.04	3.22	7	113	0.188	E
H1	20191209	Cloudy	Moderate	Mid-Flood	S	1	14:59	7.8	8.3	30.5	22.9	3.05	7	112	0.222	SE
M1	20191209	Cloudy	Moderate	Mid-Flood	B	8.2	16:17	7.63	8.31	30.55	22.72	2.92	9	114	0.147	S
M1	20191209	Cloudy	Moderate	Mid-Flood	B	8.2	16:17	7.91	8.26	30.42	22.94	2.58	8	113	0.196	S
M1	20191209	Cloudy	Moderate	Mid-Flood	M	4.6	16:18	7.45	8.2	30.61	22.77	3.05	8	114	0.173	S
M1	20191209	Cloudy	Moderate	Mid-Flood	M	4.6	16:18	8.26	8.08	30.48	22.88	2.83	9	113	0.25	S
M1	20191209	Cloudy	Moderate	Mid-Flood	S	1	16:19	7.9	8.24	30.64	22.9	2.83	9	114	0.248	SE
M1	20191209	Cloudy	Moderate	Mid-Flood	S	1	16:19	7.61	8.06	30.53	22.95	3	9	116	0.178	E
S1	20191209	Cloudy	Moderate	Mid-Flood	B	3.8	15:27	7.71	8.26	30.32	22.88	2.48	8	113	0.225	SE
S1	20191209	Cloudy	Moderate	Mid-Flood	B	3.8	15:27	8.13	8.07	30.4	22.92	2.48	8	113	0.163	SE
S1	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:28	7.32	8.2	30.35	22.9	2.92	7	113	0.17	SE
S1	20191209	Cloudy	Moderate	Mid-Flood	S	1	15:28	7.82	8.3	30.69	22.98	2.98	8	114	0.245	S
S2A	20191209	Cloudy	Moderate	Mid-Flood	B	8	16:21	7.44	8.23	30.48	22.75	2.52	7	113	0.168	S
S2A	20191209	Cloudy	Moderate	Mid-Flood	B	8	16:21	7.74	8.25	30.63	22.8	2.89	8	113	0.216	S
S2A	20191209	Cloudy	Moderate	Mid-Flood	M	4.5	16:22	8.07	8.19	30.43	22.98	3.03	7	114	0.162	SE
S2A	20191209	Cloudy	Moderate	Mid-Flood	M	4.5	16:22	7.64	8.15	30.36	22.98	2.79	8	113	0.164	S
S2A	20191209	Cloudy	Moderate	Mid-Flood	S	1	16:23	7.47	8.32	30.68	22.93	2.77	8	113	0.207	E
S2A	20191209	Cloudy	Moderate	Mid-Flood	S	1	16:23	8.09	8.06	30.35	23	3.22	9	113	0.155	SE
S3	20191209	Cloudy	Moderate	Mid-Flood	B	10.1	17:01	8.26	8.21	30.54	22.36	2.52	10	112	0.176	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S3	20191209	Cloudy	Moderate	Mid-Flood	B	10.1	17:01	7.6	8.26	30.51	22.35	2.75	9	113	0.248	S
S3	20191209	Cloudy	Moderate	Mid-Flood	M	5.55	17:02	7.47	8.06	30.45	22.46	2.71	8	113	0.181	SE
S3	20191209	Cloudy	Moderate	Mid-Flood	M	5.55	17:02	8.27	8.23	30.49	22.32	2.87	8	113	0.217	SE
S3	20191209	Cloudy	Moderate	Mid-Flood	S	1	17:03	7.82	8.19	30.46	22.57	2.78	8	112	0.159	SE
S3	20191209	Cloudy	Moderate	Mid-Flood	S	1	17:03	8.2	8.28	30.55	22.54	3.21	8	113	0.14	S
B1	20191211	Sunny	Moderate	Mid-Ebb	B	4.1	10:43	7.62	8.13	29.38	22.46	3.45	3	113	0.163	S
B1	20191211	Sunny	Moderate	Mid-Ebb	B	4.1	10:43	7.84	8.32	29.39	22.29	4.02	2	113	0.095	SE
B1	20191211	Sunny	Moderate	Mid-Ebb	S	1	10:44	7.58	8.12	29.66	22.41	4.09	2	114	0.229	SE
B1	20191211	Sunny	Moderate	Mid-Ebb	S	1	10:44	7.6	8.32	29.32	22.33	3.73	3	113	0.142	SE
B2	20191211	Sunny	Moderate	Mid-Ebb	B	4.4	11:08	7.71	8.21	29.41	22.48	3.73	4	113	0.219	E
B2	20191211	Sunny	Moderate	Mid-Ebb	B	4.4	11:08	7.38	8.22	29.53	22.45	3.74	3	112	0.225	S
B2	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:09	7.39	8.22	29.48	22.57	3.97	2	114	0.126	E
B2	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:09	7.7	8.12	29.39	22.55	4.21	3	113	0.113	S
B3	20191211	Sunny	Moderate	Mid-Ebb	B	4.3	11:39	7.67	8.09	29.3	22.64	3.99	3	113	0.115	S
B3	20191211	Sunny	Moderate	Mid-Ebb	B	4.3	11:39	7.53	8.22	29.41	22.72	3.79	<2	112	0.132	E
B3	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:40	7.72	8.27	29.65	22.58	3.73	2	113	0.132	SE
B3	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:40	7.42	8.2	29.54	22.73	4.13	<2	114	0.194	S
B4	20191211	Sunny	Moderate	Mid-Ebb	B	3.6	11:28	7.67	8.15	29.48	22.64	3.49	3	114	0.205	SE
B4	20191211	Sunny	Moderate	Mid-Ebb	B	3.6	11:28	7.27	8.21	29.68	22.67	3.59	3	114	0.116	S
B4	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:29	7.27	8.23	29.43	22.68	3.96	- note 3	113	0.209	S
B4	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:29	7.86	8.16	29.48	22.73	3.92	4	112	0.194	SE
C1A	20191211	Sunny	Moderate	Mid-Ebb	B	9.5	10:19	7.84	8.06	29.43	22.35	3.51	2	114	0.245	S
C1A	20191211	Sunny	Moderate	Mid-Ebb	B	9.5	10:19	7.15	8.12	29.49	22.12	3.72	<2	114	0.088	SE
C1A	20191211	Sunny	Moderate	Mid-Ebb	M	5.25	10:20	7.24	8.24	29.43	22.37	3.61	3	114	0.162	E
C1A	20191211	Sunny	Moderate	Mid-Ebb	M	5.25	10:20	7.74	8.11	29.41	22.38	3.75	3	114	0.139	SE
C1A	20191211	Sunny	Moderate	Mid-Ebb	S	1	10:21	7.89	8.12	29.6	22.35	4	4	113	0.119	S
C1A	20191211	Sunny	Moderate	Mid-Ebb	S	1	10:21	7.44	8.29	29.42	22.2	3.76	3	113	0.176	SE
C2A	20191211	Sunny	Moderate	Mid-Ebb	B	11.2	12:19	7.24	8.32	29.36	22.81	3.79	3	113	0.252	S

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C2A	20191211	Sunny	Moderate	Mid-Ebb	B	11.2	12:19	7.19	8.33	29.63	22.79	3.92	3	114	0.192	S
C2A	20191211	Sunny	Moderate	Mid-Ebb	M	6.1	12:20	7.68	8.14	29.5	22.91	4.08	3	114	0.226	SE
C2A	20191211	Sunny	Moderate	Mid-Ebb	M	6.1	12:20	7.34	8.27	29.67	22.86	4.01	3	113	0.209	S
C2A	20191211	Sunny	Moderate	Mid-Ebb	S	1	12:21	7.48	8.08	29.42	22.74	3.83	2	113	0.171	SE
C2A	20191211	Sunny	Moderate	Mid-Ebb	S	1	12:21	7.14	8.13	29.33	22.85	4.01	3	114	0.165	S
CR1	20191211	Sunny	Moderate	Mid-Ebb	B	12.1	13:00	7.42	8.07	29.61	22.95	3.54	<2	114	0.172	E
CR1	20191211	Sunny	Moderate	Mid-Ebb	B	12.1	13:00	7.58	8.15	29.42	22.85	3.71	<2	114	0.103	E
CR1	20191211	Sunny	Moderate	Mid-Ebb	M	6.55	13:01	7.72	8.11	29.42	22.83	3.91	3	115	0.237	SE
CR1	20191211	Sunny	Moderate	Mid-Ebb	M	6.55	13:01	7.39	8.32	29.66	22.87	3.76	3	113	0.193	SE
CR1	20191211	Sunny	Moderate	Mid-Ebb	S	1	13:02	7.81	8.2	29.31	22.83	4.15	<2	114	0.153	S
CR1	20191211	Sunny	Moderate	Mid-Ebb	S	1	13:02	7.28	8.15	29.51	22.92	3.94	2	114	0.081	S
CR2	20191211	Sunny	Moderate	Mid-Ebb	B	10.7	12:27	7.34	8.28	29.64	22.88	3.88	2	112	0.203	E
CR2	20191211	Sunny	Moderate	Mid-Ebb	B	10.7	12:27	7.67	8.19	29.58	22.83	3.9	<2	113	0.107	SE
CR2	20191211	Sunny	Moderate	Mid-Ebb	M	5.85	12:28	7.4	8.23	29.31	22.92	3.97	3	113	0.172	SE
CR2	20191211	Sunny	Moderate	Mid-Ebb	M	5.85	12:28	7.88	8.14	29.48	22.86	4.06	<2	113	0.089	SE
CR2	20191211	Sunny	Moderate	Mid-Ebb	S	1	12:29	7.44	8.3	29.46	22.91	4.47	<2	114	0.208	S
CR2	20191211	Sunny	Moderate	Mid-Ebb	S	1	12:29	7.78	8.16	29.4	22.84	4.2	3	114	0.149	SE
F1A	20191211	Sunny	Moderate	Mid-Ebb	B	7.7	11:00	7.58	8.16	29.54	22.45	3.57	<2	113	0.174	S
F1A	20191211	Sunny	Moderate	Mid-Ebb	B	7.7	11:00	7.59	8.33	29.53	22.59	3.88	<2	113	0.163	S
F1A	20191211	Sunny	Moderate	Mid-Ebb	M	4.35	11:01	7.79	8.15	29.32	22.37	3.62	2	114	0.172	SE
F1A	20191211	Sunny	Moderate	Mid-Ebb	M	4.35	11:01	7.35	8.29	29.53	22.43	3.82	3	114	0.172	SE
F1A	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:02	7.62	8.14	29.52	22.56	3.71	2	114	0.227	E
F1A	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:02	7.15	8.08	29.35	22.42	4.2	3	113	0.186	S
H1	20191211	Sunny	Moderate	Mid-Ebb	B	8	11:57	7.13	8.33	29.43	22.53	3.54	3	113	0.223	SE
H1	20191211	Sunny	Moderate	Mid-Ebb	B	8	11:57	7.64	8.24	29.49	22.54	4.02	<2	113	0.215	SE
H1	20191211	Sunny	Moderate	Mid-Ebb	M	4.5	11:58	7.79	8.11	29.52	22.7	3.64	4	114	0.14	SE
H1	20191211	Sunny	Moderate	Mid-Ebb	M	4.5	11:58	7.27	8.25	29.37	22.53	3.96	2	113	0.162	SE
H1	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:59	7.35	8.18	29.61	22.63	4.08	2	114	0.197	SE

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H1	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:59	7.33	8.32	29.47	22.7	4.07	4	114	0.212	S
M1	20191211	Sunny	Moderate	Mid-Ebb	B	8.5	10:27	7.46	8.31	29.42	22.27	3.6	<2	113	0.085	S
M1	20191211	Sunny	Moderate	Mid-Ebb	B	8.5	10:27	7.83	8.33	29.45	22.35	4	<2	113	0.237	SE
M1	20191211	Sunny	Moderate	Mid-Ebb	M	4.75	10:28	7.86	8.1	29.46	22.31	3.92	2	114	0.136	E
M1	20191211	Sunny	Moderate	Mid-Ebb	M	4.75	10:28	7.14	8.29	29.6	22.29	3.74	3	112	0.134	SE
M1	20191211	Sunny	Moderate	Mid-Ebb	S	1	10:29	7.45	8.27	29.33	22.37	3.82	<2	113	0.177	SE
M1	20191211	Sunny	Moderate	Mid-Ebb	S	1	10:29	7.62	8.16	29.32	22.13	3.76	2	114	0.14	SE
S1	20191211	Sunny	Moderate	Mid-Ebb	B	4.1	10:55	7.34	8.26	29.48	22.42	3.49	<2	114	0.113	SE
S1	20191211	Sunny	Moderate	Mid-Ebb	B	4.1	10:55	7.44	8.33	29.53	22.54	3.96	2	114	0.121	SE
S1	20191211	Sunny	Moderate	Mid-Ebb	S	1	10:56	7.36	8.1	29.43	22.56	4.2	2	114	0.175	E
S1	20191211	Sunny	Moderate	Mid-Ebb	S	1	10:56	7.32	8.2	29.57	22.51	4.16	3	113	0.123	SE
S2A	20191211	Sunny	Moderate	Mid-Ebb	B	7.8	11:55	7.13	8.28	29.36	22.67	3.89	2	113	0.106	SE
S2A	20191211	Sunny	Moderate	Mid-Ebb	B	7.8	11:55	7.81	8.16	29.57	22.7	3.47	2	113	0.185	SE
S2A	20191211	Sunny	Moderate	Mid-Ebb	M	4.4	11:56	7.23	8.08	29.43	22.6	4.09	4	113	0.152	SE
S2A	20191211	Sunny	Moderate	Mid-Ebb	M	4.4	11:56	7.79	8.22	29.4	22.51	3.8	2	113	0.128	S
S2A	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:57	7.62	8.14	29.59	22.62	3.71	2	113	0.164	SE
S2A	20191211	Sunny	Moderate	Mid-Ebb	S	1	11:57	7.46	8.21	29.45	22.56	4.18	2	113	0.094	SE
S3	20191211	Sunny	Moderate	Mid-Ebb	B	10.5	12:37	7.4	8.26	29.31	22.83	4.14	<2	113	0.164	S
S3	20191211	Sunny	Moderate	Mid-Ebb	B	10.5	12:37	7.41	8.09	29.49	22.88	3.78	3	114	0.138	SE
S3	20191211	Sunny	Moderate	Mid-Ebb	M	5.75	12:38	7.66	8.26	29.7	22.8	4.39	<2	113	0.119	S
S3	20191211	Sunny	Moderate	Mid-Ebb	M	5.75	12:38	7.54	8.26	29.45	22.71	4.19	3	113	0.189	E
S3	20191211	Sunny	Moderate	Mid-Ebb	S	1	12:39	7.19	8.11	29.68	22.91	4.53	3	113	0.097	E
S3	20191211	Sunny	Moderate	Mid-Ebb	S	1	12:39	7.16	8.14	29.44	22.9	4.45	2	113	0.236	S
B1	20191211	Sunny	Moderate	Mid-Flood	B	4	15:44	7.72	7.85	29.34	23.03	3.56	3	112	0.168	W
B1	20191211	Sunny	Moderate	Mid-Flood	B	4	15:44	7.39	7.95	29.31	22.92	3.46	3	113	0.196	W
B1	20191211	Sunny	Moderate	Mid-Flood	S	1	15:45	7.7	8.18	29.49	23.08	3.9	3	114	0.284	W
B1	20191211	Sunny	Moderate	Mid-Flood	S	1	15:45	8.07	7.89	29.76	22.93	4.18	2	113	0.232	NW
B2	20191211	Sunny	Moderate	Mid-Flood	B	3.4	16:09	7.8	8.32	29.81	22.9	3.47	2	114	0.225	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B2	20191211	Sunny	Moderate	Mid-Flood	B	3.4	16:09	7.76	7.95	29.32	22.91	3.78	<2	112	0.135	NW
B2	20191211	Sunny	Moderate	Mid-Flood	S	1	16:10	7.81	8.08	29.68	22.86	3.85	2	113	0.232	W
B2	20191211	Sunny	Moderate	Mid-Flood	S	1	16:10	8.09	8.02	29.78	22.83	3.93	<2	114	0.211	W
B3	20191211	Sunny	Moderate	Mid-Flood	B	3.3	17:00	7.82	8.04	29.24	22.65	3.76	3	112	0.174	NW
B3	20191211	Sunny	Moderate	Mid-Flood	B	3.3	17:00	7.65	7.89	29.48	22.62	3.41	2	113	0.166	NW
B3	20191211	Sunny	Moderate	Mid-Flood	S	1	17:01	7.63	8.24	29.32	22.66	3.69	3	114	0.17	SW
B3	20191211	Sunny	Moderate	Mid-Flood	S	1	17:01	8.07	8.36	29.29	22.68	3.85	<2	112	0.162	SW
B4	20191211	Sunny	Moderate	Mid-Flood	B	4.3	16:47	8.03	8.08	29.62	22.87	3.73	2	113	0.226	W
B4	20191211	Sunny	Moderate	Mid-Flood	B	4.3	16:47	7.68	8.22	29.62	22.83	3.32	4	112	0.2	W
B4	20191211	Sunny	Moderate	Mid-Flood	S	1	16:48	7.41	8.23	29.7	22.71	3.79	2	113	0.156	W
B4	20191211	Sunny	Moderate	Mid-Flood	S	1	16:48	7.88	8.25	29.56	22.84	4.09	3	112	0.277	W
C1A	20191211	Sunny	Moderate	Mid-Flood	B	9.4	15:22	7.39	7.93	29.68	23.08	3.41	5	113	0.269	W
C1A	20191211	Sunny	Moderate	Mid-Flood	B	9.4	15:22	7.92	8.37	29.38	23.14	3.88	4	113	0.127	SW
C1A	20191211	Sunny	Moderate	Mid-Flood	M	5.2	15:23	7.93	8.02	29.27	23.02	3.72	4	113	0.253	SW
C1A	20191211	Sunny	Moderate	Mid-Flood	M	5.2	15:23	7.78	8.32	29.85	23.09	3.92	3	113	0.255	W
C1A	20191211	Sunny	Moderate	Mid-Flood	S	1	15:24	8.04	8.37	29.56	23.11	3.71	3	112	0.279	W
C1A	20191211	Sunny	Moderate	Mid-Flood	S	1	15:24	7.73	8.01	29.5	23.05	3.84	<2	112	0.18	W
C2A	20191211	Sunny	Moderate	Mid-Flood	B	10.7	15:19	7.46	8.34	29.61	23.04	3.38	3	113	0.146	NW
C2A	20191211	Sunny	Moderate	Mid-Flood	B	10.7	15:19	8.01	8.31	29.37	23	3.89	3	113	0.227	W
C2A	20191211	Sunny	Moderate	Mid-Flood	M	5.85	15:20	8.06	8.28	29.38	23.2	3.83	3	113	0.255	SW
C2A	20191211	Sunny	Moderate	Mid-Flood	M	5.85	15:20	7.37	7.97	29.4	23.11	3.87	3	113	0.282	NW
C2A	20191211	Sunny	Moderate	Mid-Flood	S	1	15:21	7.98	8.26	29.48	23.14	3.75	3	114	0.212	W
C2A	20191211	Sunny	Moderate	Mid-Flood	S	1	15:21	7.52	7.86	29.79	23.06	4.14	3	112	0.205	W
CR1	20191211	Sunny	Moderate	Mid-Flood	B	11.1	17:59	8.08	8.09	29.57	22.44	3.71	3	113	0.286	SW
CR1	20191211	Sunny	Moderate	Mid-Flood	B	11.1	17:59	7.57	8.04	29.29	22.36	3.8	4	114	0.163	W
CR1	20191211	Sunny	Moderate	Mid-Flood	M	6.05	18:00	7.4	8.12	29.68	22.45	4.03	3	113	0.281	SW
CR1	20191211	Sunny	Moderate	Mid-Flood	M	6.05	18:00	7.86	8.21	29.2	22.54	3.7	3	113	0.257	W
CR1	20191211	Sunny	Moderate	Mid-Flood	S	1	18:01	7.41	8.19	29.73	22.45	4.11	<2	113	0.238	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR1	20191211	Sunny	Moderate	Mid-Flood	S	1	18:01	7.55	8.27	29.25	22.51	3.95	3	114	0.152	NW
CR2	20191211	Sunny	Moderate	Mid-Flood	B	9.7	17:28	7.64	7.89	29.52	22.61	4.17	4	113	0.213	SW
CR2	20191211	Sunny	Moderate	Mid-Flood	B	9.7	17:28	7.39	7.94	29.33	22.65	4.18	4	114	0.158	NW
CR2	20191211	Sunny	Moderate	Mid-Flood	M	5.35	17:29	7.54	7.91	29.4	22.54	3.92	3	114	0.275	SW
CR2	20191211	Sunny	Moderate	Mid-Flood	M	5.35	17:29	7.93	8.03	29.27	22.58	3.91	4	113	0.22	W
CR2	20191211	Sunny	Moderate	Mid-Flood	S	1	17:30	7.98	8.36	29.52	22.44	4.19	4	114	0.133	W
CR2	20191211	Sunny	Moderate	Mid-Flood	S	1	17:30	7.54	8.19	29.33	22.52	3.98	4	113	0.158	NW
F1A	20191211	Sunny	Moderate	Mid-Flood	B	7.6	16:24	7.48	8.29	29.25	22.93	3.91	2	114	0.278	SW
F1A	20191211	Sunny	Moderate	Mid-Flood	B	7.6	16:24	7.82	7.93	29.44	22.91	3.49	2	113	0.15	W
F1A	20191211	Sunny	Moderate	Mid-Flood	M	4.3	16:25	7.67	8.12	29.58	22.82	3.76	3	113	0.235	NW
F1A	20191211	Sunny	Moderate	Mid-Flood	M	4.3	16:25	7.46	8.37	29.85	22.83	4.02	2	113	0.262	W
F1A	20191211	Sunny	Moderate	Mid-Flood	S	1	16:26	7.68	8.22	29.71	22.91	4.09	<2	113	0.2	W
F1A	20191211	Sunny	Moderate	Mid-Flood	S	1	16:26	7.49	8.36	29.22	22.89	4.02	3	114	0.162	W
H1	20191211	Sunny	Moderate	Mid-Flood	B	7.3	17:19	7.6	8.23	29.82	22.53	3.86	<2	113	0.189	W
H1	20191211	Sunny	Moderate	Mid-Flood	B	7.3	17:19	8.07	8.37	29.64	22.44	3.9	2	113	0.151	W
H1	20191211	Sunny	Moderate	Mid-Flood	M	4.15	17:20	7.4	8.19	29.25	22.63	3.98	2	113	0.127	NW
H1	20191211	Sunny	Moderate	Mid-Flood	M	4.15	17:20	7.9	8.13	29.43	22.61	3.92	3	112	0.159	W
H1	20191211	Sunny	Moderate	Mid-Flood	S	1	17:21	7.82	8.14	29.6	22.69	4.25	2	113	0.254	W
H1	20191211	Sunny	Moderate	Mid-Flood	S	1	17:21	7.35	8.27	29.3	22.7	4.11	3	112	0.282	W
M1	20191211	Sunny	Moderate	Mid-Flood	B	7.5	15:54	7.62	8.3	29.28	22.88	3.76	4	112	0.172	W
M1	20191211	Sunny	Moderate	Mid-Flood	B	7.5	15:54	7.47	8.11	29.63	22.94	3.5	3	112	0.219	W
M1	20191211	Sunny	Moderate	Mid-Flood	M	4.25	15:55	7.87	8.39	29.82	22.85	4.11	4	113	0.252	W
M1	20191211	Sunny	Moderate	Mid-Flood	M	4.25	15:55	7.6	8	29.52	23	3.68	3	113	0.185	W
M1	20191211	Sunny	Moderate	Mid-Flood	S	1	15:56	7.4	8.07	29.48	23.03	4.1	4	113	0.198	W
M1	20191211	Sunny	Moderate	Mid-Flood	S	1	15:56	7.6	8.25	29.36	22.93	3.83	4	114	0.122	W
S1	20191211	Sunny	Moderate	Mid-Flood	B	4	15:56	7.96	8.24	29.33	22.95	3.54	3	113	0.281	W
S1	20191211	Sunny	Moderate	Mid-Flood	B	4	15:56	7.43	7.89	29.54	22.92	3.56	4	113	0.232	W
S1	20191211	Sunny	Moderate	Mid-Flood	S	1	15:57	7.38	8.38	29.4	22.87	3.85	3	113	0.211	SW

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S1	20191211	Sunny	Moderate	Mid-Flood	S	1	15:57	7.45	8.22	29.27	22.87	3.91	<2	113	0.225	W
S2A	20191211	Sunny	Moderate	Mid-Flood	B	8.4	16:57	7.69	8.08	29.2	22.69	3.75	3	113	0.227	W
S2A	20191211	Sunny	Moderate	Mid-Flood	B	8.4	16:57	8	8.09	29.56	22.54	3.58	4	113	0.269	SW
S2A	20191211	Sunny	Moderate	Mid-Flood	M	4.7	16:58	7.95	8.34	29.63	22.68	3.9	3	113	0.278	SW
S2A	20191211	Sunny	Moderate	Mid-Flood	M	4.7	16:58	7.93	7.9	29.24	22.64	4.03	4	113	0.183	W
S2A	20191211	Sunny	Moderate	Mid-Flood	S	1	16:59	7.8	7.9	29.6	22.6	3.69	3	113	0.266	W
S2A	20191211	Sunny	Moderate	Mid-Flood	S	1	16:59	7.39	8.25	29.55	22.62	3.86	3	113	0.275	W
S3	20191211	Sunny	Moderate	Mid-Flood	B	8.1	17:38	8.01	8.22	29.76	22.54	4.07	3	114	0.202	W
S3	20191211	Sunny	Moderate	Mid-Flood	B	8.1	17:38	7.49	7.89	29.52	22.42	4.19	4	114	0.261	NW
S3	20191211	Sunny	Moderate	Mid-Flood	M	4.55	17:39	7.47	8.16	29.41	22.48	4.32	3	114	0.139	W
S3	20191211	Sunny	Moderate	Mid-Flood	M	4.55	17:39	7.82	7.89	29.79	22.55	4.16	4	112	0.152	SW
S3	20191211	Sunny	Moderate	Mid-Flood	S	1	17:40	8.05	7.89	29.72	22.44	4.03	3	114	0.215	NW
S3	20191211	Sunny	Moderate	Mid-Flood	S	1	17:40	8	8.24	29.79	22.43	4.52	2	113	0.252	W
B1	20191213	Cloudy	Moderate	Mid-Ebb	B	3.7	11:30	8.31	8.16	30.47	22.41	2.72	9	113	0.132	SE
B1	20191213	Cloudy	Moderate	Mid-Ebb	B	3.7	11:30	7.92	8.17	30.48	22.55	2.5	10	114	0.083	S
B1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:31	8.06	8.25	30.41	22.33	3.02	9	114	0.144	S
B1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:31	8.27	7.97	30.38	22.51	3.15	8	113	0.097	SE
B2	20191213	Cloudy	Moderate	Mid-Ebb	B	4.4	11:53	7.8	8.09	30.38	22.59	2.52	9	113	0.183	S
B2	20191213	Cloudy	Moderate	Mid-Ebb	B	4.4	11:53	7.73	8.09	30.3	22.45	2.97	8	113	0.182	S
B2	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:54	8.07	7.97	30.65	22.64	3.13	11	113	0.121	S
B2	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:54	7.74	8.01	30.53	22.37	3.02	11	113	0.228	S
B3	20191213	Cloudy	Moderate	Mid-Ebb	B	4.2	12:20	8.01	8.26	30.64	22.61	2.56	11	114	0.113	E
B3	20191213	Cloudy	Moderate	Mid-Ebb	B	4.2	12:20	7.78	8.16	30.58	22.6	2.6	10	114	0.197	S
B3	20191213	Cloudy	Moderate	Mid-Ebb	S	1	12:21	8.38	7.98	30.43	22.68	2.96	10	113	0.246	SE
B3	20191213	Cloudy	Moderate	Mid-Ebb	S	1	12:21	8.3	8.05	30.67	22.59	2.86	11	113	0.097	E
B4	20191213	Cloudy	Moderate	Mid-Ebb	B	3.3	12:09	8.25	7.96	30.52	22.53	2.75	7	114	0.199	SE
B4	20191213	Cloudy	Moderate	Mid-Ebb	B	3.3	12:09	8.23	8.27	30.43	22.51	2.57	6	114	0.141	S
B4	20191213	Cloudy	Moderate	Mid-Ebb	S	1	12:10	8.3	8.09	30.7	22.53	2.81	12	114	0.182	SE

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B4	20191213	Cloudy	Moderate	Mid-Ebb	S	1	12:10	8.14	8.21	30.55	22.6	3.2	11	113	0.163	SE
C1A	20191213	Cloudy	Moderate	Mid-Ebb	B	9.6	11:05	8.02	7.96	30.5	22.49	2.95	11	113	0.115	S
C1A	20191213	Cloudy	Moderate	Mid-Ebb	B	9.6	11:05	8.36	8.26	30.63	22.46	2.65	12	114	0.128	E
C1A	20191213	Cloudy	Moderate	Mid-Ebb	M	5.3	11:06	8.24	8.28	30.31	22.32	2.98	9	113	0.137	SE
C1A	20191213	Cloudy	Moderate	Mid-Ebb	M	5.3	11:06	7.88	8.21	30.39	22.31	2.9	9	114	0.152	S
C1A	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:07	8.06	8.16	30.55	22.43	2.99	10	114	0.216	SE
C1A	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:07	8.13	8.17	30.3	22.51	3.23	9	114	0.212	S
C2A	20191213	Cloudy	Moderate	Mid-Ebb	B	11.5	13:01	8.06	8.02	30.61	22.83	2.82	9	113	0.215	S
C2A	20191213	Cloudy	Moderate	Mid-Ebb	B	11.5	13:01	7.89	8.27	30.67	22.75	2.92	9	113	0.09	SE
C2A	20191213	Cloudy	Moderate	Mid-Ebb	M	6.25	13:02	8.25	8.16	30.52	22.58	2.74	8	114	0.201	SE
C2A	20191213	Cloudy	Moderate	Mid-Ebb	M	6.25	13:02	7.78	8.04	30.66	22.83	2.68	9	114	0.171	S
C2A	20191213	Cloudy	Moderate	Mid-Ebb	S	1	13:03	7.94	8.21	30.38	22.85	3.14	8	113	0.155	S
C2A	20191213	Cloudy	Moderate	Mid-Ebb	S	1	13:03	7.84	8.27	30.53	22.62	2.94	9	113	0.221	S
CR1	20191213	Cloudy	Moderate	Mid-Ebb	B	12.7	13:42	8.25	8.29	30.44	22.82	2.57	12	114	0.188	E
CR1	20191213	Cloudy	Moderate	Mid-Ebb	B	12.7	13:42	8.09	8.2	30.43	22.75	2.83	12	113	0.169	SE
CR1	20191213	Cloudy	Moderate	Mid-Ebb	M	6.85	13:43	8.12	8	30.66	22.91	2.72	11	114	0.122	S
CR1	20191213	Cloudy	Moderate	Mid-Ebb	M	6.85	13:43	7.91	8.11	30.62	23	2.95	10	114	0.078	E
CR1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	13:44	8.07	8.02	30.48	22.94	2.67	10	114	0.134	S
CR1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	13:44	7.91	8.1	30.47	22.89	2.74	10	114	0.159	SE
CR2	20191213	Cloudy	Moderate	Mid-Ebb	B	10.9	13:02	8.07	8.07	30.63	22.87	2.65	10	114	0.121	SE
CR2	20191213	Cloudy	Moderate	Mid-Ebb	B	10.9	13:02	7.92	8.14	30.61	22.86	2.96	9	114	0.112	SE
CR2	20191213	Cloudy	Moderate	Mid-Ebb	M	5.95	13:03	8.04	8.13	30.37	22.84	2.82	11	114	0.2	E
CR2	20191213	Cloudy	Moderate	Mid-Ebb	M	5.95	13:03	7.83	8.09	30.31	22.62	2.97	10	113	0.187	SE
CR2	20191213	Cloudy	Moderate	Mid-Ebb	S	1	13:04	8.34	7.99	30.3	22.72	3.05	11	114	0.096	SE
CR2	20191213	Cloudy	Moderate	Mid-Ebb	S	1	13:04	8.22	7.97	30.66	22.82	3.01	10	114	0.237	S
F1A	20191213	Cloudy	Moderate	Mid-Ebb	B	8	11:39	7.97	8.24	30.51	22.43	2.56	10	113	0.079	S
F1A	20191213	Cloudy	Moderate	Mid-Ebb	B	8	11:39	8.33	8.05	30.47	22.53	2.98	11	114	0.081	SE
F1A	20191213	Cloudy	Moderate	Mid-Ebb	M	4.5	11:40	7.9	8.26	30.61	22.35	2.88	8	113	0.201	S

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
F1A	20191213	Cloudy	Moderate	Mid-Ebb	M	4.5	11:40	7.82	8.14	30.44	22.33	2.66	8	113	0.081	SE
F1A	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:41	7.98	8.06	30.31	22.47	2.92	8	113	0.111	SE
F1A	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:41	8.01	8.02	30.58	22.51	2.97	9	114	0.081	E
H1	20191213	Cloudy	Moderate	Mid-Ebb	B	7.1	12:39	7.72	7.98	30.66	22.52	2.95	9	113	0.228	SE
H1	20191213	Cloudy	Moderate	Mid-Ebb	B	7.1	12:39	7.76	8.27	30.51	22.48	2.52	8	114	0.17	S
H1	20191213	Cloudy	Moderate	Mid-Ebb	M	4.05	12:40	8.12	8.26	30.59	22.45	3.08	10	113	0.217	SE
H1	20191213	Cloudy	Moderate	Mid-Ebb	M	4.05	12:40	8.22	8.16	30.69	22.72	2.94	9	113	0.16	SE
H1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	12:41	8.03	7.99	30.46	22.62	2.86	9	113	0.153	E
H1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	12:41	8.35	8.17	30.32	22.76	3.07	8	113	0.248	SE
M1	20191213	Cloudy	Moderate	Mid-Ebb	B	7.9	11:08	8.36	8.26	30.48	22.49	2.96	7	113	0.134	S
M1	20191213	Cloudy	Moderate	Mid-Ebb	B	7.9	11:08	8.39	8.01	30.3	22.39	2.92	8	114	0.178	E
M1	20191213	Cloudy	Moderate	Mid-Ebb	M	4.45	11:09	7.98	8.21	30.62	22.43	3.01	7	114	0.119	S
M1	20191213	Cloudy	Moderate	Mid-Ebb	M	4.45	11:09	7.8	8.06	30.31	22.43	3.11	8	113	0.09	SE
M1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:10	8.17	8.11	30.68	22.38	2.85	9	113	0.183	S
M1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:10	8.05	8.07	30.59	22.53	3.17	10	114	0.239	S
S1	20191213	Cloudy	Moderate	Mid-Ebb	B	4.5	11:43	8.08	8.24	30.7	22.53	2.83	10	113	0.165	S
S1	20191213	Cloudy	Moderate	Mid-Ebb	B	4.5	11:43	8.27	8.03	30.67	22.34	2.92	10	114	0.246	S
S1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:44	7.92	8.26	30.7	22.54	2.82	11	114	0.099	E
S1	20191213	Cloudy	Moderate	Mid-Ebb	S	1	11:44	7.98	8.25	30.6	22.56	2.9	10	113	0.221	E
S2A	20191213	Cloudy	Moderate	Mid-Ebb	B	8.1	12:30	7.84	8.05	30.7	22.73	2.81	10	114	0.224	S
S2A	20191213	Cloudy	Moderate	Mid-Ebb	B	8.1	12:30	8.1	8.05	30.31	22.74	2.61	9	113	0.083	SE
S2A	20191213	Cloudy	Moderate	Mid-Ebb	M	4.55	12:31	8.37	8.08	30.56	22.71	2.95	11	113	0.198	SE
S2A	20191213	Cloudy	Moderate	Mid-Ebb	M	4.55	12:31	8.35	7.96	30.5	22.56	2.59	10	114	0.143	S
S2A	20191213	Cloudy	Moderate	Mid-Ebb	S	1	12:32	8.11	8.29	30.58	22.59	2.74	9	113	0.127	S
S2A	20191213	Cloudy	Moderate	Mid-Ebb	S	1	12:32	8.22	7.99	30.53	22.47	2.99	10	113	0.187	E
S3	20191213	Cloudy	Moderate	Mid-Ebb	B	10.4	13:12	7.89	8.15	30.65	22.77	2.63	7	114	0.235	SE
S3	20191213	Cloudy	Moderate	Mid-Ebb	B	10.4	13:12	7.76	8.03	30.61	22.68	3	8	113	0.182	SE
S3	20191213	Cloudy	Moderate	Mid-Ebb	M	5.7	13:13	7.72	8.21	30.56	22.56	2.86	8	113	0.087	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S3	20191213	Cloudy	Moderate	Mid-Ebb	M	5.7	13:13	8.28	8.21	30.64	22.77	2.97	9	113	0.227	SE
S3	20191213	Cloudy	Moderate	Mid-Ebb	S	1	13:14	7.95	8.15	30.43	22.63	3.23	10	113	0.207	SE
S3	20191213	Cloudy	Moderate	Mid-Ebb	S	1	13:14	8.37	8.22	30.51	22.65	3.08	10	113	0.233	E
B1	20191213	Cloudy	Moderate	Mid-Flood	B	4	15:29	8.51	8.04	30.43	22.67	2.76	8	113	0.145	W
B1	20191213	Cloudy	Moderate	Mid-Flood	B	4	15:29	8.33	8.26	30.27	22.68	2.51	7	113	0.17	W
B1	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:30	8.56	8.19	30.57	22.54	3.1	8	114	0.156	W
B1	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:30	8.5	7.91	30.43	22.67	2.72	8	113	0.146	W
B2	20191213	Cloudy	Moderate	Mid-Flood	B	3.9	15:52	8.29	8.21	30.54	22.64	2.76	8	113	0.282	W
B2	20191213	Cloudy	Moderate	Mid-Flood	B	3.9	15:52	8.56	7.97	30.42	22.53	2.74	8	113	0.244	NW
B2	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:53	8.42	8.02	30.42	22.58	3.15	8	112	0.222	W
B2	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:53	8.11	8.17	30.53	22.64	3.19	9	113	0.178	SW
B3	20191213	Cloudy	Moderate	Mid-Flood	B	3.5	16:41	8.22	8.28	30.46	22.63	2.6	11	112	0.225	W
B3	20191213	Cloudy	Moderate	Mid-Flood	B	3.5	16:41	8.6	7.96	30.25	22.56	2.52	10	112	0.138	W
B3	20191213	Cloudy	Moderate	Mid-Flood	S	1	16:42	8.18	7.98	30.71	22.57	2.92	11	113	0.274	W
B3	20191213	Cloudy	Moderate	Mid-Flood	S	1	16:42	8.39	8.15	30.59	22.47	2.68	12	113	0.258	W
B4	20191213	Cloudy	Moderate	Mid-Flood	B	4	16:31	8.24	8.21	30.54	22.44	2.49	8	114	0.23	SW
B4	20191213	Cloudy	Moderate	Mid-Flood	B	4	16:31	8.5	7.89	30.51	22.45	2.61	9	113	0.203	W
B4	20191213	Cloudy	Moderate	Mid-Flood	S	1	16:32	8.54	7.92	30.58	22.51	2.99	9	112	0.282	W
B4	20191213	Cloudy	Moderate	Mid-Flood	S	1	16:32	8.07	8.09	30.38	22.43	3.05	10	113	0.193	W
C1A	20191213	Cloudy	Moderate	Mid-Flood	B	10.9	15:05	8.43	8.18	30.46	22.62	2.73	8	113	0.198	NW
C1A	20191213	Cloudy	Moderate	Mid-Flood	B	10.9	15:05	8.45	8.26	30.72	22.52	2.6	9	113	0.22	W
C1A	20191213	Cloudy	Moderate	Mid-Flood	M	5.95	15:06	8.44	8.27	30.34	22.63	2.81	7	113	0.242	W
C1A	20191213	Cloudy	Moderate	Mid-Flood	M	5.95	15:06	8.48	8.23	30.51	22.53	3.12	8	113	0.153	NW
C1A	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:07	8.55	7.88	30.41	22.69	2.93	8	113	0.231	W
C1A	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:07	8.58	8.21	30.53	22.55	2.79	7	113	0.219	W
C2A	20191213	Cloudy	Moderate	Mid-Flood	B	10.3	15:04	8.31	8.04	30.31	22.58	2.47	9	113	0.192	W
C2A	20191213	Cloudy	Moderate	Mid-Flood	B	10.3	15:04	8.16	8.24	30.42	22.65	2.63	10	113	0.215	W
C2A	20191213	Cloudy	Moderate	Mid-Flood	M	5.65	15:05	8.05	8.26	30.24	22.63	2.55	9	113	0.219	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
C2A	20191213	Cloudy	Moderate	Mid-Flood	M	5.65	15:05	8.55	8.13	30.3	22.69	2.64	8	113	0.265	W
C2A	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:06	8.31	8.03	30.25	22.63	3.16	- note 3	114	0.193	W
C2A	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:06	8.59	7.95	30.57	22.74	3.03	9	114	0.204	SW
CR1	20191213	Cloudy	Moderate	Mid-Flood	B	11.4	17:40	8.09	7.95	30.5	22.5	2.56	13	113	0.278	W
CR1	20191213	Cloudy	Moderate	Mid-Flood	B	11.4	17:40	8.37	8.28	30.73	22.48	2.83	12	113	0.152	SW
CR1	20191213	Cloudy	Moderate	Mid-Flood	M	6.2	17:41	8.48	8.21	30.31	22.51	2.78	13	113	0.123	W
CR1	20191213	Cloudy	Moderate	Mid-Flood	M	6.2	17:41	8.48	8.26	30.31	22.45	2.9	13	112	0.291	W
CR1	20191213	Cloudy	Moderate	Mid-Flood	S	1	17:42	8.52	8.14	30.54	22.32	3.11	14	114	0.2	W
CR1	20191213	Cloudy	Moderate	Mid-Flood	S	1	17:42	8.6	8.25	30.47	22.4	2.67	13	112	0.2	SW
CR2	20191213	Cloudy	Moderate	Mid-Flood	B	10.1	17:01	8.24	7.87	30.52	22.34	2.69	10	113	0.203	NW
CR2	20191213	Cloudy	Moderate	Mid-Flood	B	10.1	17:01	8.46	8.1	30.26	22.31	2.68	11	113	0.13	W
CR2	20191213	Cloudy	Moderate	Mid-Flood	M	5.55	17:02	8.08	7.9	30.7	22.4	3	13	120	0.226	SW
CR2	20191213	Cloudy	Moderate	Mid-Flood	M	5.55	17:02	8.59	8.14	30.49	22.36	2.82	12	119	0.273	SW
CR2	20191213	Cloudy	Moderate	Mid-Flood	S	1	17:03	8.6	7.85	30.28	22.35	3.07	12	113	0.222	W
CR2	20191213	Cloudy	Moderate	Mid-Flood	S	1	17:03	8.08	8.24	30.53	22.41	3.11	13	113	0.268	W
F1A	20191213	Cloudy	Moderate	Mid-Flood	B	7.5	16:03	8.42	8.13	30.7	22.43	2.47	10	113	0.275	SW
F1A	20191213	Cloudy	Moderate	Mid-Flood	B	7.5	16:03	8.25	8.07	30.62	22.45	2.64	9	113	0.262	SW
F1A	20191213	Cloudy	Moderate	Mid-Flood	M	4.25	16:04	8.35	7.99	30.34	22.51	2.74	8	113	0.18	W
F1A	20191213	Cloudy	Moderate	Mid-Flood	M	4.25	16:04	8.44	8.04	30.2	22.41	3.02	8	114	0.206	NW
F1A	20191213	Cloudy	Moderate	Mid-Flood	S	1	16:05	8.46	8.13	30.64	22.53	3.17	8	114	0.179	W
F1A	20191213	Cloudy	Moderate	Mid-Flood	S	1	16:05	8.48	7.9	30.6	22.65	3.15	9	113	0.139	NW
H1	20191213	Cloudy	Moderate	Mid-Flood	B	7.6	17:00	8.58	8.22	30.48	22.42	2.45	10	113	0.249	SW
H1	20191213	Cloudy	Moderate	Mid-Flood	B	7.6	17:00	8.37	8.23	30.62	22.56	2.68	9	113	0.138	NW
H1	20191213	Cloudy	Moderate	Mid-Flood	M	4.3	17:01	8.46	8.05	30.52	22.38	2.59	9	113	0.272	W
H1	20191213	Cloudy	Moderate	Mid-Flood	M	4.3	17:01	8.43	7.91	30.42	22.42	2.92	8	113	0.132	SW
H1	20191213	Cloudy	Moderate	Mid-Flood	S	1	17:02	8.29	7.97	30.68	22.31	3.16	9	113	0.126	W
H1	20191213	Cloudy	Moderate	Mid-Flood	S	1	17:02	8.58	7.96	30.62	22.32	2.98	9	112	0.274	SW
M1	20191213	Cloudy	Moderate	Mid-Flood	B	7.4	15:35	8.27	7.85	30.36	22.61	2.53	10	114	0.181	W

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M1	20191213	Cloudy	Moderate	Mid-Flood	B	7.4	15:35	8.18	7.99	30.54	22.64	2.37	10	113	0.183	W
M1	20191213	Cloudy	Moderate	Mid-Flood	M	4.2	15:36	8.51	8.25	30.59	22.71	3.05	8	114	0.254	W
M1	20191213	Cloudy	Moderate	Mid-Flood	M	4.2	15:36	8.29	8.04	30.75	22.8	2.66	10	113	0.189	NW
M1	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:37	8.4	8.2	30.71	22.58	2.8	12	114	0.185	NW
M1	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:37	8.29	8.07	30.33	22.63	2.73	12	116	0.195	SW
S1	20191213	Cloudy	Moderate	Mid-Flood	B	4.7	15:42	8.46	8.19	30.58	22.62	2.38	11	113	0.277	W
S1	20191213	Cloudy	Moderate	Mid-Flood	B	4.7	15:42	8.11	7.98	30.23	22.6	2.38	12	113	0.161	W
S1	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:43	8.32	7.99	30.42	22.6	3.01	10	113	0.18	NW
S1	20191213	Cloudy	Moderate	Mid-Flood	S	1	15:43	8.48	8.11	30.36	22.67	2.98	9	114	0.228	W
S2A	20191213	Cloudy	Moderate	Mid-Flood	B	8.6	16:30	8.07	8.12	30.54	22.45	2.48	10	113	0.123	NW
S2A	20191213	Cloudy	Moderate	Mid-Flood	B	8.6	16:30	8.32	7.86	30.2	22.37	2.84	11	113	0.192	W
S2A	20191213	Cloudy	Moderate	Mid-Flood	M	4.8	16:31	8.44	8.04	30.42	22.64	3.07	9	114	0.269	SW
S2A	20191213	Cloudy	Moderate	Mid-Flood	M	4.8	16:31	8.1	8.06	30.33	22.62	2.83	10	113	0.275	W
S2A	20191213	Cloudy	Moderate	Mid-Flood	S	1	16:32	8.21	8.12	30.37	22.36	2.93	8	113	0.236	NW
S2A	20191213	Cloudy	Moderate	Mid-Flood	S	1	16:32	8.1	7.9	30.26	22.53	2.71	9	113	0.221	SW
S3	20191213	Cloudy	Moderate	Mid-Flood	B	9.2	17:12	8.36	8.11	30.5	22.45	2.58	12	112	0.162	W
S3	20191213	Cloudy	Moderate	Mid-Flood	B	9.2	17:12	8.46	8.25	30.69	22.36	2.82	12	113	0.175	W
S3	20191213	Cloudy	Moderate	Mid-Flood	M	5.1	17:13	8.56	7.94	30.28	22.45	2.69	10	113	0.256	W
S3	20191213	Cloudy	Moderate	Mid-Flood	M	5.1	17:13	8.54	8.1	30.44	22.35	3.08	9	113	0.14	W
S3	20191213	Cloudy	Moderate	Mid-Flood	S	1	17:14	8.4	7.96	30.4	22.34	3	8	112	0.196	W
S3	20191213	Cloudy	Moderate	Mid-Flood	S	1	17:14	8.38	7.96	30.47	22.35	3.1	10	113	0.212	SW
B1	20191216	Cloudy	Moderate	Mid-Flood	B	4.1	8:50	8.13	8.14	29.32	22.58	3.24	11	113	0.291	NW
B1	20191216	Cloudy	Moderate	Mid-Flood	B	4.1	8:50	7.96	8.17	29.91	22.63	3.05	11	113	0.22	NW
B1	20191216	Cloudy	Moderate	Mid-Flood	S	1	8:51	8.11	8.23	29.2	22.61	2.5	10	114	0.301	W
B1	20191216	Cloudy	Moderate	Mid-Flood	S	1	8:51	8	8.22	29.81	22.3	2.35	11	113	0.278	NW
B2	20191216	Cloudy	Moderate	Mid-Flood	B	4.1	9:13	7.64	8.09	29.29	22.53	3.18	14	113	0.288	W
B2	20191216	Cloudy	Moderate	Mid-Flood	B	4.1	9:13	7.84	8.2	29.61	22.66	3.28	13	113	0.244	W
B2	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:14	7.76	8.05	29.37	22.52	2.4	13	112	0.201	W

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B2	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:14	7.85	8.17	29.66	22.31	2.54	13	113	0.268	W
B3	20191216	Cloudy	Moderate	Mid-Flood	B	3.8	10:15	8.13	8.07	29.51	22.66	3.44	12	112	0.198	NW
B3	20191216	Cloudy	Moderate	Mid-Flood	B	3.8	10:15	7.59	8.2	29.85	22.8	3.29	13	112	0.23	NW
B3	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:16	7.55	8.21	29.22	22.68	2.43	12	113	0.2	NW
B3	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:16	7.88	8.18	29.6	22.54	2.92	11	113	0.205	NW
B4	20191216	Cloudy	Moderate	Mid-Flood	B	4.6	10:06	8.11	8.2	29.31	22.62	3.52	12	114	0.225	NW
B4	20191216	Cloudy	Moderate	Mid-Flood	B	4.6	10:06	8.04	8.21	29.51	22.52	3.48	12	113	0.245	W
B4	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:07	7.71	8.17	29.71	22.59	2.42	10	112	0.238	W
B4	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:07	7.86	8.19	29.49	22.58	2.65	12	113	0.218	NW
C1A	20191216	Cloudy	Moderate	Mid-Flood	B	9.9	8:25	7.61	8.2	29.69	22.27	3.3	8	113	0.294	W
C1A	20191216	Cloudy	Moderate	Mid-Flood	B	9.9	8:25	8.15	8.09	29.62	22.32	3.13	7	113	0.255	W
C1A	20191216	Cloudy	Moderate	Mid-Flood	M	5.45	8:26	7.61	8.2	29.9	22.24	2.83	6	113	0.212	W
C1A	20191216	Cloudy	Moderate	Mid-Flood	M	5.45	8:26	7.85	8.12	29.31	22.34	3.09	5	113	0.209	W
C1A	20191216	Cloudy	Moderate	Mid-Flood	S	1	8:27	7.73	8.2	29.93	22.58	2.54	6	113	0.211	W
C1A	20191216	Cloudy	Moderate	Mid-Flood	S	1	8:27	7.97	8.19	29.45	22.3	2.93	5	113	0.224	W
C2A	20191216	Cloudy	Moderate	Mid-Flood	B	10.3	8:25	7.74	8.09	29.34	22.69	3.39	7	113	0.271	W
C2A	20191216	Cloudy	Moderate	Mid-Flood	B	10.3	8:25	7.76	8.09	29.54	22.51	3.35	8	113	0.24	W
C2A	20191216	Cloudy	Moderate	Mid-Flood	M	5.65	8:26	7.95	8.1	29.52	22.4	2.59	8	113	0.206	W
C2A	20191216	Cloudy	Moderate	Mid-Flood	M	5.65	8:26	7.59	8.11	29.5	22.45	3.09	8	113	0.256	W
C2A	20191216	Cloudy	Moderate	Mid-Flood	S	1	8:27	8.11	8.17	29.39	22.4	2.89	7	114	0.246	NW
C2A	20191216	Cloudy	Moderate	Mid-Flood	S	1	8:27	8.1	8.08	29.95	22.28	2.82	6	114	0.214	W
CR1	20191216	Cloudy	Moderate	Mid-Flood	B	11.6	11:03	8.13	8.17	29.65	22.62	3.25	7	113	0.2	W
CR1	20191216	Cloudy	Moderate	Mid-Flood	B	11.6	11:03	7.64	8.11	29.23	22.86	3.23	6	113	0.239	NW
CR1	20191216	Cloudy	Moderate	Mid-Flood	M	6.3	11:04	7.78	8.19	29.33	22.63	2.96	6	113	0.2	W
CR1	20191216	Cloudy	Moderate	Mid-Flood	M	6.3	11:04	7.72	8.05	29.55	22.65	2.87	6	112	0.203	W
CR1	20191216	Cloudy	Moderate	Mid-Flood	S	1	11:05	8	8.06	29.29	22.69	2.59	7	114	0.279	NW
CR1	20191216	Cloudy	Moderate	Mid-Flood	S	1	11:05	7.72	8.07	29.8	22.9	2.65	7	112	0.275	W
CR2	20191216	Cloudy	Moderate	Mid-Flood	B	9.8	10:17	7.7	8.11	29.51	22.8	3.32	8	113	0.273	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR2	20191216	Cloudy	Moderate	Mid-Flood	B	9.8	10:17	8.06	8.16	29.4	22.75	3.28	7	113	0.283	W
CR2	20191216	Cloudy	Moderate	Mid-Flood	M	5.4	10:18	7.67	8.15	29.92	22.61	2.87	6	120	0.284	W
CR2	20191216	Cloudy	Moderate	Mid-Flood	M	5.4	10:18	7.61	8.09	29.7	22.72	2.87	5	119	0.254	NW
CR2	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:19	8.1	8.18	29.89	22.6	2.44	6	113	0.29	W
CR2	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:19	7.6	8.22	29.28	22.6	2.54	6	113	0.265	W
F1A	20191216	Cloudy	Moderate	Mid-Flood	B	7.6	9:39	7.94	8.07	29.77	22.72	3.21	8	113	0.298	W
F1A	20191216	Cloudy	Moderate	Mid-Flood	B	7.6	9:39	7.57	8.23	29.46	22.55	3.2	7	113	0.254	W
F1A	20191216	Cloudy	Moderate	Mid-Flood	M	4.3	9:40	8.05	8.17	29.89	22.77	2.92	7	113	0.262	W
F1A	20191216	Cloudy	Moderate	Mid-Flood	M	4.3	9:40	8.18	8.19	29.82	22.43	2.9	6	114	0.209	NW
F1A	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:41	8.06	8.1	29.61	22.57	2.63	7	114	0.202	NW
F1A	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:41	7.66	8.08	29.71	22.66	2.61	7	113	0.213	W
H1	20191216	Cloudy	Moderate	Mid-Flood	B	7.2	10:34	8.01	8.06	29.74	22.82	2.92	8	113	0.213	NW
H1	20191216	Cloudy	Moderate	Mid-Flood	B	7.2	10:34	7.72	8.13	29.75	22.59	3.29	6	113	0.203	W
H1	20191216	Cloudy	Moderate	Mid-Flood	M	4.1	10:35	7.56	8.2	29.95	22.82	2.94	8	113	0.224	W
H1	20191216	Cloudy	Moderate	Mid-Flood	M	4.1	10:35	7.7	8.2	29.77	22.72	2.94	8	113	0.259	NW
H1	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:36	7.62	8.13	29.4	22.8	2.61	12	113	0.218	W
H1	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:36	8.04	8.2	29.81	22.83	2.56	12	112	0.248	W
M1	20191216	Cloudy	Moderate	Mid-Flood	B	7.4	9:06	8.03	8.21	29.2	22.49	3.13	5	114	0.28	W
M1	20191216	Cloudy	Moderate	Mid-Flood	B	7.4	9:06	7.58	8.11	29.88	22.41	3.32	6	113	0.3	W
M1	20191216	Cloudy	Moderate	Mid-Flood	M	4.2	9:07	8.12	8.2	29.28	22.63	3.1	5	114	0.27	W
M1	20191216	Cloudy	Moderate	Mid-Flood	M	4.2	9:07	8.06	8.06	29.66	22.64	3.07	6	113	0.265	W
M1	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:08	8.18	8.07	29.44	22.52	2.59	6	114	0.223	W
M1	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:08	7.79	8.07	29.28	22.49	2.46	7	116	0.296	NW
S1	20191216	Cloudy	Moderate	Mid-Flood	B	4.1	9:02	8.09	8.13	29.69	22.35	3.32	8	113	0.19	W
S1	20191216	Cloudy	Moderate	Mid-Flood	B	4.1	9:02	7.97	8.13	29.27	22.59	3.02	8	113	0.205	W
S1	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:03	7.77	8.1	29.6	22.36	2.53	5	113	0.204	W
S1	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:03	8.16	8.14	29.82	22.35	2.41	6	114	0.239	W
S2A	20191216	Cloudy	Moderate	Mid-Flood	B	8.9	9:41	8.21	8.2	29.79	22.41	3.19	7	113	0.248	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S2A	20191216	Cloudy	Moderate	Mid-Flood	B	8.9	9:41	7.64	8.08	29.55	22.61	3.25	8	113	0.291	W
S2A	20191216	Cloudy	Moderate	Mid-Flood	M	4.95	9:42	7.79	8.19	29.63	22.48	2.85	8	114	0.238	W
S2A	20191216	Cloudy	Moderate	Mid-Flood	M	4.95	9:42	7.9	8.09	29.92	22.4	2.91	8	113	0.199	NW
S2A	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:43	7.85	8.23	29.47	22.69	2.48	7	113	0.217	W
S2A	20191216	Cloudy	Moderate	Mid-Flood	S	1	9:43	8.07	8.19	29.39	22.47	2.63	8	113	0.221	W
S3	20191216	Cloudy	Moderate	Mid-Flood	B	9.8	10:28	7.73	8.14	29.62	22.66	3.07	9	112	0.212	W
S3	20191216	Cloudy	Moderate	Mid-Flood	B	9.8	10:28	8.15	8.12	29.65	22.79	3.23	8	113	0.277	W
S3	20191216	Cloudy	Moderate	Mid-Flood	M	5.4	10:29	7.82	8.05	29.25	22.61	3.07	8	113	0.272	W
S3	20191216	Cloudy	Moderate	Mid-Flood	M	5.4	10:29	7.9	8.2	29.45	22.78	2.83	7	113	0.199	W
S3	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:30	7.93	8.16	29.89	22.81	2.49	6	112	0.239	W
S3	20191216	Cloudy	Moderate	Mid-Flood	S	1	10:30	7.91	8.09	29.28	22.67	2.74	6	113	0.24	W
B1	20191216	Cloudy	Moderate	Mid-Ebb	B	3.7	13:51	8.24	8.2	29.65	23.48	3.42	5	113	0.177	SE
B1	20191216	Cloudy	Moderate	Mid-Ebb	B	3.7	13:51	7.71	8.19	29.71	23.19	3.09	6	114	0.267	E
B1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	13:52	7.96	8.15	29.57	23.5	2.36	5	114	0.213	SE
B1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	13:52	8.29	8.15	29.56	23.13	2.33	4	113	0.231	SE
B2	20191216	Cloudy	Moderate	Mid-Ebb	B	4.6	14:14	8.17	8.17	29.45	23.32	3.4	5	113	0.191	SE
B2	20191216	Cloudy	Moderate	Mid-Ebb	B	4.6	14:14	8.2	8.12	29.61	23.21	3.05	4	113	0.251	SE
B2	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:15	7.69	8.13	29.48	23.1	2.53	4	113	0.262	E
B2	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:15	8.17	8.06	29.85	23.26	2.49	3	113	0.149	SE
B3	20191216	Cloudy	Moderate	Mid-Ebb	B	4.5	14:56	8.03	8.22	29.56	23.29	3.28	7	114	0.163	E
B3	20191216	Cloudy	Moderate	Mid-Ebb	B	4.5	14:56	8.1	8.11	29.84	23.04	3.16	8	114	0.175	E
B3	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:57	7.67	8.03	29.35	23.34	2.58	6	113	0.208	SE
B3	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:57	7.81	8.15	29.73	23.02	2.93	4	113	0.221	SE
B4	20191216	Cloudy	Moderate	Mid-Ebb	B	3.4	14:45	7.83	8.01	29.5	23.31	3.04	5	114	0.164	SE
B4	20191216	Cloudy	Moderate	Mid-Ebb	B	3.4	14:45	7.98	7.99	29.55	23.24	3.25	6	114	0.258	SE
B4	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:46	8.14	8.19	29.87	23.04	2.82	8	114	0.247	SE
B4	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:46	7.72	8.03	29.56	23.15	2.9	8	113	0.138	SE
C1A	20191216	Cloudy	Moderate	Mid-Ebb	B	8.6	13:26	7.96	7.97	29.88	23.39	3.01	5	113	0.243	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
C1A	20191216	Cloudy	Moderate	Mid-Ebb	B	8.6	13:26	8.24	8.04	29.36	23.46	3.44	4	114	0.206	E
C1A	20191216	Cloudy	Moderate	Mid-Ebb	M	4.8	13:27	8.05	8.23	29.82	23.17	2.42	6	113	0.162	SE
C1A	20191216	Cloudy	Moderate	Mid-Ebb	M	4.8	13:27	8.27	8.15	29.67	23.1	2.8	5	114	0.185	SE
C1A	20191216	Cloudy	Moderate	Mid-Ebb	S	1	13:28	8.11	8.15	29.32	23.16	2.67	7	114	0.161	SE
C1A	20191216	Cloudy	Moderate	Mid-Ebb	S	1	13:28	8.18	8.04	29.41	23.1	2.68	7	114	0.271	SE
C2A	20191216	Cloudy	Moderate	Mid-Ebb	B	11.2	15:46	7.75	8.08	29.67	23.03	3.08	4	113	0.186	E
C2A	20191216	Cloudy	Moderate	Mid-Ebb	B	11.2	15:46	8.17	8.22	29.79	23.17	3.37	5	113	0.228	SE
C2A	20191216	Cloudy	Moderate	Mid-Ebb	M	6.1	15:47	8.27	7.98	29.37	23.23	2.51	5	114	0.147	E
C2A	20191216	Cloudy	Moderate	Mid-Ebb	M	6.1	15:47	7.86	8.02	29.54	23.08	2.49	6	114	0.159	SE
C2A	20191216	Cloudy	Moderate	Mid-Ebb	S	1	15:48	8.04	8.22	29.37	23.17	2.82	5	113	0.167	SE
C2A	20191216	Cloudy	Moderate	Mid-Ebb	S	1	15:48	7.8	8.1	29.46	23.1	2.81	6	113	0.235	SE
CR1	20191216	Cloudy	Moderate	Mid-Ebb	B	12.2	16:04	7.98	8.22	29.44	22.99	3.01	6	114	0.229	SE
CR1	20191216	Cloudy	Moderate	Mid-Ebb	B	12.2	16:04	8.15	8.17	29.45	22.96	2.87	5	113	0.225	SE
CR1	20191216	Cloudy	Moderate	Mid-Ebb	M	6.6	16:05	8.02	8.03	29.82	23.03	2.59	6	114	0.197	SE
CR1	20191216	Cloudy	Moderate	Mid-Ebb	M	6.6	16:05	8.23	8.24	29.72	23.05	2.66	5	114	0.176	SE
CR1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	16:06	8.25	8.21	29.37	22.99	2.49	5	114	0.182	SE
CR1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	16:06	8.09	8.09	29.6	22.95	2.6	6	114	0.205	SE
CR2	20191216	Cloudy	Moderate	Mid-Ebb	B	10.7	15:18	7.83	8.01	29.75	23.19	3.19	3	114	0.227	E
CR2	20191216	Cloudy	Moderate	Mid-Ebb	B	10.7	15:18	7.74	8.19	29.68	23.2	3.34	4	114	0.187	SE
CR2	20191216	Cloudy	Moderate	Mid-Ebb	M	5.85	15:19	8.13	8.16	29.37	23.18	2.43	4	114	0.26	SE
CR2	20191216	Cloudy	Moderate	Mid-Ebb	M	5.85	15:19	7.76	8.01	29.59	23.13	2.34	4	113	0.254	SE
CR2	20191216	Cloudy	Moderate	Mid-Ebb	S	1	15:20	8.19	7.98	29.68	23.1	2.84	6	114	0.214	SE
CR2	20191216	Cloudy	Moderate	Mid-Ebb	S	1	15:20	8.18	7.98	29.82	23.28	2.68	5	114	0.153	SE
F1A	20191216	Cloudy	Moderate	Mid-Ebb	B	8	14:15	7.9	8.11	29.45	23.35	3.11	4	113	0.185	E
F1A	20191216	Cloudy	Moderate	Mid-Ebb	B	8	14:15	8.02	8.19	29.45	23.21	3.35	5	114	0.149	SE
F1A	20191216	Cloudy	Moderate	Mid-Ebb	M	4.5	14:16	7.9	8.01	29.9	23.16	2.38	6	113	0.219	SE
F1A	20191216	Cloudy	Moderate	Mid-Ebb	M	4.5	14:16	8.21	8.1	29.48	23.16	2.56	6	113	0.181	SE
F1A	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:17	8.01	8.02	29.65	23.2	2.78	5	113	0.216	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
F1A	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:17	8.16	7.97	29.53	23.39	2.71	5	114	0.257	SE
H1	20191216	Cloudy	Moderate	Mid-Ebb	B	6.8	15:20	7.77	8.01	29.5	23.31	3.26	9	113	0.199	SE
H1	20191216	Cloudy	Moderate	Mid-Ebb	B	6.8	15:20	8.26	8.2	29.4	23.32	3.31	8	114	0.183	SE
H1	20191216	Cloudy	Moderate	Mid-Ebb	M	3.9	15:21	7.84	8.1	29.71	23.06	2.45	8	113	0.209	SE
H1	20191216	Cloudy	Moderate	Mid-Ebb	M	3.9	15:21	7.98	8.23	29.64	23.3	2.69	7	113	0.172	SE
H1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	15:22	7.73	8.12	29.47	23.19	2.48	7	113	0.145	E
H1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	15:22	7.92	8.15	29.72	23.3	2.74	6	113	0.138	SE
M1	20191216	Cloudy	Moderate	Mid-Ebb	B	7.7	13:37	8.06	8.03	29.65	23.3	3.11	5	113	0.171	SE
M1	20191216	Cloudy	Moderate	Mid-Ebb	B	7.7	13:37	7.67	8.15	29.85	23.11	2.91	5	114	0.136	E
M1	20191216	Cloudy	Moderate	Mid-Ebb	M	4.35	13:38	8.19	8.02	29.39	23.34	2.63	4	114	0.209	SE
M1	20191216	Cloudy	Moderate	Mid-Ebb	M	4.35	13:38	7.89	8.15	29.7	23.3	2.71	5	113	0.231	SE
M1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	13:39	8.06	8.23	29.57	23.13	2.38	4	113	0.141	SE
M1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	13:39	7.78	8.2	29.42	23.15	2.41	5	114	0.16	SE
S1	20191216	Cloudy	Moderate	Mid-Ebb	B	4.3	14:03	8.27	7.96	29.76	23.37	3.28	6	113	0.191	SE
S1	20191216	Cloudy	Moderate	Mid-Ebb	B	4.3	14:03	7.97	8.12	29.3	23.33	3.02	7	114	0.178	SE
S1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:04	7.76	8.16	29.9	23.2	2.71	6	114	0.185	SE
S1	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:04	8.17	8.03	29.35	23.34	2.57	6	113	0.238	SE
S2A	20191216	Cloudy	Moderate	Mid-Ebb	B	8.6	14:42	8.13	8.1	29.71	23.08	3.43	5	114	0.243	E
S2A	20191216	Cloudy	Moderate	Mid-Ebb	B	8.6	14:42	8.19	8.18	29.66	23.14	3.07	5	113	0.15	SE
S2A	20191216	Cloudy	Moderate	Mid-Ebb	M	4.8	14:43	7.88	7.97	29.34	23.32	2.39	4	113	0.186	SE
S2A	20191216	Cloudy	Moderate	Mid-Ebb	M	4.8	14:43	7.85	8.1	29.33	23.25	2.45	4	114	0.204	SE
S2A	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:44	8.04	8.04	29.8	23.19	2.82	6	113	0.19	SE
S2A	20191216	Cloudy	Moderate	Mid-Ebb	S	1	14:44	7.79	8.13	29.49	23.13	2.88	6	113	0.206	E
S3	20191216	Cloudy	Moderate	Mid-Ebb	B	10.6	15:29	8.2	8.05	29.7	23.01	3.35	4	114	0.239	SE
S3	20191216	Cloudy	Moderate	Mid-Ebb	B	10.6	15:29	7.7	8.06	29.49	23.17	3.02	4	113	0.164	E
S3	20191216	Cloudy	Moderate	Mid-Ebb	M	5.8	15:30	7.98	8	29.88	23.04	2.39	6	113	0.189	E
S3	20191216	Cloudy	Moderate	Mid-Ebb	M	5.8	15:30	8.02	8.05	29.48	23.3	2.46	7	113	0.156	SE
S3	20191216	Cloudy	Moderate	Mid-Ebb	S	1	15:31	7.9	8.23	29.62	23.14	2.41	6	113	0.153	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S3	20191216	Cloudy	Moderate	Mid-Ebb	S	1	15:31	8.27	8.01	29.81	23.18	2.54	6	113	0.227	E
B1	20191218	Cloudy	Moderate	Mid-Flood	B	3.9	11:18	7.55	8.06	30.58	24.5	2.88	3	114	0.318	W
B1	20191218	Cloudy	Moderate	Mid-Flood	B	3.9	11:18	7.24	8.02	30.65	24.55	3.11	2	113	0.191	W
B1	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:19	7.56	7.96	30.31	24.61	2.47	<2	114	0.311	W
B1	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:19	7.78	8.13	30.13	24.73	2.48	- note 3	113	0.223	W
B2	20191218	Cloudy	Moderate	Mid-Flood	B	3.8	11:40	7.74	8.2	30.03	24.5	2.88	<2	113	0.311	W
B2	20191218	Cloudy	Moderate	Mid-Flood	B	3.8	11:40	7.75	8.18	30.37	24.83	3.19	<2	114	0.223	W
B2	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:41	7.67	8.17	30.31	24.46	2.79	<2	113	0.159	W
B2	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:41	7.75	8.1	30	24.64	2.68	2	115	0.216	W
B3	20191218	Cloudy	Moderate	Mid-Flood	B	4.3	11:01	7.74	7.96	30.02	24.45	3.57	<2	114	0.243	W
B3	20191218	Cloudy	Moderate	Mid-Flood	B	4.3	11:01	7.36	8.18	30.61	24.47	3.51	<2	111	0.238	W
B3	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:02	7.77	8.22	30.12	24.49	2.99	2	114	0.193	NW
B3	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:02	7.76	8.06	30.18	24.58	2.93	<2	114	0.189	W
B4	20191218	Cloudy	Moderate	Mid-Flood	B	3.6	11:13	7.47	8.21	30.19	24.48	3.41	2	113	0.31	W
B4	20191218	Cloudy	Moderate	Mid-Flood	B	3.6	11:13	7.62	8.02	30.49	24.33	3.21	3	113	0.24	W
B4	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:14	7.17	8.05	30.3	24.45	2.51	<2	113	0.266	W
B4	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:14	7.62	8.05	30.62	24.44	2.63	2	113	0.242	NW
C1A	20191218	Cloudy	Moderate	Mid-Flood	B	10.4	10:54	7.26	8.06	30.58	24.23	3.46	<2	114	0.252	W
C1A	20191218	Cloudy	Moderate	Mid-Flood	B	10.4	10:54	7.65	8.09	30.74	24.59	3.12	<2	113	0.214	NW
C1A	20191218	Cloudy	Moderate	Mid-Flood	M	5.7	10:55	7.27	8.07	30.53	24.32	2.98	<2	112	0.187	W
C1A	20191218	Cloudy	Moderate	Mid-Flood	M	5.7	10:55	7.17	8.02	30.16	24.28	3.12	<2	113	0.293	W
C1A	20191218	Cloudy	Moderate	Mid-Flood	S	1	10:56	7.5	8.16	30.75	24.42	2.56	<2	113	0.173	W
C1A	20191218	Cloudy	Moderate	Mid-Flood	S	1	10:56	7.56	8.15	30.33	24.56	2.8	<2	113	0.291	W
C2A	20191218	Cloudy	Moderate	Mid-Flood	B	10.2	10:18	7.58	8.23	30.3	24.37	3.41	2	112	0.224	W
C2A	20191218	Cloudy	Moderate	Mid-Flood	B	10.2	10:18	7.42	8.23	30.07	24.54	3.33	3	113	0.304	NW
C2A	20191218	Cloudy	Moderate	Mid-Flood	M	5.6	10:19	7.21	8.14	30.61	24.5	2.86	2	113	0.276	W
C2A	20191218	Cloudy	Moderate	Mid-Flood	M	5.6	10:19	7.24	7.96	30.7	24.36	2.59	3	113	0.14	W
C2A	20191218	Cloudy	Moderate	Mid-Flood	S	1	10:20	7.26	8.08	30.09	24.59	2.75	4	114	0.236	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
C2A	20191218	Cloudy	Moderate	Mid-Flood	S	1	10:20	7.65	7.99	30.52	24.37	2.53	3	112	0.174	W
CR1	20191218	Cloudy	Moderate	Mid-Flood	B	11.5	12:59	7.73	8.05	30.54	24.66	3.12	3	113	0.183	W
CR1	20191218	Cloudy	Moderate	Mid-Flood	B	11.5	12:59	7.27	8	30.18	24.8	3.25	3	113	0.274	W
CR1	20191218	Cloudy	Moderate	Mid-Flood	M	6.25	13:00	7.35	8.01	30.61	25.03	2.61	<2	113	0.294	W
CR1	20191218	Cloudy	Moderate	Mid-Flood	M	6.25	13:00	7.43	8.14	30.67	24.71	2.86	<2	114	0.23	NW
CR1	20191218	Cloudy	Moderate	Mid-Flood	S	1	13:01	7.5	8.2	30.07	24.6	2.86	<2	113	0.162	W
CR1	20191218	Cloudy	Moderate	Mid-Flood	S	1	13:01	7.2	8.11	30.55	24.96	2.77	<2	113	0.226	W
CR2	20191218	Cloudy	Moderate	Mid-Flood	B	10.3	12:33	7.21	8.06	30.09	24.78	2.88	<2	113	0.268	NW
CR2	20191218	Cloudy	Moderate	Mid-Flood	B	10.3	12:33	7.8	8.11	30.36	24.71	2.97	<2	114	0.149	W
CR2	20191218	Cloudy	Moderate	Mid-Flood	M	5.65	12:34	7.67	8	30.19	24.89	2.72	<2	113	0.247	NW
CR2	20191218	Cloudy	Moderate	Mid-Flood	M	5.65	12:34	7.24	7.97	30.07	24.76	2.71	<2	113	0.248	W
CR2	20191218	Cloudy	Moderate	Mid-Flood	S	1	12:35	7.77	8.09	30.75	25.01	2.93	<2	113	0.192	W
CR2	20191218	Cloudy	Moderate	Mid-Flood	S	1	12:35	7.43	7.96	30.63	24.89	2.71	<2	114	0.14	W
F1A	20191218	Cloudy	Moderate	Mid-Flood	B	7.1	11:42	7.79	7.99	30.05	24.79	2.9	<2	114	0.322	W
F1A	20191218	Cloudy	Moderate	Mid-Flood	B	7.1	11:42	7.81	7.97	30.08	24.53	3.05	<2	113	0.322	W
F1A	20191218	Cloudy	Moderate	Mid-Flood	M	4.05	11:43	7.63	8.07	30.45	24.52	2.85	<2	113	0.144	W
F1A	20191218	Cloudy	Moderate	Mid-Flood	M	4.05	11:43	7.8	8.23	30.44	24.78	2.72	<2	113	0.302	W
F1A	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:44	7.23	7.96	30.32	24.4	2.48	2	114	0.191	NW
F1A	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:44	7.71	8.14	30.47	24.73	2.35	<2	112	0.247	W
H1	20191218	Cloudy	Moderate	Mid-Flood	B	6.7	10:42	7.7	8.02	30.17	24.4	3.09	<2	113	0.254	W
H1	20191218	Cloudy	Moderate	Mid-Flood	B	6.7	10:42	7.55	7.95	30.67	24.21	2.92	<2	114	0.288	W
H1	20191218	Cloudy	Moderate	Mid-Flood	M	3.85	10:43	7.61	8.02	30.44	24.21	2.78	2	113	0.228	W
H1	20191218	Cloudy	Moderate	Mid-Flood	M	3.85	10:43	7.56	8	30.17	24.37	2.86	<2	113	0.313	W
H1	20191218	Cloudy	Moderate	Mid-Flood	S	1	10:44	7.22	8.13	30.27	24.32	2.46	4	114	0.317	W
H1	20191218	Cloudy	Moderate	Mid-Flood	S	1	10:44	7.68	8.15	30.38	24.43	2.73	3	113	0.185	W
M1	20191218	Cloudy	Moderate	Mid-Flood	B	6.6	12:13	7.53	7.97	30.36	24.5	3.03	<2	114	0.197	W
M1	20191218	Cloudy	Moderate	Mid-Flood	B	6.6	12:13	7.73	7.98	30.6	24.89	3.45	<2	113	0.322	W
M1	20191218	Cloudy	Moderate	Mid-Flood	M	3.8	12:14	7.26	8.1	30.66	24.68	2.54	2	114	0.254	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
M1	20191218	Cloudy	Moderate	Mid-Flood	M	3.8	12:14	7.56	8.21	30.17	24.5	2.75	<2	114	0.321	W
M1	20191218	Cloudy	Moderate	Mid-Flood	S	1	12:15	7.18	7.96	30.31	24.58	2.89	<2	114	0.267	W
M1	20191218	Cloudy	Moderate	Mid-Flood	S	1	12:15	7.33	8.01	30.54	24.52	2.42	<2	114	0.288	W
S1	20191218	Cloudy	Moderate	Mid-Flood	B	4.2	11:31	7.38	7.99	30.6	24.38	3.29	2	113	0.269	W
S1	20191218	Cloudy	Moderate	Mid-Flood	B	4.2	11:31	7.5	8.1	30.42	24.4	3.03	3	113	0.302	NW
S1	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:32	7.34	7.95	30.28	24.78	2.87	<2	114	0.225	W
S1	20191218	Cloudy	Moderate	Mid-Flood	S	1	11:32	7.51	8.08	30.38	24.37	2.64	2	112	0.154	W
S2A	20191218	Cloudy	Moderate	Mid-Flood	B	8.6	12:07	7.74	8.09	30.7	24.61	3.4	<2	114	0.166	W
S2A	20191218	Cloudy	Moderate	Mid-Flood	B	8.6	12:07	7.43	8.14	30.49	24.5	2.97	2	113	0.28	W
S2A	20191218	Cloudy	Moderate	Mid-Flood	M	4.8	12:08	7.28	8.09	30.18	24.78	2.95	<2	113	0.266	W
S2A	20191218	Cloudy	Moderate	Mid-Flood	M	4.8	12:08	7.5	7.96	30.39	24.49	2.71	<2	113	0.176	W
S2A	20191218	Cloudy	Moderate	Mid-Flood	S	1	12:09	7.66	8.19	30.31	24.57	2.61	<2	114	0.148	NW
S2A	20191218	Cloudy	Moderate	Mid-Flood	S	1	12:09	7.8	8.08	30.38	24.74	2.65	<2	114	0.14	W
S3	20191218	Cloudy	Moderate	Mid-Flood	B	9.4	12:44	7.56	8.1	30.48	24.63	3.2	<2	113	0.201	NW
S3	20191218	Cloudy	Moderate	Mid-Flood	B	9.4	12:44	7.46	8.2	30.05	24.89	3.29	<2	113	0.249	W
S3	20191218	Cloudy	Moderate	Mid-Flood	M	5.2	12:45	7.8	8.01	30.48	24.86	3.1	<2	112	0.147	W
S3	20191218	Cloudy	Moderate	Mid-Flood	M	5.2	12:45	7.46	7.98	30.2	24.61	2.61	<2	113	0.147	W
S3	20191218	Cloudy	Moderate	Mid-Flood	S	1	12:46	7.46	8.16	30.27	24.59	2.98	<2	113	0.267	W
S3	20191218	Cloudy	Moderate	Mid-Flood	S	1	12:46	7.8	8.12	30.17	24.7	2.49	<2	113	0.296	W
B1	20191218	Cloudy	Moderate	Mid-Ebb	B	3.6	16:19	7.46	8.03	30.29	24.43	3.41	3	112	0.163	E
B1	20191218	Cloudy	Moderate	Mid-Ebb	B	3.6	16:19	7.29	8.11	30.51	24.36	3.09	<2	113	0.133	E
B1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:20	7.3	8.04	30.51	24.46	2.74	2	113	0.215	SE
B1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:20	7.27	8.03	30.34	24.51	3.03	<2	113	0.271	E
B2	20191218	Cloudy	Moderate	Mid-Ebb	B	4.2	16:41	7.54	7.97	30.11	24.29	3.23	<2	112	0.254	SE
B2	20191218	Cloudy	Moderate	Mid-Ebb	B	4.2	16:41	7.44	8.22	30.2	24.57	3.23	<2	114	0.203	E
B2	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:42	7.81	8.13	30.16	24.55	2.93	2	114	0.215	SE
B2	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:42	7.47	8.05	30.42	24.29	2.73	<2	112	0.267	E
B3	20191218	Cloudy	Moderate	Mid-Ebb	B	3.5	17:02	7.43	8.2	30.31	24.58	3.31	<2	114	0.199	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B3	20191218	Cloudy	Moderate	Mid-Ebb	B	3.5	17:02	7.74	8.11	30.51	24.54	3.22	2	115	0.131	SE
B3	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:03	7.74	8.02	30.24	24.3	2.93	<2	115	0.191	E
B3	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:03	7.61	8.21	30.21	24.31	3.14	<2	116	0.171	SE
B4	20191218	Cloudy	Moderate	Mid-Ebb	B	3.5	16:52	7.7	8.17	30.03	24.25	3.32	<2	114	0.234	E
B4	20191218	Cloudy	Moderate	Mid-Ebb	B	3.5	16:52	7.43	8.03	30	24.26	3.57	3	113	0.189	SE
B4	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:53	7.52	8.02	30.34	24.42	3.01	<2	114	0.212	E
B4	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:53	7.3	8.21	30.04	24.41	2.81	<2	113	0.125	SE
C1A	20191218	Cloudy	Moderate	Mid-Ebb	B	8.9	15:57	7.64	8.22	30.1	24.6	3.52	<2	114	0.17	E
C1A	20191218	Cloudy	Moderate	Mid-Ebb	B	8.9	15:57	7.73	8.13	30.49	24.56	3.25	2	114	0.127	SE
C1A	20191218	Cloudy	Moderate	Mid-Ebb	M	4.95	15:58	7.7	8.02	30.4	24.42	2.83	3	114	0.146	E
C1A	20191218	Cloudy	Moderate	Mid-Ebb	M	4.95	15:58	7.22	8.07	30.28	24.63	2.78	2	115	0.241	SE
C1A	20191218	Cloudy	Moderate	Mid-Ebb	S	1	15:59	7.86	8.18	30.23	24.61	2.68	3	114	0.223	SE
C1A	20191218	Cloudy	Moderate	Mid-Ebb	S	1	15:59	7.75	8.03	30.32	24.33	2.87	4	114	0.262	E
C2A	20191218	Cloudy	Moderate	Mid-Ebb	B	11.3	17:47	7.83	8.23	30.31	24.54	3.5	3	113	0.181	E
C2A	20191218	Cloudy	Moderate	Mid-Ebb	B	11.3	17:47	7.26	8.02	30.2	24.2	3.5	3	115	0.246	E
C2A	20191218	Cloudy	Moderate	Mid-Ebb	M	6.15	17:48	7.7	8.16	30.4	24.21	3.07	<2	114	0.161	SE
C2A	20191218	Cloudy	Moderate	Mid-Ebb	M	6.15	17:48	7.33	8.05	30.35	24.42	2.71	3	115	0.278	SE
C2A	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:49	7.6	8.23	30.4	24.31	2.6	2	115	0.157	SE
C2A	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:49	7.32	8.19	30.15	24.48	2.74	<2	115	0.233	SE
CR1	20191218	Cloudy	Moderate	Mid-Ebb	B	11.6	17:58	7.36	8.17	30.42	24.34	3.21	<2	114	0.128	SE
CR1	20191218	Cloudy	Moderate	Mid-Ebb	B	11.6	17:58	7.45	8.11	30.07	24.31	3.43	2	115	0.272	E
CR1	20191218	Cloudy	Moderate	Mid-Ebb	M	6.3	17:59	7.55	8.06	30.31	24.47	2.66	2	114	0.17	SE
CR1	20191218	Cloudy	Moderate	Mid-Ebb	M	6.3	17:59	7.64	8.1	30.21	24.34	2.93	2	115	0.188	E
CR1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	18:00	7.53	7.97	30.26	24.3	3.09	<2	115	0.147	SE
CR1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	18:00	7.87	8.02	30.04	24.54	2.61	<2	115	0.276	SE
CR2	20191218	Cloudy	Moderate	Mid-Ebb	B	11.1	17:34	7.72	7.97	30.41	24.36	3.37	3	114	0.234	E
CR2	20191218	Cloudy	Moderate	Mid-Ebb	B	11.1	17:34	7.8	8.22	30.35	24.44	3.23	3	116	0.129	SE
CR2	20191218	Cloudy	Moderate	Mid-Ebb	M	6.05	17:35	7.68	8.18	30.39	24.39	3.1	2	114	0.177	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR2	20191218	Cloudy	Moderate	Mid-Ebb	M	6.05	17:35	7.24	7.99	30.37	24.26	3.07	2	115	0.118	E
CR2	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:36	7.83	8.01	30.16	24.43	2.64	3	114	0.155	SE
CR2	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:36	7.69	8.12	29.99	24.35	2.93	<2	116	0.256	SE
F1A	20191218	Cloudy	Moderate	Mid-Ebb	B	7.3	16:26	7.76	8.21	30.34	24.39	3.48	2	115	0.267	SE
F1A	20191218	Cloudy	Moderate	Mid-Ebb	B	7.3	16:26	7.22	8.04	30.03	24.63	3.16	2	115	0.25	SE
F1A	20191218	Cloudy	Moderate	Mid-Ebb	M	4.15	16:27	7.63	8.1	30.43	24.31	2.76	3	114	0.18	SE
F1A	20191218	Cloudy	Moderate	Mid-Ebb	M	4.15	16:27	7.78	8.23	30.35	24.7	2.62	3	115	0.253	E
F1A	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:28	7.39	8.12	30.39	24.53	2.86	5	114	0.148	SE
F1A	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:28	7.86	8.09	30.4	24.49	2.91	5	115	0.233	SE
H1	20191218	Cloudy	Moderate	Mid-Ebb	B	7.2	17:20	7.33	8.02	30.45	24.46	3.42	2	113	0.21	SE
H1	20191218	Cloudy	Moderate	Mid-Ebb	B	7.2	17:20	7.64	7.98	30.36	24.2	3.42	2	114	0.168	SE
H1	20191218	Cloudy	Moderate	Mid-Ebb	M	4.1	17:21	7.49	8.09	30.09	24.53	2.62	2	114	0.175	SE
H1	20191218	Cloudy	Moderate	Mid-Ebb	M	4.1	17:21	7.43	7.98	30.35	24.38	2.94	<2	114	0.206	SE
H1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:22	7.86	7.97	30.46	24.22	3.01	3	115	0.215	SE
H1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:22	7.67	8.18	30.2	24.39	2.71	4	114	0.221	SE
M1	20191218	Cloudy	Moderate	Mid-Ebb	B	8.1	15:58	7.81	8.21	30.14	24.66	3.18	3	115	0.168	E
M1	20191218	Cloudy	Moderate	Mid-Ebb	B	8.1	15:58	7.57	8.11	30.29	24.67	3.54	4	116	0.14	SE
M1	20191218	Cloudy	Moderate	Mid-Ebb	M	4.55	15:59	7.3	8	30.22	24.39	2.78	3	115	0.227	E
M1	20191218	Cloudy	Moderate	Mid-Ebb	M	4.55	15:59	7.77	8.19	30.06	24.44	2.72	<2	114	0.239	E
M1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:00	7.27	7.99	30.46	24.41	2.76	<2	115	0.223	SE
M1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:00	7.23	8.22	30.51	24.32	2.8	2	114	0.229	SE
S1	20191218	Cloudy	Moderate	Mid-Ebb	B	4	16:32	7.48	8.21	30.23	24.61	3.26	<2	116	0.143	SE
S1	20191218	Cloudy	Moderate	Mid-Ebb	B	4	16:32	7.54	8.16	30.24	24.39	3.09	<2	114	0.176	SE
S1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:33	7.51	7.98	30.05	24.66	2.99	2	114	0.202	SE
S1	20191218	Cloudy	Moderate	Mid-Ebb	S	1	16:33	7.47	8.07	30.19	24.31	2.89	2	114	0.259	SE
S2A	20191218	Cloudy	Moderate	Mid-Ebb	B	7.7	17:08	7.48	8.23	30.07	24.6	3.51	<2	114	0.117	SE
S2A	20191218	Cloudy	Moderate	Mid-Ebb	B	7.7	17:08	7.7	8.12	30.48	24.54	3.5	<2	113	0.179	E
S2A	20191218	Cloudy	Moderate	Mid-Ebb	M	4.35	17:09	7.36	8.03	30.04	24.31	3	<2	115	0.28	E

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S2A	20191218	Cloudy	Moderate	Mid-Ebb	M	4.35	17:09	7.52	8.09	30.07	24.43	3.03	<2	115	0.276	SE
S2A	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:10	7.24	8.22	29.99	24.53	3.11	<2	115	0.128	E
S2A	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:10	7.7	8.2	30.06	24.54	2.92	2	114	0.266	E
S3	20191218	Cloudy	Moderate	Mid-Ebb	B	9.9	17:45	7.89	8.17	30.15	24.54	3.33	2	115	0.276	E
S3	20191218	Cloudy	Moderate	Mid-Ebb	B	9.9	17:45	7.34	8.13	30.22	24.38	3.73	<2	115	0.122	E
S3	20191218	Cloudy	Moderate	Mid-Ebb	M	5.45	17:46	7.72	7.97	30.01	24.39	3.11	2	114	0.143	E
S3	20191218	Cloudy	Moderate	Mid-Ebb	M	5.45	17:46	7.74	7.96	30.5	24.24	3.12	3	114	0.241	SE
S3	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:47	7.26	8.01	30.1	24.35	2.65	3	115	0.233	E
S3	20191218	Cloudy	Moderate	Mid-Ebb	S	1	17:47	7.22	8.01	30.44	24.23	3.09	<2	114	0.246	E
B1	20191220	Cloudy	Moderate	Mid-Ebb	B	3.9	10:07	7.9	8.06	29.57	21.49	2.95	8	114	0.188	SE
B1	20191220	Cloudy	Moderate	Mid-Ebb	B	3.9	10:07	7.49	8.11	29.36	21.49	3.28	7	114	0.157	SE
B1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	10:08	7.58	8.07	29.87	21.46	2.79	9	114	0.246	SE
B1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	10:08	7.37	8.05	29.59	21.46	2.42	9	115	0.134	SE
B2	20191220	Cloudy	Moderate	Mid-Ebb	B	4.2	9:47	7.45	8.18	29.85	21.49	3.28	7	114	0.225	E
B2	20191220	Cloudy	Moderate	Mid-Ebb	B	4.2	9:47	7.83	8.14	29.59	21.33	2.95	6	115	0.248	SE
B2	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:48	7.39	8.13	29.46	21.23	2.37	8	114	0.19	SE
B2	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:48	7.38	8.19	29.37	21.28	2.47	7	115	0.184	SE
B3	20191220	Cloudy	Moderate	Mid-Ebb	B	3.9	8:48	7.42	8.21	29.74	21.14	3.52	9	114	0.195	E
B3	20191220	Cloudy	Moderate	Mid-Ebb	B	3.9	8:48	7.78	7.97	29.44	21.29	3.27	9	115	0.137	SE
B3	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:49	7.77	8.07	29.62	21.2	2.78	6	115	0.156	SE
B3	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:49	7.85	8.08	29.59	21.2	2.47	7	114	0.126	E
B4	20191220	Cloudy	Moderate	Mid-Ebb	B	3.6	8:58	7.46	8.2	29.62	21.26	3.2	9	114	0.232	E
B4	20191220	Cloudy	Moderate	Mid-Ebb	B	3.6	8:58	7.81	8.24	29.59	21.15	3.08	8	114	0.157	SE
B4	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:59	7.84	8.24	29.5	21.39	2.53	9	115	0.118	SE
B4	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:59	7.8	8.03	29.4	21.36	2.92	8	115	0.246	SE
C1A	20191220	Cloudy	Moderate	Mid-Ebb	B	9.2	8:00	7.33	7.97	29.5	20.91	3.05	6	114	0.149	SE
C1A	20191220	Cloudy	Moderate	Mid-Ebb	B	9.2	8:00	7.37	8.12	29.84	21.14	3.32	6	114	0.214	SE
C1A	20191220	Cloudy	Moderate	Mid-Ebb	M	5.1	8:01	7.49	8.18	29.89	21.03	2.62	9	114	0.184	E

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
C1A	20191220	Cloudy	Moderate	Mid-Ebb	M	5.1	8:01	7.6	7.99	29.81	20.9	2.39	8	114	0.127	SE
C1A	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:02	7.87	8.15	29.53	21.29	2.58	8	114	0.215	SE
C1A	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:02	7.65	8.16	29.5	21.1	2.45	9	115	0.243	E
C2A	20191220	Cloudy	Moderate	Mid-Ebb	B	10.7	8:05	7.41	8.17	29.66	21.12	3	10	115	0.176	SE
C2A	20191220	Cloudy	Moderate	Mid-Ebb	B	10.7	8:05	7.34	7.98	29.83	21.12	3.32	10	115	0.153	SE
C2A	20191220	Cloudy	Moderate	Mid-Ebb	M	5.85	8:06	7.4	7.99	29.53	21.09	2.64	8	114	0.183	SE
C2A	20191220	Cloudy	Moderate	Mid-Ebb	M	5.85	8:06	7.36	8	29.4	21.01	2.52	8	115	0.158	SE
C2A	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:07	7.86	8.02	29.36	20.93	2.43	7	115	0.292	SE
C2A	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:07	7.56	8.22	29.65	21.26	2.63	8	114	0.289	E
CR1	20191220	Cloudy	Moderate	Mid-Ebb	B	12.7	8:30	7.71	7.96	29.81	21.04	3.24	10	115	0.219	SE
CR1	20191220	Cloudy	Moderate	Mid-Ebb	B	12.7	8:30	7.72	8.14	29.44	21.02	2.86	11	113	0.149	SE
CR1	20191220	Cloudy	Moderate	Mid-Ebb	M	6.85	8:31	7.55	8.15	29.51	21.07	2.47	10	114	0.202	SE
CR1	20191220	Cloudy	Moderate	Mid-Ebb	M	6.85	8:31	7.66	7.96	29.32	21.17	2.62	10	115	0.27	SE
CR1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:32	7.37	8.08	29.81	21.22	2.87	8	115	0.169	SE
CR1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:32	7.93	7.96	29.77	21.05	2.37	9	115	0.214	SE
CR2	20191220	Cloudy	Moderate	Mid-Ebb	B	10	8:58	7.67	8.14	29.45	21.28	3.17	10	113	0.158	E
CR2	20191220	Cloudy	Moderate	Mid-Ebb	B	10	8:58	7.42	8.04	29.47	21.16	2.92	9	114	0.149	SE
CR2	20191220	Cloudy	Moderate	Mid-Ebb	M	5.5	8:59	7.57	8.15	29.88	21.36	2.93	10	115	0.251	E
CR2	20191220	Cloudy	Moderate	Mid-Ebb	M	5.5	8:59	7.9	8.07	29.5	21.37	2.47	10	115	0.193	SE
CR2	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:00	7.61	8.07	29.9	21.19	2.4	12	114	0.156	E
CR2	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:00	7.88	7.97	29.41	21.39	2.74	12	115	0.264	E
F1A	20191220	Cloudy	Moderate	Mid-Ebb	B	7.9	9:27	7.55	8.01	29.75	21.44	3.16	8	114	0.119	E
F1A	20191220	Cloudy	Moderate	Mid-Ebb	B	7.9	9:27	7.37	8.05	29.58	21.39	3.16	7	114	0.285	E
F1A	20191220	Cloudy	Moderate	Mid-Ebb	M	4.45	9:28	7.61	8.03	29.42	21.23	2.38	10	116	0.177	E
F1A	20191220	Cloudy	Moderate	Mid-Ebb	M	4.45	9:28	7.55	8.2	29.49	21.4	2.56	11	115	0.213	SE
F1A	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:29	7.61	8.21	29.42	21.38	2.38	12	114	0.192	E
F1A	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:29	7.39	8.14	29.61	21.44	2.66	12	114	0.138	SE
H1	20191220	Cloudy	Moderate	Mid-Ebb	B	6.9	8:28	7.55	8.01	29.49	21.28	3.32	7	114	0.189	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
H1	20191220	Cloudy	Moderate	Mid-Ebb	B	6.9	8:28	7.42	8.2	29.43	21.02	3.06	8	113	0.183	E
H1	20191220	Cloudy	Moderate	Mid-Ebb	M	3.95	8:29	7.7	8.22	29.35	20.98	2.63	9	115	0.21	SE
H1	20191220	Cloudy	Moderate	Mid-Ebb	M	3.95	8:29	7.84	8.24	29.65	21.26	2.44	8	114	0.147	E
H1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:30	7.77	7.98	29.86	21.1	2.4	11	115	0.153	SE
H1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:30	7.71	7.96	29.37	21.18	2.38	10	114	0.216	E
M1	20191220	Cloudy	Moderate	Mid-Ebb	B	8.4	9:58	7.83	8.06	29.64	21.38	3.31	13	114	0.17	E
M1	20191220	Cloudy	Moderate	Mid-Ebb	B	8.4	9:58	7.65	8.12	29.66	21.31	3.07	13	115	0.214	SE
M1	20191220	Cloudy	Moderate	Mid-Ebb	M	4.7	9:59	7.37	8.14	29.45	21.5	2.93	12	115	0.16	E
M1	20191220	Cloudy	Moderate	Mid-Ebb	M	4.7	9:59	7.97	8.21	29.48	21.27	2.47	12	114	0.283	SE
M1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	10:00	7.88	7.96	29.51	21.42	2.59	9	115	0.265	SE
M1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	10:00	7.8	8.1	29.48	21.23	2.86	10	115	0.225	E
S1	20191220	Cloudy	Moderate	Mid-Ebb	B	4.3	9:56	7.87	8.04	29.33	21.41	3.19	10	115	0.181	SE
S1	20191220	Cloudy	Moderate	Mid-Ebb	B	4.3	9:56	7.36	8	29.4	21.5	3.19	11	114	0.252	E
S1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:57	7.94	7.96	29.74	21.23	2.31	11	115	0.258	SE
S1	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:57	7.48	8.15	29.69	21.26	2.71	10	114	0.211	SE
S2A	20191220	Cloudy	Moderate	Mid-Ebb	B	7.7	9:22	7.6	8.19	29.85	21.26	3.37	12	115	0.276	SE
S2A	20191220	Cloudy	Moderate	Mid-Ebb	B	7.7	9:22	7.44	8.17	29.3	21.23	3.35	11	114	0.22	E
S2A	20191220	Cloudy	Moderate	Mid-Ebb	M	4.35	9:23	7.75	8.12	29.35	21.36	2.6	8	114	0.21	SE
S2A	20191220	Cloudy	Moderate	Mid-Ebb	M	4.35	9:23	7.73	8.08	29.64	21.27	2.58	8	115	0.145	E
S2A	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:24	7.73	8.06	29.66	21.39	2.77	9	114	0.152	SE
S2A	20191220	Cloudy	Moderate	Mid-Ebb	S	1	9:24	7.46	8.24	29.63	21.26	2.39	8	114	0.26	SE
S3	20191220	Cloudy	Moderate	Mid-Ebb	B	10	8:47	7.98	8.04	29.69	21.24	3.38	9	114	0.279	E
S3	20191220	Cloudy	Moderate	Mid-Ebb	B	10	8:47	7.47	8.01	29.64	21.34	3.17	10	115	0.133	E
S3	20191220	Cloudy	Moderate	Mid-Ebb	M	5.5	8:48	7.4	8.2	29.43	21.28	2.82	10	116	0.29	SE
S3	20191220	Cloudy	Moderate	Mid-Ebb	M	5.5	8:48	7.51	8.02	29.86	21.17	2.58	10	115	0.147	E
S3	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:49	7.63	7.97	29.73	21.21	2.78	9	116	0.166	E
S3	20191220	Cloudy	Moderate	Mid-Ebb	S	1	8:49	7.74	8.2	29.32	21.22	2.59	9	115	0.167	SE
B1	20191220	Cloudy	Moderate	Mid-Flood	B	4.5	14:12	7.67	8.07	29.49	22.44	2.9	10	115	0.248	NW

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B1	20191220	Cloudy	Moderate	Mid-Flood	B	4.5	14:12	7.31	8.23	29.67	22.19	3.28	9	114	0.234	NW
B1	20191220	Cloudy	Moderate	Mid-Flood	S	1	14:13	7.29	8.17	29.9	22.07	2.71	6	116	0.198	W
B1	20191220	Cloudy	Moderate	Mid-Flood	S	1	14:13	7.63	8.04	29.71	22.22	2.75	6	115	0.303	W
B2	20191220	Cloudy	Moderate	Mid-Flood	B	4	13:48	7.89	8.08	29.7	22.4	3.24	10	115	0.252	W
B2	20191220	Cloudy	Moderate	Mid-Flood	B	4	13:48	7.75	8.15	29.43	22.34	2.91	10	115	0.305	NW
B2	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:49	7.41	8.17	29.86	22.43	2.83	9	115	0.225	W
B2	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:49	7.84	8.16	29.61	22.35	2.38	9	114	0.198	W
B3	20191220	Cloudy	Moderate	Mid-Flood	B	3.7	13:19	7.75	8.21	29.22	22.44	3.3	10	114	0.312	W
B3	20191220	Cloudy	Moderate	Mid-Flood	B	3.7	13:19	7.89	8	29.49	22.29	3.61	10	115	0.246	W
B3	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:20	7.62	8.1	29.23	22.15	2.93	8	114	0.24	W
B3	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:20	7.28	8.15	29.65	22.35	2.96	9	114	0.248	W
B4	20191220	Cloudy	Moderate	Mid-Flood	B	4.4	13:09	7.33	8.15	29.51	22.35	3.06	9	115	0.215	W
B4	20191220	Cloudy	Moderate	Mid-Flood	B	4.4	13:09	7.59	8.19	29.59	22.07	3.43	9	114	0.26	W
B4	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:10	7.82	8.22	29.95	22.4	2.52	6	115	0.208	W
B4	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:10	7.78	8.18	29.34	22.03	2.73	7	115	0.307	NW
C1A	20191220	Cloudy	Moderate	Mid-Flood	B	8.9	14:12	7.86	8.03	29.56	22.14	3.43	7	115	0.221	W
C1A	20191220	Cloudy	Moderate	Mid-Flood	B	8.9	14:12	7.53	8.14	29.2	22.35	2.92	8	115	0.183	W
C1A	20191220	Cloudy	Moderate	Mid-Flood	M	4.95	14:13	7.64	8.22	29.36	22.11	3.08	6	115	0.212	W
C1A	20191220	Cloudy	Moderate	Mid-Flood	M	4.95	14:13	7.73	8.11	29.64	22.17	2.6	7	115	0.233	W
C1A	20191220	Cloudy	Moderate	Mid-Flood	S	1	14:14	7.91	7.97	29.95	22.02	2.83	5	114	0.241	W
C1A	20191220	Cloudy	Moderate	Mid-Flood	S	1	14:14	7.53	8.1	29.57	22.19	2.61	5	115	0.186	W
C2A	20191220	Cloudy	Moderate	Mid-Flood	B	10.8	12:07	7.44	8.16	29.58	21.95	3.25	7	114	0.213	W
C2A	20191220	Cloudy	Moderate	Mid-Flood	B	10.8	12:07	7.39	8.13	29.92	22.21	3.13	8	116	0.262	W
C2A	20191220	Cloudy	Moderate	Mid-Flood	M	5.9	12:08	7.48	7.97	29.64	22.15	3.03	8	114	0.214	W
C2A	20191220	Cloudy	Moderate	Mid-Flood	M	5.9	12:08	7.33	8.13	29.89	22.35	3.1	7	115	0.262	W
C2A	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:09	7.61	8.2	29.47	21.93	2.93	7	115	0.255	W
C2A	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:09	7.29	7.99	29.41	22.11	2.65	7	116	0.239	W
CR1	20191220	Cloudy	Moderate	Mid-Flood	B	11.9	12:31	7.66	7.96	29.66	22.32	2.91	8	115	0.224	NW

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR1	20191220	Cloudy	Moderate	Mid-Flood	B	11.9	12:31	7.91	8.14	29.41	22.02	3.44	7	115	0.182	W
CR1	20191220	Cloudy	Moderate	Mid-Flood	M	6.45	12:32	7.65	8.04	29.9	22.14	2.75	8	114	0.179	W
CR1	20191220	Cloudy	Moderate	Mid-Flood	M	6.45	12:32	7.36	8.07	29.26	22.43	2.67	7	114	0.315	W
CR1	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:33	7.31	7.96	29.25	22.35	2.43	10	114	0.304	W
CR1	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:33	7.57	8.22	29.52	22	2.42	11	115	0.202	NW
CR2	20191220	Cloudy	Moderate	Mid-Flood	B	9.8	12:59	7.84	8.15	29.49	22.24	2.91	8	115	0.275	NW
CR2	20191220	Cloudy	Moderate	Mid-Flood	B	9.8	12:59	7.74	8.04	29.71	22.07	2.92	7	114	0.247	W
CR2	20191220	Cloudy	Moderate	Mid-Flood	M	5.4	13:00	7.48	7.96	29.48	22.1	3.01	9	115	0.26	W
CR2	20191220	Cloudy	Moderate	Mid-Flood	M	5.4	13:00	7.28	8.21	29.92	22.43	2.75	8	113	0.266	W
CR2	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:01	7.62	7.96	29.83	22.07	2.4	10	114	0.222	NW
CR2	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:01	7.88	8.15	29.75	22.15	2.72	10	116	0.217	W
F1A	20191220	Cloudy	Moderate	Mid-Flood	B	7.6	12:42	7.29	8.09	29.72	22.38	3.33	6	115	0.187	W
F1A	20191220	Cloudy	Moderate	Mid-Flood	B	7.6	12:42	7.68	8.01	29.66	22.43	3.31	5	114	0.302	W
F1A	20191220	Cloudy	Moderate	Mid-Flood	M	4.3	12:43	7.67	8.07	29.28	22.22	3.03	6	114	0.305	W
F1A	20191220	Cloudy	Moderate	Mid-Flood	M	4.3	12:43	7.64	8.07	29.34	22.04	2.81	6	114	0.259	NW
F1A	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:44	7.47	8.15	29.82	22.15	2.77	7	114	0.236	W
F1A	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:44	7.88	8.05	29.69	22.07	2.81	6	114	0.211	NW
H1	20191220	Cloudy	Moderate	Mid-Flood	B	7	13:31	7.53	8.02	29.25	22.15	3.25	6	116	0.244	W
H1	20191220	Cloudy	Moderate	Mid-Flood	B	7	13:31	7.91	7.96	29.86	22.15	3.2	7	116	0.306	NW
H1	20191220	Cloudy	Moderate	Mid-Flood	M	4	13:32	7.65	8.06	29.66	22.37	3.05	8	114	0.23	NW
H1	20191220	Cloudy	Moderate	Mid-Flood	M	4	13:32	7.84	8.03	29.21	22.34	2.65	8	113	0.258	W
H1	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:33	7.91	8.18	29.92	22.31	2.35	9	116	0.192	W
H1	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:33	7.45	8.16	29.78	22.23	2.74	8	115	0.208	W
M1	20191220	Cloudy	Moderate	Mid-Flood	B	6.8	12:20	7.32	8.12	29.34	22.04	3.35	8	114	0.255	W
M1	20191220	Cloudy	Moderate	Mid-Flood	B	6.8	12:20	7.68	8.12	29.82	22.36	2.89	8	114	0.178	W
M1	20191220	Cloudy	Moderate	Mid-Flood	M	3.9	12:21	7.88	8.17	29.52	22.14	2.7	8	115	0.319	W
M1	20191220	Cloudy	Moderate	Mid-Flood	M	3.9	12:21	7.56	8.06	29.36	22.4	2.69	9	115	0.304	W
M1	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:22	7.33	8.08	29.42	22	2.77	9	114	0.216	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
M1	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:22	7.47	8.2	29.56	21.98	2.6	9	114	0.307	NW
S1	20191220	Cloudy	Moderate	Mid-Flood	B	4.3	13:58	7.41	8.09	29.82	22.22	3.39	6	116	0.206	W
S1	20191220	Cloudy	Moderate	Mid-Flood	B	4.3	13:58	7.72	8	29.8	22.3	2.97	7	116	0.211	NW
S1	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:59	7.89	8.22	29.72	22.23	2.5	7	115	0.227	W
S1	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:59	7.35	8.23	29.75	22.28	2.48	6	116	0.248	W
S2A	20191220	Cloudy	Moderate	Mid-Flood	B	8.1	13:23	7.87	8.11	29.94	22.24	3.11	8	115	0.202	W
S2A	20191220	Cloudy	Moderate	Mid-Flood	B	8.1	13:23	7.81	8.1	29.52	22.11	3.15	8	115	0.31	NW
S2A	20191220	Cloudy	Moderate	Mid-Flood	M	4.55	13:24	7.45	8.02	29.4	22.07	2.57	9	115	0.219	W
S2A	20191220	Cloudy	Moderate	Mid-Flood	M	4.55	13:24	7.56	8.07	29.29	22.26	3.02	10	115	0.238	W
S2A	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:25	7.37	8.11	29.83	22.15	2.93	12	114	0.319	NW
S2A	20191220	Cloudy	Moderate	Mid-Flood	S	1	13:25	7.79	8.11	29.65	22.08	2.59	10	115	0.32	W
S3	20191220	Cloudy	Moderate	Mid-Flood	B	8.5	12:49	7.72	8.03	29.74	22.29	3.18	9	115	0.251	W
S3	20191220	Cloudy	Moderate	Mid-Flood	B	8.5	12:49	7.76	8.19	29.32	22.03	3.19	9	114	0.287	W
S3	20191220	Cloudy	Moderate	Mid-Flood	M	4.75	12:50	7.57	8.09	29.7	22.37	2.54	8	115	0.198	W
S3	20191220	Cloudy	Moderate	Mid-Flood	M	4.75	12:50	7.59	8.12	29.67	22.01	2.83	9	114	0.283	NW
S3	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:51	7.84	8.01	29.38	22.15	2.97	8	114	0.29	NW
S3	20191220	Cloudy	Moderate	Mid-Flood	S	1	12:51	7.71	8.13	29.24	22.2	2.52	9	116	0.282	W
B1	20191222	Cloudy	Moderate	Mid-Ebb	B	3.6	8:58	7.08	7.97	29.7	21.45	3.04	3	114	0.251	E
B1	20191222	Cloudy	Moderate	Mid-Ebb	B	3.6	8:58	6.67	8.03	29.86	21.29	3.37	3	114	0.236	SE
B1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	8:59	6.87	8.17	29.49	21.43	2.5	4	113	0.15	SE
B1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	8:59	6.91	8.24	29.4	21.53	2.51	3	114	0.28	SE
B2	20191222	Cloudy	Moderate	Mid-Ebb	B	4.4	9:19	6.89	8.2	29.46	21.52	2.99	4	114	0.226	SE
B2	20191222	Cloudy	Moderate	Mid-Ebb	B	4.4	9:19	7.23	8.1	29.42	21.67	2.89	4	114	0.213	SE
B2	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:20	6.78	8.1	29.62	21.74	2.62	4	113	0.18	SE
B2	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:20	6.95	8.06	29.75	21.39	2.64	4	114	0.282	E
B3	20191222	Cloudy	Moderate	Mid-Ebb	B	4.5	9:36	6.66	8.17	29.83	21.67	3.31	4	114	0.148	SE
B3	20191222	Cloudy	Moderate	Mid-Ebb	B	4.5	9:36	7.22	7.98	29.51	21.38	3.25	4	113	0.219	SE
B3	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:37	6.84	8.16	29.57	21.6	2.64	4	113	0.19	E

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B3	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:37	6.71	8.03	29.82	21.76	2.74	4	114	0.25	E
B4	20191222	Cloudy	Moderate	Mid-Ebb	B	3.1	9:26	6.65	8.19	29.44	21.41	3.04	3	114	0.132	SE
B4	20191222	Cloudy	Moderate	Mid-Ebb	B	3.1	9:26	6.87	8.11	29.72	21.51	3.38	4	113	0.278	SE
B4	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:27	6.79	8.08	29.72	21.75	2.61	3	113	0.153	SE
B4	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:27	7.2	8.14	29.74	21.64	2.37	3	114	0.189	E
C1A	20191222	Cloudy	Moderate	Mid-Ebb	B	9.3	8:30	6.83	8.16	29.63	21.43	3.32	4	113	0.22	SE
C1A	20191222	Cloudy	Moderate	Mid-Ebb	B	9.3	8:30	6.89	8.19	29.88	21.32	3.13	5	114	0.252	E
C1A	20191222	Cloudy	Moderate	Mid-Ebb	M	5.15	8:31	7.18	7.99	29.58	21.38	2.74	4	114	0.221	E
C1A	20191222	Cloudy	Moderate	Mid-Ebb	M	5.15	8:31	7.06	8.12	29.66	21.23	2.81	3	114	0.232	SE
C1A	20191222	Cloudy	Moderate	Mid-Ebb	S	1	8:32	6.89	7.96	29.87	21.24	2.33	4	114	0.219	SE
C1A	20191222	Cloudy	Moderate	Mid-Ebb	S	1	8:32	6.71	8.1	29.77	21.3	2.38	3	114	0.231	SE
C2A	20191222	Cloudy	Moderate	Mid-Ebb	B	11.4	10:26	6.77	8	29.35	21.72	3.18	5	113	0.262	E
C2A	20191222	Cloudy	Moderate	Mid-Ebb	B	11.4	10:26	7.02	8.2	29.63	21.78	3.18	4	114	0.136	SE
C2A	20191222	Cloudy	Moderate	Mid-Ebb	M	6.2	10:27	7.05	8.06	29.42	21.54	2.36	4	114	0.272	SE
C2A	20191222	Cloudy	Moderate	Mid-Ebb	M	6.2	10:27	7.07	8.18	29.74	21.7	2.85	5	114	0.135	SE
C2A	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:28	6.67	8.23	29.52	21.5	2.56	4	113	0.237	E
C2A	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:28	6.97	8.21	29.82	21.85	2.78	3	114	0.17	SE
CR1	20191222	Cloudy	Moderate	Mid-Ebb	B	12.2	10:32	6.77	8.11	29.44	21.84	3.37	3	114	0.14	SE
CR1	20191222	Cloudy	Moderate	Mid-Ebb	B	12.2	10:32	6.97	8.15	29.82	21.41	3.42	4	113	0.253	SE
CR1	20191222	Cloudy	Moderate	Mid-Ebb	M	6.6	10:33	7.08	8.2	29.48	21.49	2.61	5	114	0.232	E
CR1	20191222	Cloudy	Moderate	Mid-Ebb	M	6.6	10:33	7.02	8.22	29.84	21.71	2.7	4	114	0.207	SE
CR1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:34	6.68	8.02	29.51	21.67	2.44	4	114	0.129	SE
CR1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:34	7.01	7.96	29.32	21.51	2.88	4	113	0.139	SE
CR2	20191222	Cloudy	Moderate	Mid-Ebb	B	9.8	10:05	6.75	8.07	29.9	21.6	3.09	3	113	0.188	SE
CR2	20191222	Cloudy	Moderate	Mid-Ebb	B	9.8	10:05	6.69	8.04	29.46	21.62	3.02	3	113	0.265	SE
CR2	20191222	Cloudy	Moderate	Mid-Ebb	M	5.4	10:06	6.99	8.15	29.67	21.78	2.93	3	114	0.229	E
CR2	20191222	Cloudy	Moderate	Mid-Ebb	M	5.4	10:06	6.64	8.17	29.46	21.57	2.61	3	112	0.187	SE
CR2	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:07	6.63	8.11	29.81	21.54	2.56	3	114	0.265	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR2	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:07	6.88	8.23	29.72	21.42	2.62	4	113	0.134	E
F1A	20191222	Cloudy	Moderate	Mid-Ebb	B	7.4	8:59	6.66	8.09	29.4	21.63	3.33	4	114	0.268	E
F1A	20191222	Cloudy	Moderate	Mid-Ebb	B	7.4	8:59	7.24	8.08	29.59	21.47	3.43	5	113	0.131	SE
F1A	20191222	Cloudy	Moderate	Mid-Ebb	M	4.2	9:00	7.18	8.06	29.67	21.79	2.38	3	114	0.179	E
F1A	20191222	Cloudy	Moderate	Mid-Ebb	M	4.2	9:00	6.97	8.03	29.71	21.61	2.91	4	113	0.259	SE
F1A	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:01	7.11	8	29.32	21.74	2.81	4	114	0.17	SE
F1A	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:01	7.28	8.24	29.47	21.48	2.57	4	114	0.218	SE
H1	20191222	Cloudy	Moderate	Mid-Ebb	B	7.4	9:59	6.9	8	29.41	21.79	3.32	4	114	0.127	E
H1	20191222	Cloudy	Moderate	Mid-Ebb	B	7.4	9:59	7.09	7.99	29.32	21.65	3.26	4	114	0.202	SE
H1	20191222	Cloudy	Moderate	Mid-Ebb	M	4.2	10:00	6.79	8.23	29.4	21.44	2.52	4	113	0.273	SE
H1	20191222	Cloudy	Moderate	Mid-Ebb	M	4.2	10:00	7.26	8.13	29.34	21.78	2.54	4	114	0.211	E
H1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:01	7.01	8.02	29.58	21.67	2.63	5	114	0.171	SE
H1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:01	7.19	8.2	29.4	21.53	2.39	4	114	0.26	SE
M1	20191222	Cloudy	Moderate	Mid-Ebb	B	8.2	8:36	7.11	8.16	29.87	21.8	3.24	4	114	0.25	SE
M1	20191222	Cloudy	Moderate	Mid-Ebb	B	8.2	8:36	7.02	8.24	29.65	21.43	2.93	5	113	0.262	SE
M1	20191222	Cloudy	Moderate	Mid-Ebb	M	4.6	8:37	7.11	8.1	29.7	21.58	2.89	4	113	0.137	SE
M1	20191222	Cloudy	Moderate	Mid-Ebb	M	4.6	8:37	6.88	8.1	29.81	21.7	2.56	4	114	0.238	E
M1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	8:38	6.93	7.98	29.76	21.34	2.48	3	113	0.147	SE
M1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	8:38	7.14	8.07	29.75	21.59	2.33	3	114	0.282	E
S1	20191222	Cloudy	Moderate	Mid-Ebb	B	4.5	9:08	7.03	8.08	29.36	21.51	3.23	3	114	0.144	SE
S1	20191222	Cloudy	Moderate	Mid-Ebb	B	4.5	9:08	6.75	8.01	29.72	21.55	3	2	113	0.16	SE
S1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:09	6.81	8.03	29.42	21.57	2.44	4	114	0.193	E
S1	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:09	6.75	8.21	29.62	21.74	2.72	4	114	0.263	SE
S2A	20191222	Cloudy	Moderate	Mid-Ebb	B	7.7	9:41	7.29	8.13	29.31	21.47	2.95	4	113	0.178	E
S2A	20191222	Cloudy	Moderate	Mid-Ebb	B	7.7	9:41	6.95	8.19	29.73	21.44	3.17	3	114	0.165	SE
S2A	20191222	Cloudy	Moderate	Mid-Ebb	M	4.35	9:42	6.76	8.08	29.75	21.63	2.51	4	114	0.186	SE
S2A	20191222	Cloudy	Moderate	Mid-Ebb	M	4.35	9:42	7.02	8.03	29.74	21.5	2.43	4	113	0.132	SE
S2A	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:43	7.22	8.24	29.73	21.38	2.6	4	114	0.258	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S2A	20191222	Cloudy	Moderate	Mid-Ebb	S	1	9:43	7.01	7.98	29.9	21.61	2.75	5	113	0.275	SE
S3	20191222	Cloudy	Moderate	Mid-Ebb	B	10.2	10:18	6.71	8.04	29.86	21.72	3.28	4	113	0.222	SE
S3	20191222	Cloudy	Moderate	Mid-Ebb	B	10.2	10:18	6.88	8.11	29.39	21.68	3.08	5	114	0.22	E
S3	20191222	Cloudy	Moderate	Mid-Ebb	M	5.6	10:19	6.87	7.98	29.9	21.73	2.45	5	114	0.13	SE
S3	20191222	Cloudy	Moderate	Mid-Ebb	M	5.6	10:19	6.89	8.03	29.81	21.71	2.61	5	114	0.249	E
S3	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:20	7.14	8.06	29.66	21.51	2.55	4	114	0.263	E
S3	20191222	Cloudy	Moderate	Mid-Ebb	S	1	10:20	6.8	8.24	29.62	21.51	2.78	4	113	0.276	SE
B1	20191222	Cloudy	Moderate	Mid-Flood	B	3.8	14:00	6.76	7.98	29.64	22.01	2.9	3	113	0.185	NW
B1	20191222	Cloudy	Moderate	Mid-Flood	B	3.8	14:00	6.98	8.2	29.51	22.16	3.28	3	114	0.2	W
B1	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:01	6.86	8.17	29.94	22.05	2.83	3	113	0.277	W
B1	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:01	7.04	8.11	29.36	22.48	2.75	3	112	0.206	NW
B2	20191222	Cloudy	Moderate	Mid-Flood	B	3.4	14:20	6.84	8	29.7	22.08	3.06	4	114	0.283	W
B2	20191222	Cloudy	Moderate	Mid-Flood	B	3.4	14:20	6.68	8.21	29.55	22.29	3.35	3	113	0.167	W
B2	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:21	6.79	8.18	29.28	22.3	2.45	3	112	0.163	NW
B2	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:21	7	8.21	29.47	22.44	2.91	3	113	0.267	W
B3	20191222	Cloudy	Moderate	Mid-Flood	B	3.5	15:06	7.07	8.12	29.52	22.27	3.56	5	113	0.171	W
B3	20191222	Cloudy	Moderate	Mid-Flood	B	3.5	15:06	7.12	7.95	29.95	21.84	3.26	4	113	0.28	W
B3	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:07	7.16	8.07	29.6	21.97	2.64	3	112	0.191	NW
B3	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:07	6.59	8.07	29.65	22.25	2.64	3	113	0.218	W
B4	20191222	Cloudy	Moderate	Mid-Flood	B	4.5	14:55	7.05	8.23	29.45	22.2	3.15	4	114	0.239	W
B4	20191222	Cloudy	Moderate	Mid-Flood	B	4.5	14:55	6.96	8.12	29.27	22.35	3.24	4	113	0.191	W
B4	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:56	6.68	8.2	29.45	22.08	2.55	4	113	0.269	W
B4	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:56	6.65	8.13	29.49	22.26	2.99	5	113	0.256	W
C1A	20191222	Cloudy	Moderate	Mid-Flood	B	8.9	13:33	7.11	8.17	29.27	22.18	3.39	5	113	0.214	W
C1A	20191222	Cloudy	Moderate	Mid-Flood	B	8.9	13:33	6.98	8.22	29.65	22.37	2.88	5	114	0.165	W
C1A	20191222	Cloudy	Moderate	Mid-Flood	M	4.95	13:34	6.83	8.06	29.66	22.38	2.7	4	112	0.302	NW
C1A	20191222	Cloudy	Moderate	Mid-Flood	M	4.95	13:34	7.18	8.14	29.89	22.36	2.95	4	112	0.267	W
C1A	20191222	Cloudy	Moderate	Mid-Flood	S	1	13:35	6.71	8.01	29.8	22.38	2.68	4	113	0.237	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
C1A	20191222	Cloudy	Moderate	Mid-Flood	S	1	13:35	6.63	8.21	29.84	22.07	2.67	2	113	0.204	W
C2A	20191222	Cloudy	Moderate	Mid-Flood	B	10.6	13:33	6.96	7.95	29.55	22.04	3.03	4	113	0.172	W
C2A	20191222	Cloudy	Moderate	Mid-Flood	B	10.6	13:33	6.8	8.18	29.22	22.3	3.25	5	114	0.275	W
C2A	20191222	Cloudy	Moderate	Mid-Flood	M	5.8	13:34	7.03	8.17	29.31	22.05	2.91	4	114	0.22	W
C2A	20191222	Cloudy	Moderate	Mid-Flood	M	5.8	13:34	6.66	7.96	29.28	22.1	2.69	4	113	0.168	W
C2A	20191222	Cloudy	Moderate	Mid-Flood	S	1	13:35	7.09	8.08	29.73	21.93	2.43	4	113	0.231	NW
C2A	20191222	Cloudy	Moderate	Mid-Flood	S	1	13:35	6.62	8.04	29.27	22.42	2.82	4	113	0.159	NW
CR1	20191222	Cloudy	Moderate	Mid-Flood	B	12	15:37	6.98	8.13	29.5	22.04	3.16	4	114	0.264	W
CR1	20191222	Cloudy	Moderate	Mid-Flood	B	12	15:37	7.15	8.17	29.23	21.8	3.29	4	113	0.21	NW
CR1	20191222	Cloudy	Moderate	Mid-Flood	M	6.5	15:38	6.82	7.97	29.25	21.98	2.94	5	114	0.214	W
CR1	20191222	Cloudy	Moderate	Mid-Flood	M	6.5	15:38	7.21	8.18	29.27	21.98	2.75	4	114	0.188	W
CR1	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:39	6.67	8.17	29.95	21.8	2.94	6	113	0.301	W
CR1	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:39	6.61	8.03	29.67	22.18	2.72	7	114	0.256	W
CR2	20191222	Cloudy	Moderate	Mid-Flood	B	10.9	15:07	6.6	8.12	29.6	22.31	3	3	114	0.165	W
CR2	20191222	Cloudy	Moderate	Mid-Flood	B	10.9	15:07	6.6	8.05	29.37	22.3	3.23	3	114	0.209	W
CR2	20191222	Cloudy	Moderate	Mid-Flood	M	5.95	15:08	7.07	7.97	29.32	22.11	2.87	3	113	0.194	W
CR2	20191222	Cloudy	Moderate	Mid-Flood	M	5.95	15:08	6.68	7.99	29.62	22.38	2.89	3	113	0.232	W
CR2	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:09	6.61	8.1	29.91	22.26	2.62	4	114	0.177	W
CR2	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:09	6.72	7.96	29.27	22.24	2.77	3	114	0.218	W
F1A	20191222	Cloudy	Moderate	Mid-Flood	B	7.2	14:32	6.91	8.17	29.23	22.1	3.3	6	114	0.212	W
F1A	20191222	Cloudy	Moderate	Mid-Flood	B	7.2	14:32	6.82	8.07	29.31	22.45	3.19	7	113	0.272	NW
F1A	20191222	Cloudy	Moderate	Mid-Flood	M	4.1	14:33	7.15	8.14	29.82	22.01	2.54	7	113	0.238	W
F1A	20191222	Cloudy	Moderate	Mid-Flood	M	4.1	14:33	6.94	8.05	29.39	22.22	2.75	6	112	0.172	W
F1A	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:34	7.12	8.09	29.75	22.17	2.7	4	113	0.185	W
F1A	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:34	6.73	8.07	29.69	22.19	2.8	5	113	0.207	W
H1	20191222	Cloudy	Moderate	Mid-Flood	B	6.7	15:29	6.6	8.07	29.8	21.81	2.95	4	113	0.27	W
H1	20191222	Cloudy	Moderate	Mid-Flood	B	6.7	15:29	7.13	7.99	29.72	22.18	3.26	3	113	0.164	NW
H1	20191222	Cloudy	Moderate	Mid-Flood	M	3.85	15:30	7.06	8.18	29.57	21.83	3.13	4	113	0.189	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
H1	20191222	Cloudy	Moderate	Mid-Flood	M	3.85	15:30	6.79	8.2	29.81	21.77	2.79	5	113	0.245	W
H1	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:31	6.76	8.04	29.26	22.12	2.66	5	113	0.229	W
H1	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:31	7.11	8.02	29.72	22.02	2.54	4	113	0.197	W
M1	20191222	Cloudy	Moderate	Mid-Flood	B	7.7	14:05	7.06	8.22	29.25	22.08	3.34	4	114	0.209	NW
M1	20191222	Cloudy	Moderate	Mid-Flood	B	7.7	14:05	6.78	8.21	29.4	22.01	3.21	4	113	0.284	NW
M1	20191222	Cloudy	Moderate	Mid-Flood	M	4.35	14:06	6.96	8.22	29.77	22.03	3.08	5	114	0.253	NW
M1	20191222	Cloudy	Moderate	Mid-Flood	M	4.35	14:06	6.97	7.96	29.92	22.04	2.99	5	114	0.267	W
M1	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:07	6.83	8.11	29.51	22.44	2.88	4	113	0.265	W
M1	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:07	6.69	8.13	29.21	22.27	2.36	4	114	0.226	W
S1	20191222	Cloudy	Moderate	Mid-Flood	B	4.8	14:11	7.18	8.18	29.46	22.14	3.12	4	113	0.22	W
S1	20191222	Cloudy	Moderate	Mid-Flood	B	4.8	14:11	6.91	8.19	29.72	22.39	2.95	4	113	0.285	W
S1	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:12	6.71	8.22	29.67	22.34	2.75	5	114	0.252	W
S1	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:12	7.08	8.08	29.52	22.22	2.69	5	113	0.254	NW
S2A	20191222	Cloudy	Moderate	Mid-Flood	B	8.9	14:45	6.72	8.14	29.77	22.25	3.43	4	114	0.169	W
S2A	20191222	Cloudy	Moderate	Mid-Flood	B	8.9	14:45	7.06	8.23	29.6	22.43	3.2	3	113	0.222	W
S2A	20191222	Cloudy	Moderate	Mid-Flood	M	4.95	14:46	6.84	8.16	29.44	22.15	3.1	4	115	0.242	W
S2A	20191222	Cloudy	Moderate	Mid-Flood	M	4.95	14:46	6.84	7.95	29.74	22.15	3.1	3	114	0.294	W
S2A	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:47	7.04	8.05	29.57	22.44	2.67	4	113	0.245	W
S2A	20191222	Cloudy	Moderate	Mid-Flood	S	1	14:47	6.64	7.98	29.36	22.17	2.69	4	114	0.174	NW
S3	20191222	Cloudy	Moderate	Mid-Flood	B	8.8	15:19	7.08	7.99	29.83	21.94	3.16	4	114	0.287	W
S3	20191222	Cloudy	Moderate	Mid-Flood	B	8.8	15:19	7.14	8.12	29.88	21.93	3.42	3	113	0.239	W
S3	20191222	Cloudy	Moderate	Mid-Flood	M	4.9	15:20	7.21	8.21	29.78	22.31	2.7	4	113	0.195	W
S3	20191222	Cloudy	Moderate	Mid-Flood	M	4.9	15:20	7.14	7.97	29.72	22.39	2.76	3	113	0.17	W
S3	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:21	6.71	7.95	29.45	21.84	2.8	4	113	0.242	W
S3	20191222	Cloudy	Moderate	Mid-Flood	S	1	15:21	7	8.16	29.2	21.83	2.76	5	114	0.211	W
B1	20191224	Sunny	Moderate	Mid-Ebb	B	3.8	10:09	7.74	8.23	30.66	22.57	2.95	6	113	0.129	SE
B1	20191224	Sunny	Moderate	Mid-Ebb	B	3.8	10:09	8.39	8.29	30.4	22.39	3.08	6	114	0.262	E
B1	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:10	7.89	8.15	30.82	22.23	2.8	8	113	0.27	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B1	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:10	8.21	8.23	30.47	22.57	2.56	7	114	0.247	SE
B2	20191224	Sunny	Moderate	Mid-Ebb	B	4.6	10:33	8.48	8.26	30.8	22.72	3.4	11	114	0.157	SE
B2	20191224	Sunny	Moderate	Mid-Ebb	B	4.6	10:33	8.11	8.09	30.48	22.42	3.43	11	115	0.266	SE
B2	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:34	8.39	8.3	30.3	22.57	2.43	5	114	0.188	E
B2	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:34	8.23	8.26	30.37	22.74	2.63	5	114	0.142	E
B3	20191224	Sunny	Moderate	Mid-Ebb	B	3.7	11:02	8.12	8.23	30.33	22.64	3.26	13	113	0.171	SE
B3	20191224	Sunny	Moderate	Mid-Ebb	B	3.7	11:02	7.73	8.12	30.9	22.75	3.28	13	114	0.229	SE
B3	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:03	8.08	8.32	30.95	22.66	2.39	10	114	0.253	E
B3	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:03	7.91	8.27	30.49	22.79	2.55	9	113	0.135	SE
B4	20191224	Sunny	Moderate	Mid-Ebb	B	4.1	10:50	8.35	8.08	30.68	22.63	3.15	10	114	0.13	SE
B4	20191224	Sunny	Moderate	Mid-Ebb	B	4.1	10:50	8.27	8.14	30.41	22.58	3.21	10	114	0.117	SE
B4	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:51	8.18	8.19	30.53	22.69	2.47	7	114	0.266	SE
B4	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:51	7.63	8.29	30.6	22.51	2.72	6	114	0.147	E
C1A	20191224	Sunny	Moderate	Mid-Ebb	B	10	9:49	8.33	8.06	30.8	22.38	3.44	7	114	0.253	E
C1A	20191224	Sunny	Moderate	Mid-Ebb	B	10	9:49	7.8	8.29	30.55	22.56	3.33	6	114	0.211	SE
C1A	20191224	Sunny	Moderate	Mid-Ebb	M	5.5	9:50	7.91	8.27	30.95	22.63	2.93	10	113	0.193	E
C1A	20191224	Sunny	Moderate	Mid-Ebb	M	5.5	9:50	7.72	8.08	30.82	22.57	2.35	9	114	0.155	SE
C1A	20191224	Sunny	Moderate	Mid-Ebb	S	1	9:51	8.09	8.27	30.46	22.17	2.46	12	113	0.275	SE
C1A	20191224	Sunny	Moderate	Mid-Ebb	S	1	9:51	7.66	8.31	30.39	22.64	2.9	12	113	0.21	SE
C2A	20191224	Sunny	Moderate	Mid-Ebb	B	11.4	11:47	7.77	8.32	30.47	22.43	3.35	10	114	0.255	SE
C2A	20191224	Sunny	Moderate	Mid-Ebb	B	11.4	11:47	8.27	8.15	30.94	22.5	3.39	10	113	0.204	E
C2A	20191224	Sunny	Moderate	Mid-Ebb	M	6.2	11:48	8.27	8.11	30.73	22.4	2.93	9	113	0.135	SE
C2A	20191224	Sunny	Moderate	Mid-Ebb	M	6.2	11:48	8.48	8.21	30.89	22.74	2.76	9	114	0.181	SE
C2A	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:49	8.41	8.31	30.76	22.74	2.47	8	114	0.171	SE
C2A	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:49	8.4	8.32	30.59	22.59	2.78	7	113	0.199	SE
CR1	20191224	Sunny	Moderate	Mid-Ebb	B	12.8	11:48	7.9	8.14	30.34	22.53	2.91	11	114	0.159	SE
CR1	20191224	Sunny	Moderate	Mid-Ebb	B	12.8	11:48	8.27	8.25	30.52	22.81	2.92	10	114	0.144	SE
CR1	20191224	Sunny	Moderate	Mid-Ebb	M	6.9	11:49	8.28	8.25	30.91	22.68	2.63	8	114	0.265	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR1	20191224	Sunny	Moderate	Mid-Ebb	M	6.9	11:49	8.17	8.07	30.32	22.82	2.53	9	114	0.143	E
CR1	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:50	7.69	8.06	30.55	22.51	2.76	7	114	0.172	SE
CR1	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:50	8.23	8.17	30.38	22.7	2.67	8	114	0.26	E
CR2	20191224	Sunny	Moderate	Mid-Ebb	B	11.1	11:18	7.72	8.34	30.61	22.6	3.16	12	113	0.277	SE
CR2	20191224	Sunny	Moderate	Mid-Ebb	B	11.1	11:18	7.81	8.34	30.36	22.49	3.23	13	114	0.239	SE
CR2	20191224	Sunny	Moderate	Mid-Ebb	M	6.05	11:19	7.75	8.08	30.38	22.73	2.55	12	114	0.175	SE
CR2	20191224	Sunny	Moderate	Mid-Ebb	M	6.05	11:19	8.24	8.28	30.38	22.75	2.48	12	114	0.277	E
CR2	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:20	7.74	8.07	30.82	22.79	2.64	10	114	0.186	SE
CR2	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:20	8.29	8.33	30.97	22.61	2.49	9	113	0.122	SE
F1A	20191224	Sunny	Moderate	Mid-Ebb	B	6.9	10:24	7.84	8.17	30.76	22.26	3.15	6	113	0.282	SE
F1A	20191224	Sunny	Moderate	Mid-Ebb	B	6.9	10:24	7.84	8.26	30.32	22.49	3.44	4	114	0.216	SE
F1A	20191224	Sunny	Moderate	Mid-Ebb	M	3.95	10:25	8.11	8.13	30.85	22.27	2.47	9	113	0.277	SE
F1A	20191224	Sunny	Moderate	Mid-Ebb	M	3.95	10:25	7.92	8.15	30.54	22.4	2.57	8	114	0.231	SE
F1A	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:26	8.38	8.27	30.81	22.47	2.89	14	114	0.208	SE
F1A	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:26	8.34	8.22	30.96	22.2	2.55	13	114	0.152	SE
H1	20191224	Sunny	Moderate	Mid-Ebb	B	7.3	11:22	8.06	8.26	30.94	22.69	2.92	6	114	0.189	SE
H1	20191224	Sunny	Moderate	Mid-Ebb	B	7.3	11:22	8.24	8.26	30.81	22.76	3.4	7	114	0.209	SE
H1	20191224	Sunny	Moderate	Mid-Ebb	M	4.15	11:23	7.73	8.27	30.36	22.7	2.92	9	114	0.162	E
H1	20191224	Sunny	Moderate	Mid-Ebb	M	4.15	11:23	8.4	8.17	30.66	22.78	2.45	9	114	0.116	SE
H1	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:24	8.32	8.06	30.6	22.54	2.55	10	113	0.228	E
H1	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:24	8.29	8.1	30.32	22.81	2.38	11	114	0.252	SE
M1	20191224	Sunny	Moderate	Mid-Ebb	B	8.5	9:53	8.04	8.17	30.76	22.17	3.06	12	114	0.225	SE
M1	20191224	Sunny	Moderate	Mid-Ebb	B	8.5	9:53	8.43	8.16	30.78	22.34	3.32	13	114	0.178	SE
M1	20191224	Sunny	Moderate	Mid-Ebb	M	4.75	9:54	7.64	8.32	30.42	22.25	2.38	9	114	0.209	SE
M1	20191224	Sunny	Moderate	Mid-Ebb	M	4.75	9:54	7.66	8.08	30.3	22.35	2.75	10	114	0.181	SE
M1	20191224	Sunny	Moderate	Mid-Ebb	S	1	9:55	8.35	8.32	30.33	22.22	2.82	7	113	0.123	SE
M1	20191224	Sunny	Moderate	Mid-Ebb	S	1	9:55	7.77	8.24	30.5	22.3	2.4	8	113	0.165	SE
S1	20191224	Sunny	Moderate	Mid-Ebb	B	3.9	10:22	8.3	8.24	30.64	22.56	2.87	13	114	0.264	E

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S1	20191224	Sunny	Moderate	Mid-Ebb	B	3.9	10:22	7.98	8.23	30.93	22.2	3.31	14	113	0.274	SE
S1	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:23	7.68	8.28	30.76	22.62	2.9	5	113	0.176	SE
S1	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:23	8.11	8.21	30.96	22.4	2.39	6	114	0.132	E
S2A	20191224	Sunny	Moderate	Mid-Ebb	B	8.3	10:57	7.91	8.21	30.42	22.45	3.43	6	113	0.123	SE
S2A	20191224	Sunny	Moderate	Mid-Ebb	B	8.3	10:57	8.34	8.13	30.65	22.37	3.25	5	113	0.273	SE
S2A	20191224	Sunny	Moderate	Mid-Ebb	M	4.65	10:58	7.62	8.14	30.79	22.44	2.41	6	114	0.213	SE
S2A	20191224	Sunny	Moderate	Mid-Ebb	M	4.65	10:58	7.96	8.15	30.4	22.51	2.87	4	114	0.224	SE
S2A	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:59	7.85	8.26	30.35	22.66	2.4	6	113	0.208	SE
S2A	20191224	Sunny	Moderate	Mid-Ebb	S	1	10:59	8.44	8.08	30.59	22.61	2.72	8	112	0.218	E
S3	20191224	Sunny	Moderate	Mid-Ebb	B	10.5	11:28	7.7	8.2	30.42	22.61	3.22	10	114	0.177	E
S3	20191224	Sunny	Moderate	Mid-Ebb	B	10.5	11:28	8.05	8.32	30.55	22.81	3.14	11	113	0.252	SE
S3	20191224	Sunny	Moderate	Mid-Ebb	M	5.75	11:29	8.38	8.09	30.51	22.6	2.37	7	113	0.267	E
S3	20191224	Sunny	Moderate	Mid-Ebb	M	5.75	11:29	7.79	8.08	30.5	22.57	2.72	7	114	0.255	E
S3	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:30	7.93	8.18	30.37	22.56	2.43	5	113	0.275	SE
S3	20191224	Sunny	Moderate	Mid-Ebb	S	1	11:30	8.48	8.09	30.78	22.72	2.7	6	113	0.136	E
B1	20191224	Sunny	Moderate	Mid-Flood	B	4.4	15:10	7.49	8.29	30.39	22.26	2.95	6	113	0.311	W
B1	20191224	Sunny	Moderate	Mid-Flood	B	4.4	15:10	7.71	8.31	30.35	22.42	3.01	5	113	0.179	W
B1	20191224	Sunny	Moderate	Mid-Flood	S	1	15:11	8.24	8.2	30.88	22.33	2.45	4	113	0.195	NW
B1	20191224	Sunny	Moderate	Mid-Flood	S	1	15:11	7.97	8.08	30.45	22.25	2.42	4	113	0.283	NW
B2	20191224	Sunny	Moderate	Mid-Flood	B	3.6	15:32	7.75	8.07	30.51	22.32	3.24	6	114	0.241	W
B2	20191224	Sunny	Moderate	Mid-Flood	B	3.6	15:32	7.46	8.29	30.48	22.41	3.33	7	113	0.297	NW
B2	20191224	Sunny	Moderate	Mid-Flood	S	1	15:33	7.97	8.05	30.42	22.5	2.91	4	113	0.189	W
B2	20191224	Sunny	Moderate	Mid-Flood	S	1	15:33	7.86	8.24	30.43	22.49	2.53	4	114	0.284	W
B3	20191224	Sunny	Moderate	Mid-Flood	B	3.9	16:25	7.99	8.05	30.32	22.15	3.07	5	113	0.2	W
B3	20191224	Sunny	Moderate	Mid-Flood	B	3.9	16:25	7.77	8.27	30.23	22.25	3.09	5	114	0.302	NW
B3	20191224	Sunny	Moderate	Mid-Flood	S	1	16:26	7.58	8.21	30.35	22.1	2.48	6	114	0.271	NW
B3	20191224	Sunny	Moderate	Mid-Flood	S	1	16:26	7.97	8.3	30.63	22.42	2.54	6	114	0.217	W
B4	20191224	Sunny	Moderate	Mid-Flood	B	4.1	16:16	7.53	8.14	30.35	22.17	3.11	5	114	0.254	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B4	20191224	Sunny	Moderate	Mid-Flood	B	4.1	16:16	7.59	8.32	30.51	22.13	3.05	4	114	0.166	W
B4	20191224	Sunny	Moderate	Mid-Flood	S	1	16:17	7.53	8.3	30.93	22.39	2.67	6	114	0.298	W
B4	20191224	Sunny	Moderate	Mid-Flood	S	1	16:17	7.33	8.29	30.26	22.34	2.71	6	114	0.283	W
C1A	20191224	Sunny	Moderate	Mid-Flood	B	10.2	14:47	7.74	8.01	30.21	22.54	3.3	9	113	0.316	W
C1A	20191224	Sunny	Moderate	Mid-Flood	B	10.2	14:47	8.2	8.06	30.48	22.34	3.43	8	114	0.252	W
C1A	20191224	Sunny	Moderate	Mid-Flood	M	5.6	14:48	7.36	8.29	30.62	22.46	2.61	6	114	0.166	W
C1A	20191224	Sunny	Moderate	Mid-Flood	M	5.6	14:48	7.98	8.28	30.39	22.59	2.88	7	114	0.2	W
C1A	20191224	Sunny	Moderate	Mid-Flood	S	1	14:49	7.63	8.27	30.82	22.15	2.58	5	114	0.254	W
C1A	20191224	Sunny	Moderate	Mid-Flood	S	1	14:49	7.4	8.19	30.43	22.43	2.71	5	113	0.239	W
C2A	20191224	Sunny	Moderate	Mid-Flood	B	11	14:47	7.7	8.11	30.36	22.52	3.16	7	113	0.181	W
C2A	20191224	Sunny	Moderate	Mid-Flood	B	11	14:47	8.01	8.34	30.44	22.33	3.36	8	113	0.176	W
C2A	20191224	Sunny	Moderate	Mid-Flood	M	6	14:48	7.98	8.33	30.7	22.29	2.58	8	114	0.257	NW
C2A	20191224	Sunny	Moderate	Mid-Flood	M	6	14:48	8.03	8.31	30.27	22.34	3	8	114	0.24	W
C2A	20191224	Sunny	Moderate	Mid-Flood	S	1	14:49	8.31	8.33	30.26	22.4	2.53	5	114	0.162	W
C2A	20191224	Sunny	Moderate	Mid-Flood	S	1	14:49	7.78	8.07	30.47	22.16	2.85	5	113	0.152	W
CR1	20191224	Sunny	Moderate	Mid-Flood	B	12	16:47	7.52	8.31	30.67	22.35	2.93	8	114	0.269	W
CR1	20191224	Sunny	Moderate	Mid-Flood	B	12	16:47	7.8	8.22	30.91	22.35	3.42	8	114	0.296	W
CR1	20191224	Sunny	Moderate	Mid-Flood	M	6.5	16:48	8	8.12	30.53	22.25	2.55	7	114	0.282	NW
CR1	20191224	Sunny	Moderate	Mid-Flood	M	6.5	16:48	7.64	8.09	30.41	21.86	3.03	8	114	0.318	W
CR1	20191224	Sunny	Moderate	Mid-Flood	S	1	16:49	7.31	8.26	30.95	21.96	2.45	5	113	0.167	W
CR1	20191224	Sunny	Moderate	Mid-Flood	S	1	16:49	7.31	8.06	30.2	22.24	2.45	6	114	0.279	W
CR2	20191224	Sunny	Moderate	Mid-Flood	B	10.6	16:17	8.14	8.13	30.91	22.36	3.45	12	114	0.294	W
CR2	20191224	Sunny	Moderate	Mid-Flood	B	10.6	16:17	8.2	8.18	30.43	22.15	3.29	12	114	0.146	W
CR2	20191224	Sunny	Moderate	Mid-Flood	M	5.8	16:18	7.65	8.12	30.5	22.27	2.75	8	114	0.255	NW
CR2	20191224	Sunny	Moderate	Mid-Flood	M	5.8	16:18	7.99	8.1	30.45	22.38	2.82	8	114	0.227	W
CR2	20191224	Sunny	Moderate	Mid-Flood	S	1	16:19	8.15	8.28	30.46	22.43	2.56	8	114	0.17	NW
CR2	20191224	Sunny	Moderate	Mid-Flood	S	1	16:19	8.29	8.03	30.76	22.38	2.63	8	113	0.194	W
F1A	20191224	Sunny	Moderate	Mid-Flood	B	6.6	15:52	7.61	8.11	30.93	22.42	3.05	7	113	0.156	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
F1A	20191224	Sunny	Moderate	Mid-Flood	B	6.6	15:52	7.94	8.27	30.82	22.12	3.4	6	114	0.309	W
F1A	20191224	Sunny	Moderate	Mid-Flood	M	3.8	15:53	7.74	8.27	30.42	22.29	2.96	8	113	0.289	W
F1A	20191224	Sunny	Moderate	Mid-Flood	M	3.8	15:53	7.41	8.18	30.82	22.43	2.62	8	114	0.251	NW
F1A	20191224	Sunny	Moderate	Mid-Flood	S	1	15:54	7.29	8.32	30.57	22.12	2.93	11	113	0.142	W
F1A	20191224	Sunny	Moderate	Mid-Flood	S	1	15:54	8.16	8.34	30.61	22.34	2.45	10	113	0.158	W
H1	20191224	Sunny	Moderate	Mid-Flood	B	7.3	16:42	7.83	8.11	30.59	22.22	2.98	4	114	0.218	W
H1	20191224	Sunny	Moderate	Mid-Flood	B	7.3	16:42	7.77	8.32	30.59	21.87	3.27	5	112	0.176	W
H1	20191224	Sunny	Moderate	Mid-Flood	M	4.15	16:43	7.83	8.08	30.77	22.19	2.61	6	113	0.178	NW
H1	20191224	Sunny	Moderate	Mid-Flood	M	4.15	16:43	7.84	8.01	30.55	22.13	3.01	5	113	0.232	W
H1	20191224	Sunny	Moderate	Mid-Flood	S	1	16:44	7.95	8.19	30.79	22.32	2.91	8	114	0.277	NW
H1	20191224	Sunny	Moderate	Mid-Flood	S	1	16:44	7.94	8.12	30.72	22.26	2.62	9	114	0.171	W
M1	20191224	Sunny	Moderate	Mid-Flood	B	6.5	15:21	7.57	8.06	30.72	22.44	2.97	5	113	0.174	W
M1	20191224	Sunny	Moderate	Mid-Flood	B	6.5	15:21	8.19	8.34	30.82	22.52	3.03	5	114	0.18	W
M1	20191224	Sunny	Moderate	Mid-Flood	M	3.75	15:22	7.94	8.24	30.77	22.58	2.9	6	114	0.148	W
M1	20191224	Sunny	Moderate	Mid-Flood	M	3.75	15:22	7.74	8	30.94	22.35	2.55	5	114	0.256	W
M1	20191224	Sunny	Moderate	Mid-Flood	S	1	15:23	8.11	8	30.38	22.31	2.69	9	113	0.26	W
M1	20191224	Sunny	Moderate	Mid-Flood	S	1	15:23	8.31	8.27	30.9	22.27	2.5	9	113	0.252	W
S1	20191224	Sunny	Moderate	Mid-Flood	B	4.2	15:20	7.28	8.14	30.57	22.55	3.26	6	112	0.299	W
S1	20191224	Sunny	Moderate	Mid-Flood	B	4.2	15:20	7.71	8.17	30.94	22.56	3.3	7	114	0.179	W
S1	20191224	Sunny	Moderate	Mid-Flood	S	1	15:21	8.17	8.14	30.57	22.48	2.39	4	114	0.202	W
S1	20191224	Sunny	Moderate	Mid-Flood	S	1	15:21	7.37	8.36	30.95	22.32	2.53	4	113	0.314	W
S2A	20191224	Sunny	Moderate	Mid-Flood	B	8.9	15:56	7.46	8.35	30.85	22.36	3.17	8	113	0.195	W
S2A	20191224	Sunny	Moderate	Mid-Flood	B	8.9	15:56	7.86	8.23	30.82	22.13	3.24	9	114	0.146	W
S2A	20191224	Sunny	Moderate	Mid-Flood	M	4.95	15:57	8.1	8.27	30.56	22.4	2.61	6	113	0.318	W
S2A	20191224	Sunny	Moderate	Mid-Flood	M	4.95	15:57	8.28	8.2	30.79	22.22	2.96	7	114	0.191	W
S2A	20191224	Sunny	Moderate	Mid-Flood	S	1	15:58	8.28	8.3	30.53	22.29	2.38	6	114	0.194	NW
S2A	20191224	Sunny	Moderate	Mid-Flood	S	1	15:58	7.64	8.24	30.58	22.23	2.68	6	114	0.154	W
S3	20191224	Sunny	Moderate	Mid-Flood	B	9.2	16:27	7.6	8.08	30.48	22.08	3.43	7	114	0.299	NW

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S3	20191224	Sunny	Moderate	Mid-Flood	B	9.2	16:27	7.63	8.29	30.36	22.05	3.56	6	114	0.299	W
S3	20191224	Sunny	Moderate	Mid-Flood	M	5.1	16:28	7.65	8.23	30.45	22.32	2.82	7	114	0.289	W
S3	20191224	Sunny	Moderate	Mid-Flood	M	5.1	16:28	8.15	8.25	30.8	22.29	2.79	7	114	0.144	W
S3	20191224	Sunny	Moderate	Mid-Flood	S	1	16:29	8.03	8.3	30.38	22.31	2.68	9	113	0.311	W
S3	20191224	Sunny	Moderate	Mid-Flood	S	1	16:29	7.83	8.03	30.83	22.4	2.55	9	114	0.185	W
B1	20191227	Sunny	Moderate	Mid-Ebb	B	4	12:50	8.04	8.27	31.19	21.9	3.64	9	113	0.152	SE
B1	20191227	Sunny	Moderate	Mid-Ebb	B	4	12:50	8.55	8.12	31.27	21.75	3.76	8	114	0.148	SE
B1	20191227	Sunny	Moderate	Mid-Ebb	S	1	12:51	8.17	8.34	31.25	21.34	2.74	6	113	0.155	E
B1	20191227	Sunny	Moderate	Mid-Ebb	S	1	12:51	8.54	8.21	31.29	21.77	2.8	7	113	0.178	SE
B2	20191227	Sunny	Moderate	Mid-Ebb	B	4	13:16	8.58	8.27	31.34	21.41	3.2	11	113	0.185	SE
B2	20191227	Sunny	Moderate	Mid-Ebb	B	4	13:16	8.11	8.2	31.47	21.78	3.27	10	112	0.273	SE
B2	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:17	8.56	8.23	31.58	21.39	2.99	8	112	0.2	SE
B2	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:17	8.18	8.32	31.16	21.35	3.2	8	114	0.23	SE
B3	20191227	Sunny	Moderate	Mid-Ebb	B	3.5	13:33	8.09	8.23	31.52	21.75	3.69	13	113	0.197	SE
B3	20191227	Sunny	Moderate	Mid-Ebb	B	3.5	13:33	8.16	8.27	31.57	21.89	3.54	12	112	0.271	E
B3	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:34	8.46	8.19	31.36	21.36	2.67	8	112	0.175	E
B3	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:34	8.57	8.14	31.19	21.49	2.91	10	113	0.168	E
B4	20191227	Sunny	Moderate	Mid-Ebb	B	3.5	13:23	8.55	8.13	31.59	21.69	3.32	12	112	0.261	SE
B4	20191227	Sunny	Moderate	Mid-Ebb	B	3.5	13:23	8.48	8.27	31.63	21.83	3.53	12	114	0.198	E
B4	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:24	8.41	8.3	31.33	21.85	2.93	10	112	0.166	E
B4	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:24	8.33	8.19	31.59	21.41	2.74	10	112	0.192	E
C1A	20191227	Sunny	Moderate	Mid-Ebb	B	8.5	12:25	8.45	8.28	31.26	21.55	3.31	9	114	0.158	E
C1A	20191227	Sunny	Moderate	Mid-Ebb	B	8.5	12:25	8.04	8.27	31.66	21.87	3.26	10	114	0.22	SE
C1A	20191227	Sunny	Moderate	Mid-Ebb	M	4.75	12:26	8.53	8.18	31.38	21.56	3.01	8	114	0.118	SE
C1A	20191227	Sunny	Moderate	Mid-Ebb	M	4.75	12:26	8.39	8.12	31.21	21.87	2.77	7	113	0.13	E
C1A	20191227	Sunny	Moderate	Mid-Ebb	S	1	12:27	8.53	8.15	31.41	21.76	2.68	8	113	0.124	SE
C1A	20191227	Sunny	Moderate	Mid-Ebb	S	1	12:27	8.07	8.31	31.55	21.89	2.81	8	112	0.28	E
C2A	20191227	Sunny	Moderate	Mid-Ebb	B	10.4	14:15	8.26	8.34	31.42	21.32	3.44	8	113	0.189	SE

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C2A	20191227	Sunny	Moderate	Mid-Ebb	B	10.4	14:15	8.52	8.2	31.65	21.78	3.29	9	114	0.145	E
C2A	20191227	Sunny	Moderate	Mid-Ebb	M	5.7	14:16	8.34	8.13	31.49	21.61	3.13	9	114	0.183	SE
C2A	20191227	Sunny	Moderate	Mid-Ebb	M	5.7	14:16	8.31	8.3	31.17	21.3	3.08	8	114	0.22	SE
C2A	20191227	Sunny	Moderate	Mid-Ebb	S	1	14:17	8.33	8.14	31.18	21.9	2.74	8	114	0.267	SE
C2A	20191227	Sunny	Moderate	Mid-Ebb	S	1	14:17	8.18	8.31	31.53	21.5	2.75	7	114	0.233	SE
CR1	20191227	Sunny	Moderate	Mid-Ebb	B	12.4	14:35	8.57	8.13	31.45	21.67	3.55	9	113	0.13	SE
CR1	20191227	Sunny	Moderate	Mid-Ebb	B	12.4	14:35	8.55	8.25	31.34	21.31	3.61	10	113	0.264	SE
CR1	20191227	Sunny	Moderate	Mid-Ebb	M	6.7	14:36	8.32	8.12	31.14	21.38	3.24	9	114	0.265	SE
CR1	20191227	Sunny	Moderate	Mid-Ebb	M	6.7	14:36	8.59	8.13	31.41	21.43	2.78	8	113	0.158	SE
CR1	20191227	Sunny	Moderate	Mid-Ebb	S	1	14:37	8.45	8.24	31.59	21.84	3.12	8	115	0.198	E
CR1	20191227	Sunny	Moderate	Mid-Ebb	S	1	14:37	8.17	8.3	31.46	21.65	2.71	8	114	0.172	SE
CR2	20191227	Sunny	Moderate	Mid-Ebb	B	9.8	14:08	8.11	8.31	31.48	21.83	3.61	10	113	0.178	E
CR2	20191227	Sunny	Moderate	Mid-Ebb	B	9.8	14:08	8.31	8.27	31.32	21.59	3.46	10	113	0.129	SE
CR2	20191227	Sunny	Moderate	Mid-Ebb	M	5.4	14:09	8.13	8.3	31.66	21.73	2.78	9	114	0.19	E
CR2	20191227	Sunny	Moderate	Mid-Ebb	M	5.4	14:09	8.56	8.29	31.47	21.69	3.1	8	114	0.168	SE
CR2	20191227	Sunny	Moderate	Mid-Ebb	S	1	14:10	8.35	8.22	31.35	21.87	3.21	8	113	0.181	SE
CR2	20191227	Sunny	Moderate	Mid-Ebb	S	1	14:10	8.04	8.25	31.26	21.49	3.12	8	113	0.222	E
F1A	20191227	Sunny	Moderate	Mid-Ebb	B	7.9	12:54	8.16	8.11	31.62	21.62	3.29	12	114	0.21	E
F1A	20191227	Sunny	Moderate	Mid-Ebb	B	7.9	12:54	8.52	8.27	31.24	21.76	3.56	11	114	0.277	SE
F1A	20191227	Sunny	Moderate	Mid-Ebb	M	4.45	12:55	8.29	8.22	31.45	21.57	3.09	11	113	0.163	SE
F1A	20191227	Sunny	Moderate	Mid-Ebb	M	4.45	12:55	8.32	8.2	31.4	21.77	2.98	11	114	0.143	SE
F1A	20191227	Sunny	Moderate	Mid-Ebb	S	1	12:56	8.02	8.26	31.42	21.42	3.19	9	113	0.22	SE
F1A	20191227	Sunny	Moderate	Mid-Ebb	S	1	12:56	8.5	8.31	31.52	21.85	2.78	8	114	0.234	SE
H1	20191227	Sunny	Moderate	Mid-Ebb	B	7.5	13:52	8.47	8.3	31.44	21.41	3.41	8	113	0.254	SE
H1	20191227	Sunny	Moderate	Mid-Ebb	B	7.5	13:52	8.48	8.19	31.52	21.64	3.47	8	112	0.132	SE
H1	20191227	Sunny	Moderate	Mid-Ebb	M	4.25	13:53	8.43	8.26	31.41	21.34	2.83	10	113	0.257	E
H1	20191227	Sunny	Moderate	Mid-Ebb	M	4.25	13:53	8.04	8.12	31.57	21.83	2.69	10	113	0.243	SE
H1	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:54	8.15	8.12	31.36	21.33	3.17	10	112	0.146	E

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H1	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:54	8.1	8.29	31.41	21.6	3.06	10	111	0.19	SE
M1	20191227	Sunny	Moderate	Mid-Ebb	B	7.7	12:27	8.13	8.18	31.32	21.74	3.18	8	114	0.116	E
M1	20191227	Sunny	Moderate	Mid-Ebb	B	7.7	12:27	8.05	8.32	31.42	21.85	3.43	9	114	0.222	SE
M1	20191227	Sunny	Moderate	Mid-Ebb	M	4.35	12:28	8.2	8.26	31.38	21.9	3.13	8	114	0.247	SE
M1	20191227	Sunny	Moderate	Mid-Ebb	M	4.35	12:28	8.21	8.21	31.27	21.59	2.81	8	114	0.15	E
M1	20191227	Sunny	Moderate	Mid-Ebb	S	1	12:29	8.28	8.33	31.39	21.45	3.13	8	113	0.197	SE
M1	20191227	Sunny	Moderate	Mid-Ebb	S	1	12:29	8.25	8.33	31.5	21.46	2.75	7	113	0.187	SE
S1	20191227	Sunny	Moderate	Mid-Ebb	B	3.9	13:02	8.22	8.25	31.65	21.6	3.46	10	114	0.121	E
S1	20191227	Sunny	Moderate	Mid-Ebb	B	3.9	13:02	8.36	8.33	31.32	21.71	3.24	10	114	0.227	SE
S1	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:03	8.31	8.15	31.47	21.77	3.19	9	113	0.183	SE
S1	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:03	8.07	8.28	31.66	21.31	3.17	8	114	0.197	E
S2A	20191227	Sunny	Moderate	Mid-Ebb	B	8.4	13:41	8.09	8.2	31.51	21.61	3.71	13	114	0.238	SE
S2A	20191227	Sunny	Moderate	Mid-Ebb	B	8.4	13:41	8.1	8.15	31.52	21.43	3.32	13	113	0.142	E
S2A	20191227	Sunny	Moderate	Mid-Ebb	M	4.7	13:42	8.09	8.28	31.3	21.45	3.14	11	114	0.264	SE
S2A	20191227	Sunny	Moderate	Mid-Ebb	M	4.7	13:42	8.54	8.17	31.68	21.34	2.79	11	113	0.174	E
S2A	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:43	8.45	8.25	31.31	21.69	3.09	10	114	0.198	E
S2A	20191227	Sunny	Moderate	Mid-Ebb	S	1	13:43	8.47	8.21	31.44	21.9	2.93	10	114	0.214	E
S3	20191227	Sunny	Moderate	Mid-Ebb	B	9	14:19	8.55	8.22	31.52	21.61	3.69	11	114	0.14	E
S3	20191227	Sunny	Moderate	Mid-Ebb	B	9	14:19	8.41	8.27	31.43	21.66	3.35	12	114	0.202	SE
S3	20191227	Sunny	Moderate	Mid-Ebb	M	5	14:20	8.5	8.17	31.13	21.87	2.84	9	114	0.196	E
S3	20191227	Sunny	Moderate	Mid-Ebb	M	5	14:20	8.3	8.22	31.59	21.79	2.74	9	113	0.157	SE
S3	20191227	Sunny	Moderate	Mid-Ebb	S	1	14:21	8.25	8.14	31.51	21.57	3.23	7	114	0.274	E
S3	20191227	Sunny	Moderate	Mid-Ebb	S	1	14:21	8.57	8.27	31.64	21.66	2.84	8	113	0.186	SE
B1	20191227	Sunny	Moderate	Mid-Flood	B	3.6	15:54	8.23	8.31	31.64	21.03	3.75	7	113	0.174	W
B1	20191227	Sunny	Moderate	Mid-Flood	B	3.6	15:54	7.97	8.12	31.45	21.22	3.72	7	114	0.301	NW
B1	20191227	Sunny	Moderate	Mid-Flood	S	1	15:55	8	8.28	31.36	21.09	2.98	6	114	0.253	W
B1	20191227	Sunny	Moderate	Mid-Flood	S	1	15:55	8.25	8.13	31.25	21.42	3.02	5	114	0.196	W
B2	20191227	Sunny	Moderate	Mid-Flood	B	4	16:20	7.95	8.18	31.71	21.23	3.39	9	114	0.213	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
B2	20191227	Sunny	Moderate	Mid-Flood	B	4	16:20	8.27	8.11	31.2	21.26	3.57	9	113	0.166	W
B2	20191227	Sunny	Moderate	Mid-Flood	S	1	16:21	7.97	8.16	31.41	21.08	2.92	9	114	0.31	W
B2	20191227	Sunny	Moderate	Mid-Flood	S	1	16:21	8.08	8.11	31.35	21.01	2.85	8	114	0.138	W
B3	20191227	Sunny	Moderate	Mid-Flood	B	4	17:02	7.88	8.26	31.49	21.38	3.35	8	113	0.152	W
B3	20191227	Sunny	Moderate	Mid-Flood	B	4	17:02	7.85	8.34	31.93	21.29	3.54	9	113	0.196	NW
B3	20191227	Sunny	Moderate	Mid-Flood	S	1	17:03	8.23	8.37	31.22	21.17	3.17	7	114	0.294	NW
B3	20191227	Sunny	Moderate	Mid-Flood	S	1	17:03	7.99	8.35	31.79	21.38	3.01	6	113	0.156	W
B4	20191227	Sunny	Moderate	Mid-Flood	B	4	16:52	7.92	8.1	31.53	21.06	3.88	10	113	0.23	NW
B4	20191227	Sunny	Moderate	Mid-Flood	B	4	16:52	8.09	8.11	31.46	21.25	3.43	11	113	0.295	W
B4	20191227	Sunny	Moderate	Mid-Flood	S	1	16:53	7.96	8.38	31.91	21.1	3.19	8	114	0.245	W
B4	20191227	Sunny	Moderate	Mid-Flood	S	1	16:53	7.93	8.08	31.5	21.22	2.77	7	114	0.273	W
C1A	20191227	Sunny	Moderate	Mid-Flood	B	9.8	15:29	8.1	8.11	31.92	21.14	3.49	9	113	0.285	W
C1A	20191227	Sunny	Moderate	Mid-Flood	B	9.8	15:29	7.87	8.27	31.84	21.31	3.47	8	114	0.23	W
C1A	20191227	Sunny	Moderate	Mid-Flood	M	5.4	15:30	7.99	8.22	31.37	21.44	3.18	9	114	0.254	W
C1A	20191227	Sunny	Moderate	Mid-Flood	M	5.4	15:30	7.93	8.12	31.91	21.24	3.17	8	113	0.322	W
C1A	20191227	Sunny	Moderate	Mid-Flood	S	1	15:31	8.1	8.11	31.52	21.49	3.01	7	114	0.303	W
C1A	20191227	Sunny	Moderate	Mid-Flood	S	1	15:31	7.86	8.37	31.83	21.25	3.18	8	114	0.173	W
C2A	20191227	Sunny	Moderate	Mid-Flood	B	10.3	15:29	7.96	8.36	31.85	21.1	3.45	11	113	0.297	W
C2A	20191227	Sunny	Moderate	Mid-Flood	B	10.3	15:29	7.96	8.35	31.65	21.11	3.73	11	114	0.222	W
C2A	20191227	Sunny	Moderate	Mid-Flood	M	5.65	15:30	8.28	8.37	31.36	21.33	3.29	10	114	0.247	W
C2A	20191227	Sunny	Moderate	Mid-Flood	M	5.65	15:30	8.16	8.24	31.73	21.45	3.41	11	113	0.17	W
C2A	20191227	Sunny	Moderate	Mid-Flood	S	1	15:31	8.05	8.14	31.9	21.34	3.03	8	114	0.27	W
C2A	20191227	Sunny	Moderate	Mid-Flood	S	1	15:31	7.97	8.08	31.91	21.16	3.02	8	114	0.148	W
CR1	20191227	Sunny	Moderate	Mid-Flood	B	11.3	17:31	7.95	8.26	31.54	21.13	3.72	10	112	0.157	W
CR1	20191227	Sunny	Moderate	Mid-Flood	B	11.3	17:31	8.23	8.15	31.23	21.17	3.72	11	114	0.278	NW
CR1	20191227	Sunny	Moderate	Mid-Flood	M	6.15	17:32	7.99	8.05	31.92	20.95	3.14	9	114	0.271	NW
CR1	20191227	Sunny	Moderate	Mid-Flood	M	6.15	17:32	7.95	8.06	31.21	20.96	3.22	9	114	0.214	NW
CR1	20191227	Sunny	Moderate	Mid-Flood	S	1	17:33	8.25	8.21	31.59	21.12	2.8	6	113	0.174	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
CR1	20191227	Sunny	Moderate	Mid-Flood	S	1	17:33	8.28	8.05	31.47	21.04	2.65	6	114	0.311	W
CR2	20191227	Sunny	Moderate	Mid-Flood	B	10.4	17:12	8.05	8.3	31.43	21.18	3.75	13	113	0.242	W
CR2	20191227	Sunny	Moderate	Mid-Flood	B	10.4	17:12	8.15	8.06	31.22	21.3	3.53	13	114	0.202	W
CR2	20191227	Sunny	Moderate	Mid-Flood	M	5.7	17:13	8.28	8.12	31.21	21.4	2.9	10	113	0.246	W
CR2	20191227	Sunny	Moderate	Mid-Flood	M	5.7	17:13	8.28	8.15	31.64	21.15	3.13	10	113	0.208	W
CR2	20191227	Sunny	Moderate	Mid-Flood	S	1	17:14	8.04	8.18	31.78	21.37	2.74	10	113	0.178	W
CR2	20191227	Sunny	Moderate	Mid-Flood	S	1	17:14	8.09	8.11	31.53	21.21	3.12	11	114	0.214	W
F1A	20191227	Sunny	Moderate	Mid-Flood	B	7.7	16:28	8.02	8.17	31.87	21.16	3.48	12	113	0.187	W
F1A	20191227	Sunny	Moderate	Mid-Flood	B	7.7	16:28	8.3	8.32	31.49	21.1	3.39	13	114	0.277	W
F1A	20191227	Sunny	Moderate	Mid-Flood	M	4.35	16:29	7.94	8.18	31.71	21.27	3.27	11	114	0.156	NW
F1A	20191227	Sunny	Moderate	Mid-Flood	M	4.35	16:29	8.3	8.09	31.32	21.07	3.16	11	114	0.172	W
F1A	20191227	Sunny	Moderate	Mid-Flood	S	1	16:30	8.04	8.38	31.32	21.04	3.04	10	113	0.271	W
F1A	20191227	Sunny	Moderate	Mid-Flood	S	1	16:30	7.92	8.17	31.78	21.24	3.21	11	113	0.238	W
H1	20191227	Sunny	Moderate	Mid-Flood	B	6.9	17:23	8.3	8.32	31.43	21.09	3.6	10	113	0.278	W
H1	20191227	Sunny	Moderate	Mid-Flood	B	6.9	17:23	8.04	8.24	31.71	21.17	3.65	11	113	0.149	W
H1	20191227	Sunny	Moderate	Mid-Flood	M	3.95	17:24	7.94	8.22	31.65	21.26	3.2	10	112	0.174	W
H1	20191227	Sunny	Moderate	Mid-Flood	M	3.95	17:24	7.85	8.16	31.68	21.1	3.09	10	113	0.217	NW
H1	20191227	Sunny	Moderate	Mid-Flood	S	1	17:25	8.09	8.34	31.4	21.08	2.72	9	114	0.176	W
H1	20191227	Sunny	Moderate	Mid-Flood	S	1	17:25	8.09	8.16	31.36	21.17	2.99	10	113	0.204	W
M1	20191227	Sunny	Moderate	Mid-Flood	B	7	15:59	8.31	8.36	31.8	21.31	3.61	7	113	0.322	W
M1	20191227	Sunny	Moderate	Mid-Flood	B	7	15:59	8.28	8.12	31.4	21.27	3.62	7	114	0.267	W
M1	20191227	Sunny	Moderate	Mid-Flood	M	4	16:00	8.23	8.15	31.31	21.35	3.29	10	114	0.268	W
M1	20191227	Sunny	Moderate	Mid-Flood	M	4	16:00	7.88	8.17	31.84	21.1	3.2	9	114	0.167	NW
M1	20191227	Sunny	Moderate	Mid-Flood	S	1	16:01	8.2	8.15	31.74	21.3	2.78	10	114	0.166	NW
M1	20191227	Sunny	Moderate	Mid-Flood	S	1	16:01	8.07	8.31	31.68	21.27	3.13	11	114	0.26	W
S1	20191227	Sunny	Moderate	Mid-Flood	B	4.8	16:06	8.05	8.35	31.9	21.2	3.49	9	114	0.198	NW
S1	20191227	Sunny	Moderate	Mid-Flood	B	4.8	16:06	8.28	8.18	31.95	21.22	3.21	10	113	0.309	NW
S1	20191227	Sunny	Moderate	Mid-Flood	S	1	16:07	7.85	8.26	31.5	21.32	3.03	8	113	0.255	W

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S1	20191227	Sunny	Moderate	Mid-Flood	S	1	16:07	8.17	8.3	31.64	21.13	2.98	8	112	0.185	W
S2A	20191227	Sunny	Moderate	Mid-Flood	B	8.1	16:45	7.86	8.14	31.5	21.29	3.75	9	114	0.219	NW
S2A	20191227	Sunny	Moderate	Mid-Flood	B	8.1	16:45	7.93	8.1	31.54	21.21	3.61	9	113	0.267	W
S2A	20191227	Sunny	Moderate	Mid-Flood	M	4.55	16:46	8.21	8.05	31.83	21.18	3.34	7	113	0.203	W
S2A	20191227	Sunny	Moderate	Mid-Flood	M	4.55	16:46	8.02	8.2	31.48	21.02	3.12	8	114	0.305	W
S2A	20191227	Sunny	Moderate	Mid-Flood	S	1	16:47	7.86	8.16	31.73	21.21	3.03	6	113	0.211	W
S2A	20191227	Sunny	Moderate	Mid-Flood	S	1	16:47	7.98	8.32	31.91	21.24	2.7	7	114	0.278	W
S3	20191227	Sunny	Moderate	Mid-Flood	B	8.4	17:22	8.21	8.26	31.76	21.27	3.61	7	114	0.154	W
S3	20191227	Sunny	Moderate	Mid-Flood	B	8.4	17:22	8	8.14	31.9	21.28	3.61	7	114	0.196	NW
S3	20191227	Sunny	Moderate	Mid-Flood	M	4.7	17:23	8.06	8.38	31.51	21.09	2.94	7	113	0.204	W
S3	20191227	Sunny	Moderate	Mid-Flood	M	4.7	17:23	7.91	8.3	31.21	21.26	3.23	7	113	0.214	W
S3	20191227	Sunny	Moderate	Mid-Flood	S	1	17:24	7.98	8.13	31.41	21.1	2.99	5	113	0.314	W
S3	20191227	Sunny	Moderate	Mid-Flood	S	1	17:24	8.08	8.09	31.88	21.07	3.25	6	114	0.306	W
B1	20191230	Cloudy	Moderate	Mid-Flood	B	3.5	8:47	8.43	8.35	30.17	20.84	3.43	10	115	0.308	W
B1	20191230	Cloudy	Moderate	Mid-Flood	B	3.5	8:47	7.69	8.17	30.44	20.79	3.15	10	115	0.187	W
B1	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:48	8.1	8.08	30.51	20.79	2.35	7	116	0.141	W
B1	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:48	8.63	8.31	30.6	20.63	2.36	8	115	0.271	W
B2	20191230	Cloudy	Moderate	Mid-Flood	B	3.7	9:07	7.71	8.2	30.57	21.05	3.21	9	116	0.139	W
B2	20191230	Cloudy	Moderate	Mid-Flood	B	3.7	9:07	8.4	8.07	30.58	20.76	3.16	8	116	0.168	W
B2	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:08	8.29	8.22	30.33	21	2.59	8	115	0.213	W
B2	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:08	7.88	8.07	30.21	20.99	2.85	8	116	0.319	W
B3	20191230	Cloudy	Moderate	Mid-Flood	B	4.3	9:06	7.55	8.31	30.36	21.14	3.36	7	116	0.164	W
B3	20191230	Cloudy	Moderate	Mid-Flood	B	4.3	9:06	7.87	8.17	30.5	20.79	3.23	6	115	0.219	W
B3	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:07	8.79	8.26	30.65	21	2.7	10	116	0.302	W
B3	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:07	7.65	8.18	30.12	21.09	2.67	10	116	0.164	W
B4	20191230	Cloudy	Moderate	Mid-Flood	B	3.9	9:15	7.91	8.34	30.12	20.86	3.23	5	116	0.263	W
B4	20191230	Cloudy	Moderate	Mid-Flood	B	3.9	9:15	8.76	8.21	30.31	20.75	3.46	6	116	0.188	W
B4	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:16	7.7	8.27	30.58	20.97	2.95	7	116	0.203	W

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B4	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:16	7.75	8.21	30.3	21.13	2.74	6	115	0.217	NW
C1A	20191230	Cloudy	Moderate	Mid-Flood	B	10.7	8:22	7.68	8.34	30.37	20.6	3.02	4	115	0.286	NW
C1A	20191230	Cloudy	Moderate	Mid-Flood	B	10.7	8:22	8.61	8.05	30.53	20.59	3.38	5	115	0.186	W
C1A	20191230	Cloudy	Moderate	Mid-Flood	M	5.85	8:23	8.32	8.19	30.65	20.53	2.85	5	115	0.143	W
C1A	20191230	Cloudy	Moderate	Mid-Flood	M	5.85	8:23	8.11	8.23	30.25	20.76	2.76	4	116	0.223	W
C1A	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:24	7.87	8.08	30.39	20.83	2.91	5	115	0.155	NW
C1A	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:24	7.96	8.36	30.64	20.7	2.89	5	116	0.203	W
C2A	20191230	Cloudy	Moderate	Mid-Flood	B	10.6	8:22	8.07	8.28	30.55	20.73	3.06	6	116	0.322	W
C2A	20191230	Cloudy	Moderate	Mid-Flood	B	10.6	8:22	8.45	8.27	30.23	20.83	3.33	7	115	0.307	W
C2A	20191230	Cloudy	Moderate	Mid-Flood	M	5.8	8:23	8.58	8.08	30.15	20.83	2.56	5	114	0.283	NW
C2A	20191230	Cloudy	Moderate	Mid-Flood	M	5.8	8:23	8	8.28	30.44	20.53	2.69	5	116	0.189	W
C2A	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:24	7.86	8.05	30.41	20.98	2.66	4	115	0.263	W
C2A	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:24	8.34	8.2	30.61	20.76	2.67	5	115	0.204	W
CR1	20191230	Cloudy	Moderate	Mid-Flood	B	11.2	10:23	8.41	8.09	30.27	20.9	2.91	6	115	0.187	W
CR1	20191230	Cloudy	Moderate	Mid-Flood	B	11.2	10:23	8.38	8.35	30.56	20.95	3.17	6	115	0.151	W
CR1	20191230	Cloudy	Moderate	Mid-Flood	M	6.1	10:24	8.23	8.25	30.49	21.2	2.9	6	115	0.139	W
CR1	20191230	Cloudy	Moderate	Mid-Flood	M	6.1	10:24	8.39	8.2	30.42	21.04	2.6	6	116	0.303	W
CR1	20191230	Cloudy	Moderate	Mid-Flood	S	1	10:25	8.11	8.13	30.58	20.82	2.77	5	116	0.148	W
CR1	20191230	Cloudy	Moderate	Mid-Flood	S	1	10:25	7.74	8.06	30.53	21.06	2.38	5	116	0.292	W
CR2	20191230	Cloudy	Moderate	Mid-Flood	B	10.6	9:53	8.54	8.38	30.41	21.13	3.16	4	115	0.238	W
CR2	20191230	Cloudy	Moderate	Mid-Flood	B	10.6	9:53	8.06	8.35	30.17	20.91	3.4	6	115	0.175	W
CR2	20191230	Cloudy	Moderate	Mid-Flood	M	5.8	9:54	7.87	8.32	30.37	21.03	2.81	5	115	0.202	W
CR2	20191230	Cloudy	Moderate	Mid-Flood	M	5.8	9:54	8.05	8.21	30.11	20.96	2.95	6	115	0.292	W
CR2	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:55	8.24	8.18	30.36	20.77	2.55	5	115	0.197	W
CR2	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:55	7.72	8.34	30.3	21	2.51	5	116	0.3	W
F1A	20191230	Cloudy	Moderate	Mid-Flood	B	7.8	9:43	8.59	8.06	30.35	20.96	3.15	3	115	0.192	W
F1A	20191230	Cloudy	Moderate	Mid-Flood	B	7.8	9:43	7.57	8.26	30.27	20.99	3.46	4	115	0.2	NW
F1A	20191230	Cloudy	Moderate	Mid-Flood	M	4.4	9:44	8.25	8.27	30.41	21.17	2.81	4	115	0.27	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
F1A	20191230	Cloudy	Moderate	Mid-Flood	M	4.4	9:44	8.32	8.25	30.39	20.83	2.63	3	116	0.252	W
F1A	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:45	8.4	8.28	30.39	20.8	2.56	5	115	0.174	NW
F1A	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:45	8.38	8.31	30.29	21.12	2.58	5	115	0.175	NW
H1	20191230	Cloudy	Moderate	Mid-Flood	B	7.5	8:46	8.78	8.26	30.15	20.82	3.36	4	115	0.256	W
H1	20191230	Cloudy	Moderate	Mid-Flood	B	7.5	8:46	8.26	8.15	30.5	20.6	3.43	4	116	0.186	W
H1	20191230	Cloudy	Moderate	Mid-Flood	M	4.25	8:47	8.74	8.14	30.52	20.67	3.1	5	116	0.222	W
H1	20191230	Cloudy	Moderate	Mid-Flood	M	4.25	8:47	8.69	8.38	30.62	20.65	2.76	4	115	0.262	W
H1	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:48	8.73	8.23	30.42	20.65	2.61	7	115	0.285	W
H1	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:48	7.63	8.36	30.31	20.86	2.48	8	115	0.139	W
M1	20191230	Cloudy	Moderate	Mid-Flood	B	7.7	10:13	7.75	8.08	30.59	21.03	2.96	8	116	0.233	NW
M1	20191230	Cloudy	Moderate	Mid-Flood	B	7.7	10:13	7.79	8.14	30.34	20.89	3.29	8	116	0.26	W
M1	20191230	Cloudy	Moderate	Mid-Flood	M	4.35	10:14	7.67	8.27	30.4	20.91	2.62	8	115	0.164	W
M1	20191230	Cloudy	Moderate	Mid-Flood	M	4.35	10:14	8.4	8.29	30.4	21.23	2.79	7	115	0.315	W
M1	20191230	Cloudy	Moderate	Mid-Flood	S	1	10:15	7.55	8.3	30.46	20.95	2.51	6	114	0.275	W
M1	20191230	Cloudy	Moderate	Mid-Flood	S	1	10:15	8.28	8.35	30.58	21.09	2.7	6	115	0.255	W
S1	20191230	Cloudy	Moderate	Mid-Flood	B	4.4	8:56	8.06	8.22	30.36	20.76	3.3	8	116	0.313	W
S1	20191230	Cloudy	Moderate	Mid-Flood	B	4.4	8:56	7.86	8.16	30.43	20.75	2.91	8	115	0.159	W
S1	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:57	8.57	8.27	30.19	21.03	2.74	4	115	0.218	NW
S1	20191230	Cloudy	Moderate	Mid-Flood	S	1	8:57	7.9	8.27	30.62	20.95	2.52	5	115	0.214	W
S2A	20191230	Cloudy	Moderate	Mid-Flood	B	8.6	9:29	8.09	8.2	30.27	20.9	2.96	7	115	0.244	W
S2A	20191230	Cloudy	Moderate	Mid-Flood	B	8.6	9:29	7.91	8.26	30.12	20.79	3.01	6	115	0.166	W
S2A	20191230	Cloudy	Moderate	Mid-Flood	M	4.8	9:30	7.73	8.19	30.63	21.28	2.66	7	114	0.275	W
S2A	20191230	Cloudy	Moderate	Mid-Flood	M	4.8	9:30	7.7	8.25	30.58	20.82	2.72	6	115	0.225	NW
S2A	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:31	8.44	8.15	30.52	20.79	2.61	5	115	0.26	W
S2A	20191230	Cloudy	Moderate	Mid-Flood	S	1	9:31	8.06	8.21	30.13	20.82	2.49	4	116	0.201	W
S3	20191230	Cloudy	Moderate	Mid-Flood	B	8.6	10:07	8.65	8.29	30.23	20.91	3.49	6	115	0.144	NW
S3	20191230	Cloudy	Moderate	Mid-Flood	B	8.6	10:07	7.67	8.32	30.64	21.24	3.49	5	115	0.21	W
S3	20191230	Cloudy	Moderate	Mid-Flood	M	4.8	10:08	8.74	8.32	30.43	20.94	2.78	5	115	0.18	W

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
S3	20191230	Cloudy	Moderate	Mid-Flood	M	4.8	10:08	8.27	8.32	30.28	21.12	2.95	6	115	0.227	W
S3	20191230	Cloudy	Moderate	Mid-Flood	S	1	10:09	8.25	8.37	30.53	21.13	2.65	5	116	0.221	W
S3	20191230	Cloudy	Moderate	Mid-Flood	S	1	10:09	8.73	8.14	30.58	20.81	2.44	5	114	0.209	W
B1	20191230	Cloudy	Moderate	Mid-Ebb	B	3.9	14:43	8.09	8.06	30.51	21.35	2.91	4	115	0.226	SE
B1	20191230	Cloudy	Moderate	Mid-Ebb	B	3.9	14:43	7.67	8.34	30.16	21.49	3.28	4	115	0.158	E
B1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:44	8.45	8	30.68	21.75	2.89	4	115	0.135	E
B1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:44	7.34	8.34	30.36	21.23	2.71	4	115	0.187	SE
B2	20191230	Cloudy	Moderate	Mid-Ebb	B	4.9	15:06	8.45	8.1	30.33	21.58	3.11	4	115	0.26	E
B2	20191230	Cloudy	Moderate	Mid-Ebb	B	4.9	15:06	7.64	8.24	30.29	21.81	3.19	4	115	0.197	E
B2	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:07	8.22	8.07	30.9	21.51	2.61	3	116	0.257	E
B2	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:07	8.3	8.33	30.42	21.7	2.58	4	115	0.23	E
B3	20191230	Cloudy	Moderate	Mid-Ebb	B	4.1	15:45	7.84	8.06	30.13	21.18	3.28	4	114	0.181	E
B3	20191230	Cloudy	Moderate	Mid-Ebb	B	4.1	15:45	7.66	8.17	30.58	21.28	3.36	6	115	0.213	SE
B3	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:46	8.46	8.09	30.76	21.33	2.79	5	116	0.211	SE
B3	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:46	7.84	8.05	30.45	21.18	2.4	4	116	0.257	SE
B4	20191230	Cloudy	Moderate	Mid-Ebb	B	3.4	15:36	7.4	8.05	30.41	21.47	3.29	4	115	0.222	SE
B4	20191230	Cloudy	Moderate	Mid-Ebb	B	3.4	15:36	7.61	8.31	30.86	21.38	3.23	4	116	0.253	E
B4	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:37	8.24	8.16	30.76	21.43	2.78	5	115	0.24	E
B4	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:37	8.03	8.01	30.28	21.63	2.36	5	116	0.249	E
C1A	20191230	Cloudy	Moderate	Mid-Ebb	B	8.8	14:20	8.19	8.19	30.28	21.38	2.94	7	116	0.163	SE
C1A	20191230	Cloudy	Moderate	Mid-Ebb	B	8.8	14:20	7.95	8.03	30.7	21.69	2.9	7	115	0.272	SE
C1A	20191230	Cloudy	Moderate	Mid-Ebb	M	4.9	14:21	8.09	8.22	30.19	21.6	2.36	6	116	0.229	SE
C1A	20191230	Cloudy	Moderate	Mid-Ebb	M	4.9	14:21	7.78	8.07	30.61	21.77	2.64	5	115	0.212	SE
C1A	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:22	7.39	8.16	30.6	21.41	2.42	5	115	0.229	SE
C1A	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:22	8.23	8.06	30.74	21.27	2.4	6	116	0.258	SE
C2A	20191230	Cloudy	Moderate	Mid-Ebb	B	11.3	16:27	8.28	8.25	30.3	21.16	2.94	6	116	0.226	E
C2A	20191230	Cloudy	Moderate	Mid-Ebb	B	11.3	16:27	7.42	8.29	30.78	21.02	2.94	6	115	0.151	E
C2A	20191230	Cloudy	Moderate	Mid-Ebb	M	6.15	16:28	7.92	8.26	30.4	20.92	2.72	5	115	0.231	SE

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
C2A	20191230	Cloudy	Moderate	Mid-Ebb	M	6.15	16:28	7.78	8.22	30.59	21.14	2.65	5	115	0.279	SE
C2A	20191230	Cloudy	Moderate	Mid-Ebb	S	1	16:29	7.38	8.16	30.39	20.94	2.52	4	115	0.196	SE
C2A	20191230	Cloudy	Moderate	Mid-Ebb	S	1	16:29	7.72	8.1	30.21	21.23	2.71	5	115	0.256	E
CR1	20191230	Cloudy	Moderate	Mid-Ebb	B	12.7	16:22	8.08	7.99	30.58	20.94	3.35	4	116	0.162	SE
CR1	20191230	Cloudy	Moderate	Mid-Ebb	B	12.7	16:22	7.36	8.15	30.25	21.1	3.25	5	116	0.144	E
CR1	20191230	Cloudy	Moderate	Mid-Ebb	M	6.85	16:23	7.87	7.99	30.2	21.04	2.57	7	114	0.277	E
CR1	20191230	Cloudy	Moderate	Mid-Ebb	M	6.85	16:23	8.24	8.2	30.79	21.18	2.73	6	116	0.277	SE
CR1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	16:24	8.21	8.3	30.46	20.97	2.31	6	115	0.146	SE
CR1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	16:24	7.66	8.06	30.67	21.03	2.42	7	115	0.151	E
CR2	20191230	Cloudy	Moderate	Mid-Ebb	B	10.7	15:53	7.73	8.07	30.9	21.65	2.92	6	115	0.193	E
CR2	20191230	Cloudy	Moderate	Mid-Ebb	B	10.7	15:53	7.4	8.25	30.17	21.63	3.24	6	115	0.176	E
CR2	20191230	Cloudy	Moderate	Mid-Ebb	M	5.85	15:54	7.6	8.11	30.42	21.11	2.71	6	116	0.245	SE
CR2	20191230	Cloudy	Moderate	Mid-Ebb	M	5.85	15:54	8.36	8.2	30.6	21.38	2.77	5	115	0.144	E
CR2	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:55	7.89	8.06	30.13	21.65	2.53	7	116	0.148	SE
CR2	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:55	7.78	8.26	30.34	21.28	2.7	7	116	0.197	SE
F1A	20191230	Cloudy	Moderate	Mid-Ebb	B	7.3	14:57	7.89	8.08	30.4	21.61	2.88	8	116	0.159	SE
F1A	20191230	Cloudy	Moderate	Mid-Ebb	B	7.3	14:57	8.14	8.28	30.32	21.51	3.16	8	115	0.24	SE
F1A	20191230	Cloudy	Moderate	Mid-Ebb	M	4.15	14:58	7.93	8.22	30.82	21.51	2.59	7	116	0.173	SE
F1A	20191230	Cloudy	Moderate	Mid-Ebb	M	4.15	14:58	7.81	8.26	30.67	21.75	2.6	7	116	0.256	SE
F1A	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:59	7.92	8.2	30.77	21.11	2.7	5	116	0.212	SE
F1A	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:59	8.49	8.15	30.9	21.39	2.72	6	115	0.182	SE
H1	20191230	Cloudy	Moderate	Mid-Ebb	B	7.2	16:03	7.59	8.28	30.28	21.41	3.13	5	115	0.16	SE
H1	20191230	Cloudy	Moderate	Mid-Ebb	B	7.2	16:03	8.18	8.28	30.28	21.38	2.93	6	115	0.201	E
H1	20191230	Cloudy	Moderate	Mid-Ebb	M	4.1	16:04	7.74	8.04	30.77	21.22	2.87	6	116	0.157	SE
H1	20191230	Cloudy	Moderate	Mid-Ebb	M	4.1	16:04	8.25	8.03	30.6	21.55	2.84	7	116	0.278	SE
H1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	16:05	7.95	8.28	30.4	21.54	2.5	6	116	0.14	SE
H1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	16:05	7.5	8.11	30.46	21.18	2.49	7	115	0.227	SE
M1	20191230	Cloudy	Moderate	Mid-Ebb	B	8.3	14:24	7.87	8.05	30.26	21.27	3.15	7	115	0.205	E

Location	Date (YYYYMMDD)	Weather	Sea Condition	Tidal	Water Level note 1	Depth (m)	Time (hh:mm)	DO (mg/L)	pH	Sal (ppt)	Temp (°C)	Turbidty (NTU) note 2	SS (mg/L)	Total Alkalinity (mg/L)	Current Velocity (m/s)	Direction in NESW
M1	20191230	Cloudy	Moderate	Mid-Ebb	B	8.3	14:24	7.63	8.27	30.87	21.12	3.43	7	116	0.228	E
M1	20191230	Cloudy	Moderate	Mid-Ebb	M	4.65	14:25	7.41	8.1	30.4	21.05	2.52	6	116	0.24	SE
M1	20191230	Cloudy	Moderate	Mid-Ebb	M	4.65	14:25	8.4	8.13	30.68	21.74	2.67	7	115	0.214	E
M1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:26	8.48	8.16	30.89	21.27	2.47	4	116	0.143	E
M1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:26	7.92	8.32	30.24	21.42	2.73	5	116	0.151	E
S1	20191230	Cloudy	Moderate	Mid-Ebb	B	4.5	14:55	7.35	8.27	30.51	21.66	2.97	8	116	0.136	E
S1	20191230	Cloudy	Moderate	Mid-Ebb	B	4.5	14:55	8.43	8.2	30.17	21.71	3.45	9	116	0.171	SE
S1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:56	8.07	8.07	30.6	21.13	2.75	7	116	0.24	E
S1	20191230	Cloudy	Moderate	Mid-Ebb	S	1	14:56	8.32	8.3	30.46	21.64	2.52	6	115	0.195	SE
S2A	20191230	Cloudy	Moderate	Mid-Ebb	B	8.6	15:28	7.64	8.3	30.89	21.22	3.08	8	115	0.186	SE
S2A	20191230	Cloudy	Moderate	Mid-Ebb	B	8.6	15:28	7.85	8.21	30.49	21.59	3.36	8	116	0.182	SE
S2A	20191230	Cloudy	Moderate	Mid-Ebb	M	4.8	15:29	7.83	7.99	30.28	21.88	2.83	5	116	0.214	SE
S2A	20191230	Cloudy	Moderate	Mid-Ebb	M	4.8	15:29	7.77	8.26	30.28	21.21	2.36	5	115	0.202	SE
S2A	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:30	7.96	8.18	30.59	21.79	2.68	5	116	0.133	E
S2A	20191230	Cloudy	Moderate	Mid-Ebb	S	1	15:30	7.43	8.15	30.43	21.35	2.75	5	115	0.221	SE
S3	20191230	Cloudy	Moderate	Mid-Ebb	B	8.9	16:05	8.18	8.25	30.39	21.39	3.05	6	116	0.211	SE
S3	20191230	Cloudy	Moderate	Mid-Ebb	B	8.9	16:05	7.46	8.18	30.68	21.05	3.15	7	116	0.136	E
S3	20191230	Cloudy	Moderate	Mid-Ebb	M	4.95	16:06	7.81	8.12	30.34	21.3	2.79	7	115	0.238	SE
S3	20191230	Cloudy	Moderate	Mid-Ebb	M	4.95	16:06	7.33	8.07	30.1	21.06	2.64	6	115	0.144	E
S3	20191230	Cloudy	Moderate	Mid-Ebb	S	1	16:07	8.2	8.02	30.83	21.22	2.63	7	115	0.282	E
S3	20191230	Cloudy	Moderate	Mid-Ebb	S	1	16:07	8.38	8.18	30.85	21.3	2.46	7	116	0.276	E

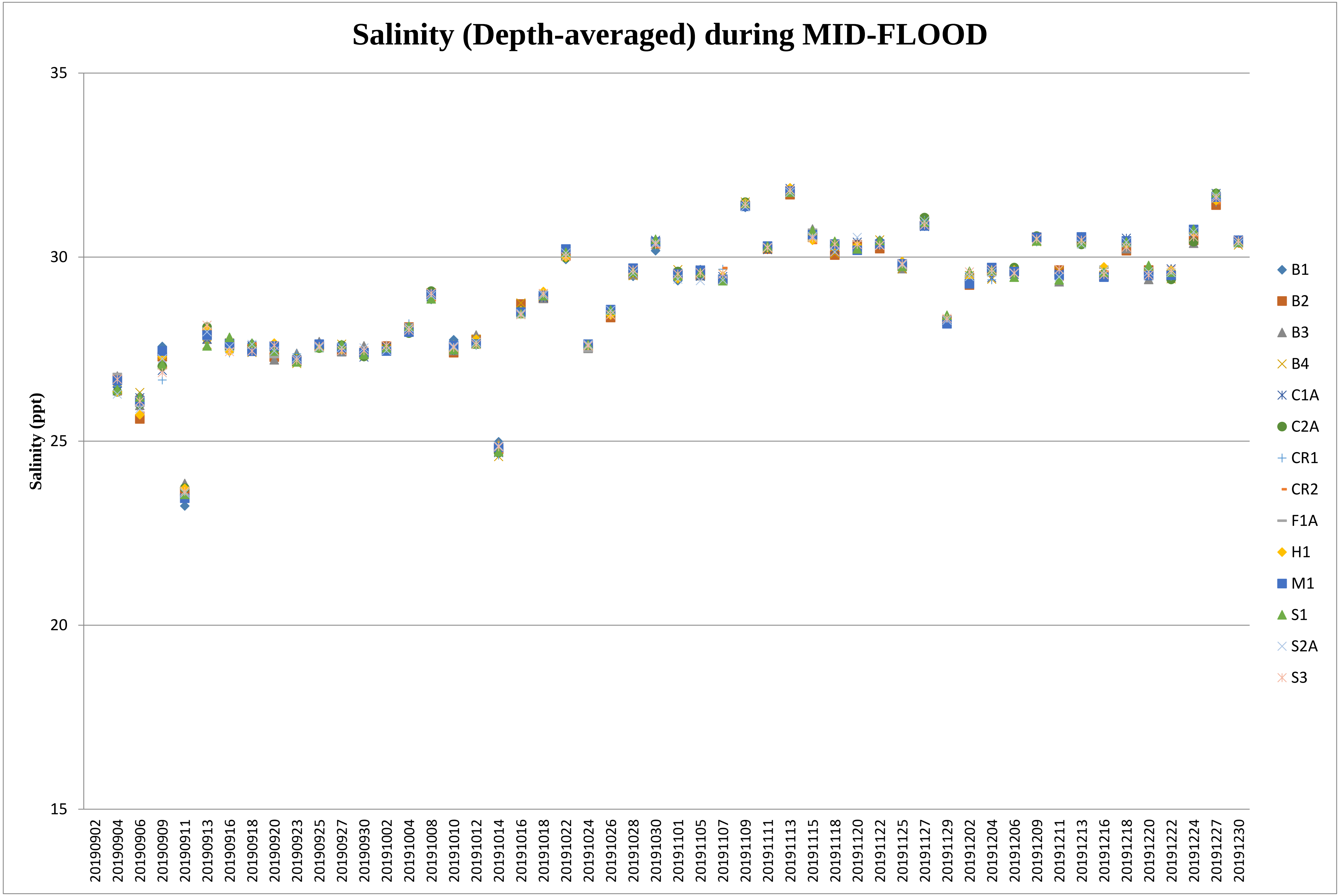
Remarks:

Note 1: S - Surface M - Middle B - Bottom

Note 2: Measurements of turbidity would be rounding to 0.1 NTU for proven accuracy as per the equipment specs during utilization of data.

Note 3: No experimental result due to container's leakage.

Note 4: Due to short monitoring frame, the sampling time is out of monitoring schedule and tidal period. The data would be presented for reference only.



Salinity (Depth-averaged) during MID-FLOOD
35
30
25
20
15
Salinity (ppt)
20190902
20190904
20190906
20190909
20190911
20190913
20190916
20190918
20190920
20190923
20190925
20190927
20190930
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20191004
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20191202
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20191213
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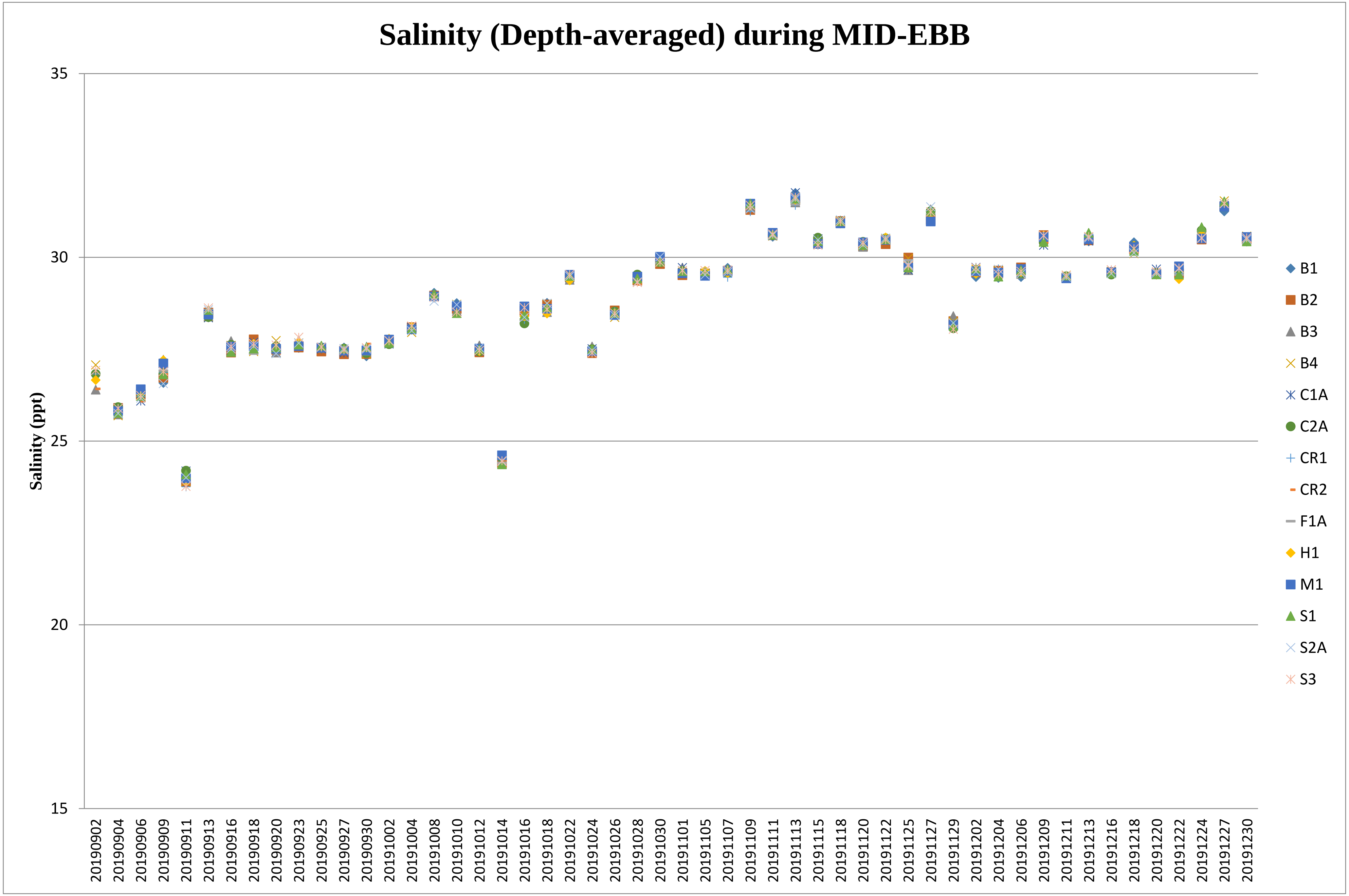
20191218
20191220
20191222
20191224
20191227
20191230
B1
B2
B3
B4
C1A
C2A
CR1
CR2
F1A
H1
M1
S1
S2A
S3


Salinity (Depth-averaged) during MID-EBB
Salinity (ppt)
35
30
25
20
15
20190902
20190904
20190906
20190909
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20190913
20190916
20190918
20190920
20190923
20190925
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20191127
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20191202
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20191216
20191218
20191220
20191222
20191224
20191227
20191230
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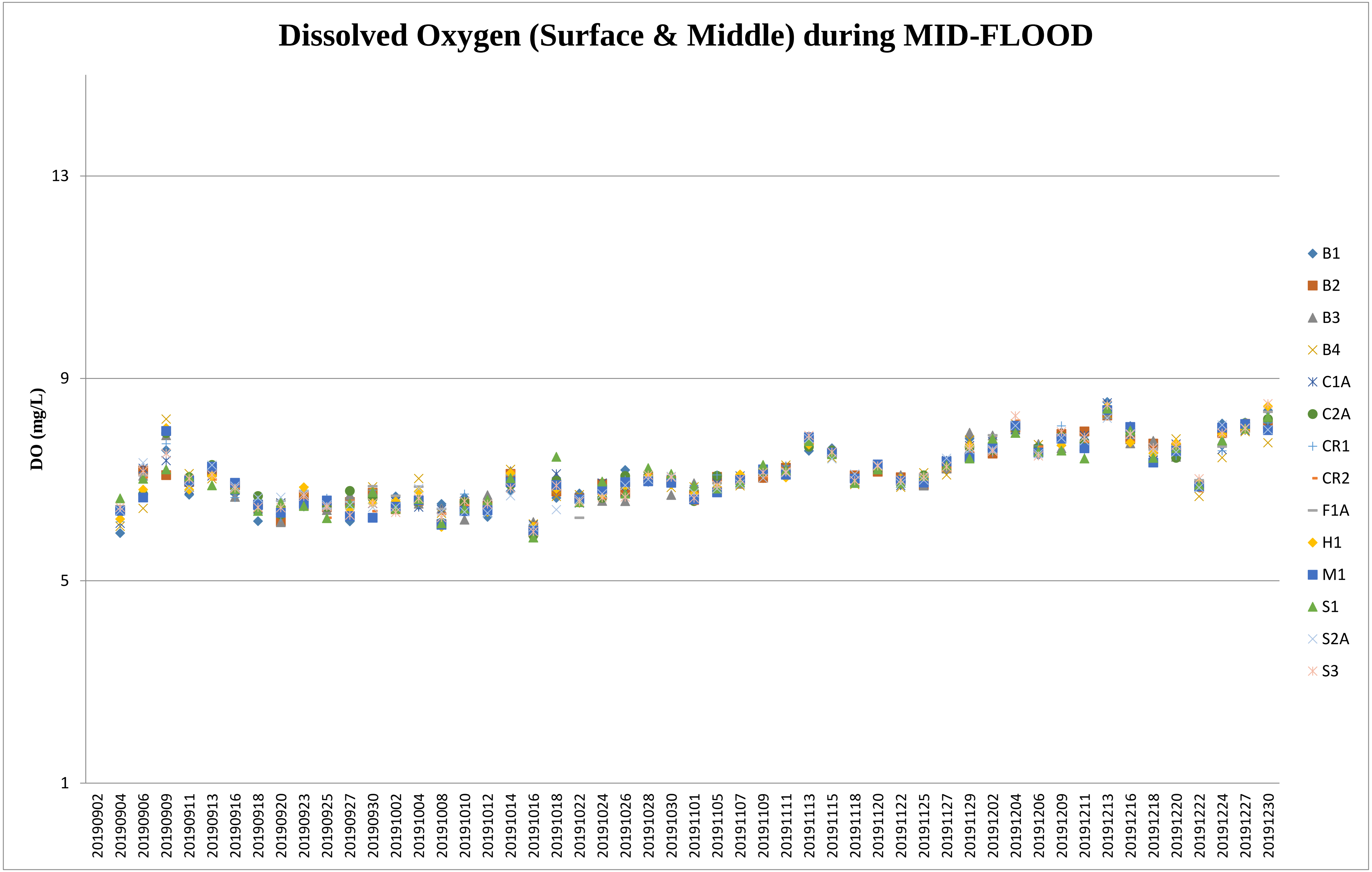
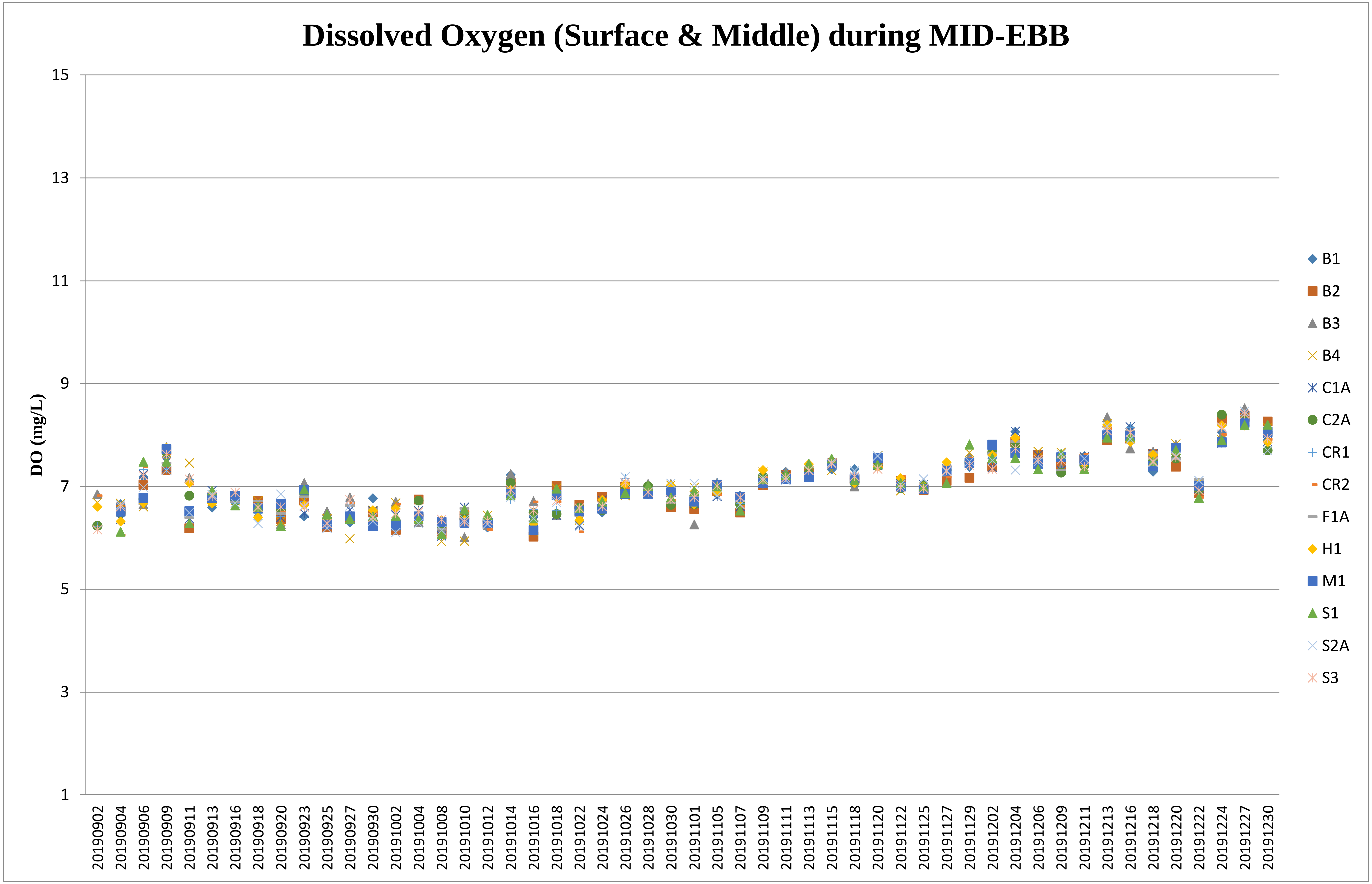
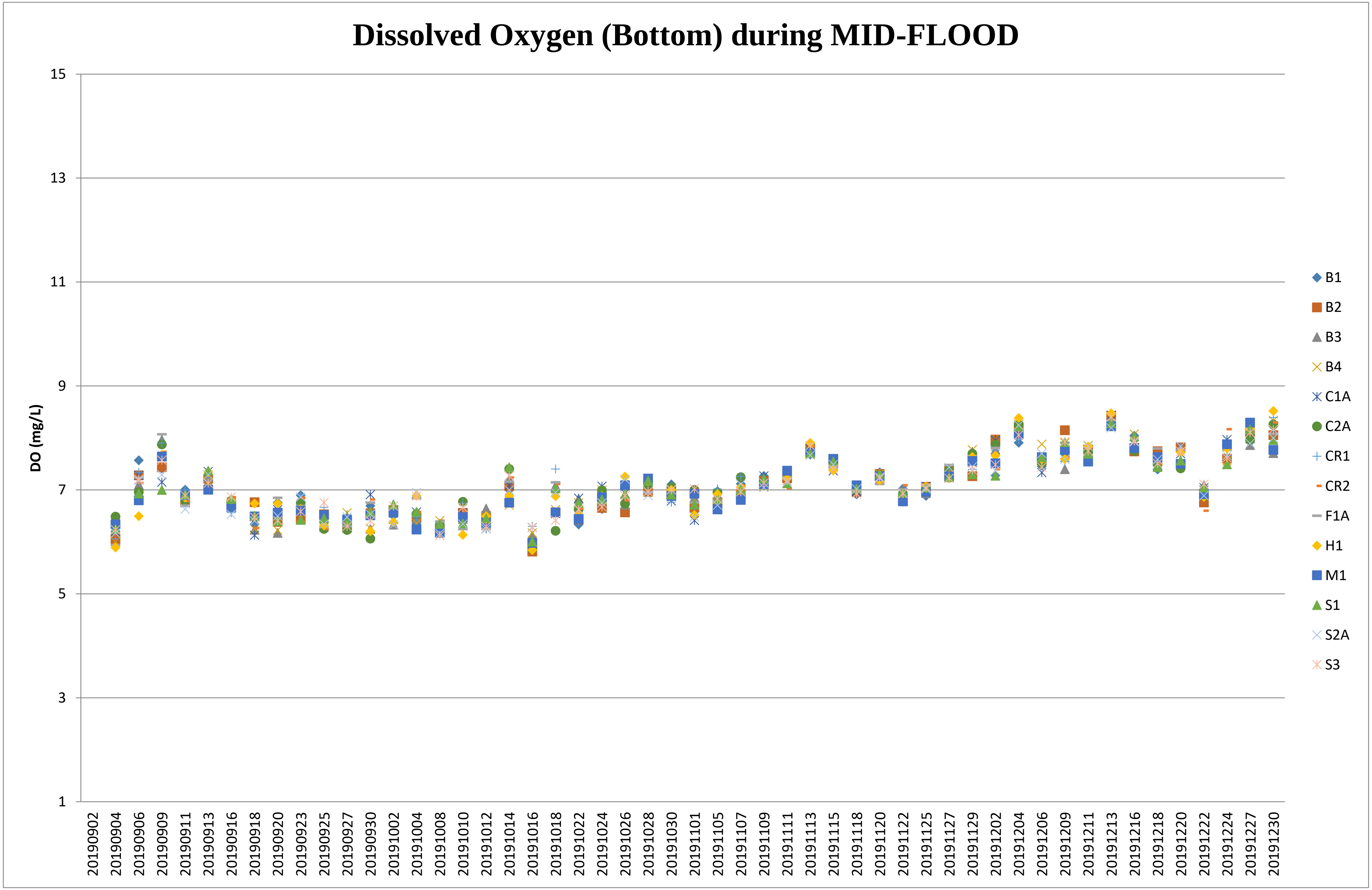
B2
B3
B4
C1A
C2A
CR1
CR2
F1A
H1
M1
S1
S2A
S3



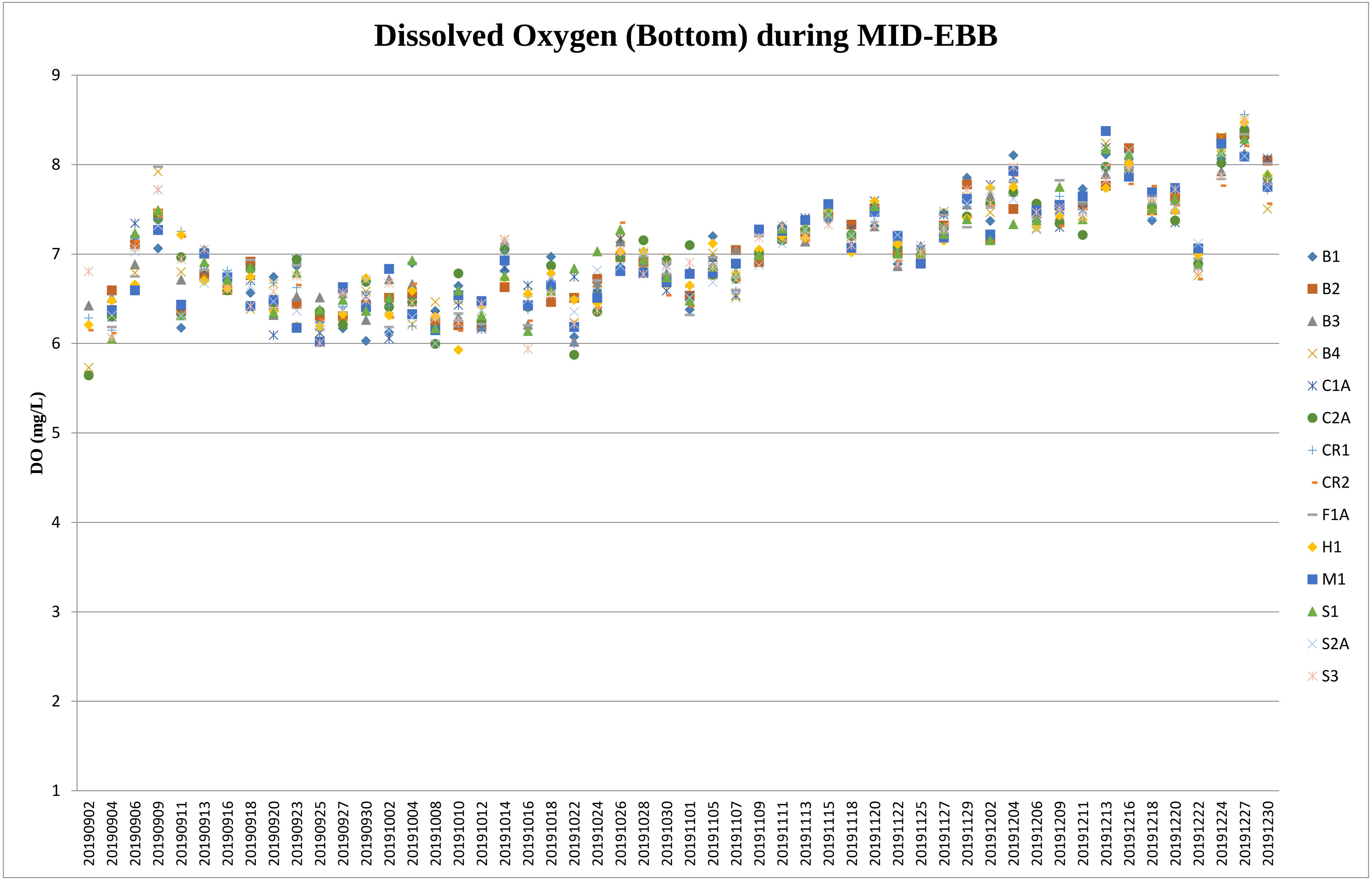
Note: The Action and Limit Level of dissolved oxygen can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.



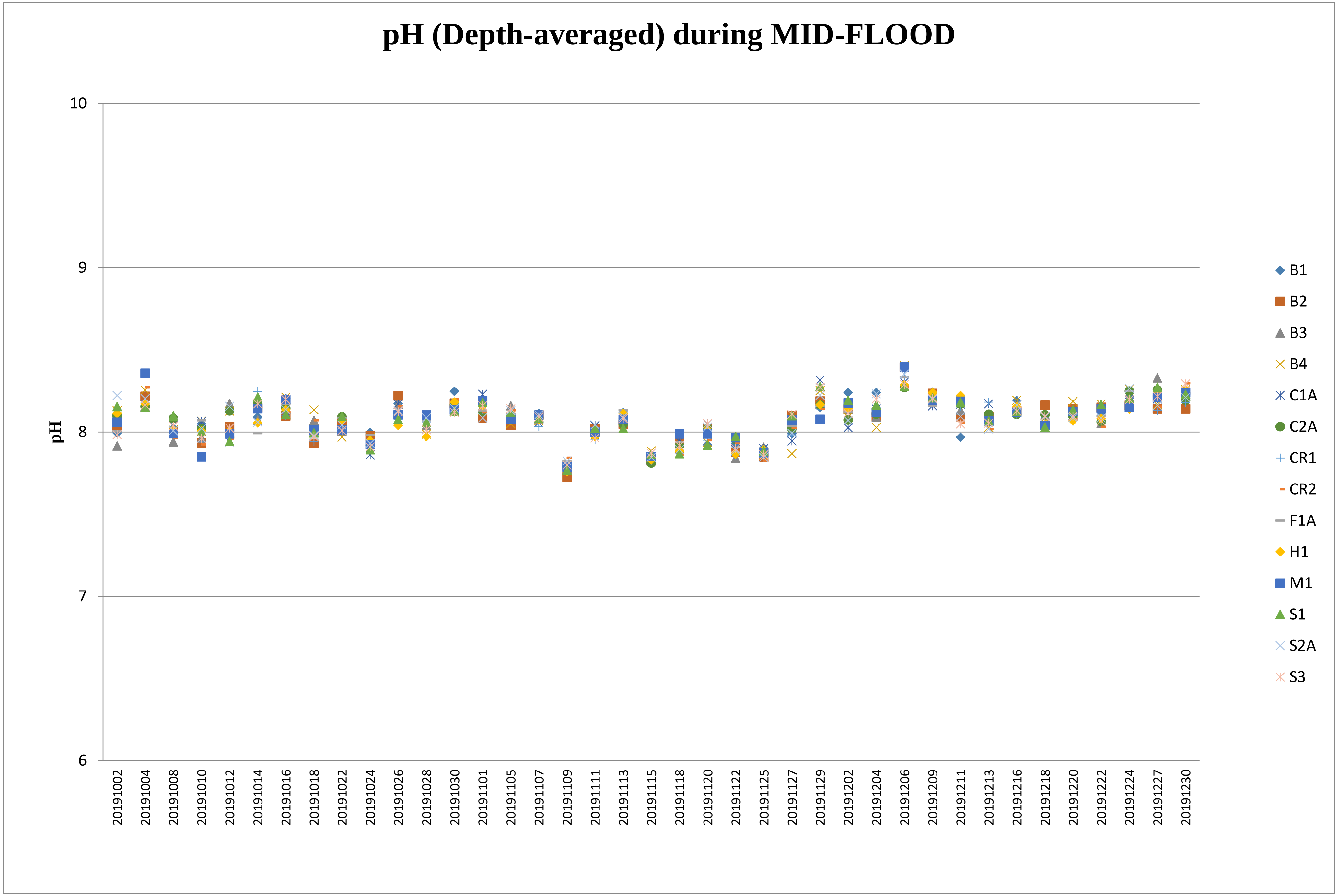
Note: The Action and Limit Level of dissolved oxygen can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.

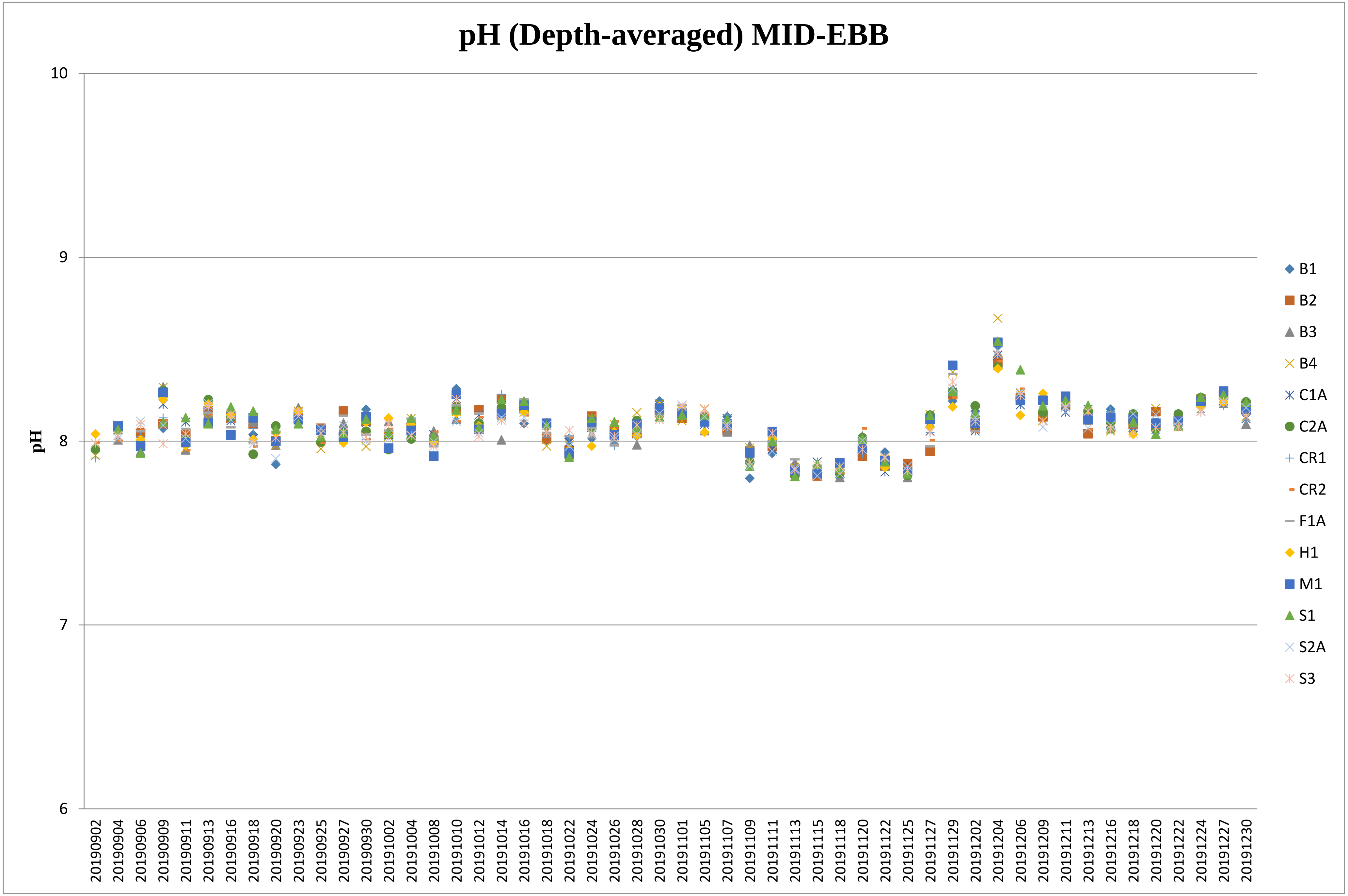


Note: The Action and Limit Level of dissolved oxygen can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.

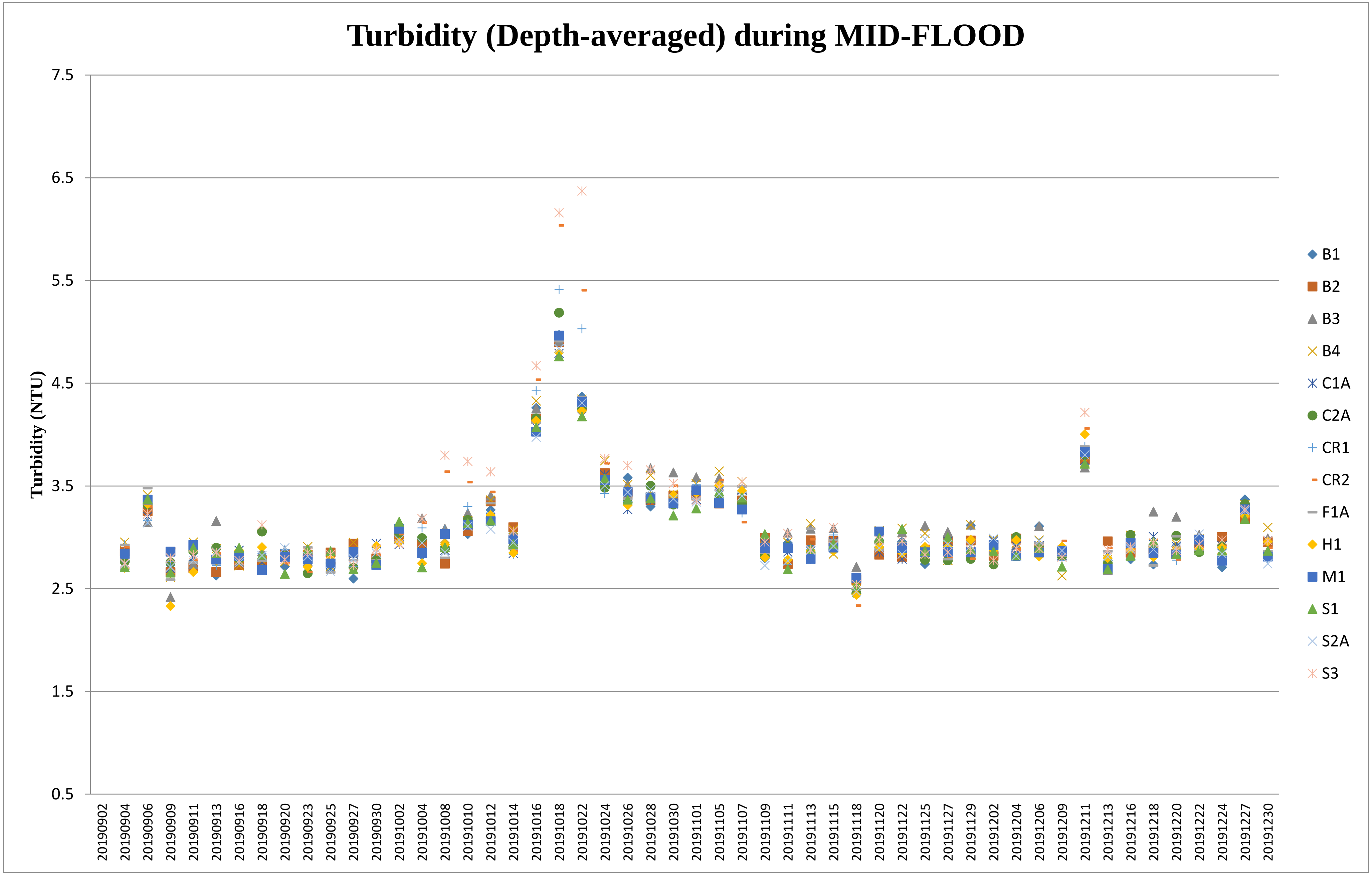


Note: The Action and Limit Level of dissolved oxygen can be referred to **Table 2.7** & **2.8** of the monthly EM&A report.

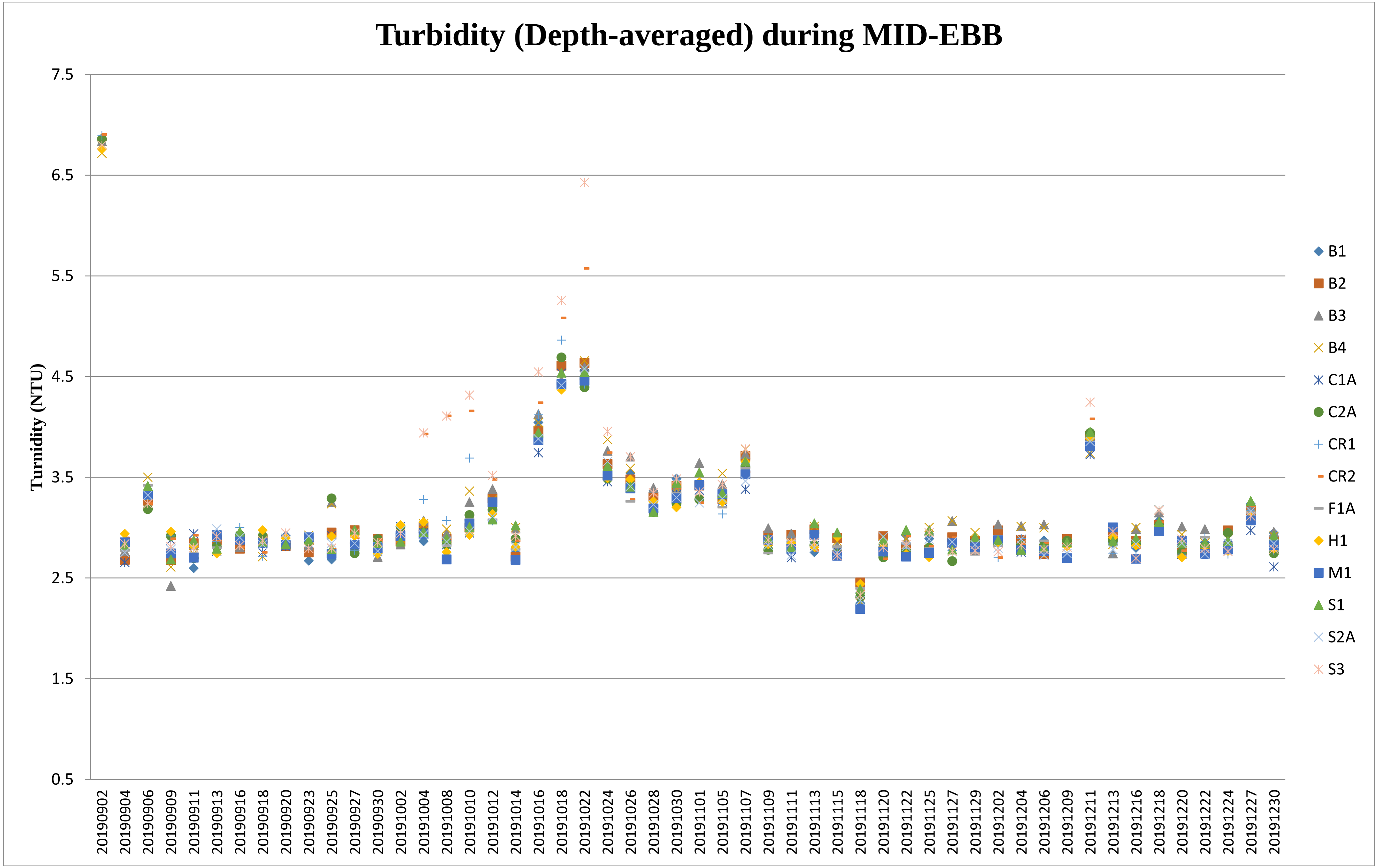

pH (Depth-averaged) during MID-FLOOD
pH
10
9
8
7
6
20191002
20191004
20191008
20191010
20191012
20191014
20191016
20191018
20191022
20191024
20191026
20191028
20191030
20191101
20191105
20191107
20191109
20191111
20191113
20191115
20191118
20191120
20191122
20191125
20191127
20191129
20191202
20191204
20191206
20191209
20191211
20191213
20191216
20191218
20191220
20191222
20191224
20191227
20191230
B1
B2
B3
B4
C1A
C2A
CR1
CR2
F1A
H1
M1
S1
S2A
S3



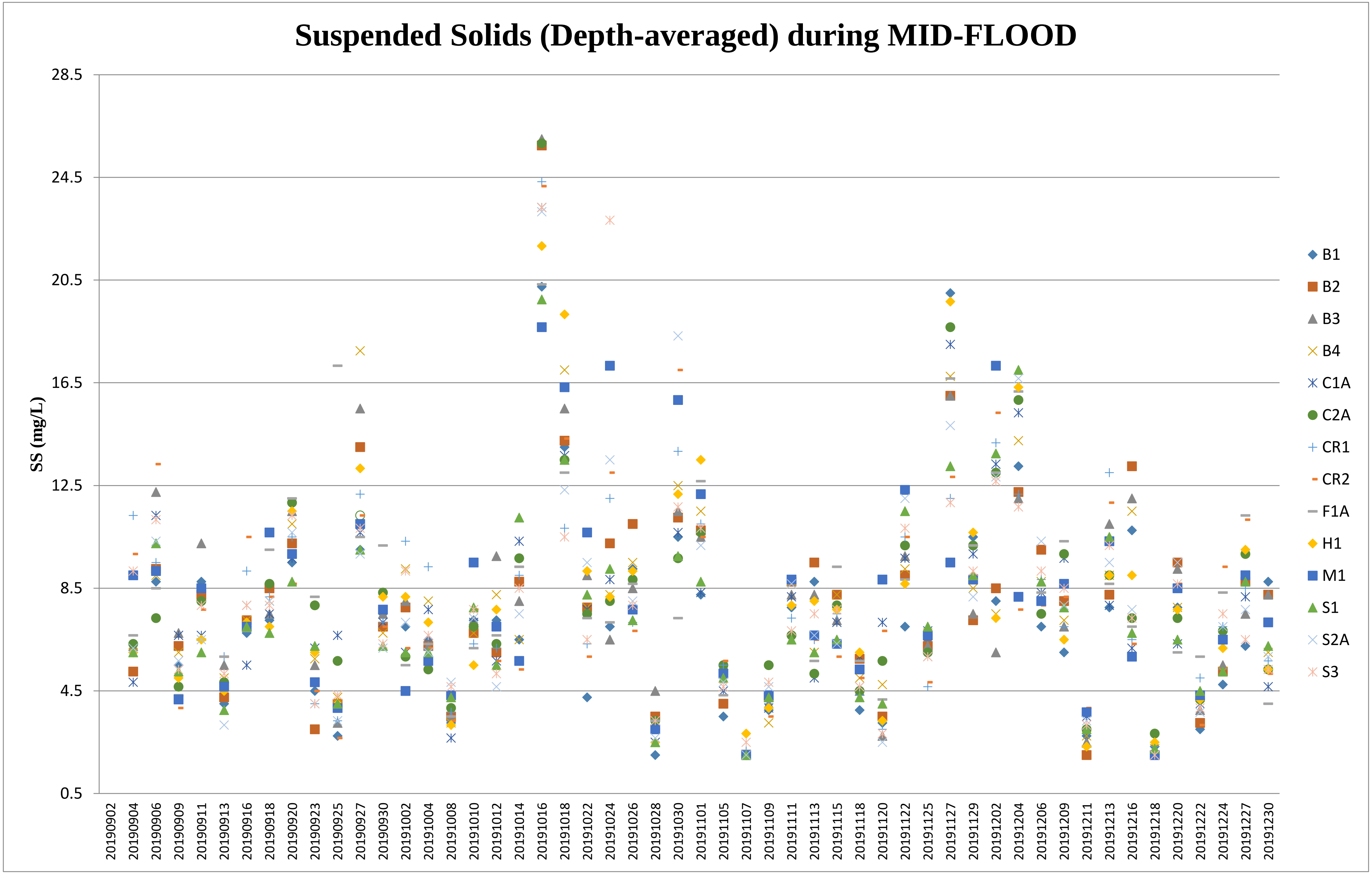
pH (Depth-averaged) MID-EBB
pH
10
9
8
7
6
20190902
20190904
20190906
20190909
20190911
20190913
20190916
20190918
20190920
20190923
20190925
20190927
20190930
20191002
20191004
20191008
20191010
20191012
20191014
20191016
20191018
20191022
20191024
20191026
20191028
20191030
20191101
20191105
20191107
20191109
20191111
20191113
20191115
20191118
20191120
20191122
20191125
20191127
20191129
20191202
20191204
20191206
20191209
20191211
20191213
20191216
20191218
20191220
20191222
20191224
20191227
20191230
B1
B2
B3
B4
C1A
C2A
CR1
CR2
F1A
H1
M1
S1
S2A
S3



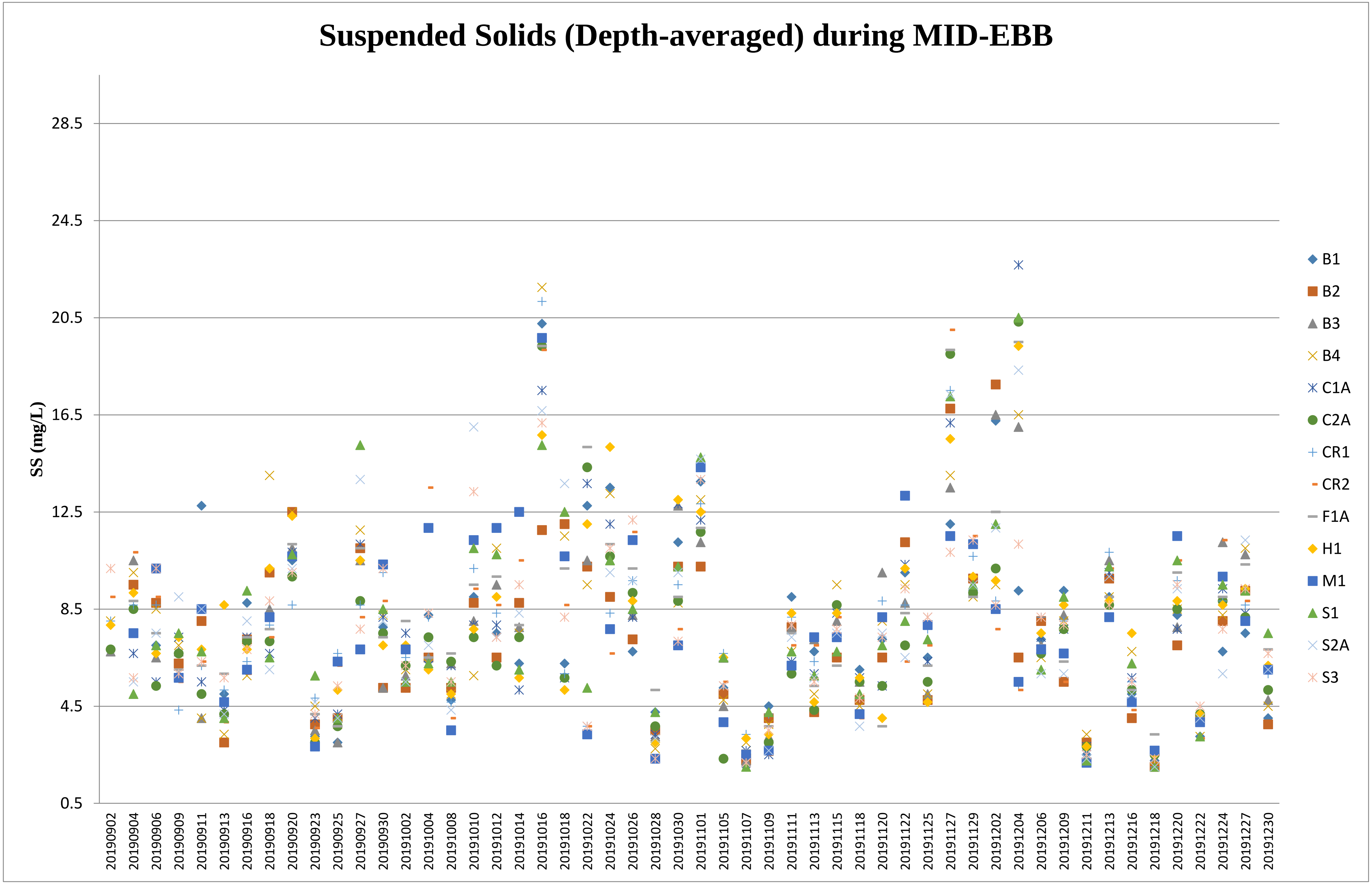
Note: The Action and Limit Level of turbidity can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.



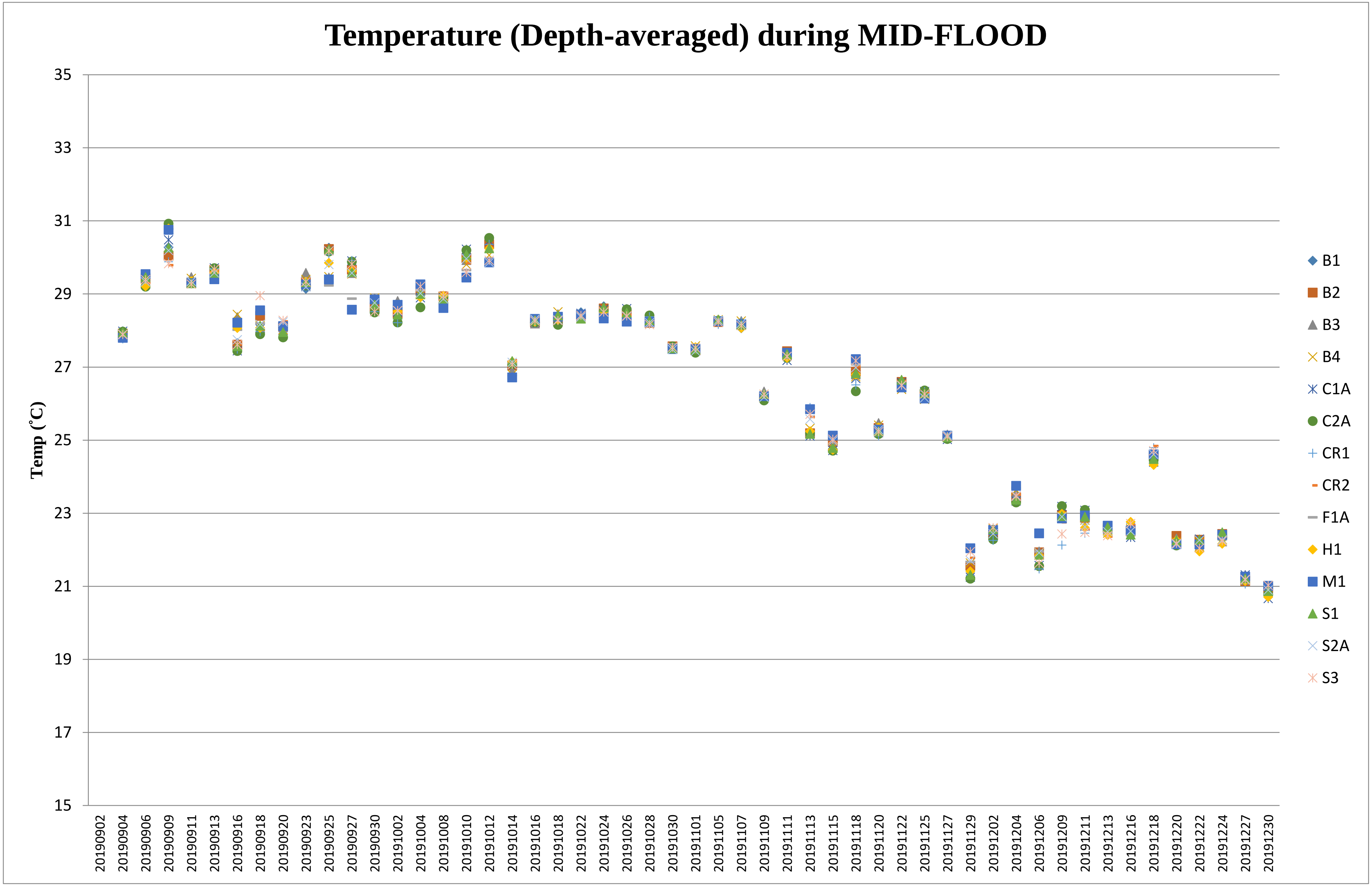
Note: The Action and Limit Level of turbidity can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.



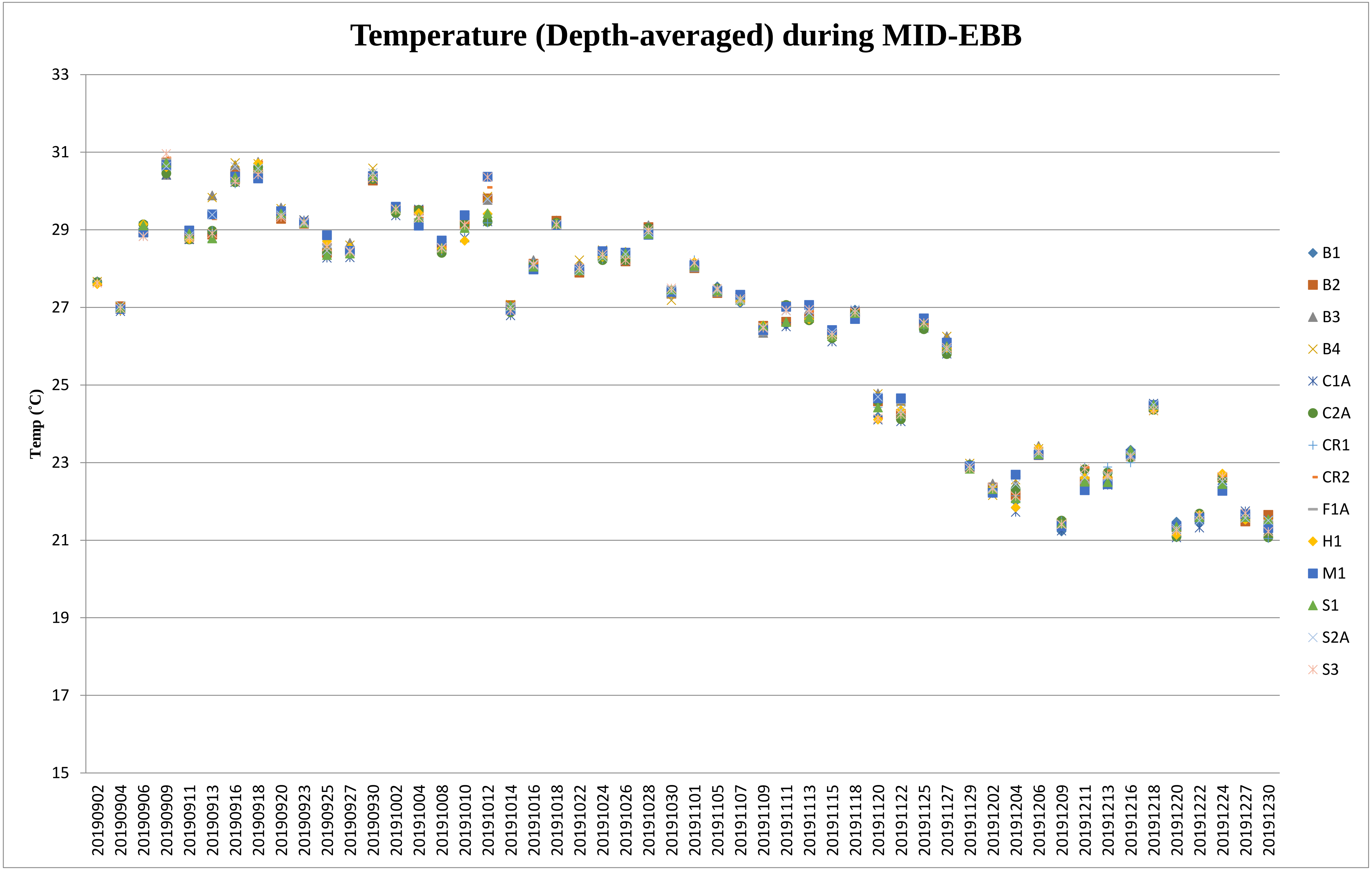
Note: The Action and Limit Level of suspended solids can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.



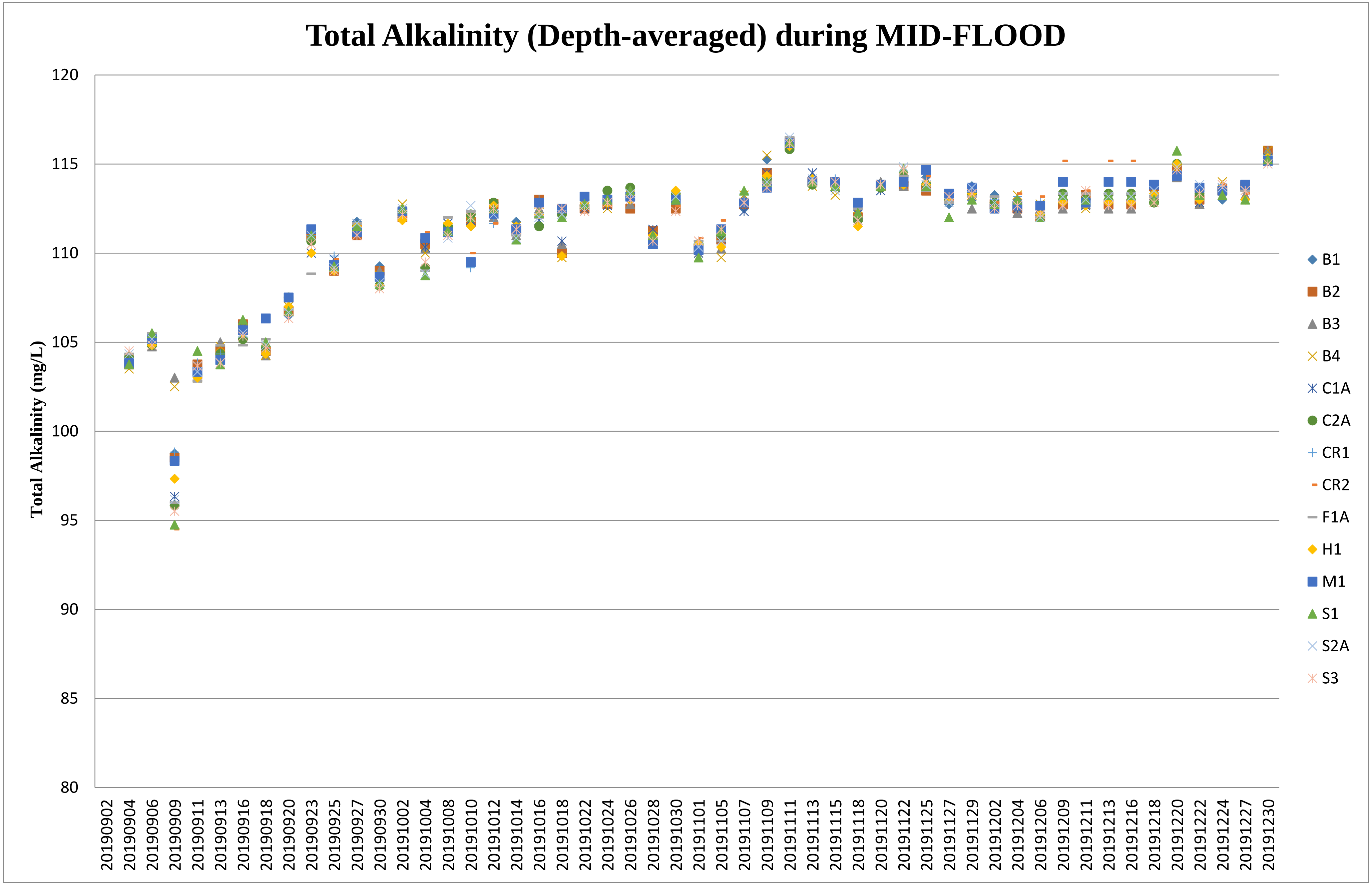
Note: The Action and Limit Level of suspended solids can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.



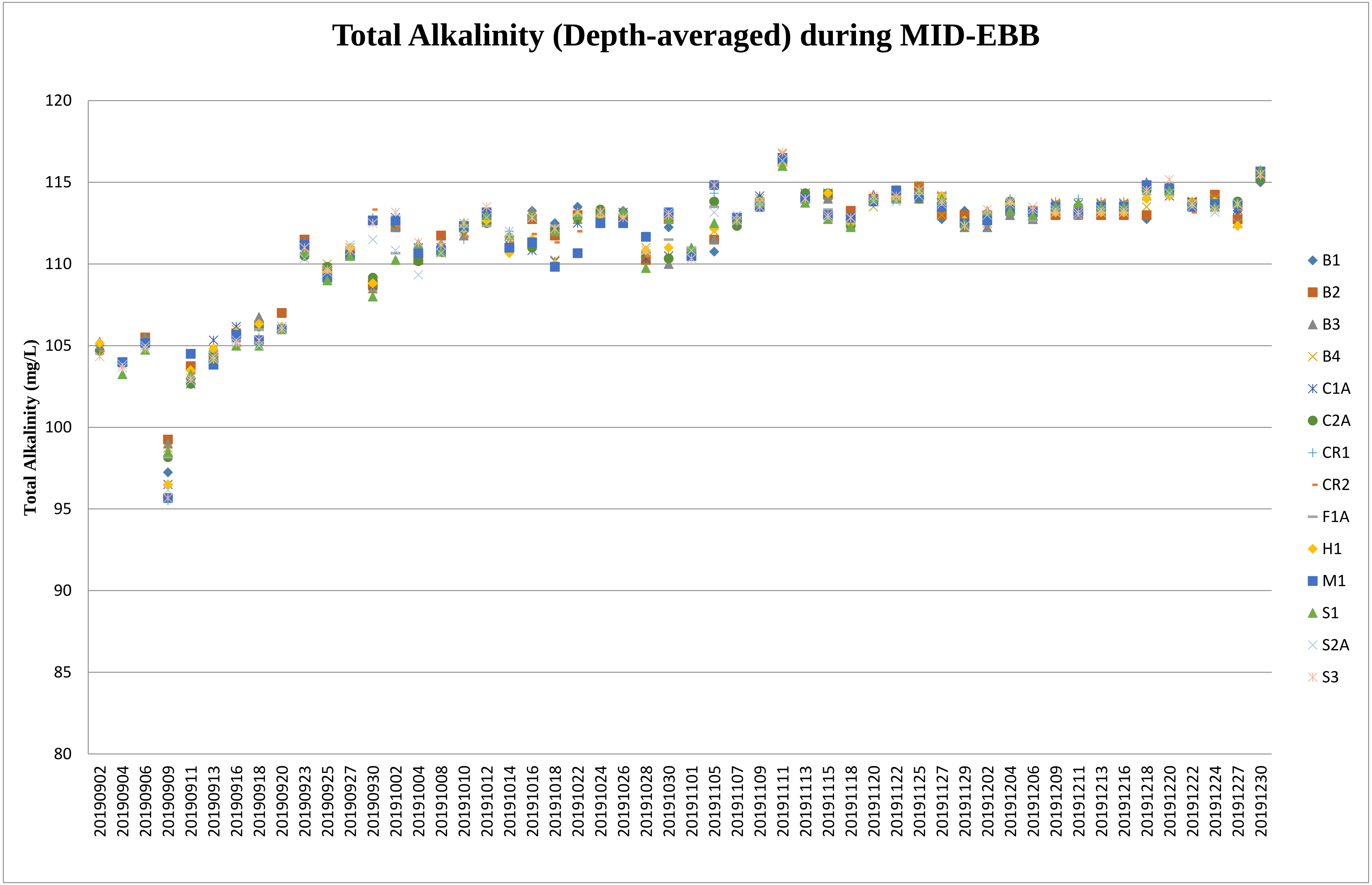
Note: The Action and Limit Level of temperature can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.



Note: The Action and Limit Level of temperature can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.



Note: The Action and Limit Level of total alkalinity can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.



Note: The Action and Limit Level of total alkalinity can be referred to **Table 2.7 & 2.8** of the monthly EM&A report.

Appendix E HOKLAS Laboratory Certificate

Hong Kong Accreditation Service
香港認可處

Certificate of Accreditation
認可證書

This is to certify that
特此證明

ALS TECHNICHEM (HK) PTY LIMITED

11/F., Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, New Territories, Hong Kong
香港新界葵涌永業街1-3號忠信針織中心11樓

has been accepted by the HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a
為香港認可處執行機關根據認可諮詢委員會建議而接受的

HOKLAS Accredited Laboratory
「香港實驗所認可計劃」認可實驗所

This laboratory meets the requirements of ISO / IEC 17025 : 2005 – General requirements for the competence
此實驗所符合ISO / IEC 17025 : 2005 –《測試及校正實驗所能力的通用規定》所訂的要求，
of testing and calibration laboratories and it has been accredited for performing specific tests or calibrations as
獲認可進行載於香港實驗所認可計劃《認可實驗所名冊》內下述測試類別中的指定
listed in the HOKLAS Directory of Accredited Laboratories within the test category of
測試或校正工作

Environmental Testing
環境測試

This laboratory is accredited in accordance with the recognised International Standard ISO / IEC 17025 : 2005.
本實驗所乃根據公認的國際標準 ISO / IEC 17025 : 2005 獲得認可。
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory
這項認可資格演示在指定範疇所需的技術能力及實驗所質量管理體系的運作
quality management system (see joint IAF-ILAC-ISO Communiqué).
(見國際認可論壇、國際實驗所認可合作組織及國際標準化組織的聯合公報)。

The common seal of the Hong Kong Accreditation Service is affixed hereto by the authority of the HKAS Executive
香港認可處根據認可處執行機關的權限在此蓋上通用印章

CHAN Sing Sing, Terence, Executive Administrator
執行幹事 陳成城
Issue Date : 5 May 2009
簽發日期：二零零九年五月五日

Registration Number : HOKLAS 066
註冊號碼：

Date of First Registration : 15 September 1995
首次註冊日期：一九九五年九月十五日

This certificate is issued subject to the terms and conditions laid down by HKAS
本證書按照香港認可處訂立的條款及條件發出

L 000552

Hong Kong Accreditation Service
香港認可處

Certificate of Accreditation
認可證書

This is to certify that
特此證明

ACUMEN LABORATORY AND TESTING LIMITED
浩科檢測中心有限公司

Lot 12, Tam Kon Shan Road, North Tsing Yi, New Territories, Hong Kong
香港新界青衣北担杆山路12路段

has been accepted by the HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a
在認可諮詢委員會的建議下獲香港認可處執行機關接受為

HOKLAS Accredited Laboratory
「香港實驗所認可計劃」認可實驗所

This laboratory meets the requirements of ISO/IEC 17025:2005 and it has been accredited for performing specific tests or calibrations as listed in the scope of accreditation within the test category of

Environmental Testing

此實驗所符合ISO/IEC 17025:2005所訂的要求
並獲認可進行載於認可範圍內下述測試類別中的指定測試或校正工作

環境測試

This accreditation to ISO/IEC 17025:2005 demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (see joint IAF-ILAC-ISO Communiqué).
此項 ISO/IEC 17025:2005 的認可資格證明此實驗所具備指定範疇內所須的技術能力並實施一套實驗所質量管理體系(見國際認可論壇、國際實驗所認可合作組織及國際標準化組織的聯合公報)。

The common seal of the Hong Kong Accreditation Service is affixed hereto by the authority of the HKAS Executive
現經香港認可處執行機關授權在此蓋上香港認可處的印章

WONG Wang-wah, Executive Administrator
執行幹事 黃宏華
Issue Date : 16 July 2014
簽發日期：二零一四年七月十六日

Registration Number : HOKLAS 241
註冊號碼：

Date of First Registration : 16 July 2014
首次註冊日期：二零一四年七月十六日

This certificate is issued subject to the terms and conditions laid down by HKAS
本證書按照香港認可處訂立的條款及條件發出

L 001195

Appendix F Water Quality Equipment Calibration Certificate

專 業 化 驗 有 限 公 司
QUALITY PRO TEST-CONSULT LIMITED
Unit 10, 14/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong
Email: info@qualityprotest.com; Website: www.qualityprotest.com
Tel: (852) 3956 8717; Fax: (852) 3956 3928

AMENDMENT CALIBRATION REPORT

Amendment Test Report No.	:	AI100146A
Amendment Test Report Date of Issue	:	13 November 2019
Superseded Test Report No.	*:*	*AI100146*
Superseded Test Report Date of Issue	*:*	*23 October 2019*
Page No.	:	1 of 3

PART A – CUSTOMER INFORMATION

Acuity Sustainability Consulting Limited
Unit 1908, Nos. 301-305
Castle Peak Road, Kwai Chung
N.T., HK
Attn: Mr. Nelson TSUI

PART B – CHANGE OF INFORMATION

This amendment report supersedes any previous report number AI100146 dated 23 October 2019 with this reference, the details as indicated below in the selected checkbox:

☐ Supersede relevant page(s) of previous report by the attached:

____(page no)

☒ Supersede whole previous report by the attached amendment test report.

The superseded pages or the superseded report become invalid. Please destroy them immediately or return to our office for cancelation

Amendment detail(s):

No.	Description of the amendment	Reason of the amendment
1	Name of Equipment	Typo
2	Serial Number	Typo

~ CONTINUED ON NEXT PAGE ~

FUNG Yuen-ching Aries
Laboratory Manager

專 業 化 驗 有 限 公 司
QUALITY PRO TEST-CONSULT LIMITED
Unit 10, 14/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong
Email: info@qualityprotest.com; Website: www.qualityprotest.com
Tel: (852) 3956 8717; Fax: (852) 3956 3928

AMENDMENT CALIBRATION REPORT

PART C – DESCRIPTION

Name of Equipment	:	Multi Water Quality Checker U-53
Manufacturer	:	Horiba
Serial Number	:	UHB5F2BB
Date of Received	:	Oct 15, 2019
Date of Calibration	:	Oct 23, 2019
Date of Next Calibration[a]	:	Jan 22, 2020

PART D – REFERENCE METHODS/ DOCUMENTS FOR THE CALIBRATION

Parameter	Reference Method
pH at 25ºC	APHA 21e 4500-H^+ B
Dissolved Oxygen	APHA 21e 4500-O G
Salinity	APHA 21e 2520 B
Turbidity	APHA 21e 2130 B
Temperature	Section 6 of international Accreditation New Zealand Technical Guide no. 3 Second edition March 2008: Working Thermometer Calibration Procedure.
Oxidation-Reduction Potential	APHA 22e 2580 B

PART E – CALIBRATION RESULTS[b,c]

(1) pH at 25ºC

Target (pH unit)	Displayed Reading[d] (pH Unit)	Tolerance[e](pH Unit)	Results
4.00	4.08	0.08	Satisfactory
7.42	7.50	0.08	Satisfactory
10.01	10.02	0.01	Satisfactory

Tolerance of pH should be less than ±0.20 (pH unit)

(2) Temperature

Reading of Ref. thermometer (ºC)	Displayed Reading (ºC)	Tolerance (ºC)	Results
10.0	10.06	0.06	Satisfactory
27.1	27.23	0.13	Satisfactory
45.1	45.05	0.05	Satisfactory

Tolerance limit of temperature should be less than ±2.0 (ºC)

~ CONTINUED ON NEXT PAGE ~

Remark(s): -
[a] *The "Date of Next Calibration" is recommended according to best practice principals as practiced by QPT or quoted form relevant international standards.*
[b] *The results relate only to the calibrated equipment as received*
[c] *The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.*
[d] *"Displayed Reading" denotes the figure shown on item under calibration/ checking regardless of equipment precision or significant figures.*
[e] *The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted form relevant international standards.*

專 業 化 驗 有 限 公 司
QUALITY PRO TEST-CONSULT LIMITED
Unit 10, 14/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong
Email: info@qualityprotest.com; Website: www.qualityprotest.com
Tel: (852) 3956 8717; Fax: (852) 3956 3928

AMENDMENT CALIBRATION REPORT

Amendment Test Report No.	:	AI100146A
Amendment Test Report Date of Issue	:	13 November 2019
Superseded Test Report No.	*:*	*AI100146*
Superseded Test Report Date of Issue	*:*	*23 October 2019*
Page No.	:	3 of 3

PART D – CALIBRATION RESULTS (Cont'd)

(3) Dissolved Oxygen

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)	Results
7.43	7.40	-0.03	Satisfactory
5.00	5.11	+0.11	Satisfactory
2.00	1.67	-0.33	Satisfactory
0.11	0.34	+0.23	Satisfactory

Tolerance limit of dissolved oxygen should be less than ±0.50 (mg/L)

(4) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	9.68	-3.2	Satisfactory
20	19.84	0.8	Satisfactory
30	30.48	1.6	Satisfactory

Tolerance limit of salinity should be less than ±10.0 (%)

(5) Turbidity

Expected Reading (NTU)	Displayed Reading[f] (NTU)	Tolerance[g] (%)	Results
0	0.53	--	Satisfactory
10	9.40	-6.0	Satisfactory
20	18.96	-5.2	Satisfactory
100	93.9	-6.1	Satisfactory
800	751	-6.1	Satisfactory

Tolerance limit of turbidity should be less than ±10.0 (%)

(6) Oxidation-Reduction Potential

Expected Reading (mV)	Displayed Reading (mV)	Tolerance (mV)	Results
228	236	8	Satisfactory

Tolerance limit of Oxidation-Reduction Potential should be less than ±10 (mV)

~ END OF REPORT ~

Remark(s): -
[f] *"Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.*
[g] *The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted form relevant international standards.*

專業化驗有限公司
QUALITY PRO TEST-CONSULT LIMITED
Unit 10, 14/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong
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Tel: (852) 3956 8717; Fax: (852) 3956 3928

REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Report No. : AI100180
Date of Issue : 04 November, 2019

PART A – CUSTOMER INFORMATION

Acuity Sustainability Consulting Limited
Unit C, 11/F, Ford Glory Plaza
37-39 Wing Hong Street
Cheung Sha Wan, Kowloon, Hong Kong
Attn: Mr. Nelson TSUI

PART B – DESCRIPTION

Name of Equipment	:	YSI ProDSS Multi Parameters
Manufacturer	:	YSI (a xylem brand)
Serial Number	:	15M101091
Date of Received	:	Oct 28, 2019
Date of Calibration	:	Nov 01, 2019
Date of Next Calibration[a]	:	Feb 01, 2020

PART C – REFERENCE METHODS/ DOCUMENTS FOR THE CALIBRATION

Parameter	Reference Method
pH at 25°C	APHA 21e 4500-H^+ B
Dissolved Oxygen	APHA 21e 4500-O G
Salinity	APHA 21e 2520 B
Turbidity	APHA 21e 2130 B
Temperature	Section 6 of international Accreditation New Zealand Technical Guide no. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

PART D – CALIBRATION RESULTS[b,c]

(1) pH at 25°C

Target (pH unit)	Displayed Reading[d] (pH Unit)	Tolerance[e](pH Unit)	Results
4.00	4.05	0.05	Satisfactory
7.42	7.43	0.01	Satisfactory
10.01	10.10	0.09	Satisfactory

Tolerance of pH should be less than ±0.20 (pH unit)

(2) Temperature

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)	Results
4.0	3.9	-0.1	Satisfactory
25.1	25.1	0.0	Satisfactory
46.0	46.1	0.1	Satisfactory

Tolerance limit of temperature should be less than ±2.0 (°C)

~ CONTINUED ON NEXT PAGE ~

Remark(s): -
[a] *The "Date of Next Calibration" is recommended according to best practice principals as practiced by QPT or quoted form relevant international standards.*
[b] *The results relate only to the calibrated equipment as received*
[c] *The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.*
[d] *"Displayed Reading" denotes the figure shown on item under calibration/ checking regardless of equipment precision or significant figures.*
[e] *The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted form relevant international standards.*

LEE Chun-ning, Desmond
Senior Chemist

專業化驗有限公司
QUALITY PRO TEST-CONSULT LIMITED
Unit 10, 14/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong
Email: info@qualityprotest.com; Website: www.qualityprotest.com
Tel: (852) 3956 8717; Fax: (852) 3956 3928

REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

PART D – CALIBRATION RESULTS (Cont'd)

(3) Dissolved Oxygen

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)	Results
0.10	0.22	0.12	Satisfactory
1.61	1.49	-0.12	Satisfactory
4.68	4.54	-0.14	Satisfactory
7.89	7.75	-0.14	Satisfactory

Tolerance limit of dissolved oxygen should be less than ±0.50 (mg/L)

(4) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	9.98	-0.20	Satisfactory
20	20.46	2.30	Satisfactory
30	31.24	4.13	Satisfactory

Tolerance limit of salinity should be less than ±10.0 (%)

(5) Turbidity

Expected Reading (NTU)	Displayed Reading[f] (NTU)	Tolerance[g] (%)	Results
0	-0.10	--	Satisfactory
10	9.81	-1.9	Satisfactory
20	19.23	-3.9	Satisfactory
100	97.16	-2.8	Satisfactory
800	791.46	-1.1	Satisfactory

Tolerance limit of turbidity should be less than ±10.0 (%)

~ END OF REPORT ~

Remark(s): -

(f) *"Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.*

(g) *The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted form relevant international standards.*

專業化驗有限公司
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Email: info@qualityprotest.com; Website: www.qualityprotest.com
Tel: (852) 3956 8717; Fax: (852) 3956 3928

REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Report No.	:	AI110046
Date of Issue	:	22 November, 2019
Page No.	:	1 of 2

PART A – CUSTOMER INFORMATION

Acuity Sustainability Consulting Limited
Unit C, 11/F, Ford Glory Plaza
37-39 Wing Hong Street
Cheung Sha Wan, Kowloon, Hong Kong
Attn: Mr. Nelson TSUI

PART B – DESCRIPTION

Name of Equipment	:	Multi Water Quality Checker U-53
Manufacturer	:	Horiba
Serial Number	:	L20550GA
Date of Received	:	Nov 08, 2019
Date of Calibration	:	Nov 22, 2019
Date of Next Calibration[a]	:	Feb 21, 2020

PART C – REFERENCE METHODS/ DOCUMENTS FOR THE CALIBRATION

Parameter	Reference Method
pH at 25°C	APHA 21e 4500-H^+ B
Dissolved Oxygen	APHA 21e 4500-O G
Salinity	APHA 21e 2520 B
Turbidity	APHA 21e 2130 B
Temperature	Section 6 of international Accreditation New Zealand Technical Guide no. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

PART D – CALIBRATION RESULTS[b,c]

(1) pH at 25°C

Target (pH unit)	Displayed Reading[d] (pH Unit)	Tolerance[e](pH Unit)	Results
4.00	3.92	-0.08	Satisfactory
7.42	7.34	-0.08	Satisfactory
10.01	10.04	0.03	Satisfactory

Tolerance of pH should be less than ±0.20 (pH unit)

(2) Temperature

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)	Results
15.0	14.68	-0.3	Satisfactory
26.0	25.41	-0.6	Satisfactory
44.0	44.11	0.1	Satisfactory

Tolerance limit of temperature should be less than ±2.0 (°C)

~ CONTINUED ON NEXT PAGE ~

Remark(s): -
(a) *The "Date of Next Calibration" is recommended according to best practice principals as practiced by QPT or quoted form relevant international standards.*
(b) *The results relate only to the calibrated equipment as received*
(c) *The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.*
(d) *"Displayed Reading" denotes the figure shown on item under calibration/ checking regardless of equipment precision or significant figures.*
(e) *The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted form relevant international standards.*

LEE Chun-ning, Desmond
Senior Chemist

專業化驗有限公司
QUALITY PRO TEST-CONSULT LIMITED
Unit 10, 14/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong
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REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

PART D – CALIBRATION RESULTS (Cont'd)

(3) Dissolved Oxygen

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)	Results
0.15	0.00	-0.15	Satisfactory
3.90	4.01	0.11	Satisfactory
6.80	6.70	-0.10	Satisfactory
8.15	8.05	-0.10	Satisfactory

Tolerance limit of dissolved oxygen should be less than ±0.50 (mg/L)

(4) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	9.76	-2.40	Satisfactory
20	20.21	1.05	Satisfactory
30	30.57	1.90	Satisfactory

Tolerance limit of salinity should be less than ±10.0 (%)

(5) Turbidity

Expected Reading (NTU)	Displayed Reading[f] (NTU)	Tolerance[g] (%)	Results
0	0.46	--	Satisfactory
10	9.69	-3.1	Satisfactory
20	21.10	5.5	Satisfactory
100	95.10	-4.9	Satisfactory
800	749.00	-6.4	Satisfactory

Tolerance limit of turbidity should be less than ±10.0 (%)

~ END OF REPORT ~

Remark(s): -

(f) *"Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.*

(g) *The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted form relevant international standards.*

Appendix G Event / Action Plan for Water Quality Exceedance

Event	Action			
	ET	IEC	SO	Contractor
Action level being exceeded by one sampling day	Repeat in-situ measurement to confirm findings; Identify source(s) of impact; Inform IEC and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC and Contractor; Repeat measurement on next day of exceedance. (The above actions should be taken within 1 working day after the exceedance is identified)	Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the SO accordingly; Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	Discuss with IEC on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented. (The above actions should be taken within 1 working day after the exceedance is identified)	Inform the SO and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to IEC and SO within 3 working days; Implement the agreed mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)
Action level being exceeded by more than one consecutive sampling days	Identify source(s) of impact; Inform IEC and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC and Contractor; Ensure mitigation measures are implemented; Prepare to increase the monitoring frequency to daily; Repeat measurement on next working day of exceedance. (The above actions should be taken within 1 working day after Action Level being exceeded by two consecutive sampling days)	Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the SO accordingly; Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after Action Level being exceeded by two consecutive sampling days)	Discuss with IEC on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented. Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after Action Level being exceeded by two consecutive sampling days)	Inform the SO and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to IEC and SO within 3 working days; Implement the agreed mitigation measures. (The above actions should be taken within 1 working day after Action Level being exceeded by two consecutive sampling days)

Event	Action			
	ET	IEC	SO	Contractor
Limit level being exceeded by one sampling day	Inform the SO and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with Contractor, IEC and SO and propose mitigation measures to IEC and SO within 3 working days; Implement the agreed mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the SO accordingly; Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented. Assess the effectiveness of the implemented measures. (The above actions should be taken within 1 working day after the exceedance is identified)	Inform the SO and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IEC and SO and propose mitigation measures to IEC and SO within 3 working days; Implement the agreed mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)

Event	Action			
	ET	IEC	SO	Contractor
Limit level being exceeded by more than one consecutive sampling days	Identify source(s) of impact; Inform IEC, Contractor and EPD; Check monitoring data, all plant, equipment and Contractor's working methods. Discuss mitigation measures with IEC, SO and Contractor. Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. (The above actions should be taken within 1 working day after Limit Level being exceeded by two consecutive sampling days)	Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the SO accordingly; Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after Limit Level being exceeded by two consecutive sampling days)	Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented. Assess the effectiveness of the implemented measures. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine work until no exceedance of Limit level. (The above actions should be taken within 1 working day after Limit Level being exceeded by two consecutive sampling days)	Inform the SO and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IEC and SO and propose mitigation measures to IEC and SO within 3 working days; Implement the agreed mitigation measures; As directed by the SOR, to slow down or to stop all or part of the marine work or construction activities. (The above actions should be taken within 1 working day after Limit Level being exceeded by two consecutive sampling days)

Appendix H Noise Monitoring Equipment Calibration Certificate

Certificate of Calibration

for

Description:	*Sound Level Meter*
Manufacturer:	*NTi*
Type No.:	*XL2 (Serial No.: A2A-13661-E0)*
Microphone:	*ACO 7052 (Serial No.: 73784)*
Preamplifier:	*NTi Audio MA220 (Serial No.:6282)*

Submitted by:

Customer: ***Acuity Sustainability Consulting Limited***

Address: ***Unit 1908, Nos. 301-305 Castle Peak Road, Kwai Chung, N.T.***

Upon receipt for calibration, the instrument was found to be:

☑ **Within**
☐ **Outside**

the allowable tolerance.

The test equipment used for calibration are traceable to National Standards via:
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory

Date of receipt: 27 September 2019

Date of calibration: 30 September 2019

Calibrated by: ______________ ***Calibration Technician***

Certified by: ______________ ***Mr. Tang Cheuk Hang***
Quality Manager

Date of issue: 30 September 2019

Certificate No.: APJ19-096-CC001

Room 422,Leader Industrial Centre,57-59 Au Pui Wan Street ,Fo Tan, Shatin,N.T.,Hong Kong
Tel: (852) 2668 3423 Fax:(852) 2668 6946
Homepage: http://www.aa-lab.com E-mail : inquiry@aa-lab.com

1. *Calibration Precaution:*

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

- The results presented are the mean of 3 measurements at each calibration point.

2. *Calibration Conditions:*

Air Temperature:	24.2 **°C**
Air Pressure:	1006 **hPa**
Relative Humidity:	40.8 **%**

3. *Calibration Equipment:*

	Type	Serial No.	Calibration Report Number	Traceable to
Multifunction Calibrator	B&K 4226	2288467	AV180064	HOKLAS

4. *Calibration Results*

Sound Pressure Level

Reference Sound Pressure Level

Setting of Unit-under-test (UUT)				Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz		
40-140	dBA	SPL	Fast	94	1000	94.0	±0.4

Linearity

Setting of Unit-under-test (UUT)				Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz		
30-130	dBA	SPL	Fast	94	1000	94.0	Ref
				104		104.0	±0.3
				114		114.0	±0.3

Time Weighting

Setting of Unit-under-test (UUT)				Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz		
30-130	dBA	SPL	Fast	94	1000	94.0	Ref
			Slow			94.0	±0.3

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Frequency Response

Linear Response

Setting of Unit-under-test (UUT)			Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dB SPL	Fast	94	31.5	94.0	±2.0
				63	93.8	±1.5
				125	93.9	±1.5
				250	93.9	±1.4
				500	93.8	±1.4
				1000	94.0	Ref
				2000	94.1	±1.6
				4000	94.2	±1.6
				8000	94.5	+2.1; -3.1

A-weighting

Setting of Unit-under-test (UUT)			Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBA SPL	Fast	94	31.5	54.6	-39.4 ±2.0
				63	67.7	-26.2 ±1.5
				125	77.8	-16.1 ±1.5
				250	85.2	-8.6 ±1.4
				500	90.7	-3.2 ±1.4
				1000	94.0	Ref
				2000	95.3	+1.2 ±1.6
				4000	95.2	+1.0 ±1.6
				8000	93.3	-1.1+2.1; -3.1

C-weighting

Setting of Unit-under-test (UUT)			Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBC SPL	Fast	94	31.5	91.0	-3.0 ±2.0
				63	93.1	-0.8 ±1.5
				125	93.6	-0.2 ±1.5
				250	93.9	-0.0 ±1.4
				500	93.9	-0.0 ±1.4
				1000	94.0	Ref
				2000	93.9	-0.2 ±1.6
				4000	93.4	-0.8 ±1.6
				8000	92.5	–3.0 +2.1: –3.1

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5. *Calibration Results Applied*

The results apply to the particular unit-under-test only. All calibration points are within manufacture's specification as IEC 61672 Class 1.

Uncertainties of Applied Value:

94 dB	31.5 Hz	± 0.10
	63 Hz	± 0.15
	125 Hz	± 0.10
	250 Hz	± 0.05
	500 Hz	± 0.05
	1000 Hz	± 0.05
	2000 Hz	± 0.05
	4000 Hz	± 0.05
	8000 Hz	± 0.10
104 dB	1000 Hz	± 0.05
114 dB	1000 Hz	± 0.05

The uncertainties are evaluated for a 95% confidence level.

Note:
The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted will not allow for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. (A+A)*L shall not be liable for any loss or damage resulting from the use of the equipment.

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SVANTEK

ISO9001 certified

FACTORY CALIBRATION DATA OF THE *SVAN 971 No. 77731*

with preamplifier SVANTEK type SV18 No. 78763 and with microphone ACO type 7052E No. 72681

1. CALIBRATION* (acoustical)

LEVEL METER function; Range: Low; Reference frequency: 1000Hz; Sound Pressure Level: **113.97** dB.

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	113.97	114.01	0.04
A	113.97	114.01	0.04
C	113.97	114.01	0.04

Calibration measured with the microphone ACO type 7052E No. 72681. Calibration factor: -0.20 dB.

2. LINEARITY TEST* (electrical)

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 31.5 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	83.0
Error [dB]	0.1	0.0	0.0	0.0	-0.0	0.0	0.0	0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 1000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	123.0
Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 8000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	122.0
Error [dB]	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 31.5 Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	97.0
Error [dB]	0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 1000 Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error [dB]	0.1	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 8000 Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error [dB]	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0

1/3 OCTAVE (1kHz); Range: Low; f_{sin}= 1000 Hz

Nominal result [dB]	25.0	30.0	40.0	60.0	80.0	100.0	120.0	123.0
Error [dB]	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0

3. TONE BURST RESPONSE*

LEVEL METER function; Characteristic: A; f_{sin}= 4000 Hz; Burst duration: 2s

Range: **Low**; Steady level nominal result = 120dB

Result	**Detector**	**Duration** [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	**Indication** [dB]	120.1	120.0	119.1	117.5	115.2	111.8	108.9	106.0	102.0	99.0	96.0	93.0
		Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	**Indication** [dB]	118.0	115.9	112.6	109.8	106.8	102.9	99.9	96.9	93.0	-	-	-
		Error [dB]	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-	-	-
SEL	-	**Indication** [dB]	120.1	117.1	113.1	110.1	107.1	103.1	100.1	97.0	93.1	90.0	87.0	83.9
		Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1

Range: **Low**; Steady level nominal result = 60dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5
MAX	Fast	**Indication** [dB]	60.1	60.0	59.1	57.5	55.3	51.8	48.9	46.0	42.0	39.0	36.0
		Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.1
	Slow	**Indication** [dB]	58.0	56.0	52.6	49.8	46.9	42.9	40.0	37.0	32.9	-	-
		Error [dB]	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-	-
SEL	-	**Indication** [dB]	60.1	57.1	53.1	50.1	47.1	43.1	40.1	37.1	33.1	30.1	27.0
		Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0

Range: **Low**; Steady level nominal result = 35dB

Result	Detector	Duration [ms]	1000	500	200
MAX	Fast	**Indication** [dB]	35.1	35.0	34.1
		Error [dB]	-0.0	-0.0	0.0
	Slow	**Indication** [dB]	33.0	31.0	27.6
		Error [dB]	-0.1	-0.0	-0.1
SEL	-	**Indication** [dB]	35.1	32.1	28.1
		Error [dB]	-0.0	-0.0	0.0

Range: **High**; Steady level nominal result = 134dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	**Indication** [dB]	134.1	134.0	133.1	131.5	129.3	125.8	122.9	120.0	116.0	113.0	110.0	107.0
		Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	**Indication** [dB]	132.0	130.0	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
		Error [dB]	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-	-	-
SEL	-	**Indication** [dB]	134.1	131.1	127.1	124.1	121.1	117.1	114.1	111.1	107.1	104.0	101.0	98.0
		Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

Range: **High**; Steady level nominal result = 54dB

Result	Detector	Duration [ms]	1000	500	200	100	50
MAX	Fast	**Indication** [dB]	54.1	54.0	53.1	51.5	49.3
		Error [dB]	0.0	0.0	0.0	0.0	-0.0
	Slow	**Indication** [dB]	52.1	50.0	46.6	43.9	40.9
		Error [dB]	-0.0	-0.0	-0.1	-0.1	-0.1
SEL	-	**Indication** [dB]	54.1	51.1	47.1	44.1	41.1
		Error [dB]	0.0	0.0	0.0	0.0	0.0

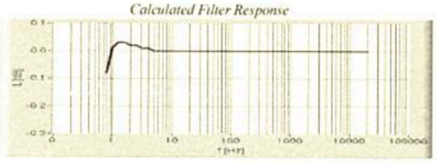
Range: **High**; Steady level nominal result = 45dB

Result	Detector	Duration [ms]	1000	500	200
MAX	Fast	**Indication** [dB]	45.2	45.1	44.2
		Error [dB]	0.0	0.0	0.0
	Slow	**Indication** [dB]	43.1	41.0	37.7
		Error [dB]	-0.0	-0.0	-0.1
SEL	-	**Indication** [dB]	45.2	42.2	38.2
		Error [dB]	0.0	0.0	0.1

4. FREQUENCY RESPONSE* (electrical)

LEVEL METER function; Characteristic: Z; Range: Low; Input signal =120 dB;

Calculated Filter Response



Measured Filter Response with Preamplifier SV18
(f-frequency, L-level)

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
10	-0.1	63	0.0	4000	0.0
12.5	0.0	125	0.0	8000	0.0
16	0.0	250	0.0	16000	0.0
20	0.0	500	0.0	20000	0.0
25	0.0	1000	0.0		
31.5	0.0	2000	0.0		

All frequencies are nominal center values for the 1/3 octave bands

5. INTERNAL NOISE LEVEL* (electrical - compensated)

LEVEL METER function; Range: Low; (Back-light – off) ; Calibration factor: 0dB

Characteristic	Z	A	C
Level [dB]	≤20	≤12	≤12

* measured with preamplifier SVANTEK type SV18 No. 78763.

6. INTERNAL NOISE LEVEL (acoustical - compensated)

LEVEL METER function; Characteristic: A; (Backlight – off)

Range	Low	High
Indication [dB]	≤15	19.8

Noise measured in special chamber, with reference microphone G.R.A.S type 40AN No. 73421

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
23 °C	25%	1016 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	87	Signal generator
2.	SVANTEK	SVAN 912A	6120	Sound & Vibration Analyser
3.	RIGOL	DM3068	DM30155100773	Digital multimeter
4.	SVANTEK	SV33	48878	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Krzysztof Czachor .... Test date: 2019-02-06

Certificate of Calibration

for

Description:	***Sound Level Meter***
Manufacturer:	***NTi Audio***
Type No.:	***XL2 (Serial No.: A2A-13548-E0)***
Microphone:	***ACO 7052 (Serial No.:60997)***
Preamplifier:	***NTi Audio MA220 (Serial No.:5287)***

Submitted by:

Customer:	*Acuity Sustainability Consulting Limited*
Address:	*Unit 1908, iPlace, Nos. 301-305 Castle Peak Road,* *Kwai Chung, New Territories*

Upon receipt for calibration, the instrument was found to be:

☑ **Within**
☐ **Outside**

the allowable tolerance.

The test equipment used for calibration are traceable to National Standards via:
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory

Date of receipt: 8 January 2019

Date of calibration: 10 January 2019

Calibrated by: ______________
Calibration Technician

Certified by: ______________
Mr. Ng Yan Wa
Laboratory Manager

Date of issue: 10 January 2019

Certificate No.: APJ18-157-CC001

Room 422,Leader Industrial Centre,57-59 Au Pui Wan Street ,Fo Tan, Shatin,N.T.,Hong Kong
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1. *Calibration Precaution:*

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

- The results presented are the mean of 3 measurements at each calibration point.

2. *Calibration Conditions:*

Air Temperature: 22.3 **°C**
Air Pressure: 1006 **hPa**
Relative Humidity: 71.3 **%**

3. *Calibration Equipment:*

	Type	Serial No.	Calibration Report Number	Traceable to
Multifunction Calibrator	B&K 4226	2288467	AV180064	HOKLAS

4. *Calibration Results*

Sound Pressure Level

Reference Sound Pressure Level

Setting of Unit-under-test (UUT)				Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBA	SPL	Fast	94	1000	94.0	±0.4

Linearity

Setting of Unit-under-test (UUT)				Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBA	SPL	Fast	94	1000	94.0	Ref
				104		104.0	±0.3
				114		114.0	±0.3

Time Weighting

Setting of Unit-under-test (UUT)				Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBA	SPL	Fast	94	1000	94.0	Ref
			Slow			94.0	±0.3

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Frequency Response

Linear Response

Setting of Unit-under-test (UUT)			Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz		
30-130	dB SPL	Fast	94	31.5	94.0	±2.0
				63	94.1	±1.5
				125	94.1	±1.5
				250	94.0	±1.4
				500	94.0	±1.4
				1000	94.0	Ref
				2000	93.8	±1.6
				4000	93.8	±1.6
				8000	92.7	+2.1; -3.1

A-weighting

Setting of Unit-under-test (UUT)			Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz		
30-130	dBA SPL	Fast	94	31.5	54.8	-39.4 ±2.0
				63	67.9	-26.2 ±1.5
				125	78.0	-16.1 ±1.5
				250	85.4	-8.6 ±1.4
				500	90.8	-3.2 ±1.4
				1000	94.0	Ref
				2000	95.1	+1.2 ±1.6
				4000	94.8	+1.0 ±1.6
				8000	91.6	-1.1+2.1; -3.1

C-weighting

Setting of Unit-under-test (UUT)			Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz		
30-130	dBC SPL	Fast	94	31.5	91.0	-3.0 ±2.0
				63	93.2	-0.8 ±1.5
				125	93.9	-0.2 ±1.5
				250	94.0	-0.0 ±1.4
				500	94.0	-0.0 ±1.4
				1000	94.0	Ref
				2000	93.7	-0.2 ±1.6
				4000	93.0	-0.8 ±1.6
				8000	89.7	−3.0 +2.1: −3.1

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5. *Calibration Results Applied*

The results apply to the particular unit-under-test only. All calibration points are within manufacture's specification as IEC 61672 Class 1.

Uncertainties of Applied Value:

94 dB	31.5 Hz	± 0.05
	63 Hz	± 0.05
	125 Hz	± 0.10
	250 Hz	± 0.10
	500 Hz	± 0.10
	1000 Hz	± 0.05
	2000 Hz	± 0.05
	4000 Hz	± 0.10
	8000 Hz	± 0.10
104 dB	1000 Hz	± 0.05
114 dB	1000 Hz	± 0.05

The uncertainties are evaluated for a 95% confidence level.

Note:
The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted will not allow for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. (A+A)*L shall not be liable for any loss or damage resulting from the use of the equipment.

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Certificate of Calibration

for

Description:	*Sound Level Meter*
Manufacturer:	*NTi Audio*
Type No.:	*XL2 (Serial No.: A2A-13663-E0)*
Microphone:	*ACO 7052 (Serial No.:73784)*
Preamplifier:	*NTi Audio MA220 (Serial No.:6282)*

Submitted by:

Customer: *Acuity Sustainability Consulting Limited*

Address: *Unit 1908, Nos. 301-305 Castle Peak Road, Kwai Chung, N.T.*

Upon receipt for calibration, the instrument was found to be:

☑ **Within**
☐ **Outside**

the allowable tolerance.

The test equipment used for calibration are traceable to National Standards via:
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory

Date of receipt: 11 September 2019

Date of calibration: 12 September 2019

Calibrated by:________________
Calibration Technician

Certified by:________________
Mr. Ng Yan Wa
Laboratory Manager

Date of issue: **12 September 2019**

ACOUSTICS AND AIR TESTING LABORATORY CO. LTD. (A+A)*L

Certificate No.: APJ19-078-CC001

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1. Calibration Precaution:

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.

2. Calibration Conditions:

Air Temperature: 24.2 **°C**
Air Pressure: 1008 **hPa**
Relative Humidity: 69.2 **%**

3. Calibration Equipment:

	Type	Serial No.	Calibration Report Number	Traceable to
Multifunction Calibrator	B&K 4226	2288467	AV180064	HOKLAS

4. Calibration Results

Sound Pressure Level

Reference Sound Pressure Level

Setting of Unit-under-test (UUT)				Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBA	SPL	Fast	94	1000	94.0	±0.4

Linearity

Setting of Unit-under-test (UUT)				Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBA	SPL	Fast	94	1000	94.0	Ref
				104		104.0	±0.3
				114		114.0	±0.3

Time Weighting

Setting of Unit-under-test (UUT)				Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting		Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBA	SPL	Fast	94	1000	94.0	Ref
			Slow			94.0	±0.3

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Frequency Response

Linear Response

Setting of Unit-under-test (UUT)			Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dB SPL	Fast	94	31.5	94.1	±2.0
				63	94.1	±1.5
				125	94.2	±1.5
				250	94.1	±1.4
				500	94.1	±1.4
				1000	94.0	Ref
				2000	93.7	±1.6
				4000	94.1	±1.6
				8000	93.7	+2.1; -3.1

A-weighting

Setting of Unit-under-test (UUT)			Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBA SPL	Fast	94	31.5	54.6	-39.4 ±2.0
				63	67.9	-26.2 ±1.5
				125	78.1	-16.1 ±1.5
				250	85.5	-8.6 ±1.4
				500	90.8	-3.2 ±1.4
				1000	94.0	Ref
				2000	94.9	+1.2 ±1.6
				4000	95.1	+1.0 ±1.6
				8000	92.6	-1.1 +2.1; -3.1

C-weighting

Setting of Unit-under-test (UUT)			Applied value		UUT Reading,	IEC 61672 Class 1
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz	dB	Specification, dB
30-130	dBC SPL	Fast	94	31.5	91.1	-3.0 ±2.0
				63	93.3	-0.8 ±1.5
				125	94.0	-0.2 ±1.5
				250	94.1	-0.0 ±1.4
				500	94.1	-0.0 ±1.4
				1000	94.0	Ref
				2000	93.6	-0.2 ±1.6
				4000	93.4	-0.8 ±1.6
				8000	90.7	-3.0 +2.1; -3.1

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5. *Calibration Results Applied*

The results apply to the particular unit-under-test only. All calibration points are within manufacture's specification as IEC 61672 Class 1.

Uncertainties of Applied Value:

94 dB	31.5 Hz	± 0.05
	63 Hz	± 0.05
	125 Hz	± 0.05
	250 Hz	± 0.05
	500 Hz	± 0.05
	1000 Hz	± 0.05
	2000 Hz	± 0.05
	4000 Hz	± 0.05
	8000 Hz	± 0.10
104 dB	1000 Hz	± 0.05
114 dB	1000 Hz	± 0.05

The uncertainties are evaluated for a 95% confidence level.

Note:
The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted will not allow for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. (A+A)*L shall not be liable for any loss or damage resulting from the use of the equipment.

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SVANTEK

ISO9001 certified

Sound Level Calibrator

Type: **SV33B** Serial No: **83042**

Calibration Chart

Sound pressure level: **114.07 dB** (THD: **0.74 %**)

Frequency: **1000 Hz**

Short term level stability: 0.05 dB

Frequency stability: 0.01 %

Measurement conditions

Temperature:	**23 °C**
Relative humidity:	**33 %**
Ambient pressure:	**1006 hPa**

Reference conditions

Temperature:	23.0 °C
Relative humidity:	50 %
Ambient pressure:	1013.2 hPa

CONFORMITY & TEST DECLARATION

The stated level is valid at reference conditions.
Measured according to IEC 60942:2003.
The stated level is relative to 20 μPa .

The level is traceable to GUM (Central Office of Measures, Poland) with a calculated uncertainty less then ± 0.15 dB (2*sd).

Calibration specialist : ....

Date : 2019-02-21

Appendix I Event / Action Plan for Noise Exceedance

Event	Actions to be taken by Environmental Team as immediate as practicable	Actions to be taken by Independent Environmental Checker as immediate as practicable	Actions to be taken by Supervising Officer's Representative as immediate as practicable	Actions to be taken by Contractor as immediate as practicable
Action Level being exceeded	1. Notify IEC and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, SO and Contractor; 4. Discuss with the IEC and Contractor on remedial measures required; 5. Increase monitoring frequency to check mitigation effectiveness. (The above actions should be taken within 2 working .days after the exceedance is identified)	1. Review the investigation results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the SO accordingly; 3. Advise the SO on the effectiveness of the proposed remedial measures. (The above actions should be taken within 2 working days after the exceedance is identified).	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise the implementation of remedial measures. (The above actions should be taken within 2 working days after the exceedance is identified).	1. Submit noise mitigation proposals to IEC and SO; 2. Implement noise mitigation proposals. (The above actions should be taken within 2 working days after the exceedance is identified)
Limit Level being exceeded	1. Inform IEC, SO, Contractor and EPD; 2. Repeat measurements to confirm findings; 3. Increase monitoring frequency; 4. Identify source and investigate the cause of exceedance; 5. Carry out analysis of Contractor's working procedures; 6. Discuss with the IEC, Contractor and SO on remedial measures required; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and SO informed of the results; 8. If exceedance stops, cease additional monitoring. (The above actions should be taken within 2 working days after the exceedance is identified)	1. Discuss amongst SO, ET, and Contractor on the potential remedial actions; 2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the SO accordingly; (The above actions should be taken within 2 working days after the exceedance is identified)	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise the implementation of remedial measures; 5. If exceedance continues, consider stopping the Contractor to continue working on that portion of work which causes the exceedance until the exceedance is abated. (The above actions should be taken within 2 working days after the exceedance is identified)	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC and SO within 3 working days of notification; 3. Implement the agreed proposals; 4. Submit further proposal if problem still not under control; 5. Stop the relevant portion of works as instructed by the SO until the exceedance is abated. (The above actions should be taken within 2 working days after the exceedance is identified)

Appendix J Noise Monitoring Data

Location:	Shek Kwu Chau Treatment & Rehabilitation Centre Hostel 1 (M1 / N_S1)
Monitoring date:	2, 9, 16, 23 & 30 December 2019 (Daytime) 2&3, 9&10, 16&17, 23&24, 30&31 December 2019 (Evening & Night time)
Parameter :	$L_{eq\ 30min}$ (Daytime), $L_{eq\ 5min}$ (Evening & Night time)
Noise source other than construction activities from the Project:	Nil

Noise Monitoring data:

Date	Start time		End time	Weather	$L_{eq\ 30min}$ dB(A) / $L_{eq\ 5min}$ dB(A)	Sound Level Meter Used	Calibrator Used
2 Dec 2019	16:07	-	16:37	Sunny	59.3	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
2 Dec 2019	19:12	-	19:17	Fine	52.3	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	20:12	-	20:17		55.2		
	21:12	-	21:17		51.1		
3 Dec 2019	1:12	-	01:17	Fine	47.3	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	3:12	-	03:17		51.6		
	5:12	-	05:17		56.1		
9 Dec 2019	16:04	-	16:34	Sunny	55.4	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
9 Dec 2019	19:14	-	19:19	Fine	53.4	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	20:14	-	20:19		53.9		
	21:14	-	21:19		57.8		
10 Dec 2019	1:14	-	01:19	Fine	50.4	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	3:14	-	03:19		47.9		
	5:14	-	05:19		49.3		
16 Dec 2019	16:15	-	16:45	Sunny	59.5	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
16 Dec 2019	19:15	-	19:20	Fine	53.5	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	20:15	-	20:20		56.1		
	21:15	-	21:20		56.7		
17 Dec 2019	1:15	-	01:20	Fine	56.7	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	3:15	-	03:20		56.2		
	5:15	-	05:20		54.5		

Date	Start time		End time	Weather	$L_{eq\ 30min}$ dB(A) / $L_{eq\ 5min}$ dB(A)	Sound Level Meter Used	Calibrator Used
23 Dec 2019	16:14	-	16:44	Sunny	57.3	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
23 Dec 2019	19:14	-	19:19	Fine	57.5	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	20:14	-	20:19		56.4		
	21:14	-	21:19		56.3		
24 Dec 2019	1:14	-	01:19	Fine	57.3	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	3:14	-	03:19		52.7		
	5:14	-	05:19		50.7		
30 Dec 2019	16:10	-	16:40	Sunny	56.7	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
30 Dec 2019	19:10	-	19:15	Fine	58.0	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	20:10	-	20:15		59.6		
	21:10	-	21:15		58.8		
31 Dec 2019	1:10	-	01:15	Fine	47.5	XL2 (Serial No. A2A-13548-E0)	SV33B (No. 83042)
	3:10	-	03:15		47.9		
	5:10	-	05:15		48.2		

Location:	Shek Kwu Chau Treatment & Rehabilitation Centre Hostel 2 (M2 / N_S2)
Monitoring date:	2, 9, 16, 23 & 30 December 2019 (Daytime) 2&3, 9&10, 16&17, 23&24, 30&31 December 2019 (Evening & Night time)
Parameter :	$L_{eq\ 30min}$ (Daytime), $L_{eq\ 5min}$ (Evening & Night time)
Noise source other than construction activities from the Project:	Nil

Noise Monitoring data:

Date	Start time		End time	Weather	$L_{eq\ 30min}$ dB(A) / $L_{eq\ 5min}$ dB(A)	Sound Level Meter Used	Calibrator Used
2 Dec 2019	16:02	-	16:32	Sunny	57.3	XL2 (Serial No. A2A-13663-E0)	SV33B (No. 83042)
2 Dec 2019	19:12	-	19:17	Fine	54.8	XL2 (Serial No. A2A-13663-E0)	SV33B (No. 83042)
	20:12	-	20:17		56.0		
	21:12	-	21:17		58.1		
3 Dec 2019	1:12	-	01:17	Fine	51.0	XL2 (Serial No. A2A-13663-E0)	SV33B (No. 83042)
	3:12	-	03:17		53.1		
	5:12	-	05:17		60.1		
9 Dec 2019	16:06	-	16:36	Sunny	56.3	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
9 Dec 2019	19:16	-	19:21	Fine	53.3	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
	20:16	-	20:21		54.0		
	21:16	-	21:21		53.7		
10 Dec 2019	1:16	-	01:21	Fine	50.2	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
	3:16	-	03:21		49.8		
	5:16	-	05:21		52.5		
16 Dec 2019	16:15	-	16:45	Sunny	58.8	XL2 (Serial No. A2A-13663-E0)	SV33B (No. 83042)
16 Dec 2019	19:15	-	19:20	Fine	53.5	XL2 (Serial No. A2A-13663-E0)	SV33B (No. 83042)
	20:15	-	20:20		55.1		
	21:15	-	21:20		54.0		
17 Dec 2019	1:15	-	01:20	Fine	56.1	XL2 (Serial No. A2A-13663-E0)	SV33B (No. 83042)
	3:15	-	03:20		58.9		
	5:15	-	05:20		55.6		

Date	Start time		End time	Weather	$L_{eq\ 30min}$ dB(A) / $L_{eq\ 5min}$ dB(A)	Sound Level Meter Used	Calibrator Used
23 Dec 2019	16:19	-	16:49	Sunny	58.6	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
23 Dec 2019	19:19	-	19:24	Fine	56.7	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
	20:19	-	20:24		55.6		
	21:19	-	21:24		54.8		
24 Dec 2019	1:19	-	01:24	Fine	56.6	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
	3:19	-	03:24		52.8		
	5:19	-	05:24		50.4		
30 Dec 2019	16:07	-	16:37	Sunny	53.4	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
30 Dec 2019	19:07	-	19:12	Fine	51.4	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
	20:07	-	20:12		53.7		
	21:07	-	21:12		52.6		
31 Dec 2019	1:07	-	01:12	Fine	49.5	XL2 (Serial No. A2A-13661-E0)	SV33B (No. 83042)
	3:07	-	03:12		50.5		
	5:07	-	05:12		49.1		

Location: Shek Kwu Chau Treatment & Rehabilitation Centre Hostel 3 (M3 / N_S3)

Monitoring date: 2, 9, 16, 23 & 30 December 2019 (Daytime)

2&3, 9&10, 16&17, 23&24, 30&31 December 2019 (Evening & Night time)

Parameter : $L_{eq\ 30min}$ (Daytime), $L_{eq\ 5min}$ (Evening & Night time)

Noise source other than construction activities from the Project: Nil

Noise Monitoring data:

Date	Start time		End time	Weather	$L_{eq\ 30min}$ dB(A) / $L_{eq\ 5min}$ dB(A)	Sound Level Meter Used	Calibrator Used
2 Dec 2019	16:04	-	16:34	Sunny	58.0	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
2 Dec 2019	19:14	-	19:19	Fine	52.2	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
	20:14	-	20:19		54.1		
	21:14	-	21:19		57.6		
3 Dec 2019	1:14	-	01:19	Fine	54.2	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
	3:14	-	03:19		48.6		
	5:14	-	05:19		51.1		
9 Dec 2019	16:07	-	16:37	Sunny	55.8	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
9 Dec 2019	19:17	-	19:22	Fine	51.2	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
	20:17	-	20:22		54.9		
	21:17	-	21:22		54.3		
10 Dec 2019	1:17	-	01:22	Fine	48.8	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
	3:17	-	03:22		51.3		
	5:17	-	05:22		52.0		
16 Dec 2019	16:14	-	16:44	Sunny	57.4	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
16 Dec 2019	19:14	-	19:19	Fine	55.1	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
	20:14	-	20:19		56.7		
	21:14	-	21:19		50.9		
17 Dec 2019	1:14	-	01:19	Fine	47.4	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
	3:14	-	03:19		51.8		
	5:14	-	05:19		48.5		

Date	Start time		End time	Weather	$L_{eq\ 30min}$ dB(A) / $L_{eq\ 5min}$ dB(A)	Sound Level Meter Used	Calibrator Used
23 Dec 2019	16:07	-	16:37	Sunny	51.6	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
23 Dec 2019	19:07	-	19:12	Fine	56.3	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
	20:07	-	20:12		57.0		
	21:07	-	21:12		51.2		
24 Dec 2019	1:07	-	01:12	Fine	49.0	SVAN 971 (Serial No. 77731)	SV33B (No. 83042)
	3:07	-	03:12		47.4		
	5:07	-	05:12		45.6		

Appendix K Waste Flow Table

吉寶西格斯 - 振華聯營公司
Keppel Seghers - Zhen Hua Joint Venture

14Monthly Summary Waste Flow Table for 2018 (year)

Project : Integrated Waste Management Facilities, Phase I

Contract No.: EP/SP/66/12

Month	Actual Quantities of Inert C&D Materials Generated Monthly								Actual Quantities of C&D Wastes Generated Monthly					
	Total Quantity Generated	Hard Rock and Large Broken Concrete (see Note 1)	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill Sand	Imported Fill Public fill	Imported Fill Rock	Metals	Paper/ cardboard packaging	Plastics (see Note 2)	Chemical Waste		Others, e.g. general refuse (see Note 3)
	(in ,000m^3)	(in ,000m^3)	(in ,000m^3)	(in ,000m^3	(in ,000m^3)	(in ,000m^3)			(in ,000 kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000L)	(in ,000 m^3)
Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0065
Sep	0	0	0	0	0	2.9619	0	0	0	0	0	0	0	0
Oct	0	0	0	0	0	3.0771	0	0	0	0	0	0	0	0.013
Nov	0	0	0	0	0	6.7871	0	0	0	0	0	0	0	0
Dec	0	0	0	0	0	59.0709	0	0	0	0	0	0.2	0.87	0
Total	0	0	0	0	0	71.8970	0	0	0	0	0	0.2	0.87	0.0195

Notes:
(1) Broken concrete for recycling into aggregates.
(2) Plastics refer to plastic bottles/ containers, plastic sheets/ foam from packaging materials.
(3) Use the conversion factor : 1 full load of dumping truck being equivalent to 6.5m^3 by volume.

吉寶西格斯 - 振華聯營公司
Keppel Seghers - Zhen Hua Joint Venture

Monthly Summary Waste Flow Table for 2019 (year)

Project : Integrated Waste Management Facilities, Phase I

Contract No.: EP/SP/66/12

Month	Actual Quantities of Inert C&D Materials Generated Monthly								Actual Quantities of C&D Wastes Generated Monthly					
	Total Quantity Generated	Hard Rock and Large Broken Concrete (see Note 1)	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill Sand	Imported Fill Public fill	Imported Fill Rock	Metals	Paper/ cardboard packaging	Plastics (see Note 2)	Chemical Waste		Others, e.g. general refuse (see Note 3)
	(in ,000m^3)	(in ,000m^3)	(in ,000m^3)	(in ,000m^3	(in ,000m^3)	(in ,000m^3)			(in ,000 kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000L)	(in ,000 m^3)
Jan	0	0	0	0	0	82.6139	0	0	0	0	0	0	0	0.0065
Feb	0	0	0	0	0	46.7821	0	0	0	0	0	0	0	0
Mar	0	0	0	0	0	97.1	0	0.7552	0	0.256	0	0	0	0
Apr	0	0	0	0	0	58.0413	0	0	0	0	0	0	0	0
May	0	0	0	0	0	14.5625	0	1.4648	0	0	0	0	0	0.0065
Jun	0	0	0	0	0	0	0	6.8421	0	0	0	0	0	0
Sub-total	0	0	0	0	0	299.0998	0	9.0621	0	0.256	0	0	0	0.013
Jul	0	0	0	0	0	0	0	0.4289	0	0	0	0	8.4	0.013
Aug	0	0	0	0	0	2.5775	0	10.56	0	0	0	0	0	0
Sep	0	0	0	0	0	6.1081	0	8.4704	0	0.353	0	0	0	0.0065
Oct	0	0	0	0	0	9.8875	0	7.19	0	0	0	0	0	0
Nov	0	0	0	0	0	38.3088	0	19.3105	0	0	0	0	0	0.0195
Dec	0	0	0	0	0	54.3469	0	26.9807	0	0	0	0	0	0.091
Total	0	0	0	0	0	410.3286	0	82.0026	0	0.609	0	0	8.4	0.143

Notes:
(1) Broken concrete for recycling into aggregates.
(2) Plastics refer to plastic bottles/ containers, plastic sheets/ foam from packaging materials.
(3) Use the conversion factor : 1 full load of dumping truck being equivalent to 6.5m^3 by volume.

Appendix L Event / Action Plan for Coral Monitoring

Event	Action			
	ET Leader	**IEC**	**SO**	**Contractor**
Action Level Exceedance	1. Check monitoring data 2. Inform the IEC, SO ,and Contractor of the findings; 3. Increase the monitoring to at least once a month to confirm findings; 4. Propose mitigation measures for consideration	1. Discuss monitoring with the ET and the Contractor; 2. Review proposals for additional monitoring and any other measures submitted by the Contractor and advise the SO accordingly.	1. Discuss with the IEC additional monitoring requirements and any other measures proposed by the ET; 2. Make the agreement on the measures to be implemented.	1. Inform the SO and confirm notification of the non-compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the SO; 3. Implement the agreed measures.
Limit Level Exceedance	1. Undertake Steps 1-4 as in the Action Level Exceedance. If further exceedance of Limit Level, propose enhancement measures for consideration.	1. Discuss monitoring with the ET and the Contractor; 2. Review proposals for additional monitoring and any other measures submitted by the Contractor and advise the SO accordingly.	1. Discuss with the IEC additional monitoring requirements and any other measures proposed by the ET; 2. Make the agreement on the measures to be implemented.	1. Inform the SO and confirm notification of the non-compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the SO; 3. Implement the agreed measures.

Appendix M Event / Action Plan for White-Bellied Sea Eagle

<table>
<tr><th rowspan="2">Event</th><th colspan="3">Action</th></tr>
<tr><th>Environmental Team</th><th>Audit Team</th><th>Contractor</th></tr>
<tr><td>Absence of White-bellied Sea Eagle during a whole day of monitoring.</td><td>Inform audit team.

Increase monitoring frequency to daily.</td><td>Inform site engineer and contractor.

If the absence remains:
Review construction activities and noise monitoring records of the associated period;
Identify potential causes of the absence;
Propose remedial measures, such as change of construction method and sequence;
Confirm the feasibility of the proposed remedial measures with site engineer and contractor;
Discuss with environmental team about the effectiveness of the proposed remedial measures.</td><td>Implement the agreed remedial measures.</td></tr>
</table>

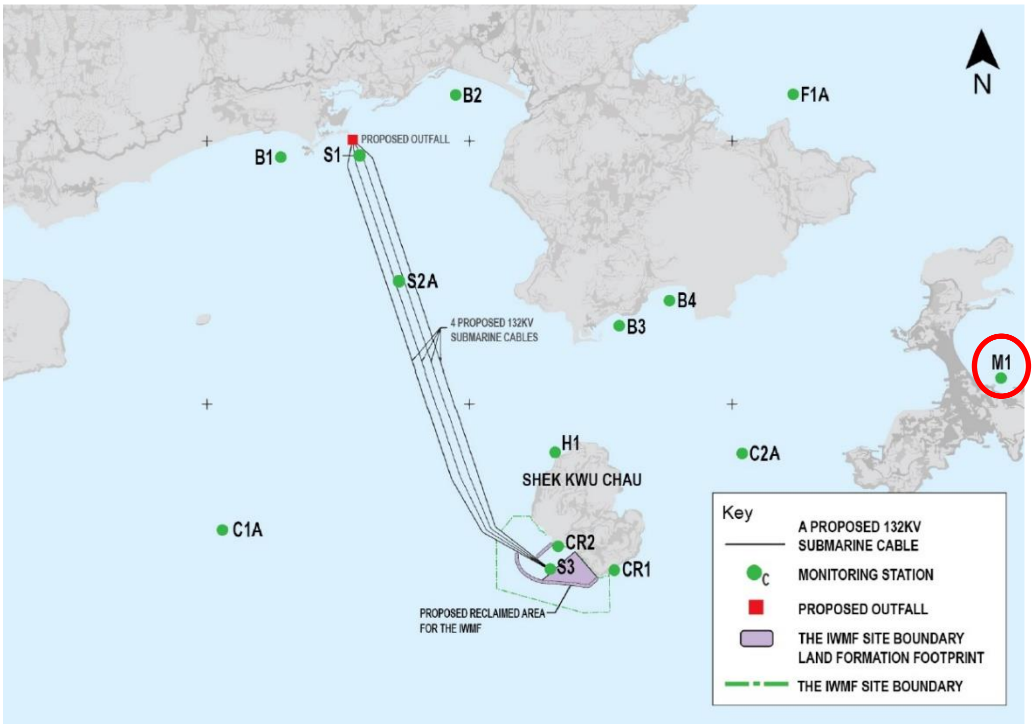
Appendix N Exceedance Report

Statistical Summary of Exceedances in the Reporting Period

Water Quality (Regular DCM)			
Location	**Action Level**	**Limit Level**	**Total**
B1	4	2	6
B2	4	3	7
B3	6	3	9
B4	2	2	4
CR1	3	1	4
CR2	4	2	6
F1A	4	2	6
H1	3	0	3
S1	2	2	4
S2A	4	3	7
S3	4	0	4
M1	2	2	4

Noise (Day Time)			
Location	**Action Level**	**Limit Level**	**Total**
M1 / N_S1	0	0	0
M2 / N_S2	0	0	0
M3 / N_S3	0	0	0
Noise (Evening Time)			
Location	**Action Level**	**Limit Level**	**Total**
M1 / N_S1	0	0	0
M2 / N_S2	0	0	0
M3 / N_S3	0	0	0
Noise (Night Time)			
Location	**Action Level**	**Limit Level**	**Total**
M1 / N_S1	0	0	0
M2 / N_S2	0	0	0
M3 / N_S3	0	0	0

<u>Incident Report on Action Level or Limit Level Non-compliance</u>

<table>
<tr><td>Project</td><td colspan="3">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="3">02 Dec 2019 (Lab result received on 05 Dec 2019)</td></tr>
<tr><td>Time</td><td colspan="3">09:45 – 13:15 (Mid-Flood)
15:09 – 17:51 (Mid-Ebb)</td></tr>
<tr><td colspan="4">Mid-Flood</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">M1

</td></tr>
<tr><td>Parameter</td><td colspan="3">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td colspan="2">Action Level</td><td>Limit Level</td></tr>
<tr><td colspan="2">≥ 15.6 mg/L (120% of C2A)</td><td>≥ 16.9 mg/L (130% of C2A)</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>17.2 mg/L (M1)</td><td>13.3 mg/L (C1A)
13.0 mg/L (C2A)</td><td>8.0 mg/L (B1)
8.5 mg/L (B2)
6.0 mg/L (B3)
7.5 mg/L (B4)
13.0 mg/L (F1A)
7.3 mg/L (H1)
14.2 mg/L (CR1)
15.3 mg/L (CR2)
13.8 mg/L (S1)
12.8 mg/L (S2A)
12.7 mg/L (S3)</td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">Works scheduled on site on 02/12 include DCM main works, DCM sample coring for DCM main works, cone penetration test, removal of the slag materials, levelling the slag materials, laying sand blanket, levelling of rock fill, levelling the sand blanket, rock filling works and dredging,

Dominating sea current direction was found to be from Southeast to Northwest at waters around Shek Kwu Chau.

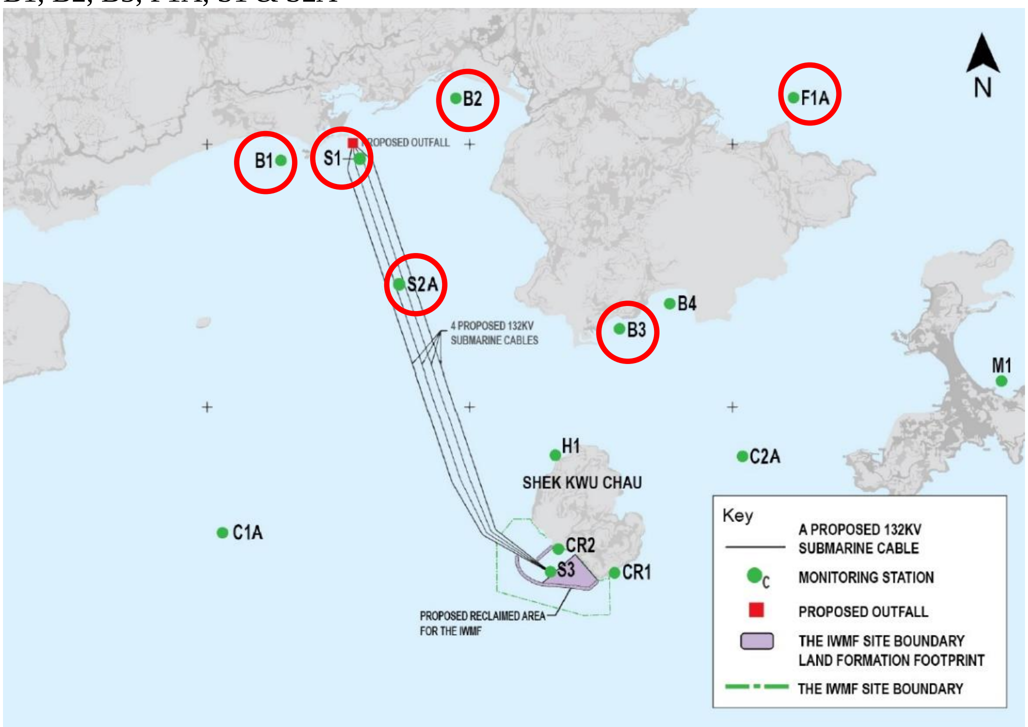
M1 is located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedance of this monitoring station is deemed to be</td></tr>
</table>

<table>
<tr><td></td><td colspan="4">unrelated to the Project.

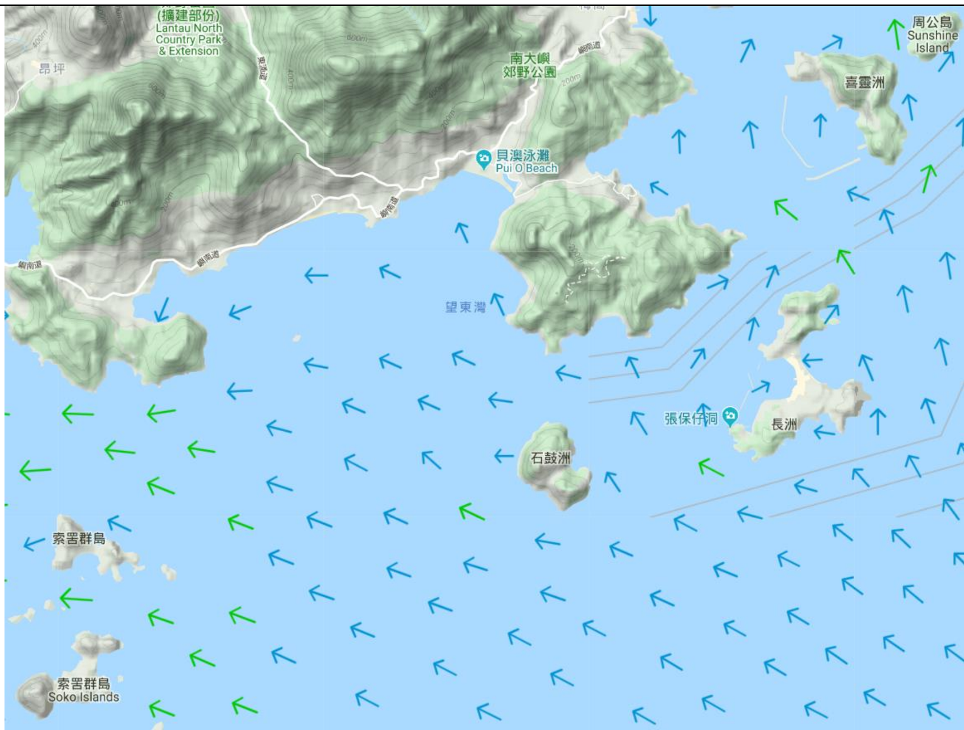
Silt curtain checking was implemented on DL5 (07:00), ESC-61 (07:00), ESC-62 (07:00), GD851 (07:00), GD853 (07:00), UDL-2 (19:00), 宏建 3 (07:00), 永照 18 (07:00) & Cheung Kee No.10 (07:00) and checking results showed that no deficiency of silt curtain was found on that day. According to the site document provided by the Contractor, no works record of 宏建 2 was stated in the site diary on that day.

From MMO monitoring records on 02/12, MMO teams were arranged for seven derrick barges (GD853, GD851, UDL-2, Cheung Kee No.10, DL5, 永照 18 & 宏建 3) and two DCM barges (ESC-61 & ESC-62) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity.

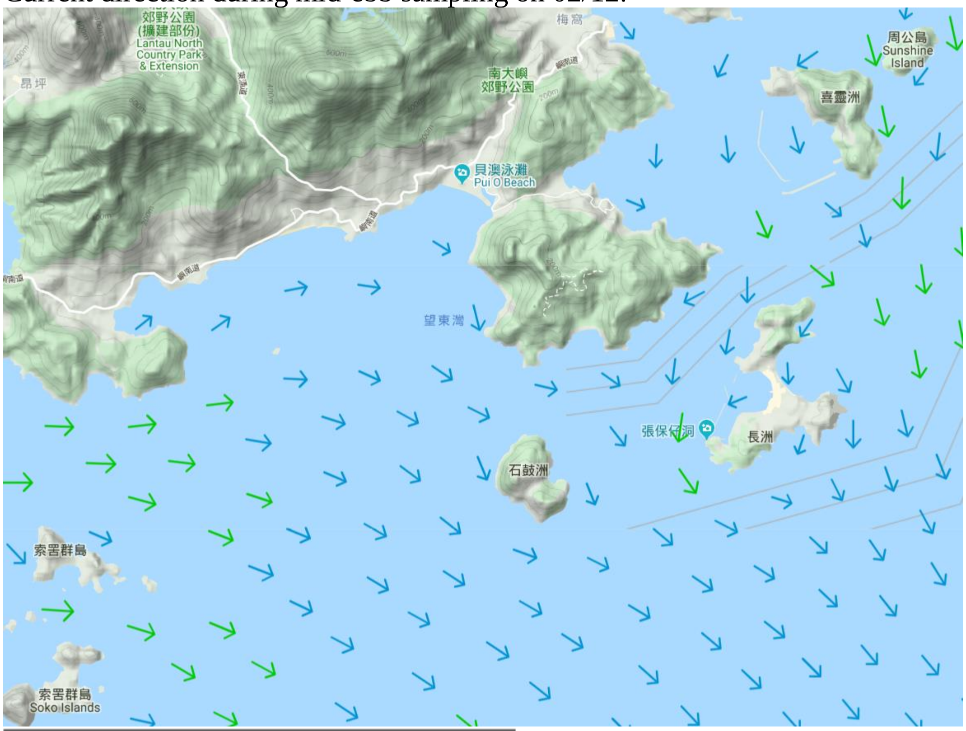
According to the field observation by sampling team & Marine Mammal Observer team during sampling event, no silt plume was observed in the Project site.

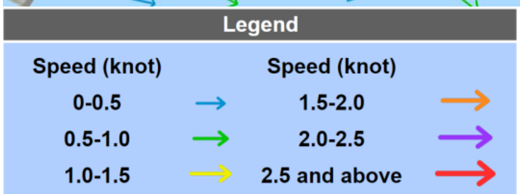
Site tidiness in the present barges in the Project site were checked during weekly site inspection on 26/11 while small amount of sediment was found at the edge of 宏建 1. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.</td></tr>
<tr><td colspan="5">Mid-Ebb</td></tr>
<tr><td>Monitoring Location</td><td colspan="4">B1, B2, B3, F1A, S1 & S2A
</td></tr>
<tr><td>Parameter</td><td colspan="4">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td colspan="2">Action Level</td><td colspan="2">Limit Level</td></tr>
<tr><td colspan="2">≥ 10.2 mg/L (120% of C1A)</td><td colspan="2">≥ 11.1 mg/L (130% of C1A)</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td colspan="2">Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>16.3 mg/L (B1)
17.8 mg/L (B2)
16.5 mg/L (B3)
12.5 mg/L (F1A)
12.0 mg/L (S1)
11.8 mg/L (S2A)</td><td colspan="2">8.5 mg/L (C1A)
10.2 mg/L (C2A)</td><td>9.5 mg/L (B4)
9.7 mg/L (H1)
8.5 mg/L (M1)
8.8 mg/L (CR1)
7.7 mg/L (CR2)
8.7 mg/L (S3)</td></tr>
<tr><td>Possible reason for Action or</td><td colspan="4">Works scheduled on site on 02/12 include DCM main works, DCM sample coring for</td></tr>
</table>

Limit Level Non-compliance	DCM main works, cone penetration test, removal of the slag materials, levelling the slag materials, laying sand blanket, levelling of rock fill, levelling the sand blanket, rock filling works and dredging, Dominating sea current direction was found to be from Northwest to Southeast at waters around Shek Kwu Chau. B1, B2, B3, F1A, S1 & S2A are located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedances of these monitoring stations are deemed to be unrelated to the Project. Silt curtain checking was implemented on DL5 (07:00), ESC-61 (07:00), ESC-62 (07:00), GD851 (07:00), GD853 (07:00), UDL-2 (19:00), 宏建 3 (07:00), 永照 18 (07:00) & Cheung Kee No.10 (07:00) and checking results showed that no deficiency of silt curtain was found on that day. According to the site document provided by the Contractor, no works record of 宏建 2 was stated in the site diary on that day. From MMO monitoring records on 02/12, MMO teams were arranged for seven derrick barges (GD853, GD851, UDL-2, Cheung Kee No.10, DL5, 永照 18 & 宏建 3) and two DCM barges (ESC-61 & ESC-62) on that day while no deficiency of silt curtain was found the commencement of and during construction activity. According to the field observation by sampling team & Marine Mammal Observer team during sampling event, no silt plume was observed in the Project site. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 26/11 while small amount of sediment was found at the edge of 宏建 1. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.
Actions taken / to be taken	Sediment at the edge of 宏建 1 had been cleaned on 28 Nov 2019. The Contractor was reminded to clean the accumulated sediment regularly to prevent falling into the sea. Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.
Remarks	Current direction during mid-flood sampling on 02/12:



Current direction during mid-ebb sampling on 02/12:

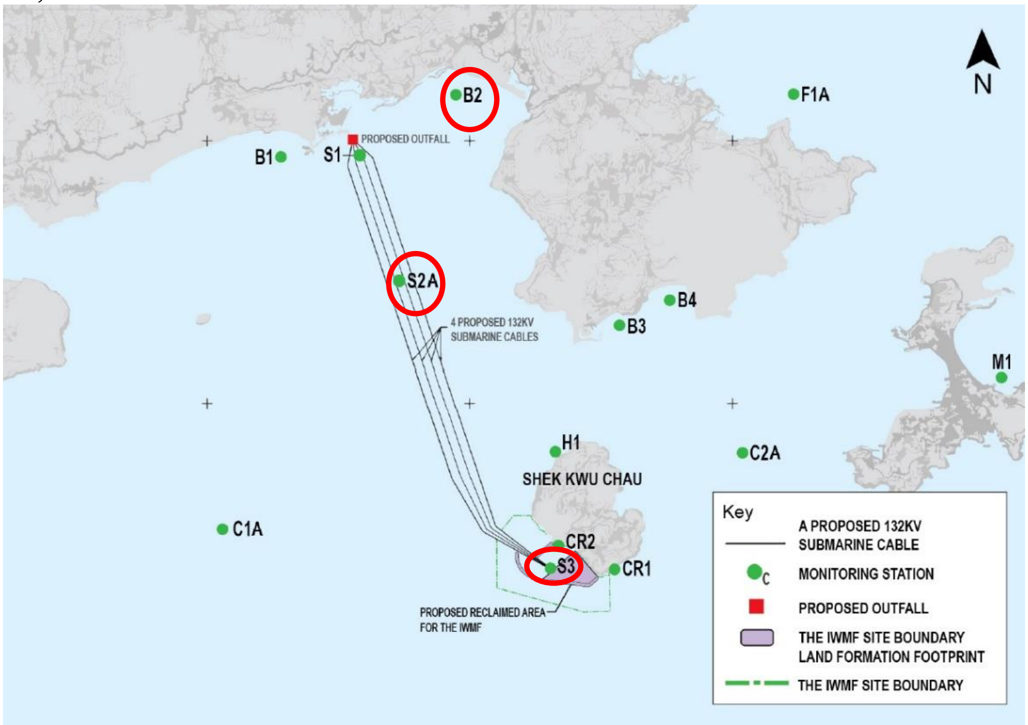




(Sourced from http://current.hydro.gov.hk/en/map.html)

Prepared by	Polar Chan
Date	11 Dec 2019

Incident Report on Action Level or Limit Level Non-compliance

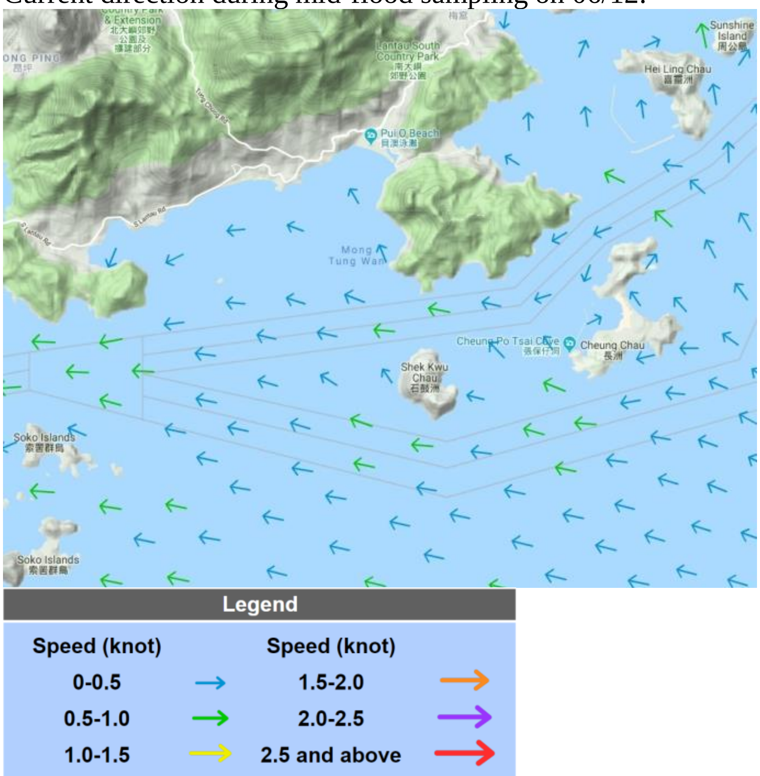
<table>
<tr><td>Project</td><td colspan="3">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="3">06 Dec 2019 (Lab result received on 11 Dec 2019)</td></tr>
<tr><td>Time</td><td colspan="3">08:07 – 11:37 (Mid-Flood)</td></tr>
<tr><td colspan="4">Mid-Flood</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">B2, S2A & S3

</td></tr>
<tr><td>Parameter</td><td colspan="3">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td colspan="2">Action Level</td><td>Limit Level</td></tr>
<tr><td colspan="2">≥ 9.0 mg/L (120% of C2A)</td><td>≥ 10.0 mg/L</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>10.0 mg/L (B2)
10.3 mg/L (S2A)
9.2 mg/L (S3)</td><td>8.3 mg/L (C1A)
7.5 mg/L (C2A)</td><td>7.0 mg/L (B1)
8.8 mg/L (B3)
8.8 mg/L (B4)
8.3 mg/L (F1A)
8.0 mg/L (H1)
8.0 mg/L (M1)
8.8 mg/L (CR1)
7.8 mg/L (CR2)
8.8 mg/L (S1)</td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">Works scheduled on site on 06/12 include DCM main works, DCM sample coring for DCM main works, cone penetration test, removal of the slag materials, levelling the slag materials, levelling of rock fill, removal steel gate of caisson, laying sand blanket, rock filling works and dredging,

Dominating sea current direction was found to be from Southeast to Northwest at waters around Shek Kwu Chau.

B2 and S2A are located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedances of these monitoring stations are deemed to be unrelated to the Project.

S3 is located close to the works location within the Project Site while silt curtain</td></tr>
</table>

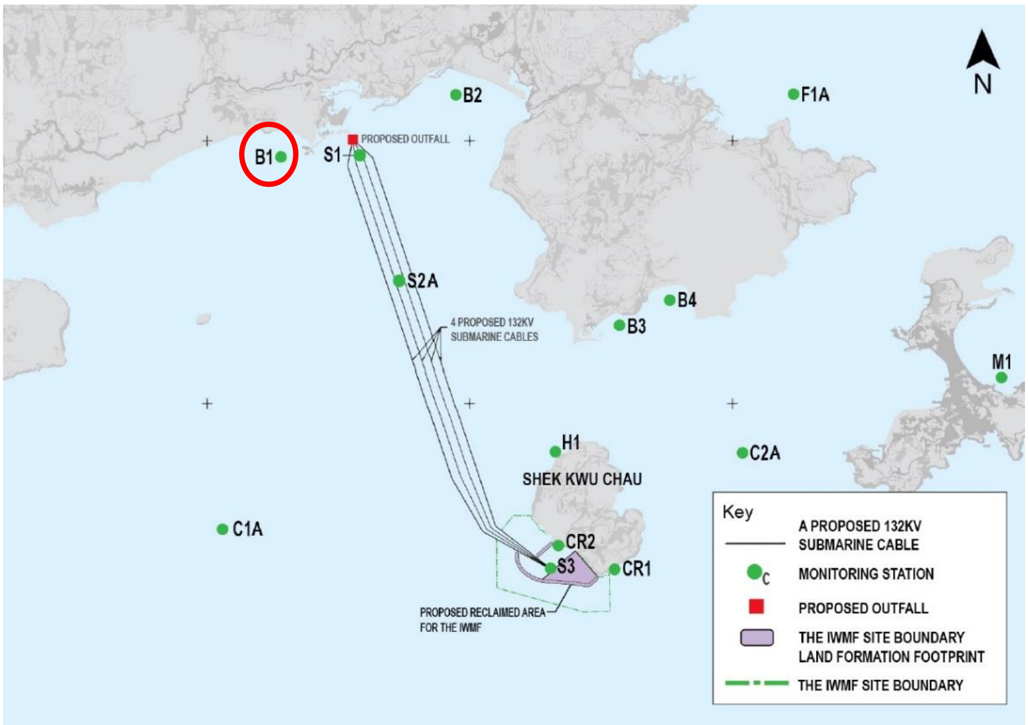
	checking was implemented on GD851 (07:00), GD853 (07:00), GD108 (17:00), UDL-2 (07:00), 宏建 1 (07:00), 宏建 2 (20:00), 宏建 3 (07:00), 永照 18 (07:00) & Cheung Kee No.10 (07:00) and checking results showed that no deficiency of silt curtain was found on that day. No DCM works scheduled on ESC-61 & ESC-62 were carried out on that day with refer to the site diary. According to the site document provided by the Contractor, no works record of 宏建 5 was stated in the site diary on that day. From MMO monitoring records on 06/12, MMO teams were arranged for ten derrick barges (GD853, GD851, GD108, 宏建 1, 宏建 2, 宏建 3, 宏建 5, Cheung Kee No.10, 永照 18, UDL-2) and two DCM barges (ESC-61 & ESC-62) on that day while no deficiency of silt curtain was found the commencement of and during construction activity. According to the field observation by sampling team & Marine Mammal Observer team during sampling event, no silt plume was observed in the Project site. It might suggest that the SS exceedance at S3 is deemed to be unrelated to the Project. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 4/12 while small amount of sediment was found at the edge of DL-5. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.
Actions taken / to be taken	Sediment at the edge of DL-5 had been cleaned on 5 Dec 2019. The Contractor was reminded to clean the accumulated sediment regularly to prevent falling into the sea. Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.
Remarks	Current direction during mid-flood sampling on 06/12:



(Sourced from http://current.hydro.gov.hk/en/map.html)

Prepared by	Polar Chan
Date	21 Dec 2019

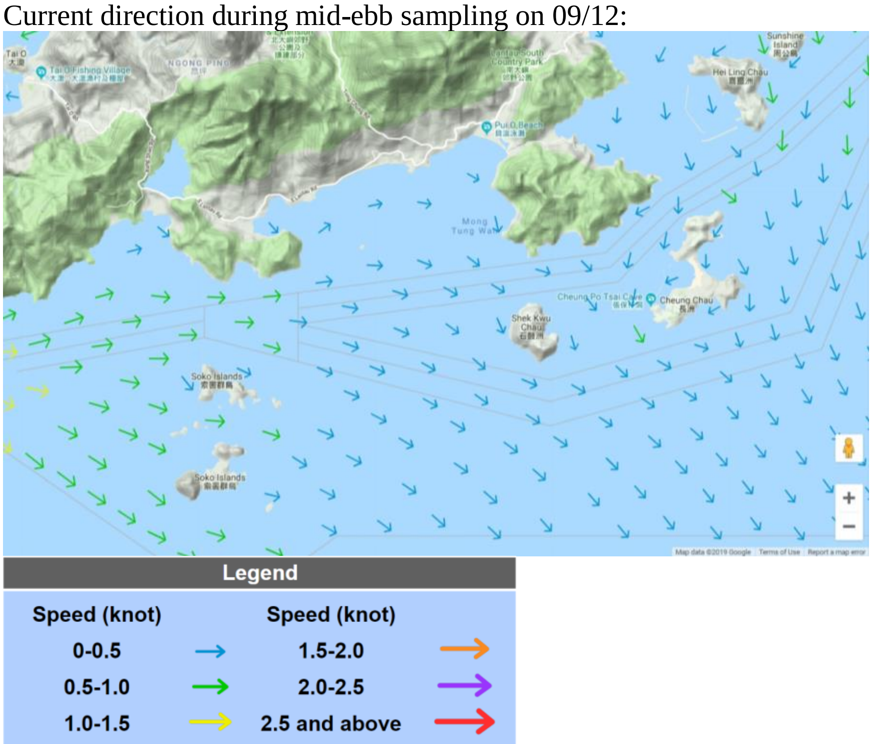
Incident Report on Action Level or Limit Level Non-compliance

<table>
<tr><td>Project</td><td colspan="3">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="3">09 Dec 2019 (Lab result received on 13 Dec 2019)</td></tr>
<tr><td>Time</td><td colspan="3">08:29 – 11:59 (Mid-Ebb)</td></tr>
<tr><td colspan="4">Mid-Ebb</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">B1

</td></tr>
<tr><td>Parameter</td><td colspan="3">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td colspan="2">Action Level</td><td>Limit Level</td></tr>
<tr><td colspan="2">≥ 9.2 mg/L (120% of C1A)</td><td>≥ 10.0 mg/L</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>9.3 mg/L (B1)</td><td>7.7 mg/L (C1A)
7.7 mg/L (C2A)</td><td>5.5 mg/L (B2)
8.3 mg/L (B3)
8.0 mg/L (B4)
6.3 mg/L (F1A)
8.7 mg/L (H1)
6.7 mg/L (M1)
8.0 mg/L (CR1)
5.5 mg/L (CR2)
9.0 mg/L (S1)
5.8 mg/L (S2A)
7.8 mg/L (S3)</td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">Works scheduled on site on 09/12 include DCM main works, DCM sample coring for DCM main works, cone penetration test, removal of G200 rock materials, levelling the slag materials, levelling the sand materials, remove steel gate for caisson, diving works for joint survey, loading slag material, infilling G75 rock material into caisson chamber and assisting installation of caisson unit.

Dominating sea current direction was found to be from Northwest to Southeast at waters around Shek Kwu Chau.

B1 is located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedance of this monitoring station is deemed to be</td></tr>
</table>

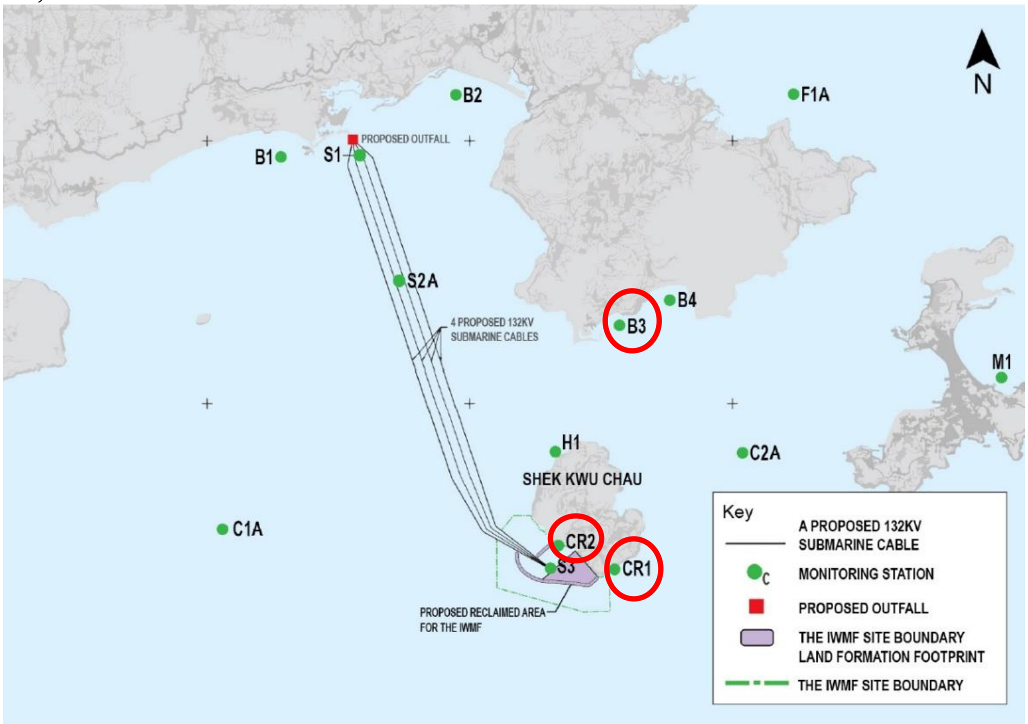
	unrelated to the Project. Silt curtain checking was implemented on GD851 (07:00), GD853 (07:00), 宏建 5 (07:00), 宏建 3 (07:00), FTB 19 (07:00), 志富 (19:00), DL-5 (07:00) & ESC-61 (07:00) and checking results showed that no deficiency of silt curtain was found on that day. No DCM works scheduled on ESC-62 was carried out with refer to the site diary on that day. According to site document provided from the Contractor, no works record of Cheung Kee No. 10 was stated in the site diary on that day. From MMO monitoring records on 09/12, MMO teams were arranged for eight derrick barges (GD853, 志富, GD851, FTB 19, DL-5, 宏建 3, 宏建 5 & Cheung Kee No.10) and two DCM barges (ESC-61 & ESC-62) on that day while no deficiency of silt curtain was found the commencement of and during construction activity. According to the field observation by sampling team & Marine Mammal Observer team during sampling event, no silt plume was observed in the Project site. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 4/12 while small amount of sediment was found at the edge of DL-5. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.
Actions taken / to be taken	Sediment at the edge of DL-5 had been cleaned on 5 Dec 2019. The Contractor was reminded to clean the accumulated sediment regularly to prevent falling into the sea. Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.
Remarks	Current direction during mid-ebb sampling on 09/12:



(Sourced from http://current.hydro.gov.hk/en/map.html)

Prepared by	Polar Chan
Date	23 Dec 2019

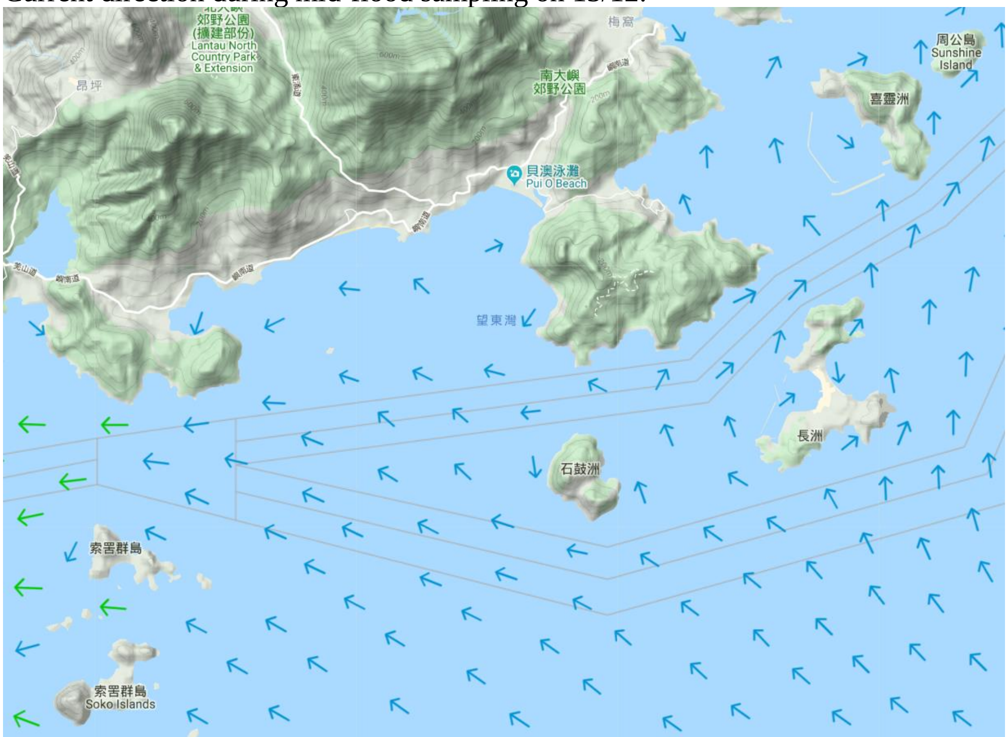
Incident Report on Action Level or Limit Level Non-compliance

<table>
<tr><td>Project</td><td colspan="3">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="3">13 Dec 2019 (Lab result received on 18 Dec 2019)</td></tr>
<tr><td>Time</td><td colspan="3">15:04 – 18:34 (Mid-Flood)</td></tr>
<tr><td colspan="4">Mid-Flood</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">B3, CR1 & CR2

</td></tr>
<tr><td>Parameter</td><td colspan="3">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td colspan="2">Action Level</td><td>Limit Level</td></tr>
<tr><td colspan="2">≥ 10.8 mg/L (120% of C2A)</td><td>≥ 11.7 mg/L (130% of C2A)</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>11.0 mg/L (B3)
13.0 mg/L (CR1)
11.8 mg/L (CR2)</td><td>7.8 mg/L (C1A)
9.0 mg/L (C2A)</td><td>7.8 mg/L (B1)
8.3 mg/L (B2)
9.0 mg/L (B4)
8.7 mg/L (F1A)
9.0 mg/L (H1)
10.3 mg/L (M1)
10.5 mg/L (S1)
9.5 mg/L (S2A)
10.2 mg/L (S3)</td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">Works schedule on site on 13/12 include DCM main works, DCM sample coring for DCM main works, cone penetration test, levelling the slag materials, removal of G200 rock material, levelling of sand materials, levelling of rockfill, laying G200 rockfill, loading slag material and removal of steel gate.

Dominating sea current direction was found to be from Southeast to Northwest at waters around Shek Kwu Chau.

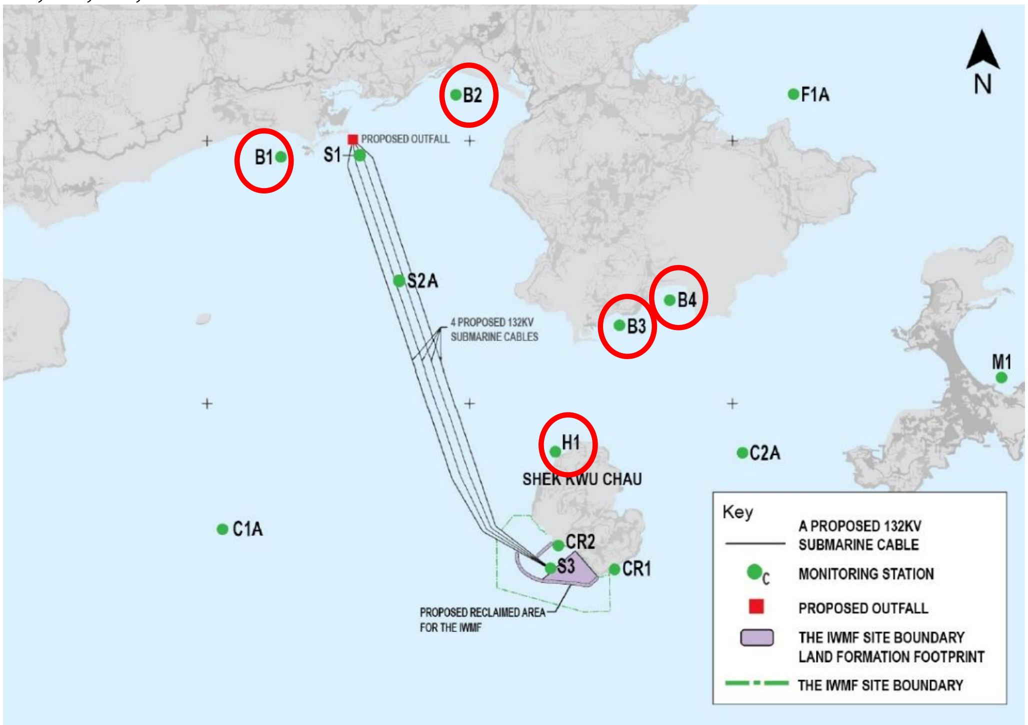
B3 is located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedance of this monitoring station is deemed to be unrelated to the Project.

CR1 is located at upstream direction and CR2 is located close to works location</td></tr>
</table>

	within the Project Site while silt curtain checking was implemented on DL-5 (22:00 @ 12/12), GD-851 (07:00), GD-853 (07:00), 宏建 3 (07:00), 永照 18 (07:00) & 宏建 5 (07:00) and checking results showed that no deficiency of silt curtain was found on that day. No DCM works scheduled in ESC-61 & ESC-62 were carried out on that day with refer to the site diary. As confirmed by the Contractor, DL-5 was operated before 7:00 am on 13/12, hence the silt curtain of DL-5 was checked on 12 Dec 2019. From MMO monitoring records on 13/12, MMO teams were arranged for six derrick barges (GD-853, GD-851, 宏建 5, DL-5, 宏建 3, 永照 18) and two DCM barges (ESC-61 & ESC-62) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity. According to the field observation by Marine Mammal Observer team & sampling team during sampling event, no silt plume was observed in the Project site. It might suggest that exceedances at CR1 & CR2 are deemed to be unrelated to the Project. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 10/12 while small amount of sediment was found at the edge of 志富 and GD108. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.
Actions taken / to be taken	Sediment on 志富 and GD108 had been cleaned on 10 Dec 2019. The crane operator had been reminded to prevent dripping during the grabbing operation. The Contractor was reminded to clean the accumulated sediment regularly to prevent falling into the sea. Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.
Remarks	Current direction during mid-flood sampling on 13/12: 

	 (Sourced from http://current.hydro.gov.hk/en/map.html)
Prepared by	Polar Chan
Date	27 Dec 2019

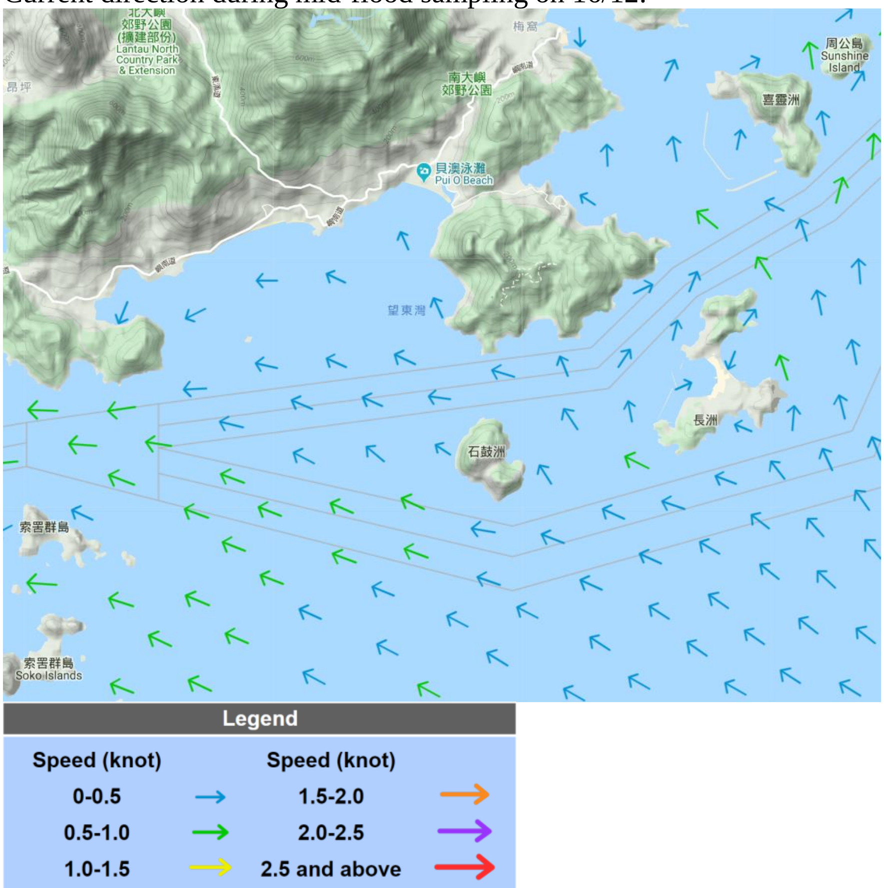
<u>Incident Report on Action Level or Limit Level Non-compliance</u>

<table>
<tr><td>Project</td><td colspan="4">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="4">16 Dec 2019 (Lab result received on 19 Dec 2019)</td></tr>
<tr><td>Time</td><td colspan="4">08:25 – 11:55 (Mid-Flood)</td></tr>
<tr><td colspan="5">Mid-Flood</td></tr>
<tr><td>Monitoring Location</td><td colspan="4">B1, B2, B3, B4 & H1

</td></tr>
<tr><td>Parameter</td><td colspan="4">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td colspan="2">Action Level</td><td colspan="2">Limit Level</td></tr>
<tr><td colspan="2">≥ 8.8 mg/L (120% of C2A)</td><td colspan="2">≥ 10.0 mg/L</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td colspan="2">Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>10.8 mg/L (B1)
13.3 mg/L (B2)
12.0 mg/L (B3)
11.5 mg/L (B4)
9.0 mg/L (H1)</td><td colspan="2">6.2 mg/L (C1A)
7.3 mg/L (C2A)</td><td>7.0 mg/L (F1A)
5.8 mg/L (M1)
6.5 mg/L (CR1)
6.3 mg/L (CR2)
6.8 mg/L (S1)
7.7 mg/L (S2A)
7.3 mg/L (S3)</td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="4">Works schedule on site on 16/12 include DCM main works, DCM sample coring for DCM main works, cone penetration test, levelling the slag materials, loading slag materials, infilling of G200 rock material, removal of G200 rock materials, levelling of sand blanket, levelling of sand materials, levelling of rockfill and laying of rockfill

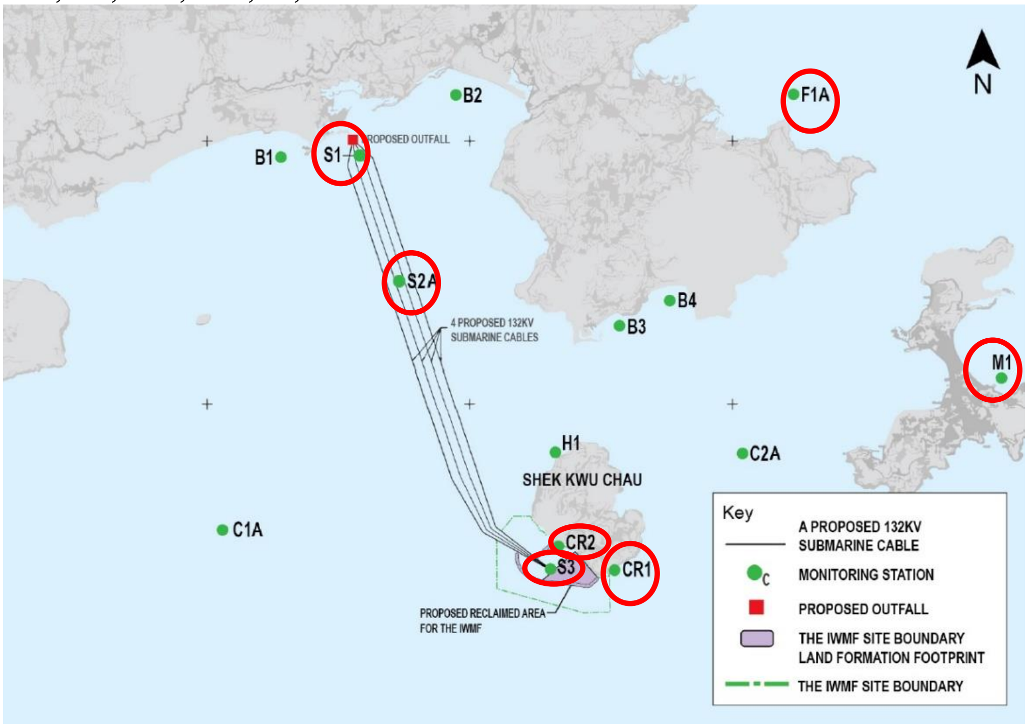
Dominating sea current direction was found to be from Southeast to Northwest at waters around Shek Kwu Chau.

B1, B2, B3 & B4 are located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedance of these monitoring stations are deemed to be unrelated to the Project.

H1 is located at downstream direction to the Project Site while silt curtain checking was implemented on DL-5 (07:00), FTB-19 (07:00), GD851 (07:00), GD853 (07:00), UDL-2 (07:00), 宏建 1 (21:30), 宏建 3 (07:00), 宏建 5 (07:00), 志富 (07:00) & 港龍</td></tr>
</table>

	108 (18:00) and checking results showed that no deficiency of silt curtain was found on that day. No DCM works scheduled in ESC-61 & ESC-62 were carried out with refer to the site diary on that day. From MMO monitoring records on 16/12, MMO teams were arranged for ten derrick barges (GD853, GD851, UDL-2, 宏建 1, 志富, 宏建 3, 港龍 108, FTB-19, DL-5 & 宏建 5) and two DCM barges (ESC-61 & ESC-62) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity. According to the field observation by Marine Mammal Observer & sampling team during sampling event, no silt plume was observed in the Project site. It might suggest that exceedance at H1 is deemed to be unrelated to the Project. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 10/12 while small amount of sediment was found at the edge of 志富 and GD108. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.
Actions taken / to be taken	Sediment on 志富 and GD108 had been cleaned on 10 Dec 2019. The crane operator had been reminded to prevent dripping during the grabbing operation. The Contractor was reminded to clean the accumulated sediment regularly to prevent falling into the sea. Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.
Remarks	Current direction during mid-flood sampling on 16/12:  (Sourced from http://current.hydro.gov.hk/en/map.html)
Prepared by	Polar Chan
Date	27 Dec 2019

Incident Report on Action Level or Limit Level Non-compliance

<table>
<tr><td>Project</td><td colspan="3">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="3">20 Dec 2019 (Lab result received on 27 Dec 2019)</td></tr>
<tr><td>Time</td><td colspan="3">08:00 – 10:08 (Mid-Ebb)
12:07 – 15:37 (Mid-Flood)</td></tr>
<tr><td colspan="4">Mid-Ebb</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">F1A, M1, CR1, CR2, S1, S2A & S3

</td></tr>
<tr><td>Parameter</td><td colspan="3">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td>Action Level</td><td colspan="2">Limit Level</td></tr>
<tr><td>≥ 9.2 mg/L (120% of C1A)</td><td colspan="2">≥ 10.0 mg/L</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>10.0 mg/L (F1A)
11.5 mg/L (M1)
9.7 mg/L (CR1)
10.5 mg/L (CR2)
10.5 mg/L (S1)
9.3 mg/L (S2A)
9.5 mg/L (S3)</td><td>7.7 mg/L (C1A)
8.5 mg/L (C2A)</td><td>8.3 mg/L (B1)
7.0 mg/L (B2)
7.8 mg/L (B3)
8.5 mg/L (B4)
8.8 mg/L (H1)</td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">Works schedule on site on 20/12 include DCM main works, DCM sample coring for DCM main works, cone penetration test, levelling the slag materials, loading slag materials, infilling of G200 rock material, laying sand blanket, laying of rockfill and dredging.

Dominating sea current direction was found to be from Northwest to Southeast at waters around Shek Kwu Chau.

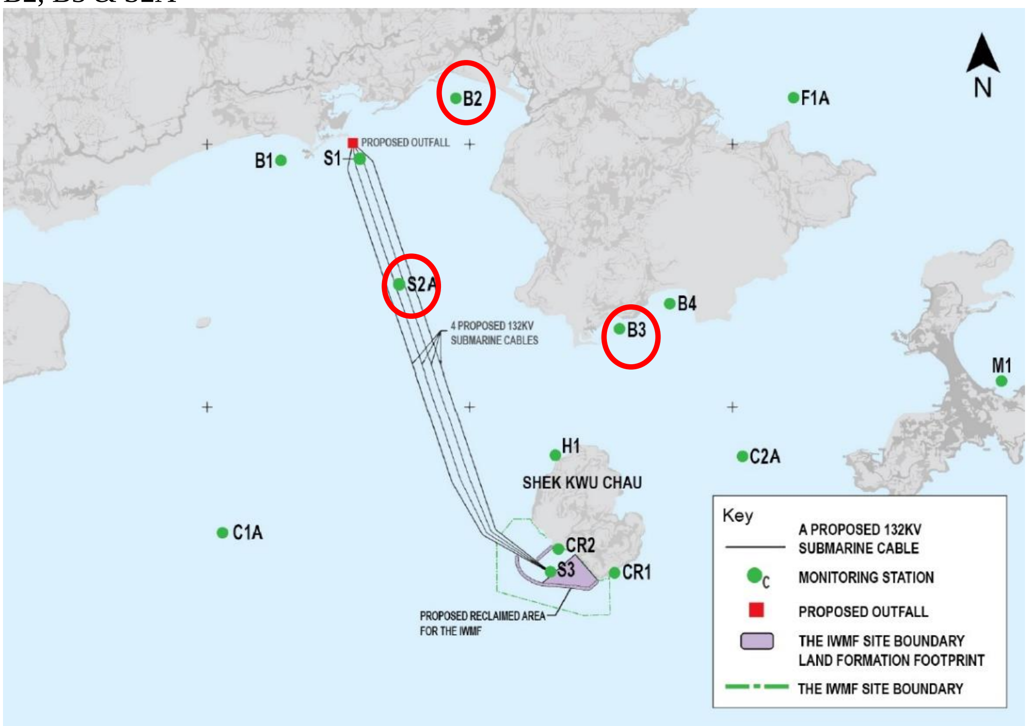
F1A, M1, S1 & S2A are located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedance of these monitoring stations are deemed to be unrelated to the Project.

CR1 is located at downstream direction, CR2 & S3 are located close to the works location within the Project Site while silt curtain checking was implemented on ESC-</td></tr>
</table>

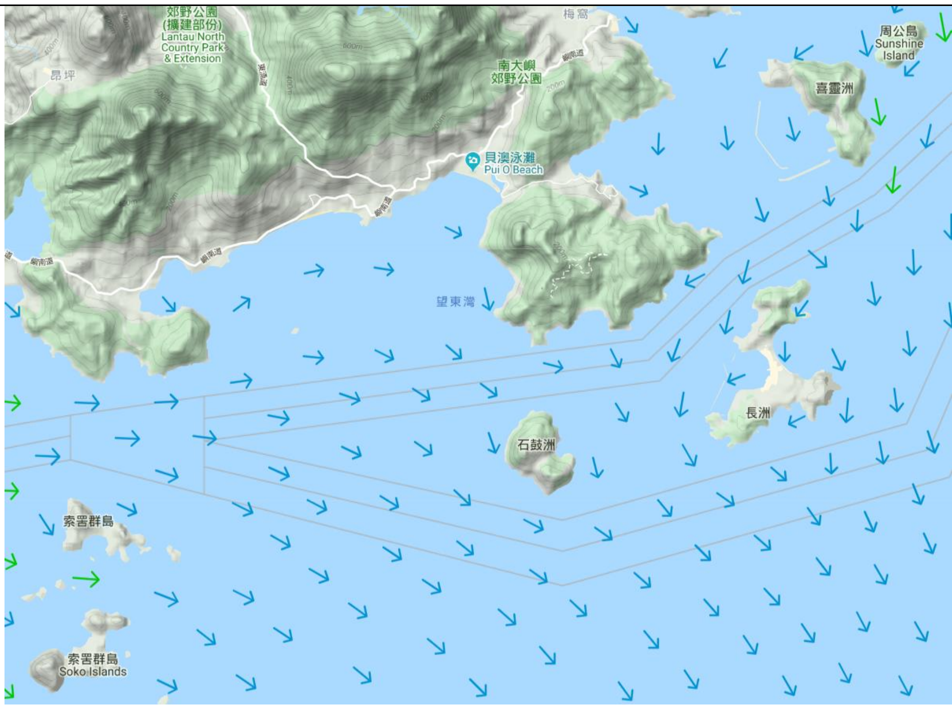
<table>
<tr><td></td><td colspan="3">61 (07:00), GD-851 (07:00), UDL-2 (07:00@19/12), 宏建 3 (07:00), 宏建 5 (07:00), 志富 (10:00), 永高 (07:00), 港龍 108 (07:00) & Cheung Kee No.10 (20:00) and checking results showed that no deficiency of silt curtain was found on that day. As confirmed by the Contractor, UDL-2 was only operated before 07:00 on 20/12, hence the silt curtain of UDL-2 was checked on 19/12. No G200 rock infilling works scheduled in 永照 18 with refer to the site diary on that day. According to the site information from the Contractor, no works record of Cheung Kee No.7 was stated in the site diary on that day.

From MMO monitoring records on 20/12, MMO teams were arranged for ten derrick barges (GD851, UDL-2, 永照 18, 永高, 志富, 宏建 3, 港龍 108, Cheung Kee No.7, Cheung Kee No.10 & 宏建 5) and one DCM barge (ESC-61) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity.

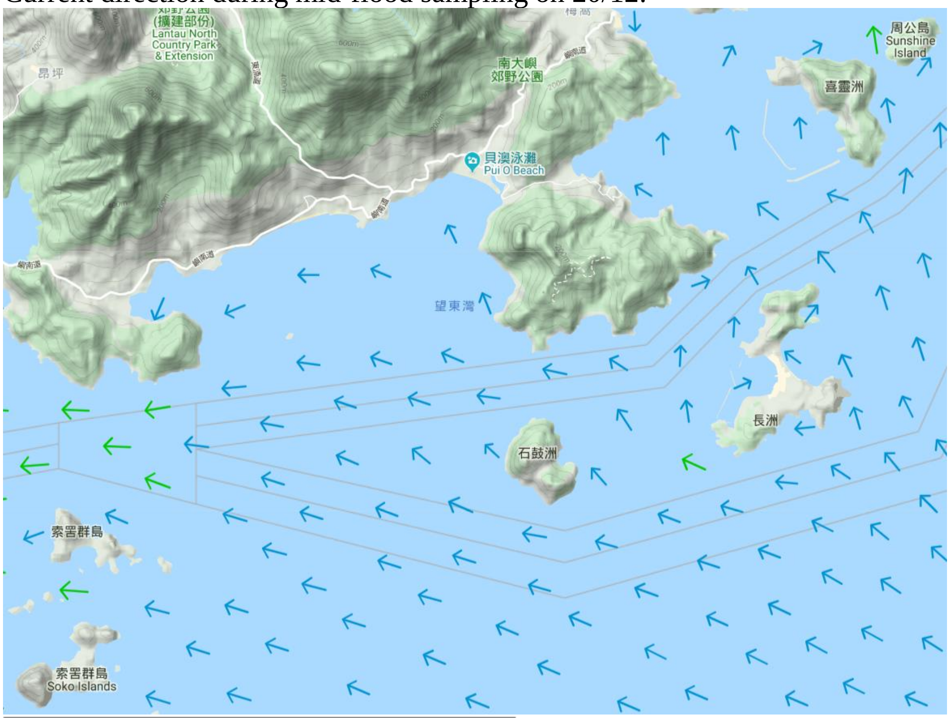
According to the field observation by Marine Mammal Observer team & sampling team during sampling event, no silt plume was observed in the Project site. It might suggest that the exceedances at CR1, CR2 & S3 are deemed to be unrelated to the Project.

Site tidiness in the present barges in the Project site were checked during weekly site inspection on 18/12 while some broken parts of silt curtain were observed on ESC-62. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.</td></tr>
<tr><td colspan="4">Mid-Flood</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">B2, B3 & S2A

</td></tr>
<tr><td>Parameter</td><td colspan="3">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td colspan="2">Action Level</td><td>Limit Level</td></tr>
<tr><td colspan="2">≥ 8.8 mg/L (120% of C2A)</td><td>≥ 10.0 mg/L</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>9.5 mg/L (B2)
9.3 mg/L (B3)
9.5 mg/L (S2A)</td><td>6.3 mg/L (C1A)
7.3 mg/L (C2A)</td><td>7.8 mg/L (B1)
7.8 mg/L (B4)
6.0 mg/L (F1A)</td></tr>
</table>

			7.7 mg/L (H1) 8.5 mg/L (M1) 8.5 mg/L (CR1) 8.7 mg/L (CR2) 6.5 mg/L (S1) 8.7 mg/L (S3)
Possible reason for Action or Limit Level Non-compliance	Works schedule on site on 20/12 include DCM main works, DCM sample coring for DCM main works, cone penetration test, levelling the slag materials, loading slag materials, infilling of G200 rock material, laying sand blanket, laying of rockfill and dredging. Dominating sea current direction was found to be from Southeast to Northwest at waters around Shek Kwu Chau. B2, B3 & S2A are located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedance of these monitoring stations are deemed to be unrelated to the Project. Silt curtain checking was implemented on ESC-61 (07:00), GD-851 (07:00), UDL-2 (07:00@19/12), 宏建 3 (07:00), 宏建 5 (07:00), 志富 (10:00), 永高 (07:00), 港龍 108 (07:00) & Cheung Kee No.10 (20:00) and checking results showed that no deficiency of silt curtain was found on that day. As confirmed by the Contractor, UDL-2 was only operated before 07:00 on 20/12, hence the silt curtain of UDL-2 was checked on 19/12. No G200 rock infilling works scheduled in 永照 18 with refer to the site diary on that day. According to the site information from the Contractor, no works record of Cheung Kee No.7 was stated in the site diary on that day. From MMO monitoring records on 20/12, MMO teams were arranged for ten derrick barges (GD851, UDL-2, 永照 18, 永高, 志富, 宏建 3, 港龍 108, Cheung Kee No.7, Cheung Kee No.10 & 宏建 5) and one DCM barge (ESC-61) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity. According to the field observation by Marine Mammal Observer team & sampling team during sampling event, no silt plume was observed in the Project site. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 18/12 while some broken parts of silt curtain were observed on ESC-62. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.		
Actions taken / to be taken	The silt curtain of ESC-62 has been repaired before returning to shipyard on 19 Dec 2019 for further maintenance. The Contractor was reminded to keep the deposited silt curtain in good position and condition. Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.		
Remarks	Current direction during mid-ebb sampling on 20/12:		



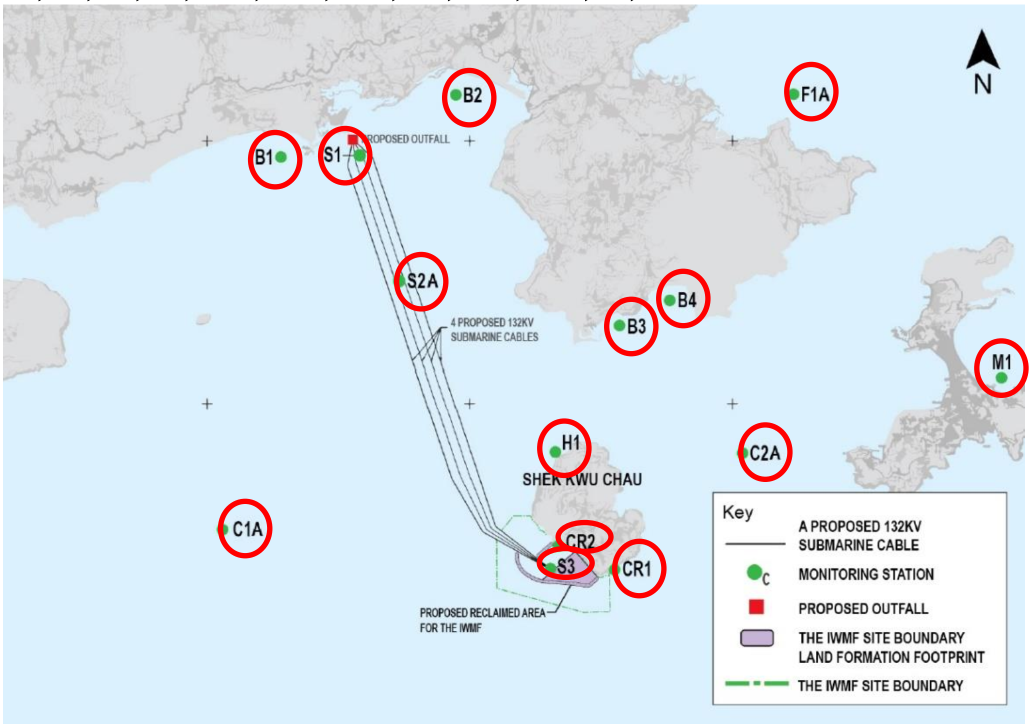
Current direction during mid-flood sampling on 20/12:



(Sourced from http://current.hydro.gov.hk/en/map.html)

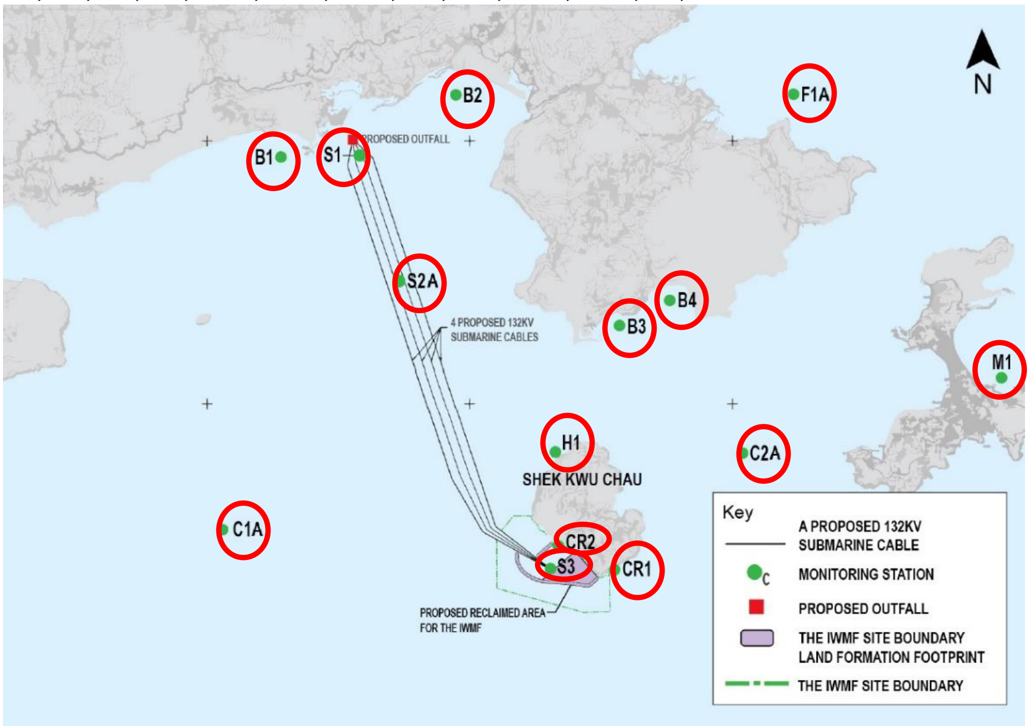
Prepared by	Polar Chan
Date	07 Jan 2020

Incident Report on Action Level or Limit Level Non-compliance

<table>
<tr><td>Project</td><td colspan="3">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="3">22 December 2019</td></tr>
<tr><td>Time</td><td colspan="3">08:00 – 11:30 (Mid-Ebb)
13:33 – 17:03 (Mid-Flood)</td></tr>
<tr><td colspan="4">Mid-Ebb</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">B1, B2, B3, B4, C1A, C2A, F1A, M1, CR1, CR2, S1, S2A & S3

</td></tr>
<tr><td>Parameter</td><td colspan="3">Dissolved Oxygen (DO)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td>Action Level</td><td colspan="2">Limit Level</td></tr>
<tr><td>≤ 7.13 mg/L</td><td colspan="2">≤ 4.00 mg/L</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) with Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>6.88 mg/L (B1)
6.96 mg/L (B2)
6.86 mg/L (B3)
6.88 mg/L (B4)
7.07 mg/L (F1A)
7.04 mg/L (H1)
7.04 mg/L (M1)
6.92 mg/L (CR1)
6.76 mg/L (CR2)
6.84 mg/L (S1)
7.04 mg/L (S2A)
6.88 mg/L (S3)</td><td>6.93 mg/L (C1A)
6.93 mg/L (C2A)</td><td></td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">All monitoring stations including control stations C1A & C2A exhibited low and similar DO level.

By reviewing the DO monitoring data in December 2018 of the Project, a seasonal fluctuation of DO level was observed in surrounding waters.

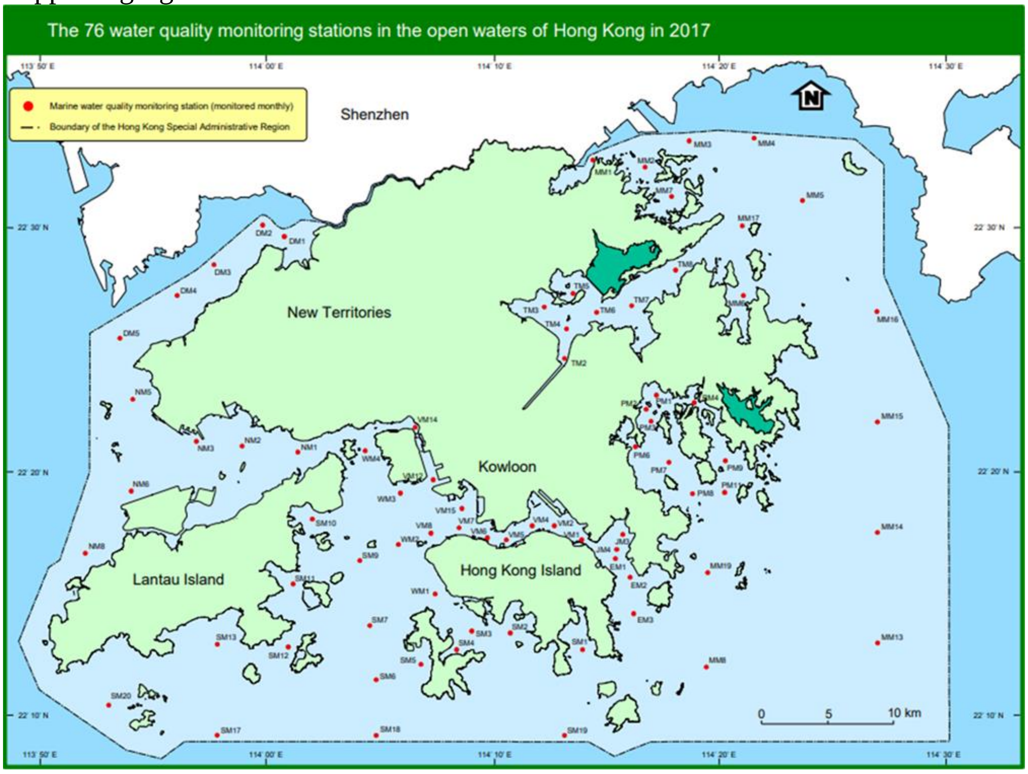
By reviewing the available data from EPD, the DO level of marine water monitoring stations SM12 & SM13 in December 2016, December 2017 & December 2018 is also below Action Level (7.13 mg/L) during dry season. Considering the absence of</td></tr>
</table>

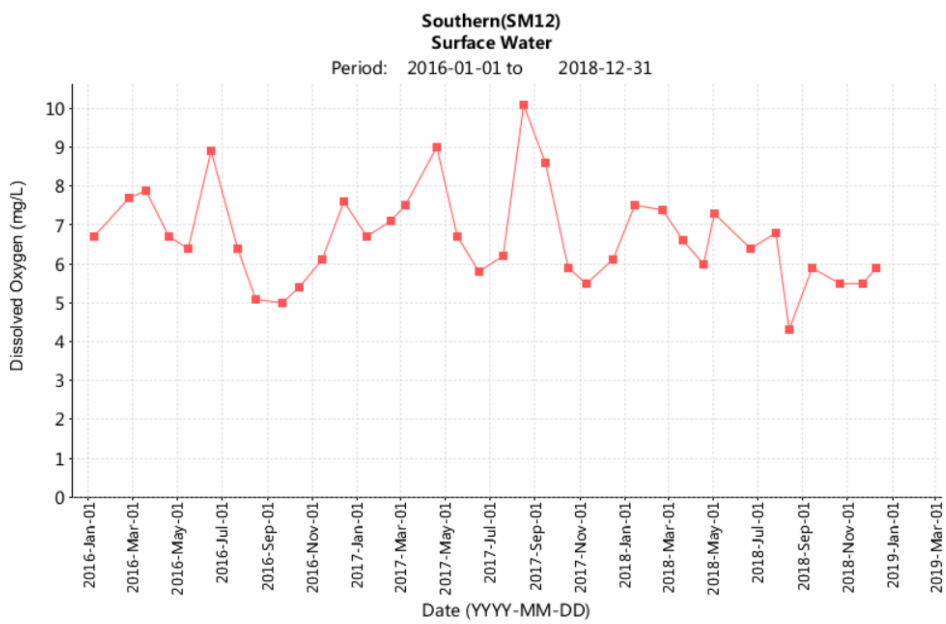
<table>
<tr><td></td><td colspan="3">distinct low DO at the impact stations near to the Project Site and plausible seasonal factor, it is concluded that exceedance of Action level of DO at all monitoring stations are related to surrounding weather conditions and deemed to be unrelated to the Project.</td></tr>
<tr><td colspan="4">Mid-Flood</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">B1, B2, B3, B4, C1A, C2A, F1A, H1, M1, CR1, CR2, S1, S2A & S3

</td></tr>
<tr><td>Parameter</td><td colspan="3">Dissolved Oxygen (DO)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td colspan="2">Action Level</td><td>Limit Level</td></tr>
<tr><td colspan="2">≤ 7.13 mg/L</td><td>≤ 4.00 mg/L</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>6.91 mg/L (B1)
6.83 mg/L (B2)
6.99 mg/L (B3)
6.84 mg/L (B4)
6.95 mg/L (F1A)
6.91 mg/L (H1)
6.88 mg/L (M1)
6.91 mg/L (CR1)
6.71 mg/L (CR2)
6.97 mg/L (S1)
6.86 mg/L (S2A)
7.05 mg/L (S3)</td><td>6.91 mg/L (C1A)
6.86 mg/L (C2A)</td><td></td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">All monitoring stations including control stations C1A & C2A exhibited low and similar DO level.

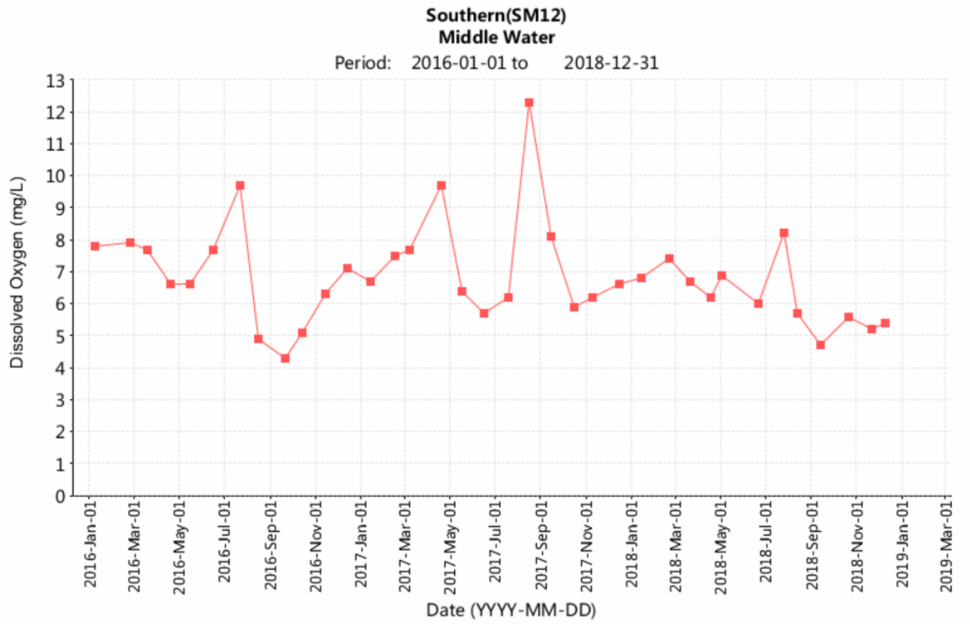
By reviewing the DO monitoring data in December 2018 of the Project, a seasonal fluctuation of DO level was observed in surrounding waters.

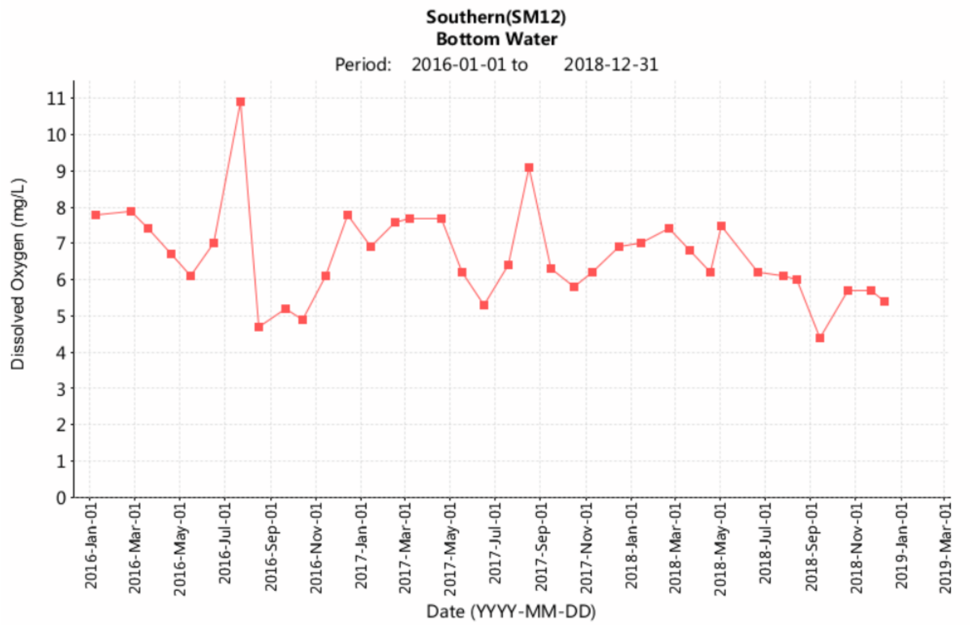
By reviewing the available data from EPD, the DO level of marine water monitoring stations SM12 & SM13 in December 2016, December 2017 & December 2018 is also below Action Level (7.13 mg/L) during dry season. Considering the absence of distinct low DO at the impact stations near to the Project Site and plausible seasonal factor, it is concluded that exceedance of Action level of DO at these monitoring</td></tr>
</table>

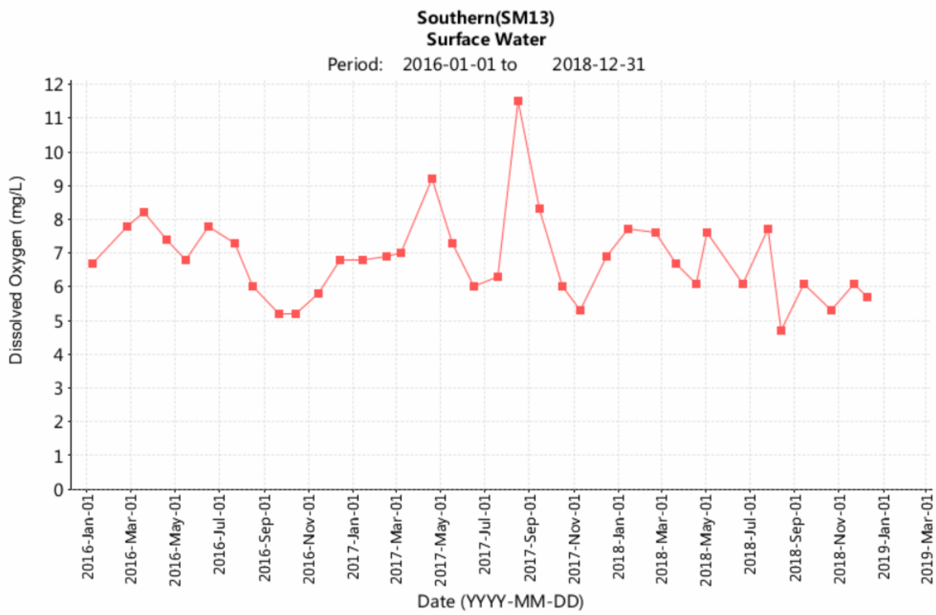
<table>
<tr><td></td><td>stations are related to surrounding weather conditions and deemed to be unrelated to the Project.</td></tr>
<tr><td>Actions taken / to be taken</td><td>Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.</td></tr>
<tr><td>Remarks</td><td>Supporting figures of the EPD water data:

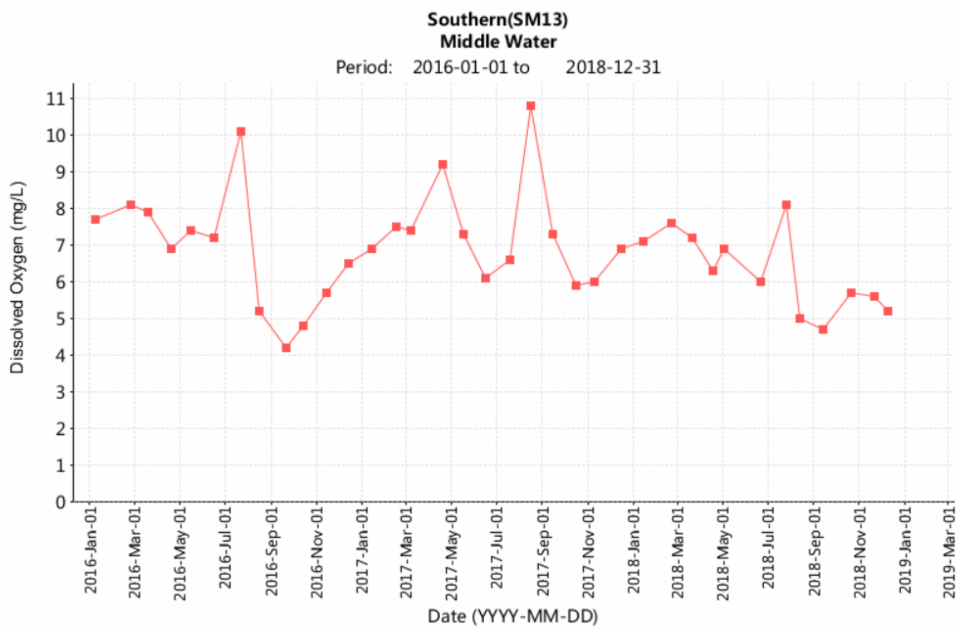


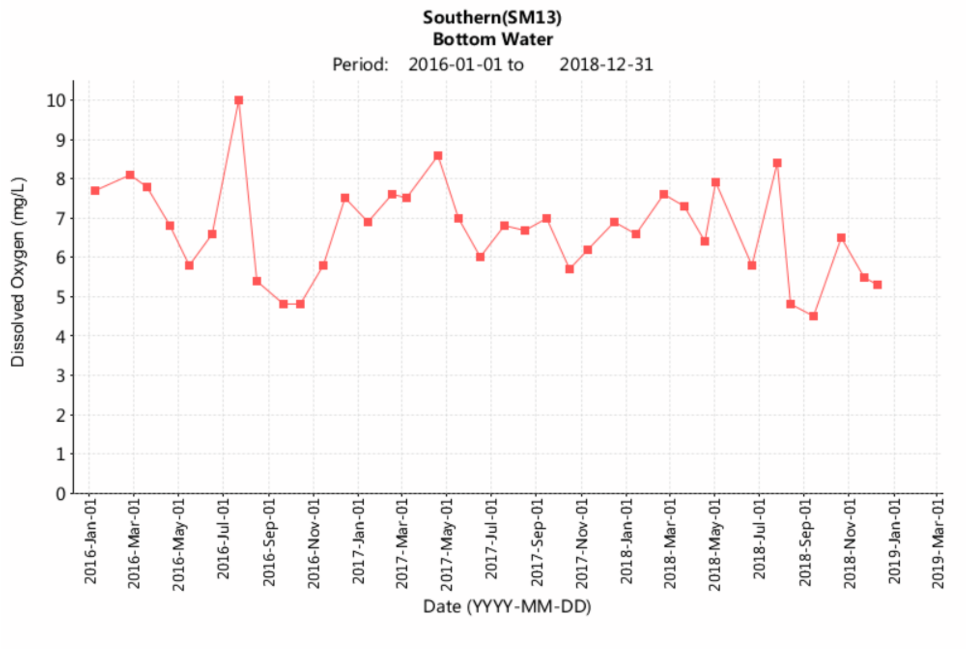

</td></tr>
</table>


Southern(SM12)
Middle Water
Period: 2016-01-01 to 2018-12-31
Dissolved Oxygen (mg/L)
Date (YYYY-MM-DD)

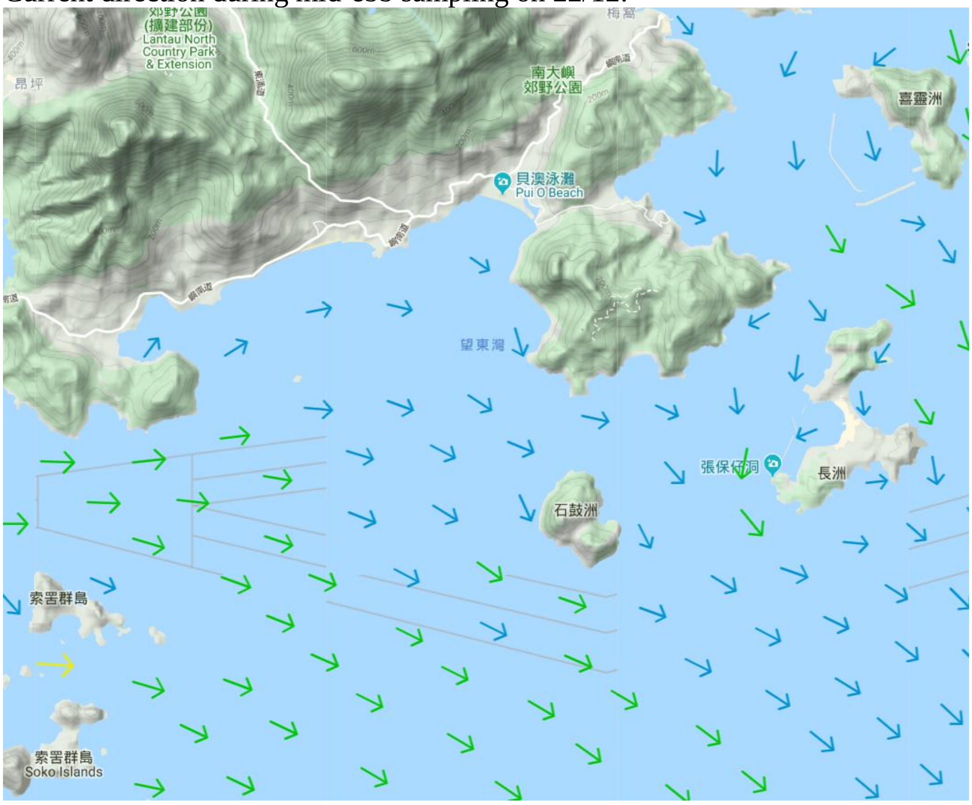

Southern(SM12)
Bottom Water
Period: 2016-01-01 to 2018-12-31
Dissolved Oxygen (mg/L)
Date (YYYY-MM-DD)


Southern(SM13)
Surface Water
Period: 2016-01-01 to 2018-12-31
Dissolved Oxygen (mg/L)
Date (YYYY-MM-DD)

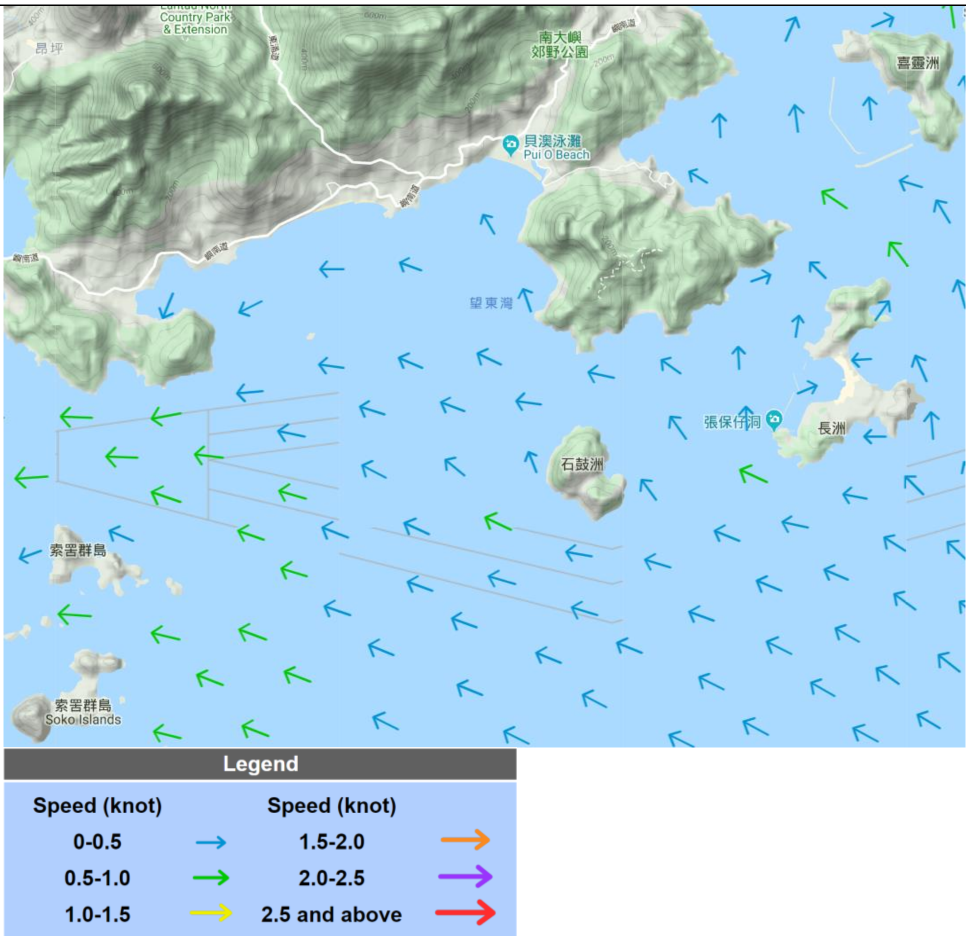

Southern(SM13)
Middle Water
Period: 2016-01-01 to 2018-12-31
Dissolved Oxygen (mg/L)
Date (YYYY-MM-DD)



Current direction during mid-ebb sampling on 22/12:



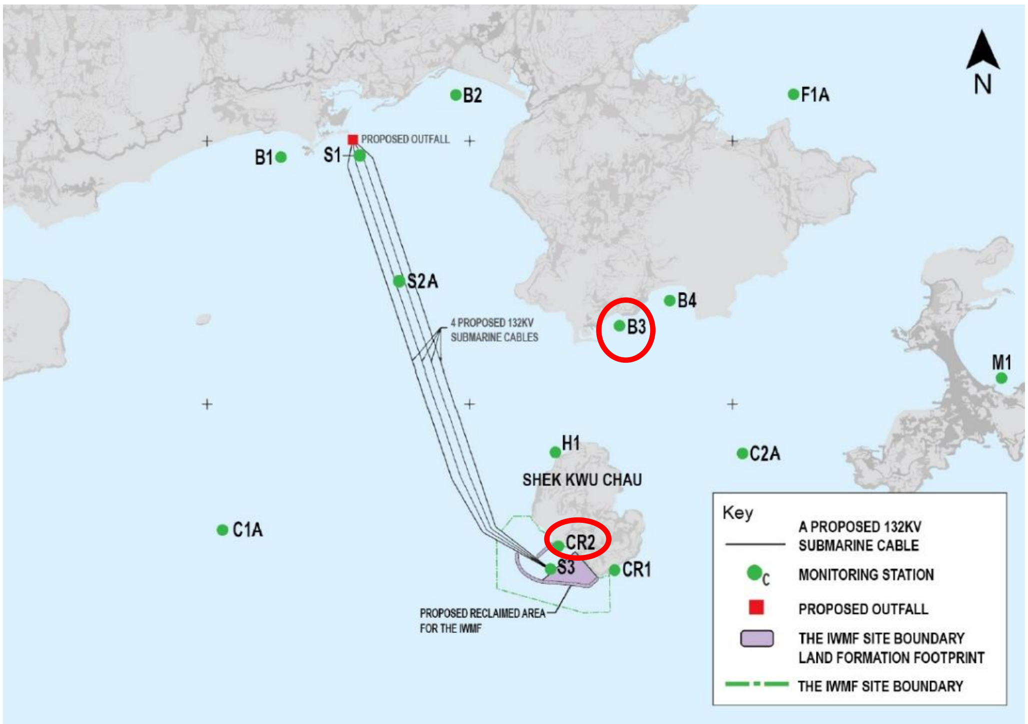
Current direction during mid-flood sampling on 22/12:



(Sourced from https://cd.epic.epd.gov.hk/EPICRIVER/marine/history/ and http://current.hydro.gov.hk/en/map.html)

Prepared by	Polar Chan
Date	09 January 2020

Incident Report on Action Level or Limit Level Non-compliance

<table>
<tr><td>Project</td><td colspan="3">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="3">24 Dec 2019 (Lab result received on 31 Dec 2019)</td></tr>
<tr><td>Time</td><td colspan="3">09:26 – 12:56 (Mid-Ebb)
14:47 – 18:17 (Mid-Flood)</td></tr>
<tr><td colspan="4">Mid-Ebb</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">B3 & CR2

</td></tr>
<tr><td>Parameter</td><td colspan="3">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td>Action Level</td><td colspan="2">Limit Level</td></tr>
<tr><td>≥ 11.2 mg/L (120% of C1A)</td><td colspan="2">≥ 12.1 mg/L (130% of C1A)</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>11.3 mg/L (B3)
11.3 mg/L (CR2)</td><td>9.3 mg/L (C1A)
8.8 mg/L (C2A)</td><td>6.8 mg/L (B1)
8.0 mg/L (B2)
8.3 mg/L (B4)
9.0 mg/L (F1A)
8.7 mg/L (H1)
9.8 mg/L (M1)
8.8 mg/L (CR1)
9.5 mg/L (S1)
5.8 mg/L (S2A)
7.7 mg/L (S3)</td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">Works schedule on site on 24/12 include DCM main works, infilling of G200 rock material, DCM sample coring for DCM main works, cone penetration test, levelling the slag materials, dredging, removal of boulder, laying sand blanket, laying of rockfill, levelling of rockfill, installation of caisson and loading slag material.

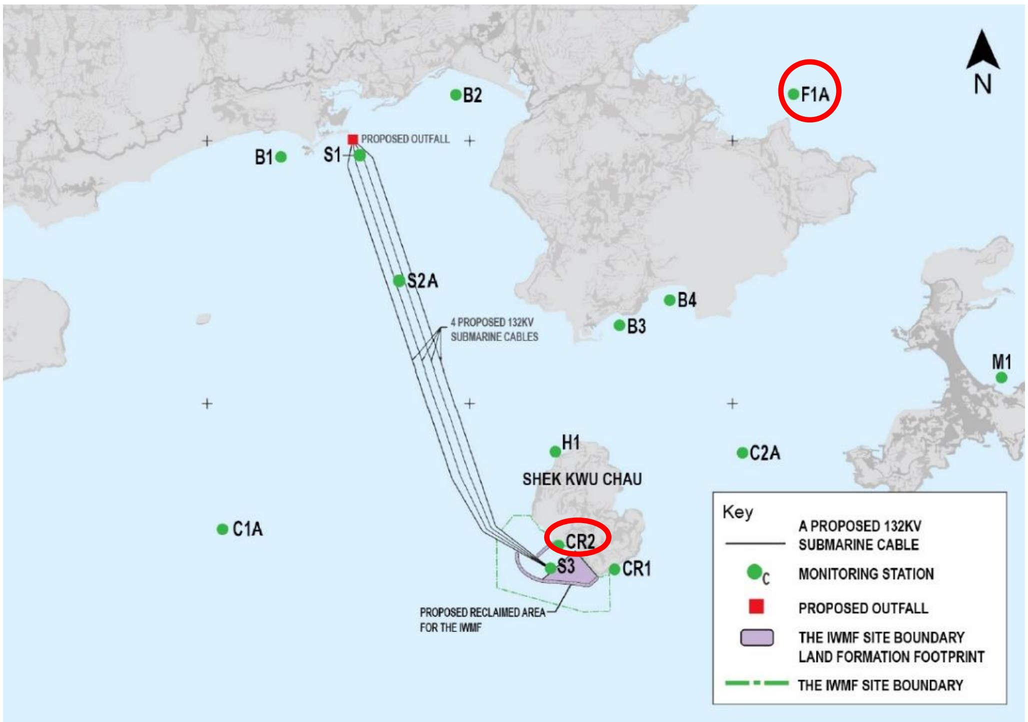
Dominating sea current direction was found to be from Northwest to Southeast at waters around Shek Kwu Chau.

B3 is located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedance of this monitoring station is deemed to be unrelated to the Project.</td></tr>
</table>

	CR2 is located close to works location within the Project Site while silt curtain checking was implemented by the Contractor on ESC-61 (07:00), GD-851 (07:00), UDL-2 (07:00), 宏建 3 (07:00), 宏建 5 (07:00), 永照 18 (07:00), 港龍 108 (07:00) & Cheung Kee No.10 (19:00) and checking results showed that no deficiency of silt curtain was found on that day. From MMO monitoring records on 24/12, MMO teams were arranged for seven derrick barges (Cheung Kee No.10, GD-851, 永照 18, 宏建 5, 宏建 3, UDL-2 & 港龍 108) and one DCM barge (ESC-61) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity. According to the field observation by Marine Mammal Observer team & sampling team during sampling event, no silt plume was observed in the Project site. It might suggest that the exceedance at CR2 is deemed to be unrelated to the Project. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 23/12. No major observation of improper site practices that could contribute to the increase of the suspended solids recorded.

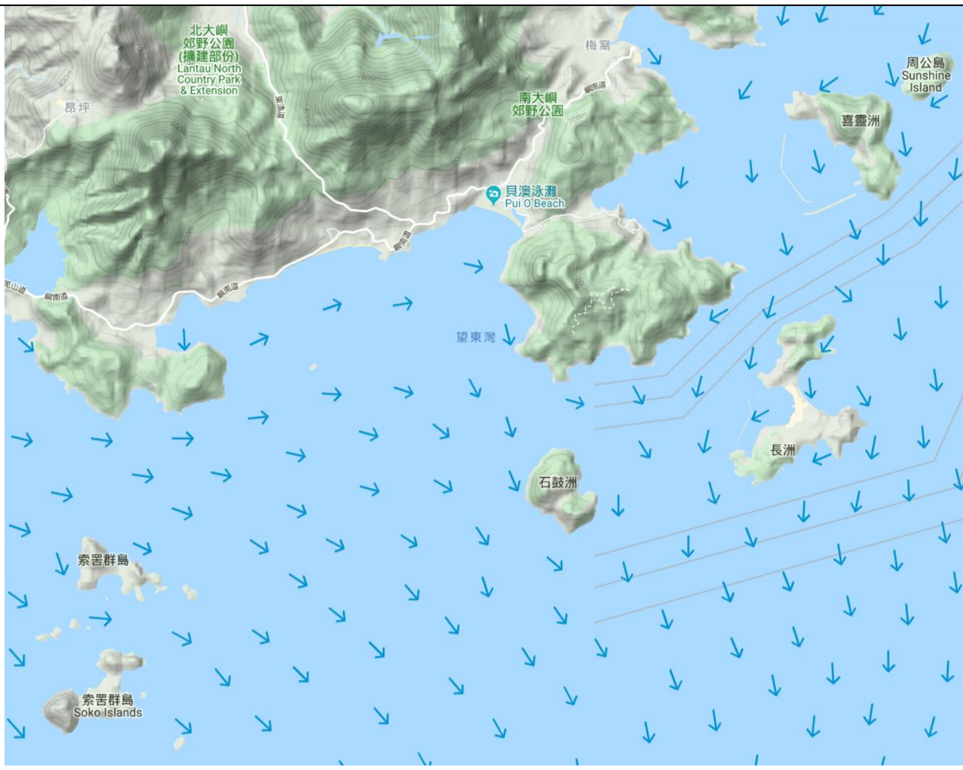
Mid-Flood

Monitoring Location	F1A & CR2

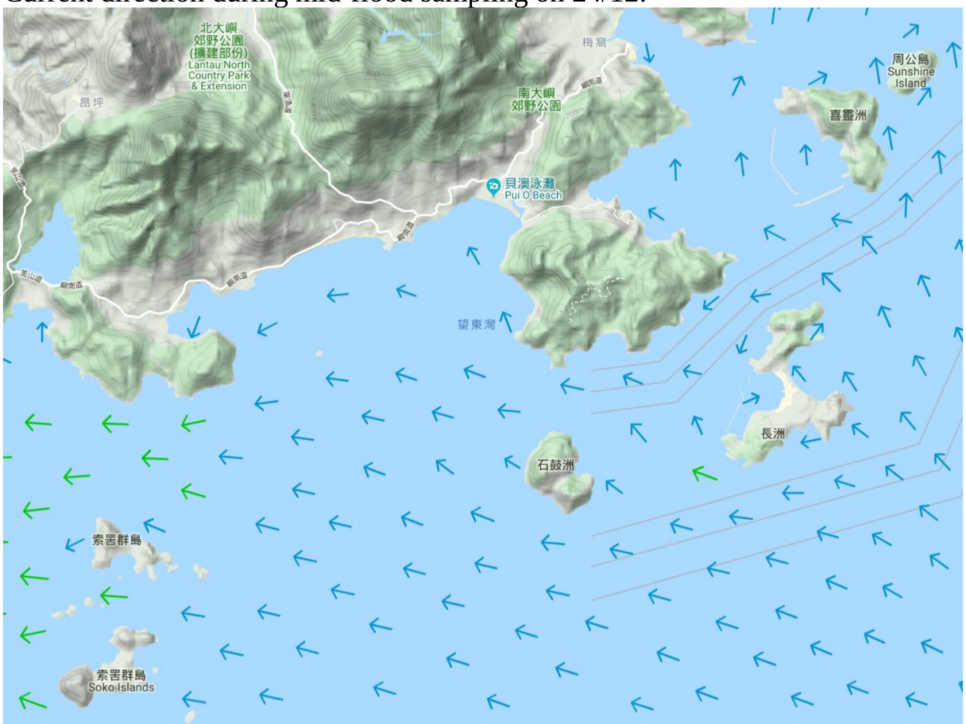


Parameter	Suspended Solid (SS)		
Action & Limit Levels	Action Level		Limit Level
	≥ 8.2 mg/L (120% of C2A)		≥ 10.0 mg/L
Measurement Level	Impact Station(s) of Exceedance	Control Stations	Impact Station(s) without Exceedance
	8.3 mg/L (F1A) 9.3 mg/L (CR2)	6.7 mg/L (C1A) 6.8 mg/L (C2A)	4.8 mg/L (B1) 5.3 mg/L (B2) 5.5 mg/L (B3) 5.3 mg/L (B4) 6.2 mg/L (H1) 6.5 mg/L (M1) 7.0 mg/L (CR1) 5.3 mg/L (S1)

			7.0 mg/L (S2A) 7.5 mg/L (S3)
Possible reason for Action or Limit Level Non-compliance	Works schedule on site on 24/12 include DCM main works, infilling of G200 rock material, DCM sample coring for DCM main works, cone penetration test, levelling the slag materials, dredging, removal of boulder, laying sand blanket, laying of rockfill, levelling of rockfill, installation of caisson and loading slag material. Dominating sea current direction was found to be from Southeast to Northwest at waters around Shek Kwu Chau. F1A is located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedance of this monitoring station is deemed to be unrelated to the Project. CR2 is located close to works location within the Project Site while silt curtain checking was implemented by the Contractor on ESC-61 (07:00), GD-851 (07:00), UDL-2 (07:00), 宏建 3 (07:00), 宏建 5 (07:00), 永照 18 (07:00), 港龍 108 (07:00) & Cheung Kee No.10 (19:00) and checking results showed that no deficiency of silt curtain was found on that day. From MMO monitoring records on 24/12, MMO teams were arranged for seven derrick barges (Cheung Kee No.10, GD-851, 永照 18, 宏建 5, 宏建 3, UDL-2 & 港龍 108) and one DCM barge (ESC-61) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity. According to the field observation by Marine Mammal Observer team & sampling team during sampling event, no silt plume was observed in the Project site. It might suggest that the exceedance at CR2 is deemed to be unrelated to the Project. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 23/12. No major observation of improper site practices that could contribute to the increase of the suspended solids recorded.		
Actions taken / to be taken	Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.		
Remarks	Current direction during mid-ebb sampling on 24/12:		



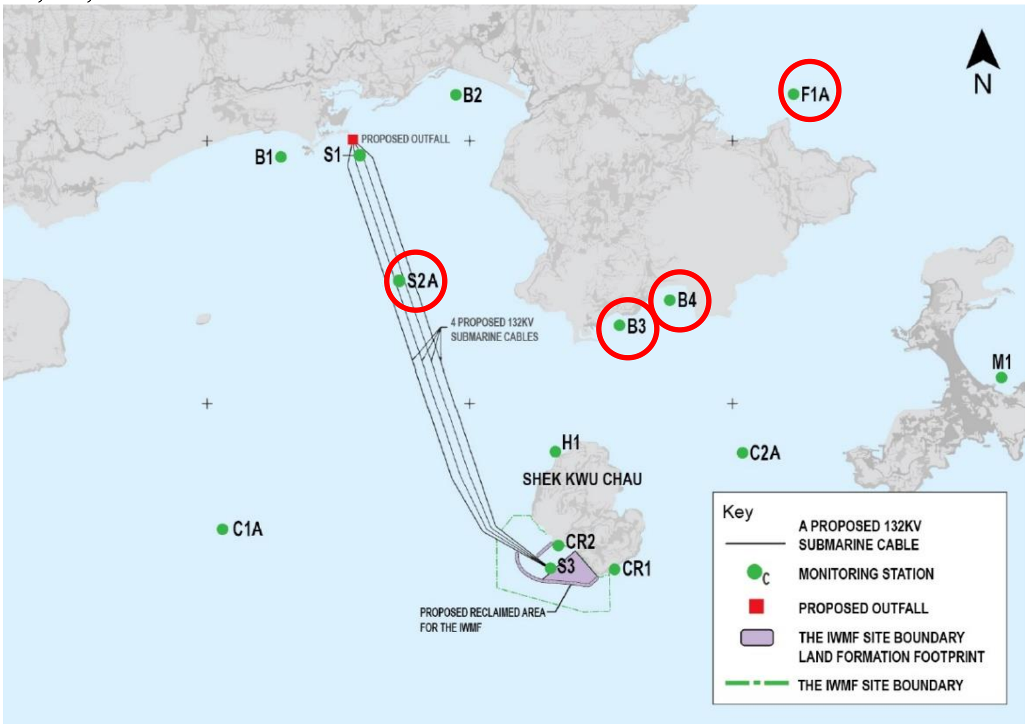
Current direction during mid-flood sampling on 24/12:



(Sourced from http://current.hydro.gov.hk/en/map.html)

Prepared by	Polar Chan
Date	03 Jan 2020

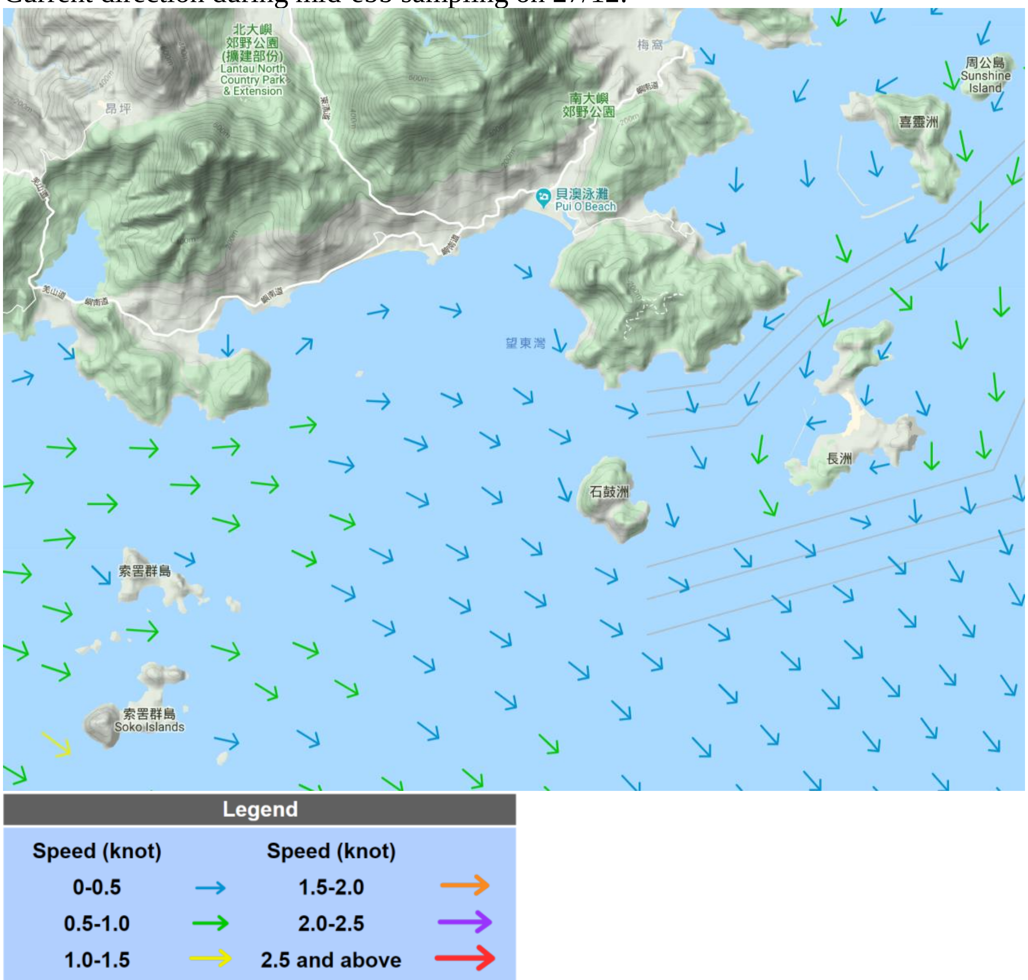
Incident Report on Action Level or Limit Level Non-compliance

<table>
<tr><td>Project</td><td colspan="3">Integrated Waste Management Facilities, Phase 1</td></tr>
<tr><td>Date</td><td colspan="3">27 Dec 2019 (Lab result received on 02 Jan 2020)</td></tr>
<tr><td>Time</td><td colspan="3">11:40 – 15:10 (Mid-Ebb)</td></tr>
<tr><td colspan="4">Mid-Ebb</td></tr>
<tr><td>Monitoring Location</td><td colspan="3">B3, B4, F1A & S2A

</td></tr>
<tr><td>Parameter</td><td colspan="3">Suspended Solid (SS)</td></tr>
<tr><td rowspan="2">Action & Limit Levels</td><td>Action Level</td><td colspan="2">Limit Level</td></tr>
<tr><td>≥ 10.0 mg/L (120% of C1A)</td><td colspan="2">≥ 10.8 mg/L (130% of C1A)</td></tr>
<tr><td rowspan="2">Measurement Level</td><td>Impact Station(s) of Exceedance</td><td>Control Stations</td><td>Impact Station(s) without Exceedance</td></tr>
<tr><td>10.8 mg/L (B3)
11.0 mg/L (B4)
10.3 mg/L (F1A)
11.3 mg/L (S2A)</td><td>8.3 mg/L (C1A)
8.2 mg/L (C2A)</td><td>7.5 mg/L (B1)
9.3 mg/L (B2)
9.3 mg/L (H1)
8.0 mg/L (M1)
8.7 mg/L (CR1)
8.8 mg/L (CR2)
9.3 mg/L (S1)
9.3 mg/L (S3)</td></tr>
<tr><td>Possible reason for Action or Limit Level Non-compliance</td><td colspan="3">Works schedule on site on 27/12 include DCM main works, infilling of G200 rock material, DCM sample coring for DCM main works, cone penetration test, levelling the slag materials, dredging, levelling of sand blanket, loading of slag materials, repairing of silt curtain, laying of sand blanket, laying of rockfill and levelling of rockfill.

Dominating sea current direction was found to be from Northwest to Southeast at waters around Shek Kwu Chau.

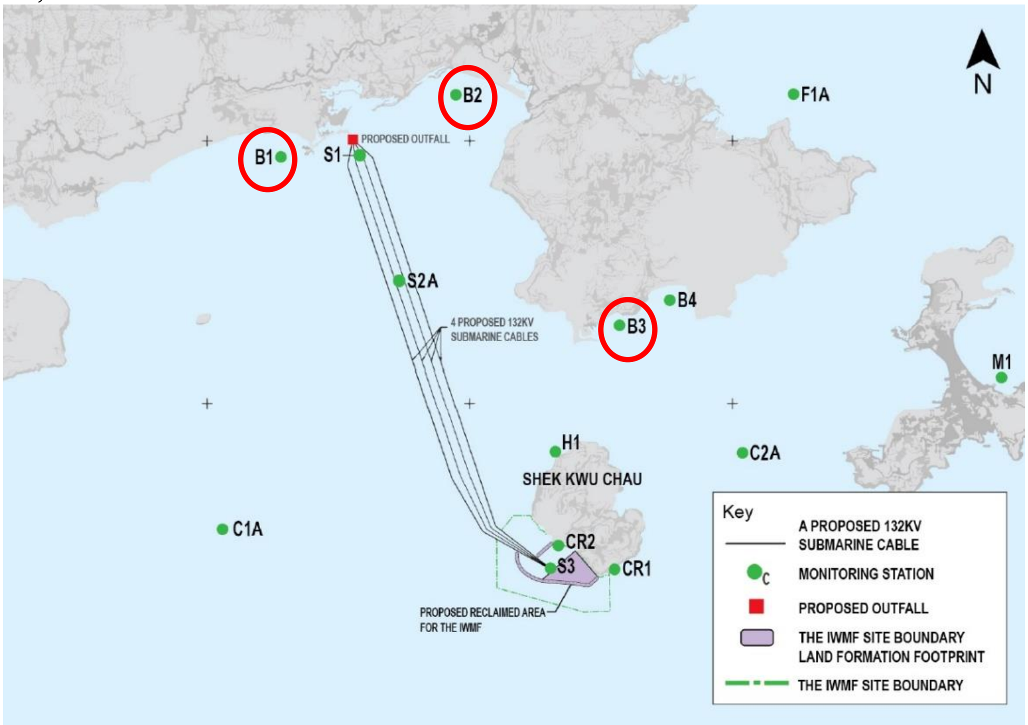
B3, B4, F1A & S2A are located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedances of these monitoring stations are deemed to be unrelated to the Project.

Silt curtain checking was implemented on DL4 (07:00), ESC-61 (07:00), GD-851</td></tr>
</table>

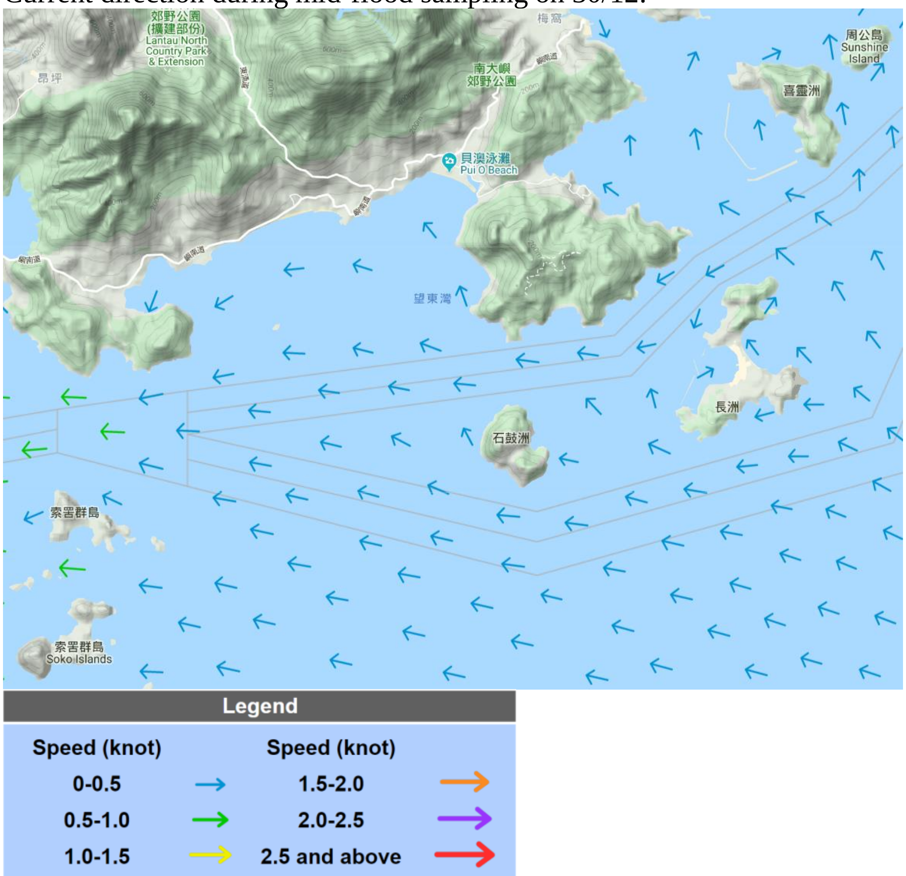
	(07:00), UDL-2 (07:00), 宏建 3 (07:00), 志富 (07:00 @ 26/12), 港龍 108 (07:00 @ 26/12) & Cheung Kee No.10 (07:00) and checking results showed that no deficiency of silt curtain was found on that day. As confirmed by the Contractor, 志富 & 港龍 108 were only operated before 07:00 on 27/12, hence the silt curtains of 志富 & 港龍 108 were checked on 26/12. From MMO monitoring records on 27/12, MMO teams were arranged for seven derrick barges (Cheung Kee No.10, GD-851, 宏建 3, 志富, UDL-2, 港龍 108 & DL-4) and one DCM barge (ESC-61) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity. According to the field observation by Marine Mammal Observer team & sampling team during sampling event, no silt plume was observed in the Project site. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 23/12. No major observation of improper site practices that could contribute to the increase of the suspended solids recorded.
Actions taken / to be taken	Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.
Remarks	Current direction during mid-ebb sampling on 27/12:  (Sourced from http://current.hydro.gov.hk/en/map.html)
Prepared by	Polar Chan
Date	03 Jan 2020

Interim Incident Report on Action Level or Limit Level Non-compliance

Project	Integrated Waste Management Facilities, Phase 1		
Date	30 Dec 2019 (Lab result received on 07 Jan 2020)		
Time	08:22 – 11:52 (Mid-Flood)		
Mid-Flood			
Monitoring Location	B1, B2 & B3		



Parameter	Suspended Solid (SS)		
Action & Limit Levels	Action Level	Limit Level	
	≥ 8.0 mg/L	≥ 10.0 mg/L	
Measurement Level	Impact Station(s) of Exceedance	Control Stations	Impact Station(s) without Exceedance
	8.8 mg/L (B1) 8.3 mg/L (B2) 8.3 mg/L (B3)	4.7 mg/L (C1A) 5.3 mg/L (C2A)	6.0 mg/L (B4) 4.0 mg/L (F1A) 5.3 mg/L (H1) 7.2 mg/L (M1) 5.7 mg/L (CR1) 5.2 mg/L (CR2) 6.3 mg/L (S1) 5.8 mg/L (S2A) 5.3 mg/L (S3)
Possible reason for Action or Limit Level Non-compliance	Works schedule on site on 30/12 include DCM main works, infilling of caisson, DCM sample coring for DCM main works, cone penetration test, levelling the slag materials, dredging, levelling of sand blanket, loading slag materials, removal of boulder, laying sand blanket, laying of rockfill, levelling of rockfill, flattening of rockfill and installation of caisson. Dominating sea current direction was found to be from Southeast to Northwest at waters around Shek Kwu Chau. B1, B2 & B3 are located at unrelated stream direction (neither upstream nor downstream, far away) to the works location, exceedances of these monitoring station are deemed to be unrelated to the Project.		

	Silt curtain checking was implemented by the Contractor on GD-853 (07:00), 港龍 108 (13:00), 宏建 2 (07:00), 宏建 3 (07:00), 志富 (18:00) & Cheung Kee No.10 (18:00) and checking results showed that no deficiency of silt curtain was found on that day. No DCM works scheduled in ESC-61 was carried out on that day with refer to the site diary. From MMO monitoring records on 30/12, MMO teams were arranged for six derrick barges (GD-853, 志富, 宏建 3, Cheung Kee No.10, 宏建 2 & 港龍 108) and one DCM barge (ESC-61) on that day while no deficiency of silt curtain was found before the commencement of and during construction activity. According to the field observation by Marine Mammal Observer team & sampling team during sampling event, no silt plume was observed in the Project site. Site tidiness in the present barges in the Project site were checked during weekly site inspection on 30/12 while garbage was observed inside the cage-type silt curtain on ESC-62. However, according to the rationale in previous paragraphs, this observation might not contribute to the increase of the suspended solids recorded.
Actions taken / to be taken	Garbage has been cleared up on 31 Dec 2019. The Contractor is remined to keep good site tidiness. Examination of environmental performance of the Project will be continued during the weekly inspection, and the Contractor is reminded to implement all applicable mitigation measures as per the Updated EM&A Manual.
Remarks	Current direction during mid-flood sampling on 30/12:  (Sourced from http://current.hydro.gov.hk/en/map.html)
Prepared by	Polar Chan
Date	08 Jan 2020

Appendix O Complaint Log

Statistical Summary of Environmental Complaints

Reporting Period	Environmental Complaint Statistics		
	Frequency	**Cumulative**	**Complaint Nature**
1 Dec 2019- 31 Dec 2019	0	0	N/A

Statistical Summary of Environmental Summons

Reporting Period	Environmental Summons Statistics		
	Frequency	**Cumulative**	**Details**
1 Dec 2019- 31 Dec 2019	0	0	N/A

Statistical Summary of Environmental Prosecution

Reporting Period	Environmental Prosecution Statistics		
	Frequency	**Cumulative**	**Details**
1 Dec 2019- 31 Dec 2019	0	0	N/A

Appendix P Impact Monitoring Schedule of Next Reporting Month

Impact Monitoring Schedule for IWMF

Jan-20

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
				Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 15:31 - 18:28 Flood Tide: 07:40 - 15:31 Monitoring Time: Mid-ebb: 15:14 - 18:44 Mid-flood: 09:50 - 13:20	Impact Ecology monitoring for WBSE	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 01:34 - 10:00 Flood Tide: 10:00 - 18:00 Monitoring Time: *# Mid-ebb: 08:00 - 10:00 Mid-flood: 12:15 - 15:45
5	6	7	8	9	10	11
	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 05:50 - 10:59 Flood Tide: 10:59 - 18:34 Monitoring Time: *# Mid-ebb: 08:00 - 10:43 Mid-flood: 13:01 - 16:31 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3 Ecology monitoring for Marine Mammals by Vessel-based Line-Transect Survey	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 08:33 - 12:18 Flood Tide: 12:18 - 19:17 Monitoring Time: Mid-ebb: 08:40 - 12:10 Mid-flood: 14:02 - 17:32	Impact Ecology monitoring for WBSE	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 10:11 - 13:42 Flood Tide: 13:42 - 20:32 Monitoring Time: Mid-ebb: 10:11 - 13:41 Mid-flood: 15:22 - 18:52	
12	13	14	15	16	17	18
	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 12:27 - 16:19 Flood Tide: 05:33 - 12:27 Monitoring Time: Mid-ebb: 12:38 - 16:08 * Mid-flood: 08:00 - 11:30 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 14:07 - 18:07 Flood Tide: 06:57 - 14:07 Monitoring Time: &# Mid-ebb: 14:22 - 17:52 Mid-flood: 08:47 - 12:17	Impact Ecology monitoring for WBSE	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 11:52 - 18:54 Flood Tide: 08:27 - 11:52 Monitoring Time: Mid-ebb: 13:38 - 17:08 Mid-flood: 08:24 - 11:54	
19	20	21	22	23	24	25
	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 06:45 - 10:59 Flood Tide: 10:59 - 18:15 Monitoring Time: *# Mid-ebb: 08:00 - 10:46 Mid-flood: 12:52 - 16:22 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3 Ecology monitoring for Marine Mammals by Vessel-based Line-Transect Survey	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 09:27 - 12:44 Flood Tide: 12:44 - 19:30 Monitoring Time: Mid-ebb: 09:20 - 12:50 Mid-flood: 14:22 - 17:52	Impact Ecology monitoring for WBSE	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 10:46 - 14:17 Flood Tide: 14:17 - 20:43 Monitoring Time: Mid-ebb: 10:46 - 14:16 Mid-flood: 15:45 - 19:15	
26	27	28	29	30	31	
			Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 13:21 - 17:35 Flood Tide: 06:46 - 13:21 Monitoring Time: Mid-ebb: 113:43 - 17:13 Mid-flood: 08:18 - 11:48 Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Daytime, Evening & Night time Noise monitoring for M1, M2 & M3	Impact Water Quality monitoring for B1, B2, B3, B4, H1, C1A, C2A, F1A, CR1, CR2, M1, S1, S2A & S3 Tidal Period: Ebb Tide: 14:23 - 19:14 Flood Tide: 07:13 - 14:23 Monitoring Time: Mid-ebb: 15:03 - 18:33 Mid-flood: 09:03 - 14:23 Ecology monitoring for WBSE	

Remarks:
1. Daytime Noise Monitoring (07:00-1900), Evening Time Noise Monitoring (1900-2300), Night Time Noise Monitoring (2300-0700)
2. Water Quality Monitoring for S1,S2 and S3 will only conduct during DCM works, refer to Detailed DCM Plan

Note:
* - as per Marine Department Notice No 107 of 2018, all vessels employed for the works should stay in the works area outside the hours of works (0700 to 2300). Due to safty concern, Water Quality Monitoring would start at 0800.
# - Prioritized routing: Mid-Ebb: C1→S3→CR2→CR1→H1→Remaining stations and Mid-Flood: C2→CR1→S3→CR2→H1→Remaining stations
$ - Since predicted tide is shorter than 3.5 hours, method of 90% tidal period as monitoring time is approached.
& - Due to safety concern for sampling event in night-time, method of 90% tidal period as monitoring time is approached and end at 1900.

Appendix Q Passive Acoustic Monitoring Report

環境保護署
Environmental Protection Department

Contract No. EP/SP/66/12
Integrated Waste Management Facilities, Phase 1
Passive Acoustic Monitoring Report

吉 寶 西 格 斯 – 振 華 聯 營 公 司
KEPPEL SEGHERS - ZHEN HUA JOINT VENTURE

Passive Acoustic Monitoring Report

Revision History

B	Revision based on IEC's comments	19 February 2020
A	First Submission	10 January 2020
Rev.	**DESCRIPTION OF MODIFICATION**	**DATE**

CONTENTS

1. INTRODUCTION

1.1 Under the EM&A Manuel for the Integrated Waste Management Facility (IWMF) [EP/SP/66/12], there is a requirement for various monitoring for marine mammals in south Lantau waters. The marine mammal monitoring programme focuses on finless porpoise (Neophocaena phocaenoides) as the Project Site has been identified as a hotspot for this species. The Chinese white dolphin (Sousa chinensis) rarely occurs in this area, however, all detections of this species are also recorded. The general aim of all marine mammal monitoring is to assess impacts to marine mammals as predicted in the Environmental Impact Assessment (EIA). The marine mammal monitoring programme will be conducted during all phases of the project. The data for this report was gathered during the construction period (Phase I). This report details the collection and analyses of a passive acoustic monitoring (PAM) study. The Environmental Monitoring and Audit (EM&A) Manual for this project details the PAM studies to be conducted, at three (3) sites, during peak porpoise period (December to May) and for a duration of no less than 30 days during all phases of the project. It was noted prior to the start of this study that it was not possible to deploy a PAM system in the exact location used in the baseline study for one site, Shek Kwu Chau, as the ongoing IWMF construction meant that seabed modifications were ongoing in that area. A new PAM site, adjacent to the original PAM site at Shek Kwu Chau was identified. Acoustic data analyses methods are described in the EM&A Manual and in more detail in the baseline PAM study report. The results from this study, impact phase monitoring, were compared to the baseline study and, in addition, reference was made to the AFCD long-term marine mammal monitoring programme reports and other published information on finless porpoise.

2. METHODOLOGY

2.1 Three PAM systems were deployed for thirty (30) plus days during peak porpoise season. The purpose of the deployment was to gain an insight of fine scale habitat use by finless porpoise. An autonomous acoustic recorder (archival data) was selected that was able to record the distinctive high frequency sounds produced by finless porpoise, as well as other marine mammal vocalisations. Acoustic data analyss were conducted using PAMGuard software (Gillespie et al, 2008). High frequency finless porpoise clicks are easily distinguished from other marine mammal species that may occur, e.g., Chinese white dolphin or other delphinids, as well as manmade high frequency sound sources, such as boat sonar emissions. Two PAM systems were deployed at controls sites, at different distances from the IWMF construction area (Pui O Wan and Tai A Chau) and a third system was deployed within the IWMF construction area (Shek Kwu Chau). Multiple PAM systems were deployed at each site to minimise the risk of PAM units being lost/malfunctioning. One system was lost, at Shek Kwu Chau, however, data gathered from the back up unit was approved and has been included in these analyses. As such, the EM&A remit was fulfilled, as more than 30 days of PAM data was gathered from each of three sites during peak porpoise season during the construction phase of IWMF (**Figure 1**).

2.2 "Soundtraps" were archival acoustic devices chosen as the best option for this study, as they can record 24-hour underwater activity of all marine mammal species, and underwater noise levels, via an omnidirectional hydrophone with a frequency range of 20Hz to 150kHz (Appendix I). These specifications are comparable to the CPOD, which was used during the PAM baseline study. Therefore, the Soundtrap can collect the same type of data the CPOD does, as well as additional parameters. There are differences between the two devices, the CPOD is large (80cm) and floats within the water column whereas the Soundtrap is much smaller and lighter (20cm and less than 500g) and is not required to float, allowing it to be safely secured in a fixed position, either on the seabed or other solid structures, without the risk of it 'floating' into fishing gear (moving and static) or boat propellers. With regards to analyses, Soundtraps collect comprehensive and complete acoustic files (wav format) whereas CPODs are restricted to brand specific file formats that can only be analysed in one way. The complete files collected by Soundtraps can be analysed to produce the same "Detection Positive Minute (DPM)" parameters that CPODs can, as well as myriad other measurements. The more compact size and secure mooring system, in addition to being able to conduct the same analyses as that presented in the PAM baseline study, made this the most convenient PAM archival device to deploy for this study.

2.3 Once each Soundtrap was retrieved, the data, in compressed wav file format, was downloaded and inflated. The data was then processed using PAMGuard software, which was configured to detect "clicks" with energy in the 2kHz to 150kHz band. Two different click classifiers were used, one with very strict criteria which has a high confidence of identifying a click correctly, and a second which has slightly more flexible criteria, to assess clicks that may have been distant or not directed towards the device. These classifiers were designed specifically for Hong Kong finless porpoise. In addition, a dolphin click classifier and a dolphin whistle detector were also used to process the data, so that the presence of Chinses white dolphin could be determined. Similar to the CPOD inbuilt classifier, these are automated analyses and the resultant positively identified detections must be visually checked by expert acoustic technicians. Periods of high ambient noise or corrupted data segments were also determined at this stage in the process and, if present, were eliminated from the dataset. Acoustic detections identified by the software were confirmed by viewing the first identified 'click' in each one minute slot, to ensure that peak frequency, inter-click intervals (ICI) and duration characteristics conformed to what has been established for finless porpoise clicks. These characteristics were analysed via varies graphs that are displayed in PAMguard when a particular click is selected (**Figure 2**). Once the first identified click in every minute was visually confirmed, this became a 'detection positive minute' (DPM). If there were no clicks recorded in any given minute, this was classified as detection negative. This analysis was conducted twice, using the highly accurate classifier as well as the more flexible classifier. The full dataset for each recorder was analysed by two experienced analysts. The first performed confirmation checking of the automatically identified clicks for the entire dataset. The second analyst then reviewed the dataset for any potential discrepancies and assessed any ambiguous detections. If any discrepancies were noted, both analysts reviewed the original sound file and resolved any issue. The resultant dataset was thus an analysis of every recorded minute of data, with the date and time of all detection positive minutes were tabulated. This dataset was also subject to independent review. This dataset was then sub-sampled to graph DPM per calendar day for each site. The data were then further sampled to graph DPM for each hour, to investigate the presence of diurnal vocalisation patterns. These graphs could then be directly compared to the baseline data of the same parameters for each site.

3. RESULTS

3.1 Summary of data collection, including errors and data loss, and comparison to the baseline study.

3.1.1 A total of 121.9 days of recordings were obtained, combining the data from the three deployment sites. This is slightly more than the baseline study, which obtained 99.01 days of useable data. This difference in study duration must be accounted for when comparing results. This study had 0% false positive DPM, compared to the baseline study which had 0%, 1% and 2% at Shek Kwu Chau, Tai A Chau and Pui O Wan, respectively. As such, false positives were deemed to be negligible in both studies. Time lost due to device malfunction, corrupted data, high levels of underwater noise (that may mask marine mammal vocalisations) or "truncated recordings"[1] was 0% for all sites for this study, compared to the baseline study which noted time lost as 1%, 2% and 31.87% for Shek Kwu Chau, Tai A Chau and Pui O Wan, respectively. For sites Shek Kwu Chau and Tai A Chau, the loss noted during the baseline study is negligible, however, the considerable time lost during the baseline study at Pui O Wan (more than 30% of each minute recorded) is significant and must be considered when comparing this site across the two studies.

Note 1: In CPODs, acoustic recordings stop when predefined "click limits" are reached, as occurred in the baseline study. This is not a feature of Soundtrap recorders, so no data was lost in this way.

3.1.2 For the baseline study, the DPM for each site was 11,160 (Shek Kwu Chau), 16,089 (Tai A Chau) and 3645 (Pui O Wan), totalling 30,894 DPM across all three sites, compared to DPMs of 4740 (Shek Kwu Chau), 7725 (Tai A Chau) and 23,986 (Pui O Wan), totalling **36,451 DPM**, for the impact phase study. As the impact phase study was longer than the baseline study, it is not appropriate to directly compare total counts of DPM, however, the DPM rate (the average number of detections per day) for each site can be more directly compared. During the baseline study, Shek Kwu Chau averaged **338.2 DPM** per day compared to **124.8 DPM** per day, during the cimpact phase study. This shows a decrease in the daily average of porpoise detection at Shek Kwu Chau. During the baseline study, Tai A Chau averaged **487.6** DPM per day compared to **179.7 DPM** per day, during the impact phase study. This shows a decrease in the daily average of porpoise detection at Tai A Chau. During the baseline study, Pui O Wan averaged **98.5 DPM** per day compared to **557.8 DPM** per day, during the impact phase study. This shows a significant increase in the daily average of porpoise detections at Pui O Wan (**Table 1**).

3.1.3 During the baseline study, Chinese white dolphins were detected for 8 DPM at Shek Kwu Chau, 21 DPM at Tai A Chau and not at all at Pui O Wan. During this study, Chinese white dolphin were recorded on one day at Pui O Wan (13/05/2019) and only for 1 DPM. As Chinese white dolphin are not the focal species of these studies and did not occur often in the area, no more reference will be made to Chinese white dolphin in this report.

3.2 Daily Patterns of Porpoise Occurrence

3.2.1 For Shek Kwu Chau, the baseline study noted an "astonishing decline in porpoise activity" (from 150 DPM to 4 DPM over 4 days) concomitant with the start of site preparation activities for IWMF. The impact phase study recorded a relatively low level of porpoise activity, with an average daily occupancy of 8.7%, which fluctuated between 1.0% and 26.3%. The peaks in occurrence did not appear to be related to site activities, e.g., did not occur over weekends, although an in-depth assessment of specific site activities was not made. When it is considered that a 97% decrease in DPM was recorded during the baseline study as site preparation activities started, the overall decline in the daily average of DPM between the baseline and this study is not unexpected. The overall trend, although weak, is of decreasing use of the Shek Kwu Chau study site as the study progressed, again this is not unexpected as the PAM monitoring took place between March and April, when the peak season for porpoise in Hong Kong is more than half way through and porpoise occurrence, in general, is slowly declining (**Figure 3**).

3.2.2 For Tai A Chau, the baseline study noted a consistently high occurrence of porpoise at this site, compared to the two other sites. Fluctuations of between <200 DPM total per day to 1000 total DPM per day were noted during the baseline study, with no particular trend. For the impact phase study, there was a higher occupancy of this site, compared to Shek Kwu Chau, with an average daily occupancy of 12.5%, which fluctuated between 2.1% and 26.3%. Although the daily average DPM between the two studies was different, both showed large fluctuations in daily occurrence. The peaks in occurrence did not appear to be related to environmental changes for either study, although an in-depth assessment of influencing parameters, such as tide or salinity, was not made. When it is considered that the PAM deployment for this study occurred later in the peak porpoise season compared to the baseline study (April cf. February), this may account for the overall fewer detections. In addition, it must also be considered that the AFCD long term marine mammal monitoring programme for Hong Kong has suggested that porpoise have been in decline in Hong Kong waters for some time and these data may be a reflection of an overall general population decline. The overall trend, although weak, is of decreasing use of the Tai A Chau study site as the study progressed. This is not unexpected as the PAM monitoring took place between March and April, when the peak season for porpoise in Hong Kong is more than half way through and porpoise occurrence in general is slowly declining (**Figure 4**).

3.2.3 The most marked difference between baseline and impact phase monitoring is noted at the Pui O Wan PAM site. During the baseline study, the Pui O Wan site was initially highly used (during the first 13 days of the study) but then occurrence dropped dramatically (>400 DPM total per day to ~50 total DPM per day). This trend was not consistent across the baseline study and, as noted previously, the data derived from this deployment was compromised due to significant data loss (>30% of each minute's data was lost). It is therefore difficult to draw direct comparisons between a full and a partial dataset, however, the trends between the two studies are quite different. During baseline, the Pui O Site showed a sudden decline in detections, whereas the impact phase monitoring showed a gradual decline in detection rate, consistent with the other two sites monitored during this study. There was a higher finless porpoise occupancy of this site, compared to both other sites, during the impact phase, with an average daily occupancy of 38.7%, which fluctuated between 6.3% and 75.0%. This site is close to the IWMF construction site and perhaps the apparent increase in this site's use, compared to the baseline study, is an indication that porpoise that may have used the Shek Kwu Chau site were displaced to the waters of Pui O Wan. It is noted that the seasonal timing of the baseline (Feb-March) and the impact phase (March-April) PAM study overlapped, so the comparatively lower use of Pui O Wan during the baseline monitoring cannot be attributed to the generally accepted seasonal decline in porpoise as the peak period progresses. Much of the comparison between the baseline study and the impact phase study at this specific site, is confounded by the data loss issue during the baseline, however, what is clear is that during the impact phase study period, finless porpoise occupied the Pui O Wan site considerably more than the other two sites. It is noted that Pui O Wan is closer to the IWMF construction area than Tai A Chau. The overall occupancy trend at Pui O Wan is of a marked decrease in use as the monitoring progressed. This is not unexpected as the PAM monitoring took place between March and April, when the peak season for porpoise in Hong Kong is nearing an end and, as is shown in the AFCD long term marine mammal monitoring, seasonal declines in porpoise do occur (**Figure 5**).

3.3 Diurnal Patterns of Porpoise Occurrence

3.3.1 During the baseline study, all three sites showed diurnal occurrence of finless porpoise, that is, porpoise were more likely to be detected during night-time hours. At Shek Kwu Chau, occurrence during the baseline study peaked between 2am and 5am, whereas, the peak in occurrence at Tai A Chau and Pui O Wan was at midnight.

3.3.2 During the impact phase study, both Shek Kwu Chau and Pui O Wan showed significant diurnal activity, as was also noted in the baseline study. At Shek Kwu Chau, detections peaked between 9pm and 4am (**Figure 6**) and, at Pui O Wan, detections peaked between 8pm and 3am (**Figure 7**). There was very weak evidence of diurnal activity patterns at Tai A Chau, with only a suggestion of a possible peak in detections at 11pm, compared to the midnight peak noted during the baseline study (**Figure 8**). This lack of a pattern may be due to a difference in environmental parameters between the two study years, e.g., it has been noted that salinity significantly impacts finless porpoise occurrence and increased freshwater outflow from the Pearl River Estuary directly effects the Tai A Chau area. In addition, the limited number of detections from this site during impact phase monitoring may be insufficient to show clear patterns.

4. DISCUSSION

4.1 The EIA for the IWMF construction work predicted that marine mammals, in particular finless porpoise, would be displaced from the area immediately adjacent to construction activities. There has not been strong evidence for this during the impact phase vessel-based line-transect monitoring, however, comparisons between baseline and impact phase studies for both theodolite tracking and PAM do show, overall, fewer porpoise detections. As the area in which the line transect monitoring is conducted results in very few visual encounters (both historical and current data clearly show this) there is low power to detect any significant changes in porpoise occurrence, making it difficult to assess EIA predictions with certainty. Both theodolite tracking and PAM studies involve considerably more survey effort and therefore, more data is recorded and trends can be more easily discerned. The theodolite tracking (both baseline and impact phase monitoring) at Shek Kwu Chau showed a decline in porpoise detections concomitant with site activities. A comparison of the PAM data obtained during baseline and impact monitoring is not as clear cut. The PAM site immediately adjacent to IWMF construction activities, Shek Kwu Chau, was utilised by finless porpoise every day of the study and diurnal behaviour, typical of this species, was clearly detected. The Shek Kwu Chau area did appear to be used less often when compared to the baseline study, thus going some way to support the EIA predictions. Pui O Wan, the control site closest to the IWMF (~2.5km) recorded the greatest rate of daily porpoise detections during impact phase monitoring and distinct diurnal activity patterns were recorded, suggesting that porpoise were behaving as normal. There was considerably more activity at Pui O Wan during impact phase monitoring when compared to baseline monitoring, suggesting, perhaps, porpoise were displaced from the adjacent Shek Kwu Chau site. This difference, however, may also be due to different environmental or other anthropogenic factors between the two study periods. Further, the significant data loss from the Pui O Wan site during the baseline study may be confounding data comparison. Tai A Chau, some 9km distant from the IWMF site, showed no difference in porpoise detections related to start up site preparation activities at IWMF during the baseline study. There were, however, considerably less detections at Tai A Chau during impact phase monitoring, when compared to baseline monitoring, even though the area is most likely outside the impact zone of IWMF construction activities. In addition, there was no clear indication of diurnal behavioural patterns at Tai A Chau. The reduction in finless porpoise detections at Tai A Chau is contrary to EIA predictions and further analyses should be conducted to assess what other factors might be driving this apparent decline.

4.2 The PAM archival system survey could be used to study habitat use by finless porpoise (Neophocaena phocaenoides). Serveral such automated static porpoise detectors (e.g. CPODs, Soundtraps) could be deployed on the seabed (mounted on blocks / frameworks) and would archive any porpoise acoustic clicks. During baseline surveys, CPOD was installed on a high profile “A” frame seabed mount. Theses frames are not suitable for use in exposed areas and CPODs are also tethered “free floating” devices which, again, may be problematic to use in exposed areas as the tether may tangle or break and excessive motion may disrupt the collection of data as CPODs only record when vertical – not when horizontal as they might be in a current. Soundtraps will be used instead of CPODs, as these devices are smaller, more robust and can be fixed directly onto a frame, thus nothing is free floating in the water column. Soundtraps archive sound, like CPODs do, and the data can be analysed in the same way as CPODs. The soundtraps would be mounted on small storm proof seabed frames, which can be deployed quickly by divers using lift bags.

4.3 Overall, the PAM study showed that porpoise continue to consistently utilise the Shek Kwu Chau habitat immediately adjacent to the IWMF construction activities, although to a lesser degree than that prior to construction activities. In addition, the Pui O Wan site, which is 2.5km away from the IWMF construction area, was also consistently utilised during the impact phase PAM study. A continued assessment of fine scale habitat use, particularly through PAM which yields large quantities of data, would allow a more comprehensive assessment of the EIA predictions.

5. References

5.1 Agriculture, Fisheries and Conservation Department (AFCD) 2018. Annual Marne Mammal Monitoring Programme April 2017-March 2018) The Agriculture, Fisheries and Conservation Department, Government ofthe Hong Kong SAR.

http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

5.2 Agriculture, Fisheries and Conservation Department (AFCD) 2017. Annual Marne Mammal Monitoring Programme April 2016-March 2017) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

5.3 Agriculture, Fisheries and Conservation Department (AFCD) 2016. Annual Marne Mammal Monitoring Programme April 2015-March 2016) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

5.4 Agriculture, Fisheries and Conservation Department (AFCD) 2015. Annual Marne Mammal Monitoring Programme April 2014-March 2015) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

5.5 Agriculture, Fisheries and Conservation Department (AFCD) 2014. Annual Marne Mammal Monitoring Programme April 2013-March 2014) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

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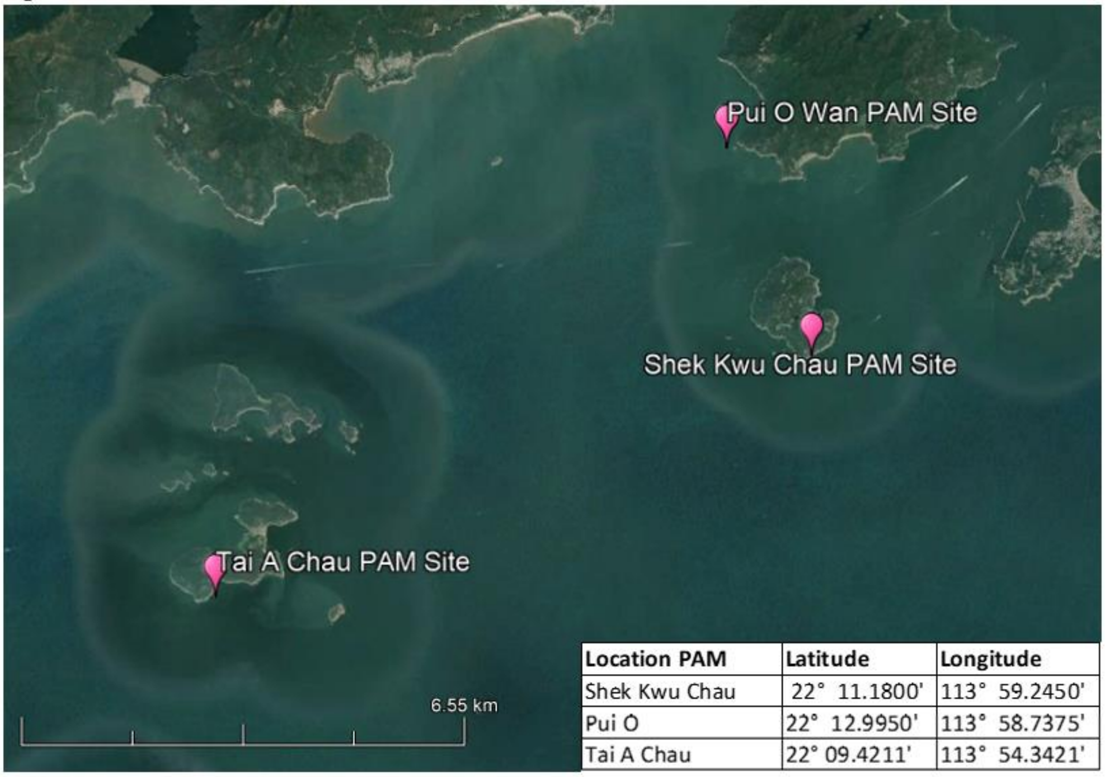
5.6 Agriculture, Fisheries and Conservation Department (AFCD) 2013. Annual Marne Mammal Monitoring Programme April 2012-March 2013) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

6. FIGURES AND TABLES

Figure 1 The Location of the PAM Sites during Impact Phase Monitoring (March - May 2019)



Location PAM	Latitude	Longitude
Shek Kwu Chau	22° 11.1800'	113° 59.2450'
Pui O	22° 12.9950'	113° 58.7375'
Tai A Chau	22° 09.4211'	113° 54.3421'

Figure 2 Using PAMGuard software, marine mammal vocalisations can be automatically detected by using inbuilt or bespoke classifiers. Here is an example of a finless porpoise click train, with corresponding click waveform and click spectrum graphs and a Wigner Plot, confirming the typical charcteristics of porpoise clicks

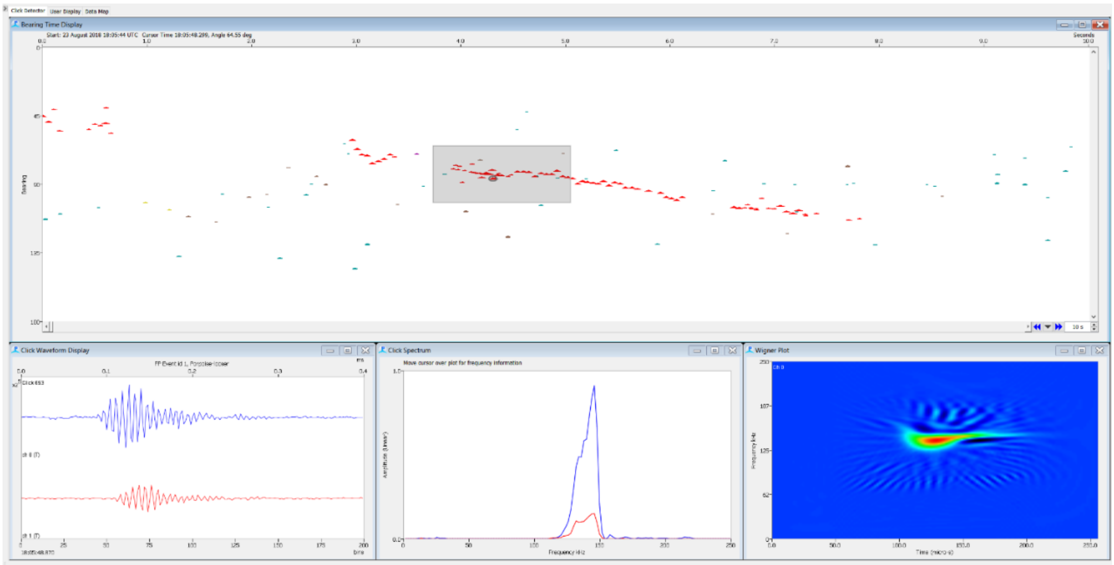


Figure 3 The Daily Rate of Detection Positive Minutes (DPM) for Finless Porpoise (Neophocaena phocaenoides) at Shek Kwu Chau, 5th March - 11th April 2019

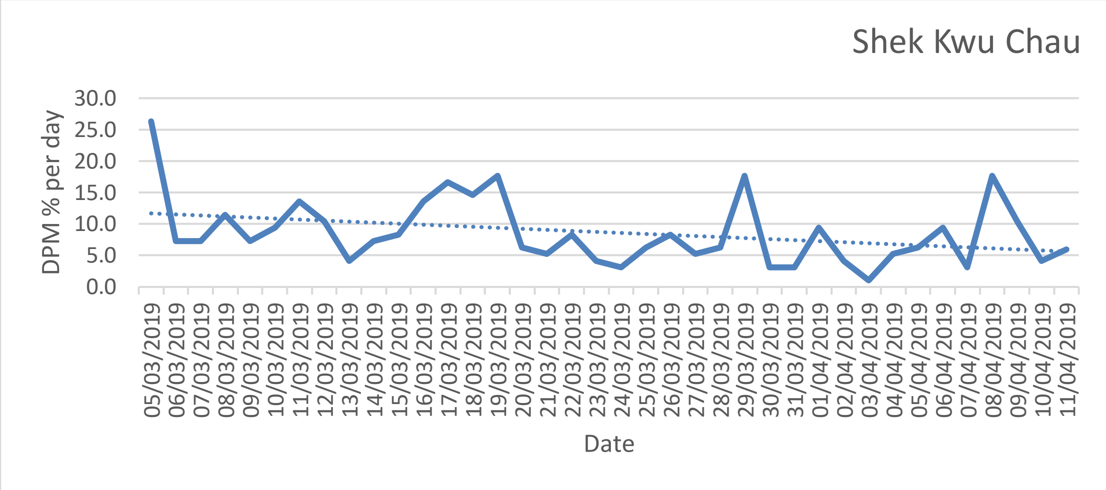


Figure 4 The Daily Rate of Detection Positive Minutes (DPM) for Finless Porpoise (Neophocaena phocaenoides) at Tai A Chau, 11th April – 23rd May 2019

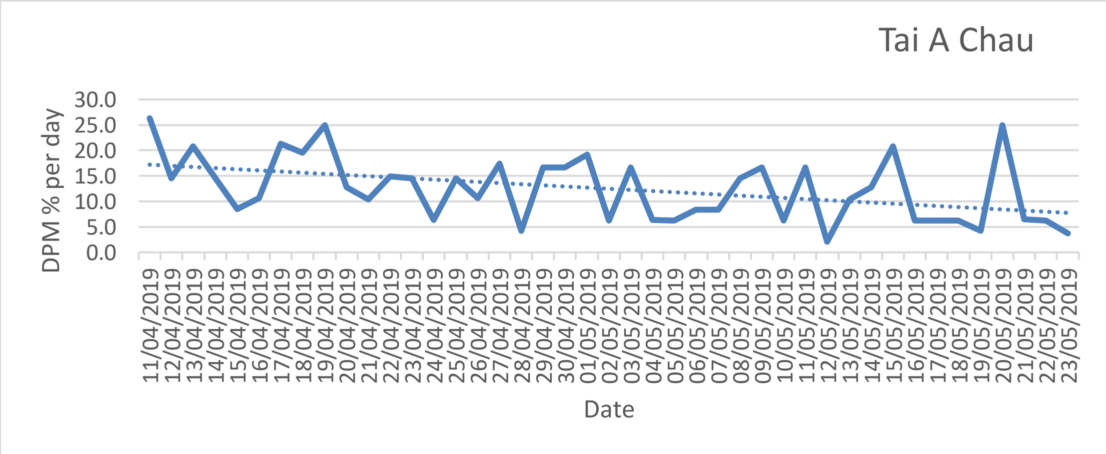


Figure 5 The Daily Rate of Detection Positive Minutes (DPM) for Finless Porpoise (Neophocaena phocaenoides) at Pui O Wan, 11th April - 23rd May 2019

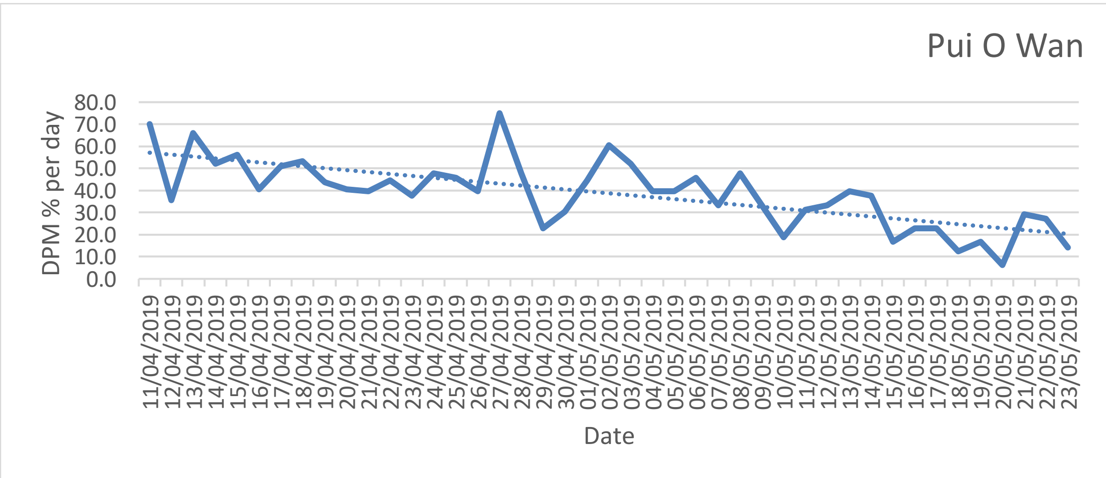


Figure 6 Finless Porpoise (Neophocaena phocaenoides) Diurnal Detection Patterns at Pui O Wan, 11th April - 23rd May 2019

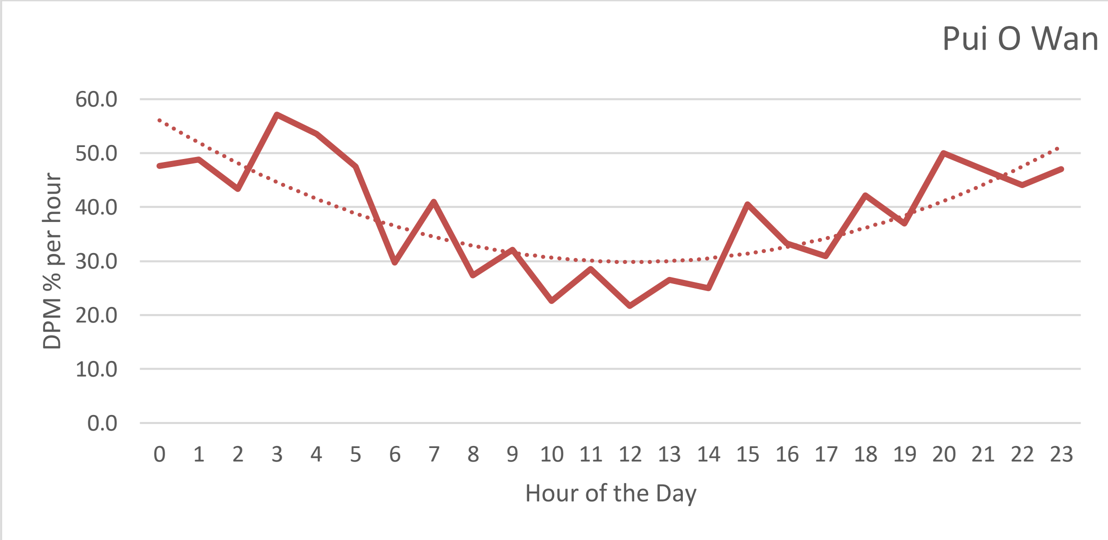
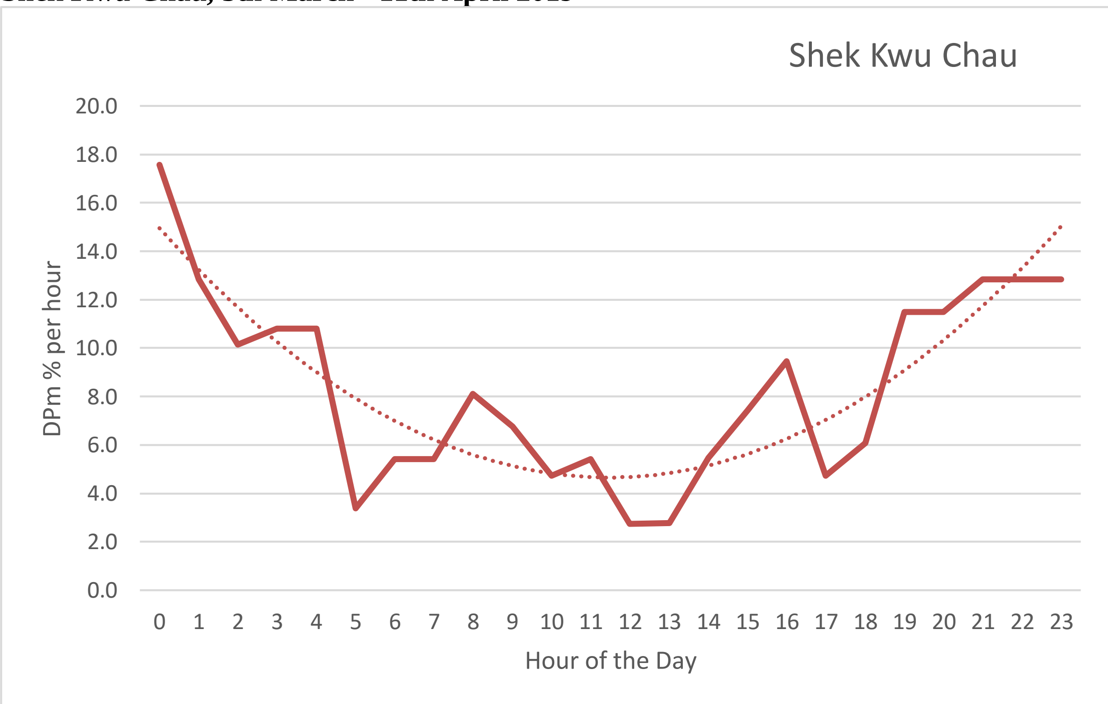


Figure 7 Finless Porpoise (Neophocaena phocaenoides) Diurnal Detection Patterns at Shek Kwu Chau, 5th March - 11th April 2019



Date	Time	Weather	Beaufort Sea State	Visibility	Fix Type	Group Number	Group Size	Behaviour	Horizontal	Vertical	Latitude	Longitude
01/03/2019	12:45:25	Fair	1	Good > 5KM	Finless Porpoise	1	1	Traveling	170.0541	267.3245	N 22° 11.1	113° 59.4

Figure 8 Finless Porpoise (Neophocaena phocaenoides) Diurnal Detection Patterns at Tai A Chau, 11th April - 23rd May 2019

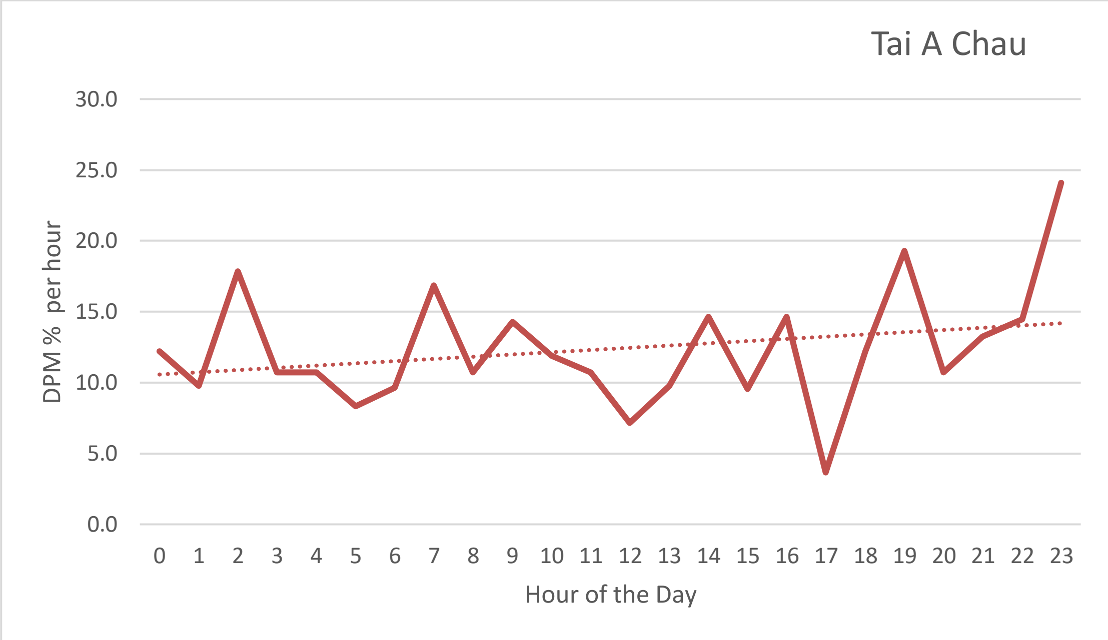


Table 1 Summary Statistic Comparison of Baseline (2018) and Impact Phase (2019) Passive Acoustic Monitoring, South Lantau, Hong Kong SAR

Baseline data									
Site	**Unit ID**	**Start**	**End**	**Days**	**DPD % Days**	**Total DPM**	**DPM /Day**	**% False Positive DPM**	**Time Lost %**
Shek Kwu Chau	2891	2018/02/09	2018/03/13	32.11	100	11160	338.2	0.0	1.00
Tai A Chau	2868	2018/02/09	2018/03/13	32.5	100	16089	487.6	1.0	2.00
Pui O Wan	2891	2018/03/13	2018/04/17	34.85	97.3	3645	98.5	2.0	31.87
Total				99.01		30894	312.0		
Impact Phase									
Site	**Unit ID**	**Start**	**End**	**Days**	**DPD % Days**	**Total DPM**	**DPM /Day**	**% False Positive DPM**	**Time Lost %**
Shek Kwu Chau	IWMF_BU_20190305_01	2019/03/05	2019/04/11	37.91	100	4740	124.8	0.0	0
Tai A Chau	IWMF_20190411_02	2019/04/11	2019/05/23	41.94	100	7725	179.7	0.0	0
Pui O Wan	IWMF_20190411_01	2019/04/11	2019/05/23	42.02	100	23986	557.8	0.0	0
Total				121.9		36451	299.1		

APPENDIX 1

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ENGINEERING SERVICES FOR MARINE SCIENCE

SoundTrap 300 Digital Sound Recorders

STD & HF models

Key features:

- **Industry leading audio fidelity**
- **Very low self-noise**
- **60 kHz and 150 kHz bandwidth models**
- **Up to 13 days continuous recording on internal battery**
- **Up to 70 days continuous with optional external battery (3 x D cell)**
- **Simple operation with IR remote control**
- **Sealed, low maintenance, flood proof housing**
- **Selectable high pass filter for high energy sites or towing**
- **Sensors for temperature and acceleration**
- **Fast USB offload**

The SoundTrap 300 series are compact self-contained underwater sound recorders for ocean acoustic research. The STD model is intended for general aquatic noise measurements with a working frequency range of 20 Hz to 60 kHz. While the HF model offers 20 Hz to 150 kHz bandwidth for high frequency bioacoustic measurements. Both feature very low self-noise, ensuring beautiful recordings in even the quietest places.

Their internal battery enables continuous recording for up to 13 days, or 56 days on a 10 minute per hour duty cycle. For longer deployments simply plug in the optional external battery pack for up to 70 days continuous recording. 128 GB of internal memory coupled with lossless audio compression provide storage for up to 65 days continuous recording at 36 kHz.

Data offload and battery recharge are done via a high quality wet plug. The housing therefore never needs opening, thereby eliminating the usual worries about o'ring maintenance and moisture ingress. Weighing less than 500 g in air, hydrophone deployment has never before been so easy.

Output files are in the industry standard WAV format. Ancillary sensors are included for logging temperature and tri-axial acceleration. The included software offers flexible deployment options for sample rate, gain control, filtering, delayed start and duty cycle. Plus the included water proof IR remote control makes for convenient in-the-field ad hoc measurements. Each instrument is supplied with a calibration certificate and features self-calibration checks for confirmation of performance in the field.

Detailed Specifications

Bandwidth	**STD model** 20 Hz - 60 kHz ± 3dB **HF model** 20 Hz - 150 kHz ± 3dB
Self-noise	Better than sea-state 0 (100 Hz - 2 kHz) **STD model** Less than 34 dB re 1 µPa above 2 kHz **HF model** Less than 37 dB re 1 µPa above 2 kHz
Gain	Two gain settings - Low noise and high dynamic range. Maximum level before clipping approx. 186 dB re 1 µPa
High Pass Filter	400 Hz selectable high pass for high energy sites
Sample rates	**STD model** 288, 144, 96, 48 & 36 kHz **HF model** 576, 288, 192, 96 & 72 kHz
ADC	16-bit SAR
Calibration	Factory OCR calibration certificate Self-calibration check Pistonphone coupler available
Control	Waterproof IR remote control for manual record start/stop.
Ancillary sensors	Temperature - 0.1°C precision, 1°C uncalibrated accuracy in water Acceleration – For detecting orientation, or cable strum / platform vibration. Tri-axial accelerometer, +/- 8g, Sampling up to 1 Hz
Memory	128 GB. Lossless audio compression provides 3 to 4 times compression, thereby allowing for up to 512 GB of wav file storage.
Internal battery	An internal rechargeable battery provides power for up to 13 days continuous operation
External battery	The optional external battery housing takes 3 x D cell batteries, and provides up to 70 days continuous operation.
Connectivity	Wet pluggable connector for connection to GPS or radio telemetry.
Maximum depth	500m (Extended depth version available on request)
Dimensions:	200mm L x 60mm D (excluding connector dummy)
Weight	Approx. 500g in air