



Expansion of Hong Kong International Airport into a Three-Runway System

Construction Phase Annual EM&A Report No.4

June 2020

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Construction Phase Annual EM&A Report No.4

June 2020

This Construction Phase Annual EM&A Report No. 4 has been reviewed

and certified by

the Environmental Team Leader (ETL) in accordance with

Section 15.5 of the Updated EM&A Manual

Certified by:

A handwritten signature in black ink, appearing to read 'Terence Kong', written over a light grey rectangular background.

Terence Kong
Environmental Team Leader (ETL)
Mott MacDonald Hong Kong Limited

Date: 26 June 2020

Our Ref : 60440482/C/JCHL200626

By Email

Airport Authority Hong Kong
HKIA Tower, 1 Sky Plaza Road
Hong Kong International Airport
Lantau, Hong Kong

Attn: Mr. Lawrence Tsui, Principal Manager

26 June 2020

Dear Sir,

Contract No. 3102
3RS Independent Environmental Checker Consultancy Services

Submission of Construction Phase Annual EM&A Report No.4

Reference is made to the Environmental Team's submission of the Construction Phase Annual EM&A Report No.4 under Condition 15.5 of the Updated EM&A Manual certified by the ET Leader on 26 June 2020.

We would like to inform you that we have no adverse comment on the captioned submission. Therefore we write to verify the captioned submission in accordance with the requirement stipulated in Condition 2.3 of EP-489/2014.

Should you have any query, please feel free to contact the undersigned at 3922 9376.

Yours faithfully,
AECOM Asia Co. Ltd.



Jackel Law
Independent Environmental Checker

Contents

Abbreviations	1
Executive Summary	3
1 Introduction	7
1.1 Background	7
1.2 Scope of this Report	7
1.3 Project Organization	7
1.4 Contact information for the Project	10
1.5 Summary of Construction Works	10
1.6 Summary of EM&A Programme Requirements	10
2 Environmental Monitoring and Auditing	14
2.1 Air Quality Monitoring	14
2.1.1 Action and Limit Levels	14
2.1.2 Monitoring Results	14
2.1.3 Conclusion	15
2.2 Noise Monitoring	15
2.2.1 Action and Limit Levels	15
2.2.2 Monitoring Results	15
2.2.3 Conclusion	16
2.3 Water Quality Monitoring	16
2.3.1 Action and Limit Levels	18
2.3.2 Monitoring Results	19
2.3.3 Conclusions	20
2.4 Waste Monitoring	20
2.4.1 Action and Limit Levels	20
2.4.2 Summary of Monitoring Results	20
2.5 Chinese White Dolphin Monitoring	21
2.5.1 Action and Limit Levels	23
2.5.2 Summary of Monitoring Results	23
2.5.3 Discussions on CWD Monitoring Results	32
2.5.4 Conclusions of CWD Monitoring Results	35
2.5.5 Site Audit for CWD-related Mitigation Measures	37
2.6 Environmental Site Inspection	37
2.7 Terrestrial Ecological Monitoring	38

2.8	Audit of the SkyPier High Speed Ferries	39
2.9	Audit of the Construction and Associated Vessels	40
2.10	Coral Post-Translocation Monitoring	40
2.11	External Stakeholder Engagement	40
2.11.1	Community Liaison Groups	41
2.11.2	Professional Liaison Group and Green Non-Governmental Organizations	41
2.11.3	Other Stakeholders	41
2.12	Review of the Key Assumptions Adopted in the EIA Report	41
2.13	Key Environmental Issues for the Coming Reporting Period	41
3	Report on Non-compliance, Complaints, Notifications of Summons and Prosecutions	43
3.1	Compliance with Other Statutory Environmental Requirements	43
3.2	Analysis and Interpretation of Complaints, Notification of Summons and Status of Prosecutions	43
3.2.1	Complaints	43
3.2.2	Notifications of Summons or Status of Prosecution	43
3.3	Cumulative Statistics	43
4	Conclusion and Recommendation	44

Tables

Table 1.1:	Contact Information of Key Personnel	8
Table 1.2:	Contact Information of the Project	10
Table 1.3:	Summary of status for all environmental aspects under the Manual	11
Table 2.1:	Impact Air Quality Monitoring Stations	14
Table 2.2:	Percentage of Air Quality Monitoring Results within Action and Limit Levels	14
Table 2.3:	General Meteorological Condition during Impact Air Quality Monitoring	15
Table 2.4:	Impact Noise Monitoring Stations	15
Table 2.5:	Percentage of Noise Monitoring Results within Action and Limit Levels	15
Table 2.6:	General Weather Condition during Impact Noise Monitoring	16
Table 2.7:	Monitoring Locations and Parameters for Impact Water Quality Monitoring	17
Table 2.8:	Action and Limit Levels for General Water Quality Monitoring and Regular DCM Monitoring	18
Table 2.9:	The Control and Impact Stations during Flood Tide and Ebb Tide for General Water Quality Monitoring and Regular DCM Monitoring	19
Table 2.10:	General Weather Condition and Sea Condition during Impact Water Quality Monitoring	19

Table 2.11:	Percentage of Water Quality Monitoring Results within Action and Limit Levels	19
Table 2.12:	Action and Limit Levels for Construction Waste	20
Table 2.13:	Statistics of Construction Waste Generated in the Reporting Period	21
Table 2.14:	Land-based Survey Station Details	23
Table 2.15:	Derived Values of Action Level and Limit Level for Chinese White Dolphin Monitoring	23
Table 2.16:	Summary of Key Audit Findings against the SkyPier Plan	39

Figures

Figure 1.1	Locations of Key Construction Activities in this Reporting Period
Figure 2.1	Locations of Air and Noise Monitoring Stations and Chek Lap Kok Wind Station
Figure 2.2a	Water Quality Monitoring Stations
Figure 2.2b	Updated Water Quality Monitoring Stations (since 5 January 2019)
Figure 2.2c	Updated Water Quality Monitoring Stations (since 8 August 2019)
Figure 2.3	Vessel based Dolphin Monitoring Transects in Construction, Post-Construction and Operation Phases
Figure 2.4	Land based Dolphin Monitoring in Baseline and Construction Phases
Figure 2.5	Location for Autonomous Passive Acoustic Monitoring in Baseline and Construction Phases

Appendices

Appendix A	Construction Programme and Contract Description
Appendix B	Project Organization Chart
Appendix C	Environmental Mitigation Implementation Schedule (EMIS) for Construction Phase
Appendix D	Monitoring Results
Appendix E	Chinese White Dolphin Monitoring Results
Appendix F	Summary of Environmental Complaints and Cumulative Statistics on Exceedances, Notification of Summons, and Prosecution

Abbreviations

3RS	Three-Runway System
AAHK	Airport Authority Hong Kong
AECOM	AECOM Asia Company Limited
AFCD	Agriculture, Fisheries and Conservation Department
AIS	Automatic Information System
ANI	Encounter Rate of Number of Dolphins
APM	Automated People Mover
AW	Airport West
BHS	Baggage Handling System
CAP	Contamination Assessment Plan
CAR	Contamination Assessment Report
CTP	Coral Translocation Plan
CWD	Chinese White Dolphin
DCM	Deep Cement Mixing
DEZ	Dolphin Exclusion Zone
DO	Dissolved Oxygen
DPSE	Number of Dolphins per 100 Units of Survey Effort
EAR	Ecological Acoustic Recorder
EIA	Environmental Impact Assessment
EM&A	Environmental Monitoring & Audit
EP	Environmental Permit
EPD	Environmental Protection Department
ET	Environmental Team
FCZ	Fish Culture Zone
HDD	Horizontal Directional Drilling
HKBCF	Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities
HKIA	Hong Kong International Airport
HSF	High Speed Ferry
IEC	Independent Environmental Checker
LKC	Lung Kwu Chau
MTCC	Marine Traffic Control Centre
MMHK	Mott MacDonald Hong Kong Limited
MMWP	Marine Mammal Watching Plan
MSS	Maritime Surveillance System
MTRMP-CAV	Marine Travel Routes and Management Plan for Construction and Associated Vessel
NEL	Northeast Lantau
NWL	Northwest Lantau
PAM	Passive Acoustic Monitoring
PM	Partial Mortality
PVD	Prefabricated Vertical Drain
SC	Sha Chau

SCLKCMP	Sha Chau and Lung Kwu Chau Marine Park
SPSE	Number of On-effort Sightings per 100 Units of Survey Effort
SS	Suspended Solids
STG	Encounter Rate of Number of Dolphin Sightings
SWL	Southwest Lantau
The Project	The Expansion of Hong Kong International Airport into a Three-Runway System
The SkyPier Plan	Marine Travel Routes and Management Plan for High Speed Ferries of SkyPier
TSP	Total Suspended Particulates
WL	West Lantau
WMP	Waste Management Plan

Executive Summary

The “Expansion of Hong Kong International Airport into a Three-Runway System” (the Project) serves to meet the future air traffic demands at Hong Kong International Airport (HKIA). On 7 November 2014, the Environmental Impact Assessment (EIA) Report (Register No.: AEIAR-185/2014) for the Project was approved and an Environmental Permit (EP) (Permit No.: EP-489/2014) was issued for the construction and operation of the Project.

Airport Authority Hong Kong (AAHK) commissioned Mott MacDonald Hong Kong Limited (MMHK) to undertake the role of Environmental Team (ET) for carrying out the Environmental Monitoring & Audit (EM&A) works during the construction phase of the Project in accordance with the Updated EM&A Manual (the Manual).

This is the 4th Construction Phase Annual EM&A Report for the Project which summarizes the monitoring results and audit findings of the EM&A programme during the reporting period from 1 January 2019 to 31 December 2019.

Key Activities in the Reporting Period

Key activities of the Project carried out in the reporting period were related to the following contracts:

Advanced Works:

Contract P560 (R) Aviation Fuel Pipeline Diversion Works

- Site reinstatement;
- Shoreline reinstatement next to the new pipe; and
- Stockpiling of construction materials

Deep Cement Mixing (DCM) Works:

Contract 3201, 3203, and 3205 DCM Works

- DCM works

Reclamation Works:

Contract 3206 Main Reclamation Works

- Land-based ground improvement works;
- Seawall construction
- PVD installation;
- DCM works; and
- Marine filling.

Airfield Works:

Contract 3301 North Runway Crossover Taxiway

- Cable ducting works;
- Subgrade compaction and paving works;
- Drainage construction works;

- Operation of aggregate mixing facility; and
- Precast of duct bank and fabrication of steel works.

Contract 3302 Eastern Vehicular Tunnel Advance Works

- Cable laying and ducting works;
- Trench excavation works;
- Backfilling and reinstatement works; and
- Site establishment.

Contract 3303 Third Runway and Associated Works

- Plant and equipment mobilisation
- Footing and utilities work; and
- Site establishment.

Third Runway Concourse and Integrated Airport Centres Works:**Contract 3402 New Integrated Airport Centres Enabling Works**

- Site establishment;
- Installation of sheet and pipe piles;
- Superstructure works;
- Lateral supports and excavation works;
- Structural steel fabrication;
- Road and paving works;
- Drawpit and duct laying works; and
- Manhole, and pipe construction works.

Terminal 2 Expansion Works:**Contract 3501 Antenna Farm and Sewage Pumping Station**

- Drainage works;
- Excavation works;
- Boring works;
- Pipe installation; and
- Reinstatement Works.

Contract 3502 Terminal 2 Automated People Mover (APM) Depot Modification Works

- Site clearance;
- Plant mobilization
- Cable duct installation
- Plastering, painting, and fitting out works; and
- Brick wall construction.

Contract 3503 Terminal 2 Foundation and Substructure Works

- Site establishment;
- Demolition works;
- Utilities, drainage, and road works; and
- Piling and structure works.

Automated People Mover (APM) Works:**Contract 3602 Existing APM System Modification Works**

- Site establishment;
- Site office construction; and
- Modification works at APM depot

Baggage Handling System (BHS) Works:**Contract 3603 3RS Baggage Handling System**

- Site office establishment; and
- BHS modification work at Terminal 1.

Airport Support Infrastructure & Logistic Works:**Contract 3721 Construction Support Infrastructure Works**

- Excavation for utilities works; and
- Construction of utilities.

Contract 3801 APM and BHS Tunnels on Existing Airport Island

- Site establishment;
- Cofferdam installation and construction of box culvert;
- Rising main installation;
- Diversion of underground utilities;
- Drilling and grouting works;
- Piling and foundation works;
- Construction of temporary traffic steel deck;
- Demolition works; and
- Site clearance.

EM&A Activities Conducted in the Reporting Period

The EM&A programme was undertaken in accordance with the Manual. Summary of monitoring activities during this reporting period is presented as below:

Monitoring/ Audit Activities	Number of Sessions
Air Quality Monitoring	384
Noise Monitoring	212
Water Quality Monitoring	155
Vessel line-transect surveys for Chinese White Dolphin (CWD) monitoring	24
Land-based theodolite tracking survey effort for CWD monitoring	36 ⁽¹⁾
Terrestrial Ecological Monitoring	1
Additional coral post-translocation monitoring	1

Notes

⁽¹⁾ Including 24 monitoring sessions required under the Manual and 12 sessions of additional monitoring.

Environmental auditing works, including weekly site inspections of construction works conducted by the ET and bi-weekly site inspections conducted by the Independent Environmental Checker (IEC), audit of

SkyPier High Speed Ferries (HSF), audit of construction and associated vessels, and audit of implementation of Marine Mammal Watching Plan (MMWP) and Dolphin Exclusion Zone (DEZ) Plan, were conducted in the reporting period. Based on the information including ET's observations, records of Maritime Surveillance System (MSS), and contractors' site records, it is noted that the environmental pollution control and mitigation measures were properly implemented and the construction operation of the Project in the reporting period did not introduce adverse impact to the environment.

Summary Findings of the EM&A Programme

The monitoring works for construction dust, construction noise, water quality, construction waste, landscape & visual, terrestrial ecology, and CWD were conducted during the reporting period in accordance with the Manual. Upon completion of coral translocation in January 2017, additional post-translocation monitoring was also carried out in the reporting period.

Monitoring results of construction dust, construction noise, construction waste, CWD, and coral post-translocation did not trigger the corresponding Action and Limit Levels in the reporting period.

The water quality monitoring results for turbidity, total alkalinity and chromium obtained during the reporting period were within the corresponding Action and Limit Levels stipulated in the EM&A programme. Relevant investigation and follow-up actions will be conducted according to the EM&A programme if the corresponding Action and Limit Levels are triggered. For dissolved oxygen (DO), suspended solids (SS), and nickel, some of the monitoring results triggered the relevant Action or Limit Levels, and the corresponding investigations were conducted accordingly. The investigation findings concluded that all cases were not related to the Project. To conclude, the construction activities in the monitoring period did not introduce adverse impact to all water quality sensitive receivers.

Additional post-translocation monitoring was carried out after the completion of coral translocation in January 2017. The final round of additional coral post-translocation monitoring survey was completed in April 2019. Both Action and Limit Levels were not triggered during this round of monitoring.

The last monthly terrestrial ecology monitoring on Sheung Sha Chau was undertaken in January 2019, as all the works on Sheung Sha Chau had been completed on 29 January 2019. There was no encroachment upon the egret area nor any significant disturbance to ardeids at Sheung Sha Chau by the works.

Summary Table

The Key findings of the EM&A programme during the reporting period are summarised as below:

	Yes	No	Details	Analysis / Recommendation / Remedial Actions
Breach of Limit Level [^]	√		No exceedance of project-related Limit Level was recorded.	Nil
Breach of Action Level [^]	√		No exceedance of project-related Action Level was recorded.	Nil
Complaints Received	√		One complaint was received on 12 April 2019.	The complaint investigation was carried out in accordance with the Complaint Management Plan. Details are presented in S3.2.1.
Notification of any summons and status of prosecutions	√		No notification of summons or prosecution were received.	Nil
Changes that affect the EM&A	√		Starting from 5 Jan 2019, two of the water quality sensitive receiver stations were updated. Starting from 8 Aug 2019, one of the water quality sensitive receiver stations was relocated.	Nil

Remarks: [^] Only triggering of Action or Limit Level found related to Project works is counted as Breach of Action or Limit Level.

1 Introduction

1.1 Background

On 7 November 2014, the Environmental Impact Assessment (EIA) Report (Register No.: AEIAR-185/2014) for the “Expansion of Hong Kong International Airport into a Three-Runway System” (the Project) was approved and an Environmental Permit (EP) (Permit No.: EP-489/2014) was issued for the construction and operation of the Project.

Airport Authority Hong Kong (AAHK) commissioned Mott MacDonald Hong Kong Limited (MMHK) to undertake the role of Environmental Team (ET) for carrying out the Environmental Monitoring & Audit (EM&A) works during the construction phase of the Project in accordance with the Manual submitted under EP Condition 3.1¹. AECOM Asia Company Limited (AECOM) was employed by AAHK as the Independent Environmental Checker (IEC) for the Project.

The Project covers the expansion of the existing airport into a three-runway system (3RS) with key project components comprising land formation of about 650 hectares and all associated facilities and infrastructure including taxiways, aprons, aircraft stands, a passenger concourse, an expanded Terminal 2, all related airside and landside works and associated ancillary and supporting facilities. The existing submarine aviation fuel pipelines and submarine power cables also require diversion as part of the works.

Construction of the Project is to proceed in the general order of diversion of the submarine aviation fuel pipelines, diversion of the submarine power cables, land formation, and construction of infrastructure, followed by construction of superstructures.

The overall phasing programme of all construction works and contract description is presented in **Appendix A**.

1.2 Scope of this Report

This is the 4th Construction Phase Annual EM&A Report for the Project which summarizes the key findings of the EM&A programme during the reporting period from 1 January 2019 to 31 December 2019.

1.3 Project Organization

The Project’s organization structure and the contact details of the key personnel are provided in **Appendix B** and **Table 1.1** respectively.

¹ The Manual is available on the Project’s dedicated website (accessible at: <http://env.threerunwaysystem.com/en/index.html>).

Table 1.1: Contact Information of Key Personnel

Party	Position	Name	Telephone
Project Manager's Representative (Airport Authority Hong Kong)	Principal Manager, Environment	Lawrence Tsui	2183 2734
Environmental Team (ET) (Mott MacDonald Hong Kong Limited)	Environmental Team Leader	Terence Kong	2828 5919
	Deputy Environmental Team Leader	Heidi Yu	2828 5704
	Deputy Environmental Team Leader	Daniel Sum	2585 8495
Independent Environmental Checker (IEC) (AECOM Asia Company Limited)	Independent Environmental Checker	Jackel Law	3922 9376
	Deputy Independent Environmental Checker	Roy Man	3922 9141

Advanced Works:

Party	Position	Name	Telephone
Contract P560(R) Aviation Fuel Pipeline Diversion Works (Langfang Huayuan Mechanical and Electrical Engineering Co., Ltd.)	Project Manager	Wei Shih	2117 0566
	Environmental Officer	Lyn Liu	5172 6543

DCM Works:

Party	Position	Name	Telephone
Contract 3201 DCM (Package 1) (Penta-Ocean-China State-Dong-Ah Joint Venture)	Project Director	Tsugunari Suzuki	9178 9689
	Environmental Officer	Hiu Yeung Tang	6329 3513
Contract 3203 DCM (Package 3) (Sambo E&C Co., Ltd)	Project Manager	Eric Kan	9014 6758
Contract 3205 DCM (Package 5) (Bachy Soletanche - Sambo Joint Venture)	Deputy Project Director	Min Park	9683 0765
	Environmental Officer	William Chan	5408 3045

Reclamation Works:

Party	Position	Name	Telephone
Contract 3206 (ZHEC-CCCC-CDC Joint Venture)	Project Manager	Kim Chuan Lim	3763 1509
	Environmental Officer	Kwai Fung Wong	3763 1452

Airfield Works:

Party	Position	Name	Telephone
Contract 3301 North Runway Crossover Taxiway (FJT-CHEC-ZHEC Joint Venture)	Deputy Project Director	Kin Hang Chung	9800 0048
	Environmental Officer	Joe Wong	6182 0351
Contract 3302 Eastern Vehicular Tunnel Advance Works (China Road and Bridge Corporation)	Project Manager	Wan Cheung Lee	6100 6075
	Environmental Officer	Dennis Ho	5645 0563
Contract 3303 Third Runway and Associated Works (SAPR Joint Venture)	Project Manager	Andrew Keung	6277 6628
	Environmental Officer	Pan Fong	9436 9435

Third Runway Concourse and Integrated Airport Centres Works:

Party	Position	Name	Telephone
Contract 3402 New Integrated Airport Centres Enabling Works (Wing Hing Construction Co., Ltd.)	Contract Manager	Michael Kan	9206 0550
	Environmental Officer	Lisa He	5374 3418

Terminal 2 (T2) Expansion Works:

Party	Position	Name	Telephone
Contract 3501 Antenna Farm and Sewage Pumping Station (Build King Construction Ltd.)	Contracts Manager	Vincent Kwan	9833 1313
	Environmental Officer	Edward Tam	9287 8270
Contract 3502 Terminal 2 APM Depot Modification Works (Build King Construction Ltd.)	Project Manager	David Ng	9010 7871
	Environmental Officer	Chun Pong Chan	9187 7118
Contract 3503 Terminal 2 Foundation and Substructure Works (Leighton – Chun Wo Joint Venture)	Project Manager	Eric Wu	3973 1718
	Environmental Officer	Malcolm Leung	3973 0850

Automated People Mover (APM) Works:

Party	Position	Name	Telephone
Contract 3602 Existing APM System Modification Works (Niiigata Transys Co., Ltd.)	Project Manager	Kunihiro Tatecho	9755 0351
	Environmental Officer	Yolanda Gao	5399 3509

Baggage Handling System (BHS) Works:

Party	Position	Name	Telephone
Contract 3603 3RS Baggage Handling System (VISH Consortium)	Project Manager	Andy Ng	9102 2739
	Environmental Officer	Eric Ha	9215 3432

Airport Support Infrastructure and Logistic Works:

Party	Position	Name	Telephone
Contract 3721 Construction Support Infrastructure Works (China State Construction Engineering (Hong Kong) Ltd.)	Site Agent	Thomas Lui	9011 5340
	Environmental Officer	Xavier Lam	9493 2944
Contract 3801 APM and BHS Tunnels on Existing Airport Island (China State Construction Engineering (Hong Kong) Ltd.)	Project Manager	Tony Wong	9642 8672
	Environmental Officer	Fredrick Wong	9842 2703

1.4 Contact information for the Project

The contact information for the Project is provided in **Table 1.2**. The public can contact us through the following channels if they have any queries and comments on the environmental monitoring data and project related information.

Table 1.2: Contact Information of the Project

Channels	Contact Information
Hotline	3908 0354
Email	env@3rsproject.com
Fax	3747 6050
Postal Address	Airport Authority Hong Kong HKIA Tower 1 Sky Plaza Road Hong Kong International Airport Lantau Hong Kong Attn: Environmental Team Leader Mr Terence Kong c/o Mr Lawrence Tsui (TRD)

1.5 Summary of Construction Works

The key activities of the Project carried out in the reporting period included reclamation works and land-based works. Reclamation works included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation. Land-based works involved mainly foundation and substructure works for Terminal 2 expansion, modification and tunnel work for APM and BHS, and preparation work for utilities, with activities including site establishment, site office construction, road and drainage works, cable ducting, demolition of existing facilities, piling, and excavation works.

The locations of the works areas are presented in **Figure 1.1**.

1.6 Summary of EM&A Programme Requirements

The status for all environmental aspects is presented in **Table 1.3**.

Table 1.3: Summary of status for all environmental aspects under the Manual

Parameters	EM&A Requirements	Status
Air Quality		
Baseline Monitoring	At least 14 consecutive days before commencement of construction work	The baseline air quality monitoring results were reported in Baseline Monitoring Report and submitted to EPD under EP Condition 3.4.
Impact Monitoring	At least 3 times every 6 days	On-going
Noise		
Baseline Monitoring	Daily for a period of at least two weeks prior to the commencement of construction works	The baseline noise monitoring results were reported in Baseline Monitoring Report and submitted to EPD under EP Condition 3.4.
Impact Monitoring	Weekly	On-going
Water Quality		
General Baseline Water Quality Monitoring for reclamation, water jetting and field joint works	Three days per week, at mid-flood and mid-ebb tides, for at least four weeks prior to the commencement of marine works.	The baseline water quality monitoring results were reported in Baseline Water Quality Monitoring Report and submitted to EPD under EP Condition 3.4.
General Impact Water Quality Monitoring for reclamation, water jetting and field joint works	Three days per week, at mid-flood and mid-ebb tides.	On-going
Initial Intensive Deep Cement Mixing (DCM) Water Quality Monitoring	At least four weeks	The Initial Intensive DCM Monitoring Report was submitted and approved by EPD in accordance with the Detailed Plan on DCM.
Regular DCM Water Quality Monitoring	Three times per week until completion of DCM works.	On-going
Waste Management		
Waste Monitoring	At least weekly	On-going
Land Contamination		
Supplementary Contamination Assessment Plan (CAP)	At least 3 months before commencement of any soil remediation works.	The Supplementary CAP was submitted and approved by EPD pursuant to EP condition 2.20.
Contamination Assessment Report (CAR) for Golf Course	CAR to be submitted for golf course first; programme for submission of supplementary CAR at the other areas to be agreed.	The CAR for Golf Course was submitted to EPD.
Contamination Assessment Report (CAR) for Terminal 2 Emergency Power Supply System No.1 (Volume 1)	CAR to be submitted for golf course first; programme for submission of supplementary CAR at the other areas to be agreed.	The CAR for Terminal 2 Emergency Power Supply System No.1 (Volume 1) was submitted to EPD.
Terrestrial Ecology		
Pre-construction Egret Survey Plan	Once per month in the breeding season between April and July, prior to the commencement of HDD drilling works.	The revised Egret Survey Plan was submitted and approved by EPD under EP Condition 2.14.
Ecological Monitoring	Monthly monitoring during the HDD construction works period from August to March.	The terrestrial ecological monitoring at Sheung Sha Chau was completed in January 2019.
Marine Ecology		
Pre-Construction Phase Coral Dive Survey	Prior to marine construction works	The Coral Translocation Plan was submitted and approved by EPD under EP Condition 2.12.
Coral Translocation	-	The coral translocation was completed on 5 January 2017.

Parameters	EM&A Requirements	Status
Coral Post-translocation Monitoring	As per an enhanced monitoring programme based on the Coral Translocation Plan	The post-translocation monitoring programme according to the Coral Translocation Plan was completed in April 2018
Chinese White Dolphins (CWD)		
Baseline Monitoring	6 months of baseline surveys before the commencement of land formation related construction works. Vessel surveys: Two full surveys per month; Land-based theodolite tracking: Two days per month at the Sha Chau station and two days per month at the Lung Kwu Chau Station; and Passive Acoustic Monitoring (PAM): For the whole duration of baseline period.	Baseline CWD results were reported in the CWD Baseline Monitoring Report and submitted to EPD in accordance with EP Condition 3.4.
Impact Monitoring	Vessel surveys: Two full surveys per month; Land-based theodolite tracking: One day per month at the Sha Chau station and one day per month at the Lung Kwu Chau Station; and PAM: For the whole duration for land formation related construction works.	On-going since its commencement in August 2016. Land-based theodolite tracking: In addition to the frequency as stipulated in the Manual, supplemental theodolite tracking was conducted, i.e. in total twice per month at the Lung Kwu Chau station.
Landscape and Visual		
Landscape and Visual Plan	At least 3 months before the commencement of construction works on the formed land of the Project.	The Landscape & Visual Plan was submitted to EPD under EP Condition 2.18.
Baseline Monitoring	One-off survey within the Project site boundary prior to commencement of any construction works	The baseline landscape & visual monitoring result has been reported in Baseline Monitoring Report and submitted to EPD under EP Condition 3.4.
Impact Monitoring	Weekly	On-going
Environmental Auditing		
Regular site inspection	Weekly	On-going
Marine Mammal Watching Plan (MMWP) implementation measures	Monitor and check	On-going
Dolphin Exclusion Zone (DEZ) Plan implementation measures	Monitor and check	On-going
SkyPier High Speed Ferries (HSF) implementation measures	Monitor and check	On-going
Construction and Associated Vessels Implementation measures	Monitor and check	On-going
Complaint Hotline and Email channel	Construction phase	On-going
Environmental Log Book	Construction phase	On-going

Taking into account the construction works in the reporting period, impact monitoring of air quality, noise, water quality, waste management, terrestrial ecology, landscape and visual, and CWD were carried out in the reporting period. Upon completion of coral translocation in January 2017, additional post-translocation monitoring was also carried out in the reporting period.

The EM&A programme also involved weekly site inspections and related auditing conducted by the ET for checking the implementation of the required environmental mitigation measures as recommended in the approved EIA Report. To promote the environmental awareness and enhance the environmental performance of the contractors, environmental briefings, environmental trainings, and regular environmental management meetings were conducted during the reporting period which are summarized as below:

- 1 dolphin observer training provided by ET;
- 22 skipper trainings provided by ET;
- 3 meetings with High Speed Ferry operators for experience sharing and recommendations to strengthen the implementation of the Marine Travel Routes and Management Plan for High Speed Ferries of SkyPier;
- 18 environmental briefings on EP and EM&A requirements of the 3RS provided by ET; and
- 93 environmental management meetings for EM&A review with works contracts.

The EM&A programme has been undertaken in accordance with the recommendations presented in the approved EIA Report and the 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 C**.

2 Environmental Monitoring and Auditing

2.1 Air Quality Monitoring

Impact 1-hour Total Suspended Particulates (TSP) monitoring was conducted three times every six days at two representative monitoring stations during the reporting period. The locations of monitoring stations are described in **Table 2.1** and presented in **Figure 2.1**.

2.1.1 Action and Limit Levels

The Action and Limit Levels of the air quality monitoring stipulated in the EM&A programme for triggering the relevant investigation and follow-up procedures under the programme are provided in **Table 2.1**.

Table 2.1: Impact Air Quality Monitoring Stations

Monitoring Station	Location	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
AR1A	Man Tung Road Park	306	500
AR2	Village House at Tin Sum	298	

2.1.2 Monitoring Results

The graphical plots of impact air quality monitoring results during the reporting period are presented in **Appendix D**. Percentage of monitoring results within their corresponding Action and Limit Levels in the reporting period are presented in **Table 2.2**.

Table 2.2: Percentage of Air Quality Monitoring Results within Action and Limit Levels

	AR1A	AR2
Jan 2019	100%	100%
Feb 2019	100%	100%
Mar 2019	100%	100%
Apr 2019	100%	100%
May 2019	100%	100%
Jun 2019	100%	100%
Jul 2019	100%	100%
Aug 2019	100%	100%
Sep 2019	100%	100%
Oct 2019	100%	100%
Nov 2019	100%	100%
Dec 2019	100%	100%
Overall	100%	100%

Note: The percentages are calculated by dividing the number of monitoring results within their corresponding Action and Limit Level by the total number of monitoring results.

All monitoring results at AR1A and AR2 were within their corresponding Action and Limit Levels.

General meteorological conditions throughout the impact monitoring period were recorded and summarized in **Table 2.3**.

Table 2.3: General Meteorological Condition during Impact Air Quality Monitoring

	Weather	Wind Direction
Jan – Mar 2019	Sunny to Cloudy	North or East
Apr – Jun 2019	Sunny to Rainy	East or Southwest
Jul – Sep 2019	Sunny to Rainy	Southwest
Oct – Dec 2019	Sunny to Drizzle	Northwest

2.1.3 Conclusion

Major sources of dust observed at the monitoring stations during the monitoring sessions were local air pollution and nearby traffic emissions. As the sensitive receivers were far away from the construction activities, with the implementation of dust control measures, there was no adverse impact at the sensitive receivers attributable to the works of the Project.

2.2 Noise Monitoring

Impact noise monitoring was conducted at four representative monitoring stations once per week during 0700 and 1900 in the reporting period. The locations of monitoring stations are described in **Table 2.4** and presented in **Figure 2.1**.

2.2.1 Action and Limit Levels

The Action and Limit levels of the noise monitoring stipulated in the EM&A programme for triggering the relevant investigation and follow-up procedures under the programme are provided in **Table 2.4**.

Table 2.4: Impact Noise Monitoring Stations

Monitoring Station	Location	Action Level	Limit Level
NM1A	Man Tung Road Park	When one documented complaint is received from any one of the sensitive receivers	75 dB(A)
NM4	Ching Chung Hau Po Woon Primary School		65dB(A) / 70 dB(A) ⁽ⁱ⁾
NM5	Village House in Tin Sum		75 dB(A)
NM6	House No. 1, Sha Lo Wan		75 dB(A)

Note:

⁽ⁱ⁾ The Limit Level for NM4 is reduced to 70dB(A) for being an educational institution. During school examination period, the Limit Level is further reduced to 65dB(A).

2.2.2 Monitoring Results

The graphical plots of impact noise quality monitoring results during the reporting period are presented in **Appendix D**. Percentage of monitoring results within their corresponding Action and Limit Levels in the reporting period are presented in **Table 2.5**.

Table 2.5: Percentage of Noise Monitoring Results within Action and Limit Levels

	NM1A	NM4	NM5	NM6
Jan 2019	100%	100%	100%	100%
Feb 2019	100%	100%	100%	100%
Mar 2019	100%	100%	100%	100%
Apr 2019	100%	100%	100%	100%
May 2019	100%	100%	100%	100%
Jun 2019	100%	100%	100%	100%
Jul 2019	100%	100%	100%	100%

	NM1A	NM4	NM5	NM6
Aug 2019	100%	100%	100%	100%
Sep 2019	100%	100%	100%	100%
Oct 2019	100%	100%	100%	100%
Nov 2019	100%	100%	100%	100%
Dec 2019	100%	100%	100%	100%
Overall	100%	100%	100%	100%

Note: The percentages are calculated by dividing the number of monitoring results within their corresponding Action and Limit Level by the total number of monitoring results.

No complaints were received from any sensitive receiver that triggered the Action Level. All monitoring results were also within the corresponding Limit Levels at all monitoring stations in the reporting period.

General weather conditions throughout the impact monitoring period were recorded and summarized in **Table 2.6**.

Table 2.6: General Weather Condition during Impact Noise Monitoring

	Weather
Jan – Mar 2019	Sunny to Cloudy
Apr – Jun 2019	Sunny to Drizzle
Jul – Sep 2019	Sunny to Drizzle
Oct – Dec 2019	Sunny to Cloudy

2.2.3 Conclusion

Major sources of noise dominating the monitoring stations observed during the construction noise impact monitoring were road traffic noise near NM1A, school activities at NM4, and aircraft and helicopter noise near NM5 and NM6 during the reporting period. As the sensitive receivers were far away from the construction activities, with the implementation of noise control measures, there was no adverse impact at the sensitive receivers attributable to the works of the Project.

2.3 Water Quality Monitoring

Impact water quality monitoring of the Project commenced on 4 Aug 2016. During the reporting period, water quality monitoring was conducted three days per week, at mid-ebb and mid-flood tides, at 23 water quality monitoring stations, comprising 12 impact (IM) stations, 8 sensitive receiver (SR) stations, and 3 control (C) stations in the vicinity of the water quality sensitive receivers around the existing airport island in accordance with the Manual. The purpose of water quality monitoring at the IM stations is to promptly capture any potential water quality impacts from the Project before the impacts could become apparent at sensitive receivers (represented by the SR stations). **Table 2.7** describes the details of the monitoring stations. **Figure 2.2a** shows the locations of the monitoring stations.

To better reflect the water quality in the immediate vicinity of the intake, the monitoring location of SR1A was shifted closer to the intake starting from 5 January 2019. The monitoring location for SR8 was shifted as well to avoid unnecessary disruptions associated with ongoing construction activities on the same day. The updated monitoring locations are presented in **Figure 2.2b**.

Starting from 8 August 2019, the monitoring location of SR6 was shifted to SR6A as the access to SR6 was obstructed by construction activities and temporary structures for Tung Chung New Town Extension. The updated monitoring locations are presented in **Figure 2.2c**.

Table 2.7: Monitoring Locations and Parameters for Impact Water Quality Monitoring

Monitoring Stations	Description	Coordinates		Parameters
		Easting	Northing	
C1	Control Station	804247	815620	<u>General</u>
C2	Control Station	806945	825682	<u>Parameters:</u>
C3 ⁽³⁾	Control Station	817803	822109	DO, pH, Temperature,
IM1	Impact Station	807132	817949	Salinity, Turbidity, SS
IM2	Impact Station	806166	818163	<u>DCM Parameters</u>
IM3	Impact Station	805594	818784	Total Alkalinity,
IM4	Impact Station	804607	819725	Heavy Metals ⁽²⁾
IM5	Impact Station	804867	820735	
IM6	Impact Station	805828	821060	
IM7	Impact Station	806835	821349	
IM8	Impact Station	808140	821830	
IM9	Impact Station	808811	822094	
IM10	Impact Station	809794	822385	
IM11	Impact Station	811460	822057	
IM12	Impact Station	812046	821459	
SR1A ⁽¹⁾	Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities (HKBCF) Seawater Intake for cooling	812586 812660 (From 5 Jan 2019 onwards)	820069 819977	<u>General</u> <u>Parameters</u> DO, pH, Temperature, Salinity, Turbidity, SS
SR2 ⁽³⁾	Planned marine park / hard corals at The Brothers / Tai Mo To	814166	821463	<u>General</u> <u>Parameters</u> DO, pH, Temperature, Salinity, Turbidity, SS <u>DCM Parameters</u> Total Alkalinity, Heavy Metals ⁽²⁾⁽⁴⁾
SR3	Sha Chau and Lung Kwu Chau Marine Park / fishing and spawning grounds in North Lantau	807571	822147	<u>General</u> <u>Parameters</u> DO, pH, Temperature, Salinity, Turbidity, SS
SR4A	Sha Lo Wan	807810	817189	
SR5A	San Tau Beach SSSI	810696	816593	
SR6 ⁽⁵⁾	Tai Ho Bay, Near Tai Ho Stream SSSI	814663	817899	
SR6A ⁽⁵⁾		814739	817963	
SR7	Ma Wan Fish Culture Zone (FCZ)	823742	823636	
SR8 ⁽⁶⁾	Seawater Intake for cooling at Hong Kong International Airport (East)	811418 811623 (From 5 Jan 2019 onwards)	820246 820390	

Notes:

- ⁽¹⁾ With the operation of HKBCF, water quality monitoring at SR1A was commenced on 25 October 2018. To better reflect the water quality in the immediate vicinity of the intake, the monitoring location of SR1A has been shifted closer to the intake starting from 5 January 2019.

- (2) Details of selection criteria for the two heavy metals for early regular and regular DCM monitoring refer to the Detailed Plan on Deep Cement Mixing available on the dedicated 3RS website (<http://env.threerunwaysystem.com/en/ep-submissions.html>). DCM specific water quality monitoring parameters (total alkalinity and heavy metals) were only conducted at C1 to C3, SR2, and IM1 to IM12.
- (3) According to the baseline water quality monitoring report, C3 station is not adequately representative as a control station of IM / SR stations during the flood tide. The control reference has been changed from C3 to SR2 from 1 September 2016 onwards.
- (4) Total alkalinity and heavy metals results are collected at SR2 as a control station for regular DCM monitoring.
- (5) As the access to SR6 was obstructed by the construction activities and temporary structures for Tung Chung New Town Extension, the monitoring location was relocated to SR6A starting from 8 August 2019.
- (6) The monitoring station for SR8 is subject to future changes due to silt curtain arrangements and the progressive relocation of this seawater intake.

2.3.1 Action and Limit Levels

The Action and Limit Levels for general water quality monitoring and regular DCM monitoring stipulated in the EM&A programme for triggering the relevant investigation and follow-up procedures under the programme are presented in **Table 2.8**. The control and impact stations during flood tide and ebb tide for general water quality monitoring and regular DCM monitoring are presented in **Table 2.9**. The weather and sea conditions during the reporting period are recorded and summarized in **Table 2.10**.

Table 2.8: Action and Limit Levels for General Water Quality Monitoring and Regular DCM Monitoring

Parameters		Action Level (AL)		Limit Level (LL)	
Action and Limit Levels for general water quality monitoring and regular DCM monitoring (excluding SR1A & SR8)					
General Water Quality Monitoring	DO in mg/l (Surface, Middle & Bottom)	Surface and Middle		Surface and Middle	
		4.5 mg/l		4.1 mg/l	5 mg/l for Fish Culture Zone (SR7) only
		Bottom		Bottom	
		3.4 mg/l		2.7 mg/l	
	Suspended Solids (SS) in mg/l	23	or 120% of upstream control station at the same tide of the same day, whichever is higher	37	or 130% of upstream control station at the same tide of the same day, whichever is higher
	Turbidity in NTU	22.6		36.1	
Regular DCM Monitoring	Total Alkalinity in ppm	95		99	
	Representative Heavy Metals for regular DCM monitoring (Chromium)	0.2		0.2	
	Representative Heavy Metals for regular DCM monitoring (Nickel)	3.2		3.6	
Action and Limit Levels SR1A					
	SS (mg/l)	33		42	
Action and Limit Levels SR8					
	SS (mg/l)	52		60	

Note:

- For DO measurement, Action or Limit Level is triggered when the monitoring result is lower than the limits.
- For parameters other than DO, Action or Limit Level is triggered when monitoring result is higher than the limits.
- Depth-averaged results are used unless specified otherwise.
- Details of selection criteria for the two heavy metals for early regular and regular DCM monitoring refer to the Detailed Plan on Deep Cement Mixing available on the dedicated 3RS website <http://env.threerunwaysystem.com/en/ep-submissions.html>
- The Action and Limit Levels for the two representative heavy metals chosen will be the same as that for the intensive DCM monitoring.

Table 2.9: The Control and Impact Stations during Flood Tide and Ebb Tide for General Water Quality Monitoring and Regular DCM Monitoring

Control Station	Impact Stations
Flood Tide	
C1	IM1, IM2, IM3, IM4, IM5, IM6, IM7, IM8, SR3
SR2 ⁽¹⁾	IM7, IM8, IM9, IM10, IM11, IM12, SR1A, SR3, SR4A, SR5A, SR6, SR6A, SR8
Ebb Tide	
C1	SR4A, SR5A, SR6, SR6A
C2	IM1, IM2, IM3, IM4, IM5, IM6, IM7, IM8, IM9, IM10, IM11, IM12, SR1A, SR2, SR3, SR7, SR8

Note ⁽¹⁾: As per findings of Baseline Water Quality Report, the control reference has been changed from C3 to SR2 from 1 September 2016 onwards.

Table 2.10: General Weather Condition and Sea Condition during Impact Water Quality Monitoring

	Weather	Sea Condition
Jan – Mar 2019	Sunny to Rainy	Calm to Rough
Apr – Jun 2019	Sunny to Rainy	Calm to Rough
Jul – Sep 2019	Sunny to Rainy	Calm to Rough
Oct – Dec 2019	Sunny to Rainy	Calm to Rough

2.3.2 Monitoring Results

Percentage of monitoring results within their corresponding Action and Limit Levels in the reporting period are presented in **Table 2.11**. It should be noted that Hong Kong was under the effect of tropical cyclones from 30 July to 2 August, 28 to 29 August and 1 to 3 September 2019 respectively, and the water quality monitoring results during the said periods might be affected by the inclement weather.

Table 2.11: Percentage of Water Quality Monitoring Results within Action and Limit Levels

	General Water Quality Monitoring				Regular DCM Monitoring		
	DO (Surface and Middle)	DO (Bottom)	SS	Turbidity	Alkalinity	Chromium	Nickel
Jan 2019	100%	100%	100%	100%	100%	100%	99.7%
Feb 2019	100%	100%	100%	100%	100%	100%	98.6%
Mar 2019	100%	100%	99.0%	100%	100%	100%	99.7%
Apr 2019	100%	100%	100%	100%	100%	100%	100%
May 2019	100%	100%	100%	100%	100%	100%	100%
Jun 2019	98.4%	96.1%	100%	100%	100%	100%	99.3%
Jul 2019	98.5%	91.4%	100%	100%	100%	100%	100%
Aug 2019	100%	100%	99.6%	100%	100%	100%	98.7%
Sep 2019	99.5%	100%	98.7%	100%	100%	100%	99.7%
Oct 2019	100%	100%	99.1%	100%	100%	100%	100%
Nov 2019	100%	100%	99.8%	100%	100%	100%	100%
Dec 2019	100%	100%	98.8%	100%	100%	100%	100%
Overall	99.7%	99.0%	99.6%	100%	100%	100%	99.6%

Note: The percentages are calculated by dividing the number of depth-averaged results within their corresponding Action and Limit Level by the total number of depth-averaged results.

The monitoring results for turbidity, total alkalinity, and chromium obtained in the reporting period were within their corresponding Action and Limit Levels.

For DO, SS and nickel, some of the testing results triggered the corresponding Action or Limit Levels in the reporting period. Investigations were conducted accordingly and the details were presented in the corresponding Construction Phase Monthly EM&A Reports. The status of each water quality parameter collected in the reporting period are presented graphically in **Appendix D**. Some of these cases were recorded at monitoring stations located upstream of the Project based on dominant tidal flow and were considered not affected by the Project. Based on respective investigation findings, cases triggering Action or Limit Level were found not related to the Project.

2.3.3 Conclusions

During the reporting period, it was noted that the vast majority of monitoring results (overall 99.0% for DO (Bottom) to 100% for turbidity, alkalinity, and chromium as presented in **Table 2.11**) were within their corresponding Action and Limit Levels, while only a minor number of results triggered their corresponding Action or Limit Level, and investigations were conducted. Based on the findings of the investigations presented in the Construction Phase Monthly EM&A Reports for 2019, all results that triggered the corresponding Action or Limit Level were not related to the Project. Therefore, the Project did not cause adverse impact at the water quality sensitive receivers. All required actions under the Event and Action Plan were followed. These cases were considered to be due to natural fluctuation or other sources not related to the Project.

Nevertheless, the non-project related triggers have been attended to and have initiated corresponding actions and measures. As part of the EM&A programme, the construction methods and mitigation measures for water quality will continue to be monitored and opportunities for further enhancement will continue to be explored and implemented where possible, to strive for better protection of water quality and the marine environment.

In the meantime, the contractors were reminded to implement and maintain all mitigation measures during weekly site inspection. These include proper maintenance of silt curtains and control the level of sand material stockpile on barges to avoid spillage as recommended in the Manual.

2.4 Waste Monitoring

In accordance with the Manual, the waste generated from construction activities was audited once per week to determine if waste was being managed in accordance with the Waste Management Plan (WMP) prepared for the Project, contract-specific WMP, and any statutory and contractual requirements. All aspects of waste management including waste generation, storage, transportation, and disposal were reviewed during the audits.

2.4.1 Action and Limit Levels

The Action and Limit Levels of the construction waste are provided in **Table 2.12**.

Table 2.12: Action and Limit Levels for Construction Waste

Monitoring Stations	Action Level	Limit Level
Construction Area	When one valid documented complaint is received	Non-compliance of the WMP, contract-specific WMPs, any statutory and contractual requirements

2.4.2 Summary of Monitoring Results

The construction waste generated in the reporting period is summarized in **Table 2.13**.

There were no complaints, non-compliance of the WMP, contract-specific WMPs, statutory and contractual requirements that triggered Action and Limit Levels in the reporting period.

Table 2.13: Statistics of Construction Waste Generated in the Reporting Period

	C&D ⁽¹⁾ Material Stockpiled for Reuse or Recycle (m ³)	C&D Material Reused in the Project (m ³)	C&D Material Reused in other Projects (m ³)	C&D Material Transferred to Public Fill (m ³)	Chemical Waste (kg)	Chemical Waste (l)	General Refuse (tonne)
Jan 2019	5,675	9,430	618	11,417	1,125	35,880	319
Feb 2019	3,329	13,262	446	5,833	255	22,500	317
Mar 2019	4,516	10,056	6,903	6,780	240	18,700	362
Apr 2019	10,184	5,748	5,184	5,598	90	13,200	432
May 2019	13,616	10,284	0	5,617	230	18,000	242
Jun 2019	9,982	4,684	339	5,570	150	15,400	354
Jul 2019	4,821	4,568	665	4,627	200	9,040	399
Aug 2019	7,766	5,568	0	3,447	200	7,200	827
Sep 2019	4,369	11,844	327	3,963	75	3,600	748
Oct 2019	1,948	19,316	0	3,600	0	3,000	796
Nov 2019	1,403	26,774	0	3,380	90	6,600	680
Dec 2019	835	30,475	0	3,027	70	7,000	779
Total	68,440	152,010	14,480	62,860	2,730	160,120	6255

Notes:

1. The excavated materials were temporarily stored at stockpiling area and will be reused in the Project.
2. C&D refers to Construction and Demolition.
3. Figures are rounded off to the nearest tonne.
4. Paper, plastics, and metals were recycled in the reporting period.

Weekly monitoring on all works contracts were carried out by the ET to check and monitor the implementation of proper waste management practices during the construction phase.

Recommendations made included provision and maintenance of proper chemical waste storage area, as well as proper handling, segregation, and regular disposal of general refuse. The contractors implemented the recommended measures to improve waste management issues.

2.5 Chinese White Dolphin Monitoring

According to Sections 10.2.1.2 and 10.2.1.3 of the EM&A Manual, CWD monitoring is required during the baseline, construction, post-construction and operation phases of the project. The aims of CWDs monitoring during construction period are:

- to monitor the effects on the potential shift in the CWD travelling areas and habitat use;
- to monitor the effectiveness of the HSF speed and routing restrictions to the CWDs;
- to provide a dataset that can be compatible with the AFCD long-term monitoring, be stratified in such a way as to allow the calculation of density and abundance for the different phases and to calculate the trends from these estimates; and
- to provide assessment of how the project and cumulative effects may be impacting the CWDs.

This section summarises the results of the CWD construction phase monitoring effort over a 12-month period between January 2019 and December 2019, to gather information on the spatial and temporal distribution patterns as well as calculate density and abundance of the CWD in the western Hong Kong

waters. Supplementary information collected focusing on northwestern Lantau waters including the habitat use and behaviours of CWD during the construction phase of the Project has also been reviewed.

This reporting period is effectively the third full year of construction phase monitoring of CWDs. The overall monitoring programme commenced in August 2016, although there were no marine construction works in August and September 2016, and only localised sand blanket laying and DCM trial works from October to December 2016. This annual report reviewed the construction phase monitoring data for 2019 and compared with the construction phase monitoring data for the previous years.

CWD monitoring was conducted by undertaking vessel line-transect surveys, supplemented by land-based theodolite tracking survey and Passive Acoustic Monitoring (PAM). The vessel line transects covered Northeast Lantau (NEL), Northwest Lantau (NWL), Airport West (AW), West Lantau (WL) and Southwest Lantau (SWL) areas at a frequency of two full surveys per month as proposed in Section 10.2.3.2 of the Updated EM&A Manual, which are consistent with the AFCD long-term monitoring programme (except AW). The locations of the CWD vessel survey transects are shown in **Figure 2.3**. Additional survey effort was collected on a voluntary basis at the same frequency of two surveys per month from Deep Bay (DB) (refer to **Appendix E** for the location of this additional survey), which is an area that historically had CWD in the outer bay, to establish a full understanding of CWD abundance. All the DB data were considered supplemental and only be used for density and abundance estimation.

Density and abundance analysis made use of both conventional distance sampling (CDS) and a more sophisticated approach – multiple covariate distance sampling (MCDS) to estimate CWD abundance for the waters of Hong Kong. The additional analysis using MCDS is more time-consuming and labour-intensive, as it uses information on environmental factors that are likely to affect detection probability (such as variables describing sighting conditions), and generally produces estimates with higher precision (i.e., lower variances and CVs). However, datasets with small sample sizes (such as often occurs in marine mammal studies) can make it difficult or impossible to achieve model “convergence” in some MCDS analyses, and thus it is critical to always start each analysis with CDS methods (this also helps to determine the appropriate truncation distance and overall modelling approach).

Based on the vessel survey data, seasonal differences in dolphin density and use of the study area were examined, using the solar seasons (Winter: December-February, Spring: March-May, Summer: June-August, Autumn: September-November) and/or oceanographic seasons (Dry: October-March, Wet: April-September).

The travelling pattern in different areas were reviewed by using photo-identification of individuals dolphins and their re-sighting locations, depicting the range use and cross-area movement of re-sighted individuals, where practicable. Travelling of CWDs in the north of Lung Kwu Chau were particularly supplemented with information from land-based theodolite tracking survey findings.

For the land-based theodolite tracking surveys, the monitoring frequency during the construction phase for marine works was one day per month at both the Lung Kwu Chau (LKC) station and Sha Chau (SC) station, as stipulated in Section 10.2.3.4 of the EM&A Manual. Additional theodolite tracking survey for one day at LKC station was conducted on a voluntary basis in this year to collect supplementary information for the Project, such that a total of two tracking days at LKC station were conducted per month. PAM was also deployed with a duty cycle of 20% for the construction phase with data supplementing the results of both vessel and land-based surveys. For details on CWD monitoring and data analysis methodologies refer to Section 10.2.4 of the EM&A Manual. The locations of land-based survey stations are described in **Table 2.14** and depicted in **Figure 2.4**. The location of the Passive Acoustic Monitoring device at A5 (with the coordinates of 22° 20.299' N, 113° 53.871' E) is shown in **Figure 2.5**.

Table 2.14: Land-based Survey Station Details

Stations	Location	Geographical Coordinates	Station Height (m)	Approximate Tracking Distance (km)
D	Sha Chau (SC)	22° 20' 43.5" N 113° 53' 24.66" E	45.66	2
E	Lung Kwu Chau (LKC)	22° 22' 44.83" N 113° 53' 0.2" E	70.40	3

2.5.1 Action and Limit Levels

The Action Level and Limit Level for CWD monitoring were formulated by an action response approach using the running quarterly dolphin encounter rates (Encounter Rate by Number of Dolphin Sightings 'STG' and Encounter Rate by Number of Dolphins 'ANI') derived from baseline monitoring data covering six months from mid-December 2015 to June 2016, as presented in the CWD Baseline Monitoring Report. The derived values of Action and Limit Levels for CWD monitoring are shown in **Table 2.15**. Running quarterly encounter rates STG and ANI have been determined for each month since August 2016 to compare with the derived Action/limit levels for construction phase monitoring of CWD. If persisting declines in the CWD running quarterly encounter rate values are determined month on month, an appropriate short-term response is then possible if the decline is shown to be related to 3RS construction activity.

Table 2.15: Derived Values of Action Level and Limit Level for Chinese White Dolphin Monitoring
NEL, NWL, AW, WL and SWL as a Whole

Action Level ⁽¹⁾	Running quarterly STG < 1.86 & ANI < 9.35
Limit Level ⁽¹⁾	Two consecutive running quarterly (3-month) STG < 1.86 & ANI < 9.35

Notes: (1) Action Level and/or Limit Level will be triggered if both STG and ANI fall below the criteria

2.5.2 Summary of Monitoring Results

2.5.2.1 Summary of Vessel Line-transect Survey Monitoring Results

Survey Effort

During the reporting period from January 2019 to December 2019, survey effort was completed in Northeast Lantau (NEL), Northwest Lantau (NWL), Airport West (AW), West Lantau (WL), and Southwest Lantau (SWL) survey areas. Although the frequencies of visiting each survey area per survey month were identical, the survey effort of different survey areas varied and was generally in proportion to the size of each survey area (i.e. larger survey area having longer distance of survey effort). A total of 5,445.0 km survey effort was collected in this reporting period (NEL: 1,141.5 km, NWL: 1,796.9 km, AW: 113.9 km, WL: 712.4 km, and SWL: 1,680.3 km). The percentage of the total survey effort collected in NEL, NWL, AW, WL and SWL was around 21.0%, 33.0%, 2.1%, 13.1% and 30.9% respectively.

Around 94.1% (5,123.1 km) of the survey effort was collected under favorable weather condition (i.e. Beaufort 0-3 and visibility of approximately 1200 m or beyond), and can be utilized in analyses of encounter rates, density and abundance.

A detailed record of the survey effort data is provided in **Appendix E**.

Sighting Distribution

During the reporting period, a total of 167 groups consisting of 606 CWDs were sighted in NWL, AW, WL and SWL survey areas. Amongst these 167 groups of CWDs, 165 groups with 596 CWDs were sighted during on-effort surveys under favourable weather condition (Beaufort 0-3 and visibility of approximately 1200 m or beyond).

The number of sightings by survey area recorded that NWL comprised 25 groups of 54 CWDs, AW comprised three groups of 17 CWDs, WL comprised 98 groups of 394 CWDs, while there were 41 groups of 141 CWDs seen in SWL. No CWDs were recorded in NEL survey area.

In NWL (including AW transects), CWDs were mostly sighted in two localities including waters around Lung Kwu Chau, and waters off Sham Wat (the southwestern corner of the survey area). Around Lung Kwu Chau, sightings of CWDs were particularly recorded in the western side as well as in waters between Lung Kwu Chau and Black Point. At the southwestern part of the survey area, CWD sightings were recorded in waters between the 3RS temporary works area and Sham Wat Wan.

In WL, the majority of CWDs were sighted along the coast and offshore waters from Tai O to Peaked Hill, as well as the waters off Fan Lau.

In SWL, sightings of CWDs were scattered amongst the survey area, with more sightings particularly around Fan Lau and Lo Kei Wan.

The sighting locations of CWDs during this reporting period are depicted in Figure 1 of **Appendix E**.

Encounter Rates

Two types of dolphin encounter rates were calculated based on the data collected during the reporting period. They included the number of dolphin sightings per 100 kilometers survey effort (STG) and total number of dolphins per 100 kilometers survey effort (ANI). The dolphin encounter rates were calculated by using survey data collected under favorable weather condition only (Beaufort sea state 3 or below with favorable visibility). Encounter rate provides a short to medium term frequency method for monitoring and responding appropriately to changes in CWD abundance as project works progress (referring to Section 10.5.2.3 of the EM&A Manual). The two types of encounter rates provide an overall indication of changes in CWD numbers over time in western Hong Kong waters.

During the reporting period, the overall combined STG and ANI of CWDs (from NEL, NWL, AW, WL and SWL) in 2019 were 3.22 and 11.63 respectively. Dolphin encounter rates by survey area and a summary of monthly encounter rates are presented in Table 1 and Table 2 of **Appendix E** respectively. Compared by area, WL had the highest encounter rates STG and ANI amongst the survey areas, followed by AW and SWL. The monthly encounter rates revealed that summer months generally recorded higher STG and ANI. The highest STG and ANI both occurred in July 2019. The lowest STG and ANI both occurred in February 2019, which is quite different from the result of year 2018 that the highest ANI was exceptionally recorded in February.

The trends of both monthly STG and ANI are presented in Figure 2 and Figure 3 of **Appendix E**. The temporal trends in 2019 is rather a normal seasonal trend that the peak occurred in summertime from July to September and decline in wintertime from January to March. It is different to 2018 in which the peak occurred unexpectedly in February.

Running quarterly encounter rates STG and ANI data were determined for each month for comparison with the Action/limit levels for construction phase monitoring of CWD. The overall Action Level was not triggered in this reporting period, though the running quarterly STG was once close to the Action Level whilst the running quarterly ANI had dropped below the Action Level. The running quarterly STG and ANI from January to December 2019 are summarized in Table 2 of **Appendix E**. The graphical plots of running quarterly encounter rates of the current reporting year and the past reporting years are presented in Figure 2 and Figure 3 of **Appendix E** respectively.

Density and Abundance Estimation

Line transect analyses to estimate the density and abundance of CWDs in Hong Kong waters during the reporting period were conducted using the same basic methods as in previous analyses. The best estimate of abundance was obtained using Beaufort sea state as a co-variate, and a half-normal model with a cosine

adjustment (effective strip width = 173 m). The detection function of 3RS CWD monitoring data of this reporting period is shown in Figure 4 of **Appendix E** and the various parameters of the 2019 estimates are shown in Table 3 of **Appendix E**. The overall abundance estimated for this reporting period (incorporating an entire year of data from all four seasons) was 40 CWDs (CV = 14.6%, indicating a very good level of precision <20%), which shows a large decrease from last year. For comparison, the 2018 abundance was 77 CWDs (CV = 18.9%). As in analyses of the last reporting year in 2018, the area with the highest abundance and highest density was WL (N=22, this has been consistent over the AFCD long-term records). NWL showed a large drop in the numbers of dolphins (from 22 in 2018 to 8 in 2019), as did SWL (from 15 to 9). NEL registered an abundance of zero, which has been the case in most of the last 8 years. Overall, all areas showed a decrease from the previous year's estimates, suggesting that any potential recovery of dolphins in North Lantau waters following the recent completion of the Hong Kong-Zhuhai-Macao Bridge (HZMB) marine works may have been interrupted. The HZMB construction phase impacts on dolphins would be expected to have been most significant between 2013 and 2016 (when the brunt of construction was occurring), and in fact, this time period saw a significant drop in numbers of dolphins in Hong Kong (Jefferson 2018).

It is worth noting, however, that the 3RS EIA predicted shifting of dolphins to waters outside of Hong Kong, and a drop in numbers of dolphins in the area during the 3RS construction phase (EIA Report Section 13.9.2) is thus anticipated. However, this will need to be examined with more data over the coming several years, after the cumulative impacts due to the 3RS Project along with other concurrent projects will become more clear as 3RS works progress, and the Project dataset grows.

In addition to estimating year-round abundance for each of the survey areas, a seasonal analysis was also conducted (the pooled dataset from all survey areas was used, as stratifying by both survey area and season would reduce the sample sizes that result in estimates with unacceptably-low levels of precision) (refer to Table 3 of **Appendix E**). The spring estimate was the lowest (N=27 dolphins), which has traditionally been the case for dolphin numbers in Hong Kong. The summer estimate showed the highest numbers (N=73 dolphins), which is also expected based on historical records. The seasonal analysis shows that, as in the past, there was a significant influx of dolphins into Hong Kong during the wet season (summer and autumn).

Quantitative Grid Analysis on Habitat Use

Habitat use amongst the survey areas was examined by using quantitative grid analysis, both SPSE (no. of on-effort sightings per 100 units of survey effort) and DPSE (no. of dolphins per 100 units of survey effort) values for each 1 km² grid were calculated in all grids amongst all survey areas for the period from January 2019 to December 2019. SPSE and DPSE of the last reporting year and the current reporting year are depicted in Figure 5 of **Appendix E**.

In 2018, it was reported that the important habitat of CWDs in SCLKCMP of NWL waters with high dolphin densities recorded in 2017 has become relatively less important. The pattern was similar in 2019 with decreasing SPSE and DPSE values over the grids around SCLKCMP, particularly around Lung Kwu Chau. Waters off Sham Wat Wan in the NWL survey area has also recorded lower DPSE values compared to year 2018.

The important dolphin habitats in WL survey area in 2019 are largely similar to 2018; grids with high SPSE and/or DPSE value(s) in WL were near Tai O, Peaked Hill and Fan Lau. Yi O has experienced a rebound of SPSE and DPSE values compared to the year 2018 (when a drop of importance was recorded).

While in SWL, the coastal waters around Fan Lau Tung Wan encountered a slight decrease in importance, while Fan Lau had higher SPSE and DPSE values than 2018. The waters around the Soko Islands, particularly the central part of the islands, became relatively more important to CWD as there are increases in DPSE values among the grids.

Cumulative SPSE and DPSE values were also calculated by using the 3RS CWD monitoring data since mid-Dec 2015 and are depicted in Figure 6 of **Appendix E**. Grids in western waters of Hong Kong with higher dolphin density are restricted to waters off West Lantau, at Tai O, Yi O, Peaked Hill and Fan Lau.

Group Size

During the reporting period from January 2019 to December 2019, group size of CWDs ranged from one to 21 dolphins, with an average of 3.63, taking into account all CWD sightings recorded. The average group sizes of NWL, AW, WL and SWL were 2.16, 5.67, 4.02 and 3.44 respectively. By four solar seasons, the average group size of CWDs was the highest in spring (4.13) but the lowest in winter (2.68). The summaries of the average group size of CWDs by survey area and by season are presented in Table 4 and Table 5 of **Appendix E**.

Small-sized CWD groups (i.e. 1 to 2 dolphins per group) accounted for around half of the sightings during the reporting period (about 48.5%). Similarly, medium-sized CWD groups (i.e. 3 to 9 dolphins per group) accounted for around 45.5%. Ten sightings, which accounted for 6.0% of the sightings, were large CWD groups with 10 or more dolphins per group.

Both small and medium CWD groups were sighted throughout the distribution range of dolphins in NWL, WL and SWL waters. There were more large-sized CWD groups sighted in WL than in SWL. No large CWD group was recorded in NWL. In WL, large CWD groups were mainly recorded at Tai O, waters between Yi O and Peaked Hill and also at Fan Lau. While in SWL, the large CWD groups were sighted at the central part of the Soko Islands. The sighting distribution of CWDs with different group sizes is illustrated in Figure 7 of **Appendix E**.

Activities and Association with Fishing Boats

Although vessel surveys do not provide the most unbiased information on the behaviour and activities of dolphins (due to the potentially disturbing presence of the vessel itself, and also the low vantage point of small vessels), nonetheless behaviour and activity data are still useful and are being collected from the vessel surveys.

During the reporting period, a total of 41, 14, 21 and 1 groups of CWDs were observed engaging in feeding, travelling, socialising and resting/milling activities, comprising of 24.6%, 8.4%, 12.6% and 0.6% of all CWD sightings respectively. The sighting locations of CWD groups engaged in different types of activities are depicted in Figure 8 of **Appendix E**.

In NWL, feeding activities mainly occurred in the southwestern part of the survey area, at the waters between the 3RS works area and coast of northwest Lantau. Occasional feeding activities were also observed north off Lung Kwu Chau. The feeding activities of CWD occurred along the coast of WL from Tai O to Fan Lau, and extended to coast in SWL survey area. In SWL, feeding activities also occurred in the northern part of the Soko Islands. Considering the sample size of sighting data of different survey areas, AW has the highest percentage of feeding again in 2019, as all CWD sightings recorded in that area showed feeding activities (although it should be kept in mind that the sample size in AW was very small), followed by SWL. A significant increase in feeding activities was observed in SWL from 17% of sightings in 2018 to 29% of sightings in 2019. However, the feeding activities recorded in NWL declined from 38% of sightings in 2018 to 28% of sightings in 2019.

Socialising activities were mainly observed around the western waters of HKIA, Tai O and Fan Lau. Travelling activities in NWL were mainly sighted around northern waters of Lung Kwu Chau. In WL and SWL, travelling activities mainly occurred in the relatively offshore waters. In addition, the only sighting with resting/milling activities was recorded in the coastal waters between Yi O and Peaked Hill in WL. The percentages of different activities for each of the survey areas are shown in Table 6 of **Appendix E**.

A total of four sightings of CWDs were observed associating with operating fishing boats, including gill netters (two groups), purse seiners (one group) and pair trawlers (one group), accounted for 2.4% of all sightings in 2019. There is an observable declining trend of CWD association with operating fishing boats in the past years (7.2% in 2016, 6.3% in 2017 and 3.7% in 2018). Such a declining trend may be attributed to a reduction of fishing activities particularly purse seiner operations in waters north of Lung Kwu Chau and in southwest Lantau waters based on field observations by survey teams during CWD monitoring. CWD association with operating fishing boats were mainly observed around Fan Lau. No observation of boat association with operating gill netters was recorded in NWL, where the waters north off Lung Kwu Chau used to be a favourite fishing ground in the past years. Based on field observation, the fishing activities in waters north off Lung Kwu Chau diminished in 2019. Although a trawling ban was implemented in December 2012, illegal trawling activities were still observed near the western and southwestern borders of Hong Kong. One group of CWDs was observed feeding in association with pair trawlers in WL close to Hong Kong border. The sighting locations of CWD groups associated with operating fishing boats are depicted in Figure 9 of **Appendix E**.

Mother-calf / Mother-unspotted Juvenile Pairs

During the reporting period, a total of 25 sightings were observed having mother-and-unspotted calf (UC) and/or mother-and-unspotted juvenile (UJ) pairs, which accounted for about 15.0% of all sightings of 2019. The percentage was slightly higher than that of 2018 (i.e. 13.0%). For different survey areas, the percentages of sightings with mother-calf pairs in NWL (including AW), WL and SWL were 3.6%, 22.4% and 4.9% respectively. These percentages were calculated by dividing the number of sightings with mother-calf pairs of a survey area by the total number of sightings of that survey area. Although a drastic decline in percentage of sightings with mother-calf pairs is found in NWL (from 19% in 2018 to 3.6% in 2019), there is an observable increase in WL from 13.3% in 2018 to 22.4% in 2019. The percentage remained relatively stable in SWL.

The abovementioned 25 sightings included six pairs of mother-and-UC and 23 pairs of mother-and-UJ. According to the result of photo-identification, these 25 sightings contained one identified UC individual and nine identified UJ individuals.

Most of the sightings with mother-calf pair were recorded in WL between Tai O and Peaked Hill. In NWL, the only sighting with mother-calf pair was recorded in the western waters off HKIA, while the two sightings in SWL occurred around the Soko Islands. The sighting distribution of mother-UC/ mother-UJ pairs is depicted in Figure 10 of **Appendix E**.

Photo Identification – Summary

During the reporting period, a total of 26 newly identified CWD individuals were added to the photo-identification catalogues, including four added to NL catalogue, 18 added to WL catalogue and four added to SL catalogue. Four animals namely WLMM116, WLMM119, WLMM120 and SLMM069 were confirmed to be duplicates of identified individuals in earlier time, namely WLMM054, SLMM058, WLMM106 and SLMM035 respectively. Therefore, all records under these four duplicates were transferred to the records under WLMM054, SLMM058, WLMM106 and SLMM035 respectively.

A total of 155 CWD individuals were identified for altogether 399 times from all sightings in 2019, that are relatively similar to the figures of last year (i.e. a total of 158 CWD individuals were identified for 431 times in 2018). Amongst these 155 CWD individuals, 38, 84 and 33 belonged to NL, WL and SWL catalogues, respectively. Amongst these 155 identified individuals, 92 individuals (around 59.4%) were sighted more than once. The number of re-sightings of an identified animal ranged from two to 10 times. The re-sighting rates (number of identified individuals that were re-sighted more than once in the reporting period divided by the total number of the identified individuals in the catalogue in the reporting period) of NL, WL and SWL catalogues were 50.0%, 57.1% and 75.8% respectively. Twenty-seven of these 92 re-sighted individuals were sighted five times or above.

The most frequently re-sighted animal in 2019 was WLMM079 (re-sighted 10 times), followed by SLMM003, SLMM052 and WLMM043 (all being re-sighted 8 times). The most frequently re-sighted animal since the establishment of the photo-identification catalogue is SLMM014 which has been identified 31 times, followed by WLMM001 (identified 30 times) and WLMM027 (identified 27 times).

A summary of the photo-identification of CWDs is presented in Table 7 of **Appendix E**.

Photo Identification – Range Use of Identified CWD individuals

WLMM079, the most frequently re-sighted animal in 2019, used to utilize WL water extensively in the past years. In 2019, it continued to occur frequently in WL waters but extended its range use further eastward to the Soko Islands in SWL waters.

SLMM014, the most frequently re-sighted animal since 2015, ranged from waters near Yi O in WL to the Soko Islands and Lo Kei Wan in SWL. The range use of SLMM014 in SWL continued to shrink in 2019, which only extended to Shek Pik with a significant reduction in use of waters between the Soko Islands and the coast of Southwest Lantau, where it used to occur in previous years.

In 2019, the range use of WLMM001, the second most frequently re-sighted animal since 2015, is similar to previous reporting years, as it appeared extensively in WL from Tai O to Fan Lau. WLMM001 showed an increased usage of waters between Peaked Hill and Fan Lau in 2018, while re-sightings were relatively scattered in WL waters this year.

WLMM027, the third most frequently re-sighted animal since 2015, used to have two relatively distinct distribution ranges, one in the northwest from Tree Island within SCLKCMP to waters around Sham Wat and HZMB Hong Kong Link Road, and the other in the southwest from Fan Lau to Shui Hau. In 2019, the re-sightings continued to be consistent with the distribution pattern in previous years.

A special mother-calf pair with a prolonged bonding, NLMM013 and its calf NLMM006 (a spotted juvenile), was once reported with significantly reduced occurrence in NWL in 2017 (re-sighted only 1 and 2 times in 2017, respectively) but re-utilized NWL waters in 2018 (5 and 7 re-sightings in 2018, respectively). Continuous utilization of NWL waters by this special pair was observed in 2019 (with re-sighting 3 and 4 times respectively). However, the number of sightings of NLMM006 and NLMM013 were much fewer when compared with 2016. Similar to previous years, their distribution range was highly restricted to NWL waters, particularly the waters around Lung Kwu Chau.

Two animals, namely SLMM011 and SLMM015, reported in 2018 significantly shrank their range use from Hong Kong waters in 2018 compared to previous years. Both of them were regularly seen in 2016 to 2017 having more than five re-sightings each year, but disappeared from Hong Kong waters in 2018. In 2019, SLMM011 returned to Hong Kong western waters and was sighted 4 times in WL and SWL waters. However, SLMM015 was not sighted in 2019, apparently disappearing from Hong Kong waters for the second consecutive year.

SLMM028 had a severe injury with deep cuts on its dorsal ridge and keel in 2018. In 2019, SLMM028 was sighted 4 times in WL and SWL but not in NWL where it used to occur in past years. It was observed recovering from the injury after receiving in-situ treatment (i.e. injection of antibiotics) in the wild last year. It continued to show good signs of health as it was observed engaging in normal feeding and socializing behaviour with other dolphins.

The sighting locations of WLMM079, SLMM014, WLMM001, WLMM027, NLMM006, NLMM013, SLMM011 and SLMM028 are depicted in location maps under Figure 11 of **Appendix E**, which provide the indicative distribution range use of representative individuals recorded for the 3RS CWD monitoring.

Photo Identification – Cross-area Movement

Amongst the 92 individuals that were re-sighted more than once in 2019, 54 individuals showed cross-area movement between different survey areas. This accounted for about 34.8% of all 155 identified animals. Amongst these 54 animals, 12 animals (22.2%) were re-sighted in both NWL (including AW) and WL, while 40 animals (74.1%) were recorded in both WL and SWL. Unlike previous years, no animals were recorded occurring in all three main survey areas (WL, SWL and NWL, including AW) in 2019. However, two (3.7%) out of these 52 animals were re-sighted in both NWL (including AW) and SWL.

Despite the fact that a number of identified CWD individuals were re-sighted in different survey areas, 38 (41.3%) out of those 92 animals re-sighted at least twice in 2019 were not observed crossing between different survey areas and were sighted in only one survey area.

2.5.2.2 Summary of Land-based Theodolite Tracking Monitoring Results

Survey Effort

In this reporting period, land-based surveys commenced on 8 January 2019, and concluded on 30 December 2019. A total of 36 days and 216:04 (hh:mm) of land-based theodolite survey effort were accomplished, including 24 days and 144:04 (hh:mm) from LKC and 12 days and 72:00 (hh:mm) from SC (Table 8 of **Appendix E** for summary). A total of 47 CWD groups were tracked from land, all from the LKC station (Table 8, Figure 12 **Appendix E**). While most initial sightings were within 1 km of the LKC tracking station, sightings were as far out as 2.5 km, towards the NE of the station. No CWDs were observed from SC.

After the raw data were filtered, 16 CWD group tracks fit criteria for analyses due to numerous CWD group tracks that were too short in duration (< 10 minutes) to include. From the tracks that fit criteria, 23 10-minute short-track segments were extracted for analyses. The number of CWD groups sighted per survey hour was 0.33 from LKC and 0 from SC. From LKC, sighting per survey hour was less than one-half of that observed in 2018 (0.77 groups per survey hour) and 2017 (0.89 groups per survey hour).

Time of Day

The diurnal pattern of CWDs was calculated by dividing the total tracking time of CWD groups (prior to filtering short-track data) by the total effort per hour block, and depicted in Figure 13 of **Appendix E**. Off LKC, the highest percentages of CWD groups (per hour of effort) were observed in the morning during the 0800 (13%) and 0900 (10%) hour blocks, whilst the lowest percentages were observed in the afternoon after the 1200 hour block. Indeed, the first two hour blocks of the day accounted for slightly over one-half of all sightings in the 6 hours (1000-1600) after this.

Time of Year

The highest percentage of CWD groups observed from LKC was during February (21%) and the lowest percentages observed were during April and May (2% each month) as depicted in Figure 14 of **Appendix E**. Based on solar season, CWDs were observed significantly more than expected by statistical chance during the winter (December-February) (with the *a priori* assumption that dolphins would be observed evenly during solar seasons and months of the year), and less than expected by statistical chance during the spring (March-May; Chi-square test, $\chi^2=5.68$, $n=47$, $df=3$, $P<0.05$). This differs from 2018 when CWDs were observed less than expected by statistical chance during the winter season and more during the spring and autumn seasons. In 2019, there was no statistical difference in CWD presence relative to oceanographic season (Chi-square test, $\chi^2=1.06$, $n=47$, $df=1$, $P>0.05$). This also differs from 2018 when CWDs were observed more than expected by statistical chance during the dry season.

Group Size

The mean group size of CWD filtered tracks off LKC was 2.13 ± 1.04 , ranging from singletons to a maximum group size of five dolphins (Table 9 of **Appendix E**), lower than in the past three years (3.26 ± 1.50 in 2018,

3.03±1.58 in 2017, and 3.08±1.81 in 2016). Based on solar season, the mean group size of CWDs was significantly lower in the autumn (1.38±0.49) than in any other season (winter = 2.67±1.26, summer = 2.50±0.51, spring = 2.0±0; (Kruskal-Wallis chi-squared=54.55, df=3, p<0.001). This is contrary to 2018 when group size was higher in autumn than in the summer or winter.

Group size did not differ significantly based on oceanographic season (Kruskal-Wallis chi-squared=2.50, df=1, p=0.114) or proximity to the SCLKCMP boundary (Kruskal-Wallis chi-squared=4.77, df=2, p=0.09). In 2018 and 2017, group size was significantly higher outside the SCLKCMP, where ferry traffic is routed, than inside the boundary. The sighting distribution of CWDs relative to group sizes within the SCLKCMP, crossing the SCLKCMP boundary and outside the SCLKCMP are represented in Figure 15, Figure 16 and Figure 17 of **Appendix E** respectively. Relative to vessel activity, mean group size was lower when high-speed ferries under speed restriction were within 500m of CWD groups than for all other categories (no boats, high-speed ferries, and other boats present; Kruskal-Wallis chi-squared=12.18, df=3, p<0.01).

Behavioural State

Excluding the unknown behavioural category from the filtered segments, travelling (50%) and foraging (37%) were observed more frequently than expected by statistical chance off LKC, and resting (8%) and socializing (6%) were observed less frequently (Chi-square test, $\chi^2=29.69$, n=52, df=3, P<0.001) (Figure 18 of **Appendix E**). This statistic is for comparative purposes only, for different years, areas, or other variables, as there is no *a priori* reason to believe that different behaviours would occur in equal percentages "by chance". Milling behaviour was not observed within short-track filtered segments.

Within the boundary of the SCLKCMP, travelling (n=24, 77%) was observed most frequently, followed by socializing (n=3, 10%), foraging (n=2, 6%), and resting (n=2, 6%). CWD groups that crossed the marine park boundary were observed foraging (n=3, 60%) and travelling (n=2, 40%) only. CWD groups outside of the marine park were observed foraging (n=14, 87%) and resting (n=2, 13%) only (Figure 19 of **Appendix E**). In 2018, CWDs inside the marine park were observed foraging and travelling most frequently, CWDs crossing the boundary were observed travelling and foraging, and CWDs outside the marine park were observed foraging, travelling and socializing, but were not recorded resting.

Vessel Activity and Dolphin Movement Analysis

Plots of vessels, including high-speed ferries under speed restriction (lower than or equal to 15 knots) and high-speed ferries (higher than 15 knots), and CWDs show overlap in habitat off LKC throughout the year (Figure 20 of **Appendix E**).

Off LKC in 2019, vessels were recorded within 500 meters of focal CWD groups on only 7 occasions (based on filtered 10-minute segments), including high-speed ferries under speed restriction on 1 occasion, high-speed ferries on 3 occasions, and other vessels (e.g., fishing and container vessels) on 3 occasions. Mean speed, reorientation rate and linearity for CWDs in the absence of vessels and in the presence of each vessel category are detailed in Table 10 of **Appendix E**. A basic one-way ANOVA showed no significant difference at the 0.05 alpha level in CWD movement patterns relative to vessel type present, including swimming speed (p=0.6497), reorientation rate (p=0.1399) and linearity (p=0.5363). However, sample size was low for each vessel type present.

Summary of findings for 2019:

- Overall, there were fewer CWD groups sighted per survey hour of effort than in the past several years, providing few samples for robust analysis.
- Most CWD groups were observed within the SCLKCMP; however, this trend may reflect a sighting bias wherein single CWDs may be more difficult to locate farther from the survey platform.
- Overall, waters off Lung Kwu Chau continue to be habitat used for foraging and travelling (observed more than expected by statistical chance). Resting and socializing were observed less than expected

by statistical chance. However, travelling was observed most frequently within the SCLKCMP boundary and foraging was observed most frequently outside of the marine park, which differs from previous years.

- The highest percentages of CWDs were observed during morning hours and during the winter season (February having the highest percentage of CWDs recorded). In 2018 the peak percentage of CWDs were observed during the spring and autumn, with a lower percentage observed in the winter.
- CWD group size was smaller in 2019 than in the past three years. Group size was significantly smaller in the autumn than any other season and in the presence of high-speed ferries under speed restriction.
- Sample sizes for the vessel categories are very small (e.g., high-speed ferries under speed restriction are within 500m of CWD in only one sample), and therefore not robust. The small sample sizes may reflect CWD potential avoidance of vessels off LKC.
- Off Sha Chau, there were no CWD sightings during land-based theodolite works in 2019.

2.5.2.3 Summary of Passive Acoustic Monitoring (PAM) Results

Dolphin Detection Rates Per Day

From 10 January 2019 to 7 January 2020, there were eight deployment periods of Ecological Acoustic Recorder (EAR) at position A5 for PAM (with the coordinates of 22° 20.299' N, 113° 53.871' E). During this period (Deployments 1 through 8), dolphins were detected at site A5 in a total of 378 of 103,514 files (0.37% of files), as summarized in Table 11 of **Appendix E**. Dolphins were detected on 137 of 362 days (38% of days) with recording effort (Figure 21 of **Appendix E**). On days with dolphins detected, the mean percentage of files with detections per day was 1.0%, and the maximum percentage of files with dolphin detections was 7.6%, on 21 July 2019. On 51 of 137 days with dolphin detections (37%), only one file containing dolphin signals was detected, and on the other 86 days, two or more files containing dolphin signals were detected. Clicks were the predominant type of dolphin signal detected ($n = 376$ of 379 detections, or 99%). Whistles ($n = 3$) were only rarely detected throughout the monitoring period.

Dolphin detection rates were greatest in the winter and spring, decreased in summer (with the exception of an unusually high detection rate on 21 July 2019), and remained relatively low through the autumn (Figure 21 of **Appendix E**). During winter through spring of 2019 (Deployments 1 to 3), dolphins were detected on more than 50% of recording days, and in 0.52%–0.86% of files (Table 11 of **Appendix E**). In summer (Deployments 4 and 5), dolphins were detected on 26%–34% of recording days and in 0.16%–0.37% of files, and in autumn (Deployments 6 and 7), dolphins were detected on 14%–20% of recording days and in 0.06%–0.16% of files. During early winter 2019–2020 (Deployment 8), dolphin detection rates began to increase again, with detections on 39% of recording days and in 0.24% of files. The overall metrics for dolphin occurrence during this reporting period are comparable to previously reported values from monitoring at site A5 in 2018 (Table 12 of **Appendix E**).

Dolphin Diel Pattern

Dolphin detection rates at A5 from 10 Jan 2019 to 07 Jan 2020 were greater at night than during daytime, with a peak in detections in the hour 2100 (as indicated in Figure 22 of **Appendix E**). This pattern of detection was similar when compared to the diel pattern in dolphin detections observed throughout Hong Kong waters, with higher numbers of detections during night-time and fewest detections at midday (Munger et al. 2016). In winter and spring, peak detection hours were from 2100 – 0000 and 1900 – 2300, respectively, with secondary peaks in the early morning around 0300–0400 (winter) and 0600 (spring); in winter another peak in detections was observed in the afternoon at 1500. Although dolphin detection rates were relatively low in summer and autumn, a weak diel trend was still apparent, with peak detections in the evening and night-time hours of 1900–2000 and 0100 (Figure 23 of **Appendix E**).

Sound Pressure Levels Per Day

Ambient received noise levels (referred to as sound pressure levels or SPL) at the EAR were calculated for each recording within the full effective frequency bandwidth (~0 to 32 kHz), as well as octave bands of 0-2 kHz, 2-4 kHz, 4-8 kHz, 8-16 kHz, and 16-32 kHz. In 2019, mean daily sound pressure level over the full bandwidth ranged from 107 dB to 121 dB, with a mean of 117 dB rms re 1 μ Pa (Figure 24 of **Appendix E**). Mean daily sound pressure levels in all frequency bands were lowest during the winter deployments. Mean SPL in the lowest frequency band (0-2 kHz) increased from 114 dB during winter to 118 dB during spring and was slightly lower at 116 dB in summer. The low frequency band (0-2 kHz) showed a peak in SPL in late April of approximately 121 dB and was also high (119 dB) in November 2019. There was a pronounced, temporary drop in SPL by approximately 10 dB in the 0-2 kHz band during the first week of February, with minimum SPL around early February during the Lunar Chinese New Year period, but mean values resumed by 10 February. In the mid- and high-frequency bands (above 2 kHz), SPL increased steadily throughout the spring and summer and reached a maximum in November 2019 of approximately 5-7 dB greater than winter and early spring levels. SPL then decreased in all bands by approximately 6 dB in December 2019.

Daily mean sound pressure levels in the 16-32 kHz band, in which energy from CWD clicks occurs, ranged from 95 to 101 dB, with the minimum in winter and maximum in autumn (Figure 24 of **Appendix E**). The autumn maximum in SPL coincided with the lowest acoustic detection rates of CWD, and it is possible that the higher noise levels reduced the probability of dolphin detection during this period. Indo-Pacific humpback dolphin click and whistle frequencies are above 16 kHz and below 10 kHz, respectively (Sims et al. 2012). However, the extent to which ambient received sound levels influenced detectability of dolphin signals was not quantified for this data set.

Diel Sound Pressure Level

Mean sound pressure levels plotted by hour indicated a daily peak during the hour 1900, which was mainly due to the contribution from the 0-2 kHz frequency band (Figure 25 of **Appendix E**). This daily peak was most pronounced in spring (March-April-May) and gradually subsided through summer, autumn, and winter. In winter and spring, SPL in the low frequency band increased during the daytime (beginning at 0700), likely due to increased anthropogenic traffic during daylight hours (Figure 26 of **Appendix E**), but this trend was not readily apparent in summer and autumn. The seasonally shifting evening peak is similar to the diel pattern of sound pressure levels reported during previous Hong Kong PAM efforts (Munger et al. 2016), and is hypothesized to be related to a local fish chorus, probably dominated by croakers (family Sciaenidae). Overall, daily noise levels decreased throughout the night-time hours of 0000 to 0700 and were lowest at 0700, and increased throughout the day thereafter, likely due to the contribution of anthropogenic traffic and activity during daytime as well as the fish chorus in late afternoon hours. Sound pressure levels in the 16-32 kHz band remained relatively flat and constant (within 2 dB) throughout all hours of the day (Figure 25 of **Appendix E**).

2.5.3 Discussions on CWD Monitoring Results

Each main survey type used in this project (i.e., vessel-based line transect with photo-identification surveys, land-based surveys with theodolite-tracking, and passive acoustic monitoring) provides important data that are complementary to each other, and when analysed together and in parallel, provide a robust dataset to examine the kinds of issues that need to be considered for proper management and conservation of CWD in Hong Kong.

2.5.3.1 Vessel Line-transect Survey and Photo-identification

From the CWD vessel-based monitoring data, the estimate of overall abundance for 2019 was 40 dolphins, which is much lower than the year before, with a CV of 14.6% (which indicates a very good level of precision). It is not surprising to see that the estimate of total dolphin numbers in Hong Kong was lower than the previous year's estimate (77 in 2018, CV = 18.9%), and a change from one year to the next should

never be taken as an indication of long-term trends. Although CWD estimates in Hong Kong increased somewhat from 2016 to 2018 (Jefferson 2018; 3RS Annual EM&A Report 2018), Hong Kong waters have been showing an overall declining trend in dolphin numbers over the last decade (see Jefferson 2018), and the 3RS EIA predicted shifting of dolphins away to waters outside Hong Kong and a significant effect on numbers in Hong Kong during intensive periods of construction (EIA Report Section 13.9.2). There was increased seawall construction and marine filling in the 3RS works area and marine construction work for other concurrent projects, for example reclamation works for the Tung Chung New Town Extension underway during 2019 in North Lantau waters, with that work effort involving over a dozen barges. This is likely to be the phase of construction that has the most impact on dolphins and such works will continue for at least another year. Also, as marine fill activity proceeds, more of the shallow seabed that was once dolphin habitat is converted to land, and it is no longer available as dolphin habitat.

The seasonal analysis showed that during summer, dolphin numbers are still reasonably high in Hong Kong waters. The 2019 seasonal range is 27 to 73 dolphins. The spring estimate was the lowest (27 dolphins), while the summer estimate was the highest (73 dolphins), and this indicates that, despite the overall reduction in the average number of dolphins using Hong Kong waters in recent years, there are over 70 dolphins still present in Hong Kong in the summer months. The main concern is that dolphin numbers in West and Southwest Lantau have also decreased since last year, and this suggests that construction activities throughout western Hong Kong (which, besides the 3RS works, also includes IWMF works at Shek Kwu Chau) and other factors that are affecting dolphins north of Lantau Island may also be affecting their use of the waters south and west of the island. The potential for cumulative and far-ranging impacts from projects in specific areas are not well understood, and should be investigated in future monitoring efforts. This is a particularly acute concern for the West Lantau area, which is known to represent the highest-density area for CWDs and although not directly impacted by marine construction in the past few years, the area is nonetheless showing evidence of decreased numbers.

Within NWL waters, dolphins are mostly found around the Castle Peak and Lung Kwu Chau areas. Earlier, concerns had been expressed by some interested stakeholders that dolphin numbers in NWL may have decreased specifically due to potential negative impacts from the re-routing of high-speed ferries (HSFs) to the Speed Control Zone (SCZ) north of Lung Kwu Chau. The analysis covering the entire first year post-SCZ (2016) provided an estimated abundance of 15 dolphins for NWL (refer to the 2016 annual report). The estimate for 2017 for the same area was 14 dolphins. The 2018 estimate was 22 dolphins, and this was substantially higher. Therefore, the drop in 2019 to 8 dolphins is not likely due to the effects of the SCZ, which has been in operation for several years but is more likely due to relatively more construction works for the 3RS reclamation and concurrent activities (such as changes in overall vessel traffic) in NL waters. Long-term CWD monitoring data that are being collected during the course of this Project will help to identify any specific impacts resulting from overall vessel traffic.

Regarding the effectiveness of the implementation of SkyPier HSF route diversion in alleviating the impacts on travelling areas of CWD using the waters between the project and SCLKCMP, and the areas between the CWD hotspots to the Northwest, Northeast and West Lantau, in view of last year's increased sightings of CWD at NEL area from vessel surveys there may have been some progress. The traveling areas are still being used, though at a lower level. However, the HZMB marine work has now been completed, and this may have affected things as well. HZMB impacts were likely most severe during the period from 2013 to 2016 (a period which saw an overall decline in CWD numbers in Hong Kong – Jefferson 2018), and the increase in CWD numbers seen in 2018 may have been a result of the recovery from this period of HZMB impacts. It is likely that the 3RS construction work and other concurrent activities in NL waters going on in 2019 caused dolphins to shift away from the area as predicted in the EIA (Section 13.9.2), but history suggests that when construction is completed, a rebound in numbers can be expected (Jefferson 2018).

Regarding the results of photo-identification work, a total number of 155 CWD individuals were identified altogether 399 times from all sightings in 2019, with 92 individuals (around 59.4%) sighted more than once.

Fifty-four individuals (around 34.8%) of the 155 identified animals showed cross-area movement between different survey areas. Unlike the previous years, no animals were recorded occurring in all three main survey areas (WL, SWL and NWL, including AW) in 2019, nevertheless, two out of these 54 animals were re-sighted in both NWL (including AW) and SWL. Regarding the re-sighted CWDs, the mother-and-spotted juvenile pair NLMM006 and NLMM013 was observed with continuous utilization of NWL waters in 2019. SLMM011, which was not found in Hong Kong waters in 2018, returned to the western waters with three re-sightings in 2019. There were other dolphins, such as SLMM014, SLMM028, WLMM001, WLMM027, WLMM079, which continued to frequent Hong Kong waters in 2019.

One of the major concerns expressed in the 3RS EIA was the potential impacts on the travel corridor/area between the existing airport and the SCLKCMP, as well as between the airport and the southwestern New Territories coastline. During the construction phase, dolphins are still using these travel areas, as movements between WL and NWL have been documented, several sightings of small-sized CWD group were recorded in 2018 at the easternmost area of NWL and at NEL (3RS Annual EM&A Report 2018). Sightings in the travel areas may have decreased (especially in 2019), but that is to be expected, as construction for the 3RS continues. It should also be kept in mind that dolphins tend to move through these areas relatively quickly and do not generally spend as much time milling as they do in the main feeding/socializing areas.

2.5.3.2 Land-based Theodolite Tracking

During 24 days and 144 hours at the theodolite station on LKC, a total of only 47 CWD groups were tracked, and only 16 groups fit criteria for analyses due to most tracks being less than 10 minutes in duration. The sighting rate was 0.33 per survey hour, less than one-half the sighting rate in 2018 and 2017. Probably as a result of low sample sizes, few parameters showed significant levels in behavioural traits, and potential conclusions must therefore be viewed with some caution. Furthermore, it is considered not appropriate to use generalized additive models to analyse observations for this year, due to low sample sizes. No dolphins were seen from SC in 2019, same as in 2018.

In 2019, dolphins were sighted as far as 2.5 km from the LKC station, with most sightings made in the first two hours of observation of the day, 8 a.m. to 10 a.m., slightly more than all other sightings for the next 6 hours. There were significantly more sightings in Winter (Dec–Feb) for this past year than in Spring (Mar–May), but oceanographic wet versus dry seasons showed no statistically-valid overall difference. Mean group size was also lower this past year (at about 2 animals per group) than in previous years (at about 3 animals per group). Group size was also lower when groups were within 500 m of high-speed ferries under speed restriction than for all other categories of vessels and no vessel. However, data for the high-speed ferry lane and outside of it were very sparse this past year, and most dolphins were sighted closer to shore, within the designated area of the SCLKCMP. Furthermore, in 2019, there were no significant differences of behavioural types of speeds, reorientation rates, and linearity of movements relative to types of vessels, but with low sample sizes and lack of robustness for analyses.

Overall, there was an obvious decline in habitat use by CWDs north of the SCLKCMP. This survey finding is in line with the vessel surveys for this general area and may be due to ongoing 3RS Project and other concurrent project construction activities in NL waters. The observed decline may also have been due to other unknown factors, for example relating to the decline of fishing activity identified by monitoring team here, or from other marine traffic activities not associated with 3RS construction works. Survey data shows that the heaviest use of waters north of the SCLKCMP by CWDs was in the first several hours of survey during the morning.

Almost all sightings and tracks were within the SCLKMP this year with comparatively fewer sightings and tracks (small sample sizes obtained) in and outside the speed control zone. This may be due to the animals using NL waters generally avoiding this area due to disturbance from ongoing marine traffic activities. It is

hoped that dolphins will return to this previous CWD "hotspot" area north of the SCLKCMP and monitoring in this important area will continue for the duration of the land formation related construction works.

2.5.3.3 Passive Acoustic Monitoring

The PAM data continue to provide useful information, especially on patterns of dolphin vocalization at night, which has previously been unavailable to us and could not be recorded during the land-based survey conducted during daytime at south of Sha Chau. The diurnal detection of clicks showed a consistent pattern of higher levels in late evening and at night compared with the day, which may be indicative of increased use of echolocation by dolphins during hours of darkness.

The PAM data provide evidence that dolphins are using the area around south of Sha Chau throughout the year. In 2019, dolphins were present with especially high incidence in winter (Jan-Feb), and less so in other seasons which supplement the low observations by vessel-transect surveys and land-based theodolite tracking at daytime. The per-file detection rates were also highest in winter; taken together, these metrics suggest that dolphins use the area more frequently and intensively in winter than in other seasons. Interestingly, this is a different pattern from that observed from theodolite tracking north of Lung Kwu Chau, where dolphins were generally less present in winter and summer and the wet season overall, than in spring and autumn. Dolphins were detected more frequently during night-time hours than during the day, and this may be related to increased nocturnal foraging behaviour. This has been a general trend throughout PAM monitoring in most parts of Hong Kong. It is also possible that at least a portion of this diel trend is related to dolphins utilizing this area more intensively at night than in daytime, because of decreased industrial activity at night.

Although the land-based and vessel-based observations indicate a potential decrease in dolphin habitat use, the PAM seems to be stable/comparable to the previous year, suggesting that dolphins continue to use the area especially in winter, and then primarily at night and in conditions when visual observation is not feasible (however, note that during 2018 there was a long gap in acoustic monitoring from June to August, so direct comparison of these months is not possible). Analysis of the most recent (December 2019) dataset suggests that dolphin acoustic activity began to increase again during early winter, but continued PAM is needed to assess whether this trend will continue and result in comparable dolphin occurrence to that detected in previous years.

Overall, there was an increase in ambient sound pressure level at the PAM station in 2019 compared to that in 2013 (EIA Report Section 13.4.6). Because decibels are on a logarithmic scale, a net increase of 5 dB represents a near doubling of the ambient sound pressure level. Increased ambient sound pressure level could be attributed to anthropogenic inputs from marine traffic activities and construction activities. Although specific anthropogenic sounds can also affect marine mammal occurrence and behaviour, overall increases in ambient noise due to anthropogenic inputs are documented to have significant impacts on distribution, behaviour, and health in many cetacean species and areas around the world (e.g. Buckstaff et al. 2013, Castellote et al. 2012, Finneran et al. 2015, Nowacek et al. 2007, Rolland et al. 2012).

2.5.4 Conclusions of CWD Monitoring Results

With reference to the aims of construction phase CWD monitoring described in the EM&A Manual, the key findings of CWD monitoring in 2019 are summarised as follows.

Effects on the Potential Shift in CWD Travelling Areas and Habitat Use

The latest monitoring data indicate there was decreased use of all the areas within Hong Kong in 2019, as compared to the previous year. Year 2018 indicated a year of partial recovery from the negative impacts caused by the HZMB Hong Kong Link Road construction phase, after its completion, and that in contrast 2019 saw 3RS Project construction activities increase including extensive seawall construction activities and increased marine filling activity as well as increasing marine works for the Tung Chung New Town

Extension project, with associated impacts and disturbance in NL waters for example from construction vessel marine traffic. As the 3RS EIA predicted, dolphins have likely shifted their activities away from the more intensive 3RS construction works although even with the disturbance they are still using Hong Kong's western waters for important ecological activities like feeding and resting.

Effectiveness of the HSF Speed and Routing Restrictions to the CWDs

As detailed above, we now have four years of data from the period since the SCZ was implemented, and the information available from both the vessel-based and land-based monitoring indicates that dolphin use of the NW Lantau area has fluctuated from year to year (ranging from 8 to 22 dolphins), with a period of initial increase once the SCZ was put into effect. Therefore, the evidence suggests that the SCZ is not having negative impacts on dolphin use of this area, and at the same time, is likely reducing the chances of dolphins being hit by vessels traveling at high speed.

Waters around Lung Kwu Chau remain a significant year-round habitat, especially for foraging, though they have become increasingly less important in recent years. There is no evidence of a decline in dolphin use of the HSF SCZ around Lung Kwu Chau is the result of ferries being re-routed to that area with slower speeds at the end of 2015. The recent (2019) decline in numbers of dolphins in that area is not considered to be linked to the SCZ.

Trends in Long Term Monitoring Data

From vessel surveys conducted in 2019, CWD use of Hong Kong waters appears to be down significantly from 2018. West Lantau waters are still being used as the most important habitat in Hong Kong, which has been true since CWD monitoring in Hong Kong first started in 1995/1996. It is estimated that 40 dolphins (on average) were found within Hong Kong waters in 2019, which is down from last year (2018). Seasonally, the number within Hong Kong ranges from about 27 to 73. There continues to be no evidence that the implementation of the SkyPier SCZ is having any negative impacts on dolphin use of the NWL area. Diverted SkyPier HSFs with speed control measures in place appear to be reducing risks to CWDs using the narrowing waters between south of SCLKCMP and the airport north and at the same time do not appear to be resulting in apparent negative impacts on CWDs along the diverted route.

Land-based observation efforts was reduced in 2019, however, sighting data were standardized by effort to account for the difference. Although land-based observations and theodolite tracking do not present overall estimates of numbers of dolphins, the 2019 data from LKC shows a reduction in CWD groups sighted and tracked compared to the past three years. This indicates a lower use of this area by CWDs, perhaps indicative of the increasing construction and other marine traffic activities in the NL waters as discussed earlier. It is possible, as mentioned in Section 2.5.3, that the data from the past three years (before 2019) represent a partial rebound of dolphin use of waters north of Lantau Island due to the intensive HZMB construction activities of 2013-2016 coming to an end (see also Jefferson 2018). During 2019, the ongoing 3RS Project marine construction activities may have reduced dolphin use in North Lantau waters in the way that was predicted in the 3RS EIA (Section 13.9.2).

It is important to remember that dolphins shift around within their habitat from year to year, due to both natural and anthropogenic factors. Thus, evidence of a decrease or increase in numbers from one year to the next should not necessarily be taken as indication of an overall population decline or recovery. Dolphins live for many decades (in some cases, over 50 years).

The CWD construction phase monitoring data so far appear to be generally consistent with findings of the ecological assessments completed during the 3RS EIA, which predicted significant negative impacts during construction, including from the physical loss of habitat due to the reclamation (EIA Report Section 13.9.1). No unexpected ecological impacts on CWDs have been identified. Construction practices have been modified to avoid negative impacts on dolphins, as much as is feasible. However, it should be noted that dolphins shifting away from NL and nearby waters is to be expected during periods of construction works

of the 3RS, such as increased seawall construction and marine filling activity, as has occurred in 2019, and this is broadly in line with EIA predictions.

In the 3RS EIA and in last year's Annual EM&A Report, it was predicted that dolphins would shift away from portions of their home range that are experiencing intense human activities, and that appears to be the case in 2019 as seawall works and marine filling activity has intensified. These impacts are a type of anthropogenic disturbance and therefore are of conservation concern; however, they are temporary and reversible, while previous studies have supported that dolphin numbers would recover in long-term after completion of works (assuming that the habitat is properly protected and still of adequate quality). Monitoring for the 3RS will continue during 2020 and beyond, with the goal being to evaluate these impacts (focussing on impacts that appear greater than predicted impacts) and recovery that occurs in the future.

With the physical loss of some habitats through 3RS reclamation, it is unknown if we can expect a full recovery in CWD numbers to those found in the past, but at least stabilization of abundance of Hong Kong CWDs is desirable for the long-term health of this population. As dolphin numbers appear to be going down in all the areas of Hong Kong in 2019, this should be monitored carefully in the future. Adaptive management measures may be considered, as appropriate, should there be any deviation from anticipated 3RS impacts. At this stage of 3RS construction, recommended mitigations have been implemented and although impacts are occurring, these are hopefully temporary and within previously predicted patterns. Once marine construction is completed, and the proposed marine park in North Lantau comes into effect, the situation should improve. The effectiveness of the mitigation measures will be kept under review over the next few years as EM&A monitoring continues.

2.5.5 Site Audit for CWD-related Mitigation Measures

During the reporting period, silt curtains were in place by the contractors for sand blanket laying and marine filling works, and dolphin observers were deployed by contractors in accordance with the Marine Mammal Watching Plan. Teams of at least two dolphin observers were deployed by contractors for continuous monitoring of the Dolphin Exclusion Zone (DEZ) for DCM works, PVD installation and seawall construction in accordance with the DEZ Plan. Training for the dolphin observers on the implementation of MMWP and DEZ monitoring was provided by the ET prior to the aforementioned works, with the training records kept by the ET. From the contractors' MMWP observation records, no dolphin or other marine mammals were observed within or around the silt curtains during the reporting period. As for DEZ monitoring records, no dolphin or other marine mammals were observed within the DEZs in this reporting period, whilst the contractor reported one record of dolphin sighting outside the DEZ of DCM works. These contractors' records were audited by the ET during site inspection.

In June 2019, site audit to the DEZ monitoring for DCM works area were made by dolphin experts, and discussions with dolphin observers conducting DEZ monitoring were made. There were useful interactions between the dolphin experts and dolphin observers, and no issues on the audit of DEZ monitoring.

Audits of acoustic decoupling for construction vessels were carried out during weekly site inspection and summarised in Section 2.6. Summary of audits of SkyPier High Speed Ferries route diversion and speed control and construction vessel management are presented in Section 2.8 and Section 2.9 respectively.

2.6 Environmental Site Inspection

Site inspections of the construction works were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Project. Bi-weekly site inspections were also conducted by the IEC. Besides, *ad-hoc* site inspections were conducted by ET and IEC if environmental problems were identified, or subsequent to receipt of an environmental complaint, or as part of the investigation work. These site inspections provided a direct means to reinforce the specified environmental protection requirements and pollution control measures in construction sites.

During site inspections, environmental situation, status of implementation of pollution control and mitigation measures were observed both within the site area as well as outside the project sites which was likely to be affected, directly or indirectly, by the site activities. Environmental documents and site records, including waste disposal record, maintenance record of environmental equipment, and relevant environmental permit and licences, were also checked on site. Observations were recorded in the site inspection checklist and passed to the contractor together with the appropriate recommended mitigation measures where necessary in order to advise contractors on environmental improvement, awareness and on-site enhancement measures. The observations were made with reference to the following information during the site inspections:

- The EIA and EM&A requirements;
- Relevant environmental protection laws, guidelines, and practice notes;
- The EP conditions and other submissions under the EP;
- Monitoring results of EM&A programme;
- Works progress and programme;
- Proposal of individual works;
- Contract specifications on environmental protection; and
- Previous site inspection results.

Good site practices were observed in site inspections during the reporting period. The ET participated in environmental drills organized by the contractor as observer, including chemical spill drills and silt curtain deployment drills. Advices were given when necessary to ensure the construction workforce were familiar with relevant procedures, and to maintain good environmental performance on site. Environmental briefings on EP and EM&A requirements were also provided to the new contracts by ET. Regular toolbox talks on environmental issues were organized for the construction workforce by the contractors to ensure understanding and proper implementation of environmental protection and pollution control mitigation measures.

During the reporting period, implementation of recommended landscape and visual mitigation measures (CM1 – CM10) where applicable was monitored weekly in accordance with the Manual and no non-conformity was recorded. In case of non-conformity, specific recommendations will be made, and actions will be proposed according to the Event and Action Plan. The monitoring status is summarised in **Appendix C**.

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 C**.

2.7 Terrestrial Ecological Monitoring

In accordance with the Manual, during the HDD construction works period from August to March, terrestrial ecological monitoring shall be undertaken monthly at the HDD daylighting location on Sheung Sha Chau Island to identify and evaluate any impacts with appropriate actions taken as required to address and minimise any adverse impact found.

The shoreline landscape reinstatement works at the HDD daylighting location on Sheung Sha Chau were finished in January 2020. The ET carried out the last monthly ecological monitoring on Sheung Sha Chau Island in January 2020 and found that there was no encroachment of any works upon the egret area nor any significant disturbance to the ardeids foraging on the island by the works and no signs of breeding or nursery activities were observed. At the HDD daylighting location, neither nest nor breeding activity of ardeids was found during the last ecological monitoring and weekly site inspections in the reporting period. All the HDD construction including shoreline landscape reinstatement works on Sheung Sha Chau was completed on 29 January 2019. Therefore, terrestrial ecological monitoring had been ceased since February 2019.

2.8 Audit of the SkyPier High Speed Ferries

The Marine Travel Routes and Management Plan for High Speed Ferries of SkyPier (the SkyPier Plan) was submitted to the Advisory Council on the Environment (ACE) for comment and subsequently submitted to and approved by EPD in November 2015 under EP Condition 2.10. The approved SkyPier Plan is available on the dedicated website of the Project. In the SkyPier Plan, AAHK has committed to implementing the mitigation measure of requiring HSFs of SkyPier travelling between HKIA and Zhuhai / Macau to start diverting the route with associated speed control across the area, i.e. SCZ, with high CWD abundance. The route diversion and speed restriction at the SCZ have been implemented since 28 December 2015. The IEC has also performed audit on the compliance of the requirements as part of the EM&A programme. The latest summary of key audit findings in the reporting period is presented in **Table 2.16**.

According to the approved SkyPier Plan, dolphin habitat index has been reviewed in the reporting period based on findings of the AFCD's marine mammals monitoring report 2017-18 and historical dolphin density records. Grids for dolphin hotspot remained unchanged, thus the HSF route diversion arrangement remained unchanged.

A total of six skipper workshops were held in 2019 with ferry operators and relevant ferry captains to refresh their understanding about the requirements of the SkyPier Plan, such as the routing and speed control requirements, with discussion on deviation cases, experience sharing and recommendations to strengthen the implementation of the SkyPier Plan.

In total, 7,849 ferry movements between HKIA SkyPier and Zhuhai / Macau were audited in the reporting period. The daily movements of all SkyPier HSFs in the reporting period ranged between 33 and 102, which falls within the maximum daily cap number of 125. The annual daily average of all SkyPier HSF movements in 2019 was 83, which falls within the annual daily average cap of 99 SkyPier HSF movements.

The total 7,849 ferry movements audited and all HSFs travelled through the SCZ with average speeds at or below 15 knots, which complied with the SkyPier Plan. All ferry movements that were not strictly following the diverted route have been investigated. All of the route deviation cases were related to strong tidal wave and current, giving way to other vessels or vessel engine failure due to safety and emergency situations.

Insufficient and no AIS data were received from some HSFs due to interference effect of AIS signal as reported by the ferry operators after checking the condition of the AIS transponders. In such cases, vessel captains were requested to provide radar track photos to indicate that the vessels entered the SCZ through the gate access points and without speeding in the SCZ.

Table 2.16: Summary of Key Audit Findings against the SkyPier Plan

Requirements in the SkyPier Plan	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Total number of ferry movements recorded and audited	806	726	806	782	676	630	640	612	600	529	510	532
Use diverted route and enter / leave SCZ through Gate Access Points	805	725	804	777	674	628	639	610	597	529	510	531
No. of SkyPier HSFs in compliance with Average Speed within 15 knots in SCZ	806	726	806	782	676	630	640	612	600	529	510	532
Range of Daily Movement (including all SkyPier HSFs)	87-94	82-94	83-88	86-89	82-88	82-82	33-83	63-82	76-95	81-102	79-82	78-83

Source: Excerpted from Monthly and Quarterly EM&A Reports

2.9 Audit of the Construction and Associated Vessels

The audit of construction and associated vessels in accordance with the Marine Travel Route and Management Plan for Construction and Associated Vessel (MTRMP-CAV) has started since August 2016. ET has audited relevant information including AIS data, vessel tracks and other relevant records provided by the contractors to ensure that the contractors were fully complied with the requirements of the MTRMP-CAV. The Maritime Surveillance System (MSS) was launched in March 2017. The MSS automatically recorded deviation cases such as speeding, entering no entry zone, and not travelling through designated gates. ET conducted checking to ensure the MSS records all deviation cases accurately. The 3-month rolling programme submitted by contractors for construction vessel activities were also checked every month to ensure the logistic of construction vessels were well planned to achieve a practicable minimum. The IEC has also performed audit on the compliance of the requirements as part of the EM&A programme.

Deviations including speeding in the works area, entry from non-designated gates, not following the designated route and entering no-entry zones were identified. All the concerned contractors were reminded to comply with the requirements of the MTRMP-CAV during the bi-weekly Marine Traffic Control Center (MTCC) audit and such deviations were also reviewed and highlighted during the monthly Environmental Management Meeting.

A total of 22 skipper training workshops were held by ET in 2019 with 120 captains of construction vessels associated with the 3RS contracts to familiarise them with the predefined routes, general education on local cetaceans, guidelines for avoiding adverse water quality impact, the required environmental practices / measures while operating construction and associated vessels under the Project, and guidelines for operating vessels safely in the presence of CWDs. Another 45 skipper training workshops were held with 82 captains by contractors' Environmental Officers and competency tests were conducted subsequently with the trained captains by ET. In addition, ET participated Marine Management Liaison Group meetings to assist and resolve any marine issues which might be encountered under the Project.

2.10 Coral Post-Translocation Monitoring

One post-translocation monitoring survey was conducted during the reporting period. The 8th post-translocation monitoring survey, which was subsequent to the 7th monitoring survey conducted in October 2018, was the final round of additional monitoring survey and was completed in April 2019.

The Action and Limited Levels stipulated in the CTP were not triggered for the 8th survey. Based on the results of the 8th post-translocation monitoring, $\geq 25\%$ change in partial mortality was recorded on 57 out of 59 translocated corals (97% of the tagged translocated coral colonies that were studied). For control corals, $\geq 25\%$ change was recorded on 15 out of 18 control corals (83% of the tagged control coral colonies that were studied) and no change was recorded on one control coral. The health condition ranged from 0 to 4 for both control and translocated coral.

As the average partial mortality recorded during the 7th and 8th monitoring is similar to each other and the average general health condition was remained between 1.5 and 2.5 for both rounds of monitoring, the coral condition appeared to have been stabilized after the damage caused by typhoon Mangkhut in September 2018.

2.11 External Stakeholder Engagement

In accordance with the EP's requirements of setting up Community and Professional Liaison Groups, the AAHK has been continuing to proactively reach out to a wide spectrum of external stakeholders to update them on the environmental aspects of the Project and to seek their insights and views. There were continuous exchanges with the local communities, relevant professionals, experts, and other stakeholders. Below are highlights of the engagement activities held in 2019.

2.11.1 Community Liaison Groups

In order to enhance communication with the community in a proactive way, five Community Liaison Groups (CLGs) were set up in 2012 in the neighbouring districts of HKIA, namely Islands, Kwai Tsing, Shatin, Tsuen Wan and Tuen Mun. The CLGs are comprehensive platforms for the AAHK to update the community leaders about the detailed design, progress of construction and operation, and environmental monitoring and audit results of the Project, and listen to their views on various topics related to HKIA and the Project, including environmental matters. The AAHK also leverages on the CLGs to exchange views with the community on the latest airport developments, hence enhancing airport services and helping to contribute to the betterment of these districts. The CLGs have a total of about 130 members involving district councillors and community leaders.

In the reporting period, two rounds of four meetings were held in August, September and December 2019. Project information including latest development of the 3RS Project, environmental monitoring and audit results, details on the implementation of environmental enhancement measures and enrichment of airport facilities and services were presented in the meetings.

2.11.2 Professional Liaison Group and Green Non-Governmental Organizations

The Professional Liaison Group, comprising 20 members of relevant professionals and experts, was set up to enhance transparency and communication, as well as enquiries and complaints-handling on all environmental issues related to the Project; and to promote community cooperation and participation and implementation of suitable local environmental enhancement works that are included in the Environmental Permit.

In the reporting period, two PLG meetings were held in June and December 2019. Project information including latest development of the 3RS Project, environmental monitoring and audit results and details on the implementation of environmental enhancement measures were presented in the meetings.

Roundtable meetings with Green Non-Governmental Organizations (NGOs) were proactively arranged to facilitate exchanges on environmental issues related to the Project. Updates of the Project, including environmental monitoring and audit results and details on the implementation of environmental enhancement measures were shared with the participants. Two roundtable meetings were held in June and December 2019.

2.11.3 Other Stakeholders

To encourage two-way communications with stakeholders and the community, a dedicated telephone hotline and email has been set up since December 2015. Six enquiries were received via the hotline, and twelve enquiries were received via the dedicated email in 2019.

2.12 Review of the Key Assumptions Adopted in the EIA Report

With reference to Appendix E of the Manual, it is noted that the key assumptions adopted in approved EIA report for the construction phase are still valid and no major changes are involved. The environmental mitigation measures recommended in the approved EIA Report remain applicable and shall be implemented in undertaking construction works for the Project.

2.13 Key Environmental Issues for the Coming Reporting Period

The key environmental issues for the Project in the coming reporting period are expected to be associated with construction activities including marine works such as DCM works, seawall construction, and marine filling, as well as land-based works such as excavation, piling, T2 expansion works, APM and BHS work. Relevant environmental impact mitigation measures will be implemented, including the deployment of

enhanced silt curtains, reuse of excavated material and public fill for marine filling, and stockpiling of excavated materials for future reuse.

The implementation of required mitigation measures by the contractors will be monitored by the ET.

3 Report on Non-compliance, Complaints, Notifications of Summons and Prosecutions

3.1 Compliance with Other Statutory Environmental Requirements

During the reporting period, environmental related licenses and permits required for the construction activities were checked. No non-compliance with environmental statutory requirements was recorded.

3.2 Analysis and Interpretation of Complaints, Notification of Summons and Status of Prosecutions

3.2.1 Complaints

One environmental complaint was received in the reporting period. The environmental complaint was attended to and investigations were conducted by the ET in accordance with the Manual and the Complaint Management Plan. The summary of the complaint and analysis is presented in **Appendix F**.

3.2.2 Notifications of Summons or Status of Prosecution

No notification of summons or prosecution were received in the reporting period.

3.3 Cumulative Statistics

Cumulative statistics on exceedance, non-compliance, complaints, notifications of summons and status of prosecutions are summarized in **Appendix F**.

4 Conclusion and Recommendation

In the reporting period from 1 January 2019 to 31 December 2019, the EM&A programme has been implemented in accordance with the Manual of the Project. The EM&A works carried out during the reporting period include construction dust and noise measurements, water quality monitoring, ecological monitoring on Sheung Sha Chau Island, vessel line-transect surveys, land-based theodolite tracking surveys supplemented with passive acoustic monitoring for CWD monitoring, waste monitoring, coral post-translocation monitoring, as well as environmental site inspections and landscape and visual monitoring for the Project's construction works.

For water quality, the monitoring results for turbidity, total alkalinity and chromium obtained in the reporting period complied with the corresponding Action and Limit Levels stipulated in the EM&A programme. Relevant investigation and follow-up procedures were conducted according to the EM&A programme if the corresponding Action and Limit Levels were triggered. For DO, SS and nickel, some of the monitoring results triggered the relevant Action or Limit Level in the reporting period, and the corresponding investigations were conducted accordingly. The investigation findings concluded that the cases were not related to the Project. To conclude, the construction operation in the reporting period did not introduce adverse impact to all water quality sensitive receivers.

The monitoring results in relation to the construction dust, construction noise, waste, CWD, and coral post-translocation monitoring did not trigger their corresponding Action or Limit Levels during the reporting period.

The monthly terrestrial ecology monitoring on Sheung Sha Chau observed that there was no encroachment upon the egret area nor any significant disturbance to ardeids at Sheung Sha Chau by the works. As all the works on Sheung Sha Chau were completed on 29 January 2019, terrestrial ecological monitoring was ceased after that day.

A total of 5,445.0 km survey effort was conducted for the vessel line-transect monitoring for CWD during the 12-month monitoring period. A total of 167 groups of 606 CWDs were sighted, with 25 groups of 54 CWDs in NWL, three groups of 17 CWDs in AW, 98 groups of 394 CWDs in WL and 41 groups of 141 CWDs in SWL. No CWDs were recorded in NEL survey area. The combined encounter rates by number of dolphin sightings and by number of dolphins were 3.22 and 11.63 respectively. No triggering of Action and Limit Level on the encounter rates were recorded during the construction phase during 2019. Overall abundance of CWD in Hong Kong western waters was estimated at 40 dolphins in 2019 from line-transect analysis. CWD relative occurrence from land-based surveys around Lung Kwu Chau peaked in February, with fewer sightings during April and May. Waters off Lung Kwu Chau continue to be habitat used for foraging and travelling. Passive acoustic monitoring provides evidence that dolphins continue using the area around south of Sha Chau throughout the year, with especially high incidence in winter than in other seasons in 2019. The acoustic data also showed consistently higher levels of dolphin clicking activity at night compared with daytime, which may be indicative of increased foraging and concomitant use of echolocation by dolphins during hours of darkness.

Ferry movements between HKIA SkyPier and Zhuhai / Macau were audited in the reporting period. In total, 7,849 ferry movements between HKIA SkyPier and Zhuhai / Macau were audited in the reporting period. The daily movements of all SkyPier HSFs in the reporting period ranged between 33 and 102, which falls within the maximum daily cap number of 125. The annual daily average of all the SkyPier HSFs in 2019 was 83 movements, within the annual daily average cap of 99 SkyPier HSF movements. The total

7,849 ferry movements in 2019, all HSFs were found travelling through the SCZ with average speeds at or below 15 knots. All ferry movements that did not strictly follow the diverted route were investigated.

The audit of construction and associated vessels has started since August 2016. ET has conducted audit to ensure that the contractors were fully complied with the requirements of the MTRMP-CAV. The MSS was launched in March 2017. The MSS automatically recorded the deviation case such as speeding, entering no entry zone, not travelling through the designated gate. ET conducted checking to ensure the MSS records all deviation cases accurately. A total of 22 skipper training workshops were conducted by the ET from January to December 2019 with captains of construction vessels associated with 3RS contracts. Another 45 skipper training workshops were held by contractors' Environmental Officers and competency tests were conducted subsequently with the trained captains by ET.

On the implementation of MMWP, silt curtains were in place by the contractors for sand blanket laying and marine filling works, and dolphin observers were deployed in accordance with the MMWP. On the implementation of DEZ Plan, dolphin observers were deployed by the contractors for continuous monitoring of the DEZ for DCM works, PVD installation and seawall construction in accordance with the DEZ Plan. Trainings for the dolphin observers on the implementation of MMWP and DEZ monitoring were provided by the ET prior to the aforementioned works. From the contractors' MMWP observation records, no dolphin or other marine mammals were observed within or around the silt curtains during the reporting period. As for DEZ monitoring records, no dolphin or other marine mammals were observed within the DEZs in this reporting period, whilst the contractor reported one record of dolphin sighting outside the DEZ of DCM works. Audits of acoustic decoupling for construction vessels were also carried out by the ET during weekly site inspections.

External stakeholder engagement activities including liaison meetings with the local community, relevant professional and green groups, regular meetings with other stakeholders, setting up of a dedicated project website for the general public, organising of media workshop, and visit to the marine work site and MTCC etc., were carried out to update them on the environmental aspects of the Project and ensure transparent and engaging communication.

Overall, the recommended environmental mitigation measures, as included in the EM&A programme, have been effectively implemented during the reporting period. Also, the EM&A programme implemented by the ET has effectively monitored the construction activities and ensure the proper implementation of mitigation measures.

Figures

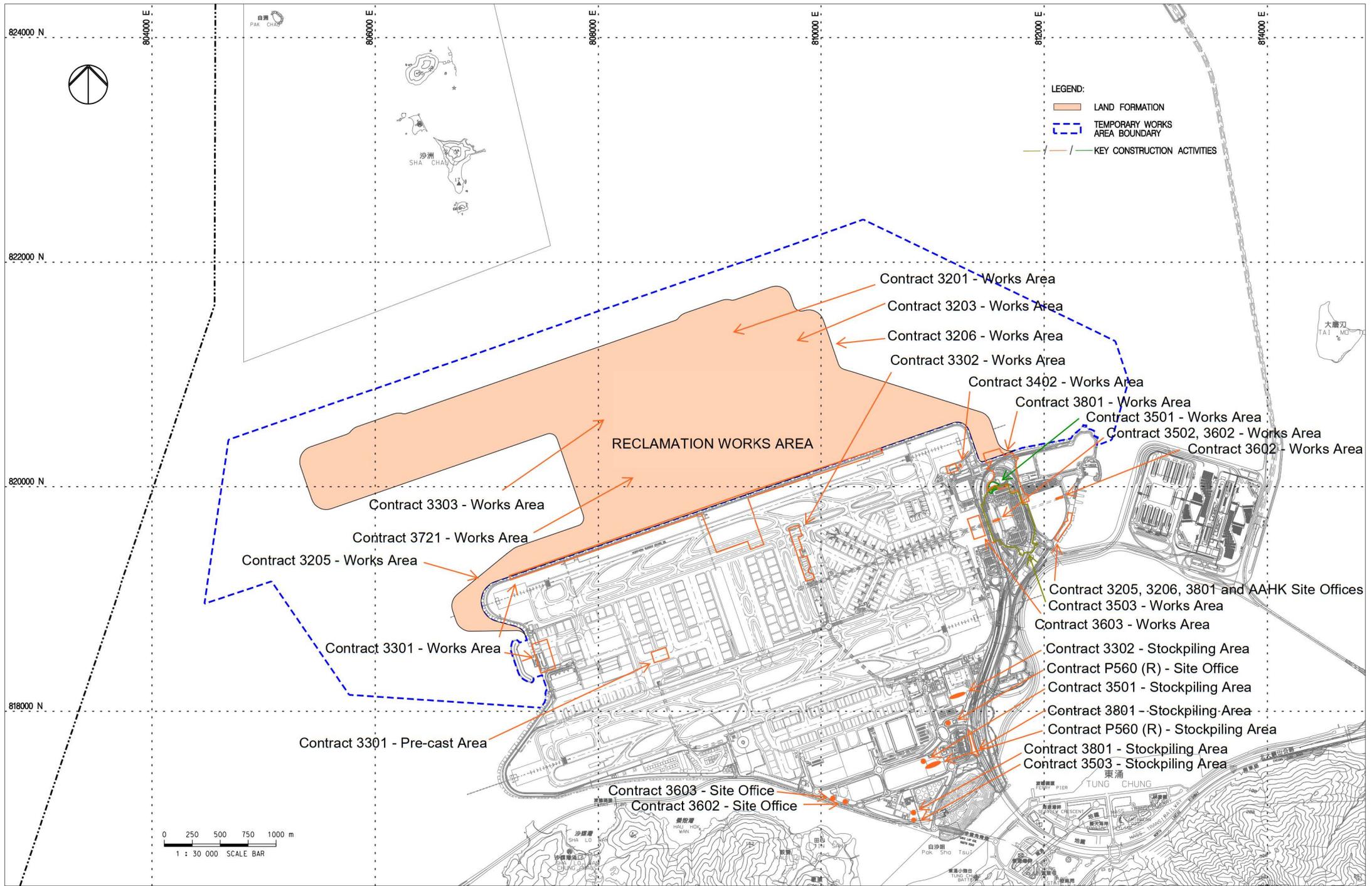


FIGURE 1.1 LOCATIONS OF KEY CONSTRUCTIONS ACTIVITIES IN THIS REPORTING PERIOD

Note: The locations are for indicative purpose. The actual construction work locations are in accordance with the construction work programme.



809000 E.

809000 E.

810000 E.

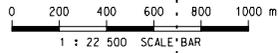
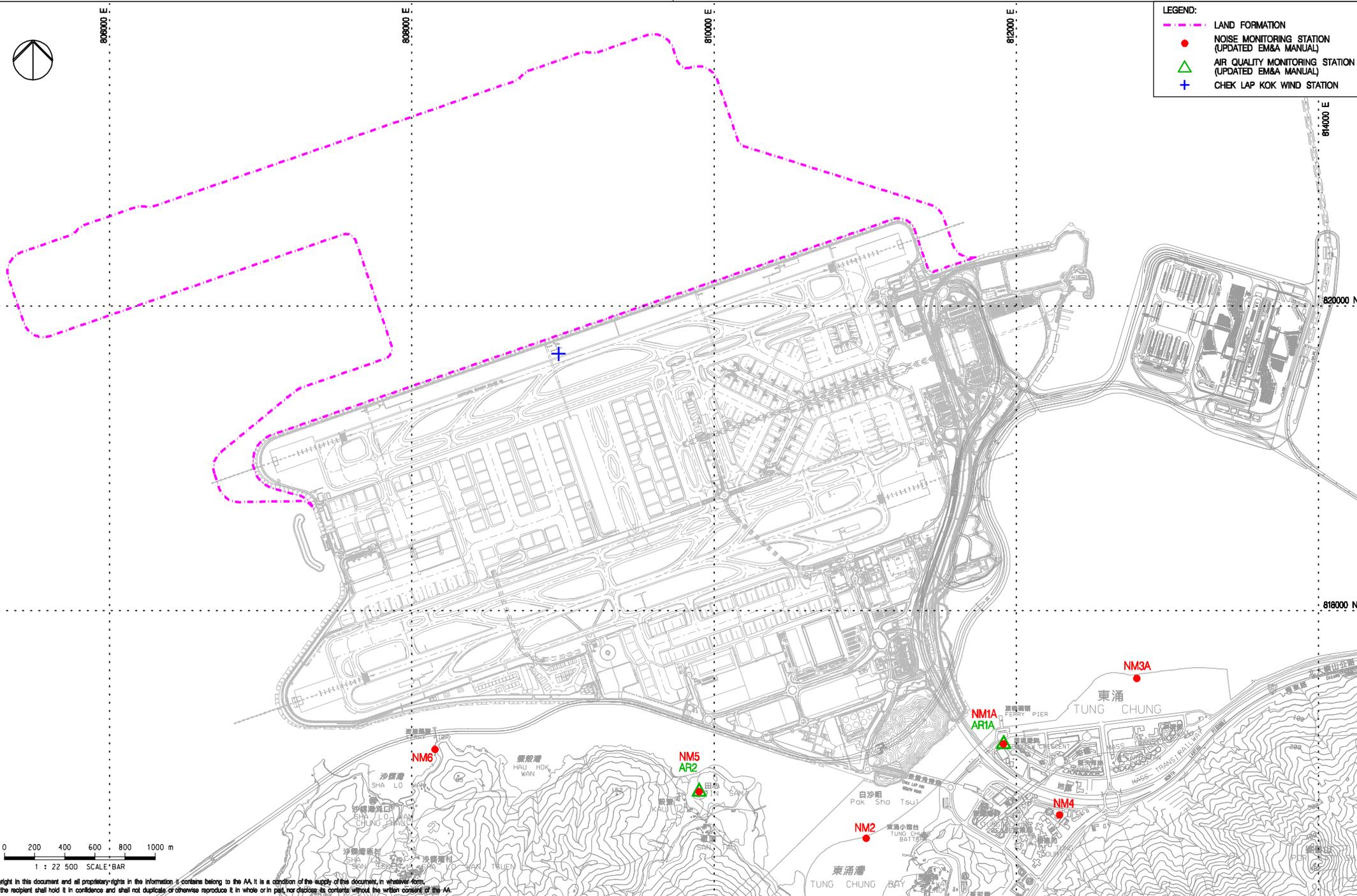
812000 E.

814000 E.

820000 N.

818000 N.

- LEGEND:
- LAND FORMATION
 - NOISE MONITORING STATION (UPDATED EM&A MANUAL)
 - AIR QUALITY MONITORING STATION (UPDATED EM&A MANUAL)
 - CHEK LAP KOK WIND STATION



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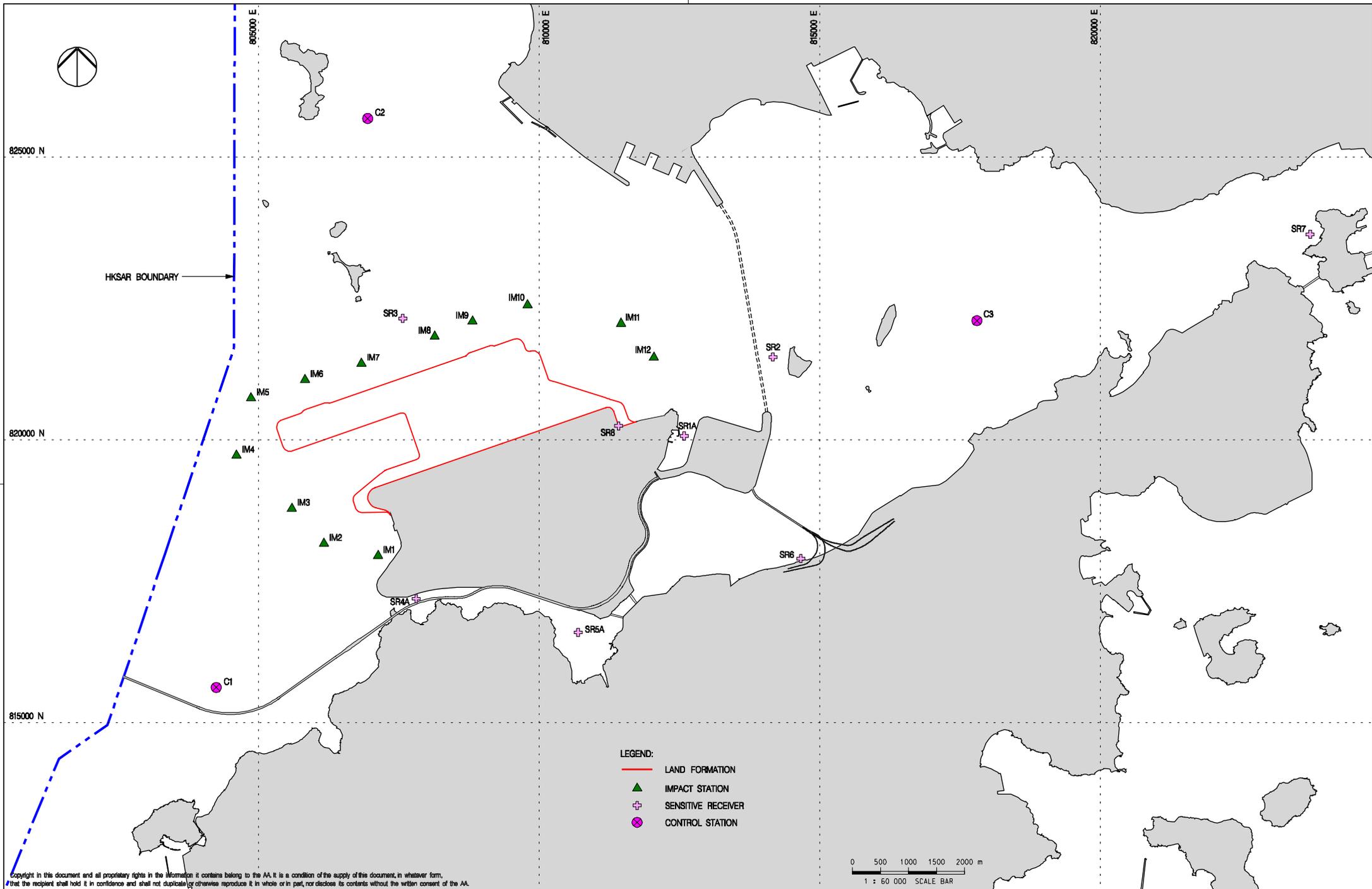
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B	28JAN16	GENERAL REVISION	RO
C	11FEB16	GENERAL REVISION	RO
D	29OCT18	GENERAL REVISION	SH



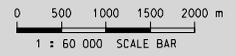
Title
LOCATIONS OF AIR AND NOISE MONITORING STATIONS AND CHEK LAP KOK WIND STATION

Consultant's Signatures for Approval		Date
Design	TK	29OCT18
Checkers	TK	29OCT18
Approver	EC	29OCT18

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM	
Drawing No.	Scale at A3 1 : 22500
FIGURE 2.1	Rev. D



- LEGEND:**
- LAND FORMATION
 - ▲ IMPACT STATION
 - + SENSITIVE RECEIVER
 - ⊗ CONTROL STATION



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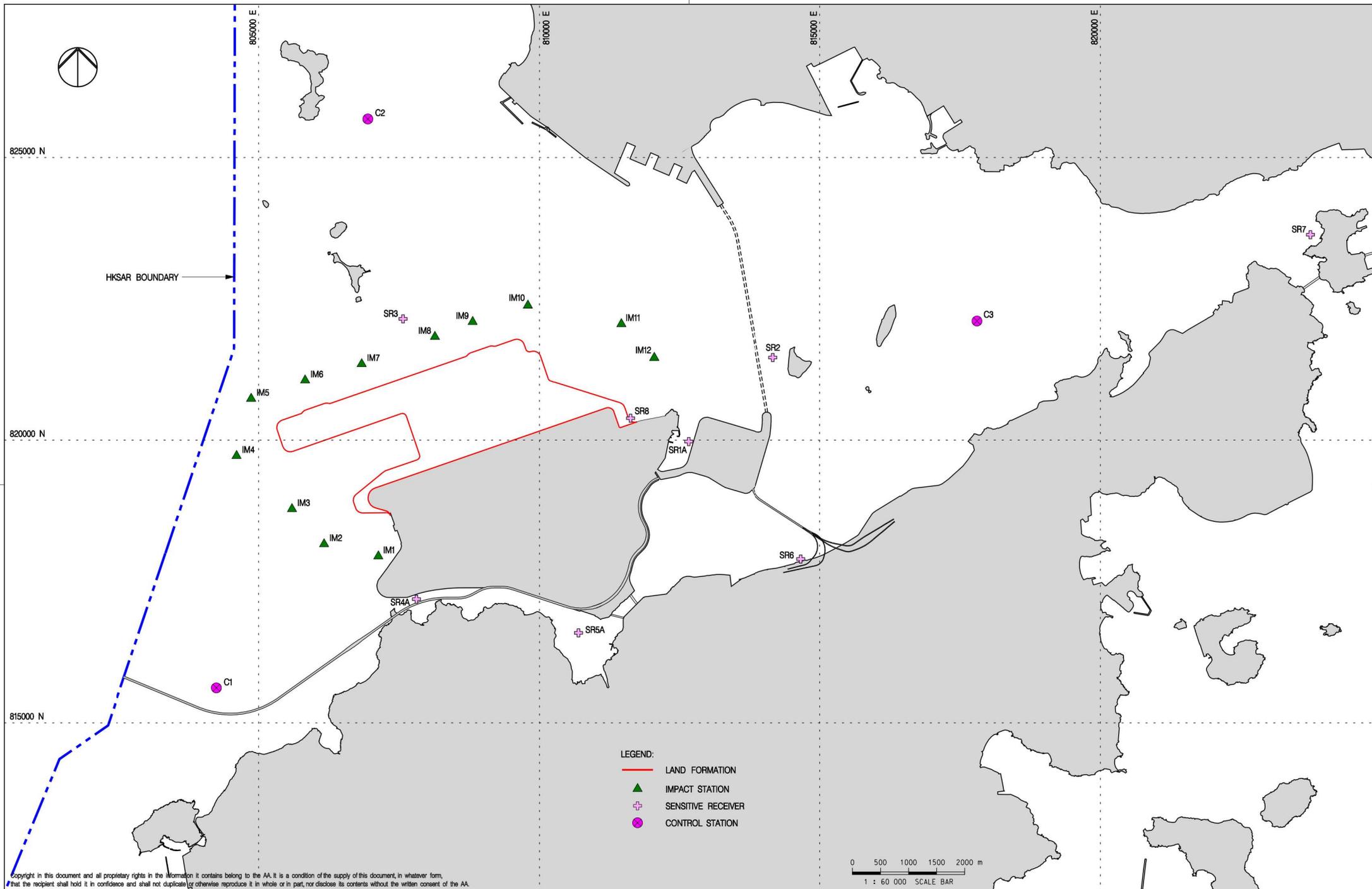
Rev.	Date	Description	Checked
A	25MAY17	FIRST ISSUE	HY
B	07AUG17	GENERAL REVISION	JL
C	25MAY18	GENERAL REVISION	SH
D	29OCT18	GENERAL REVISION	SH



WATER QUALITY MONITORING STATIONS

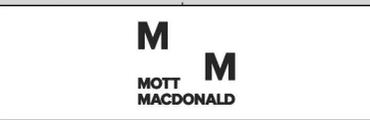
Consultant's Signatures for Approval		Date
Design	DC	29OCT18
Checkers	DC / TK	29OCT18
Approver	EC	29OCT18

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM		Scale at A3
Drawing No.		1 : 60000
FIGURE 2.2a		Rev. D



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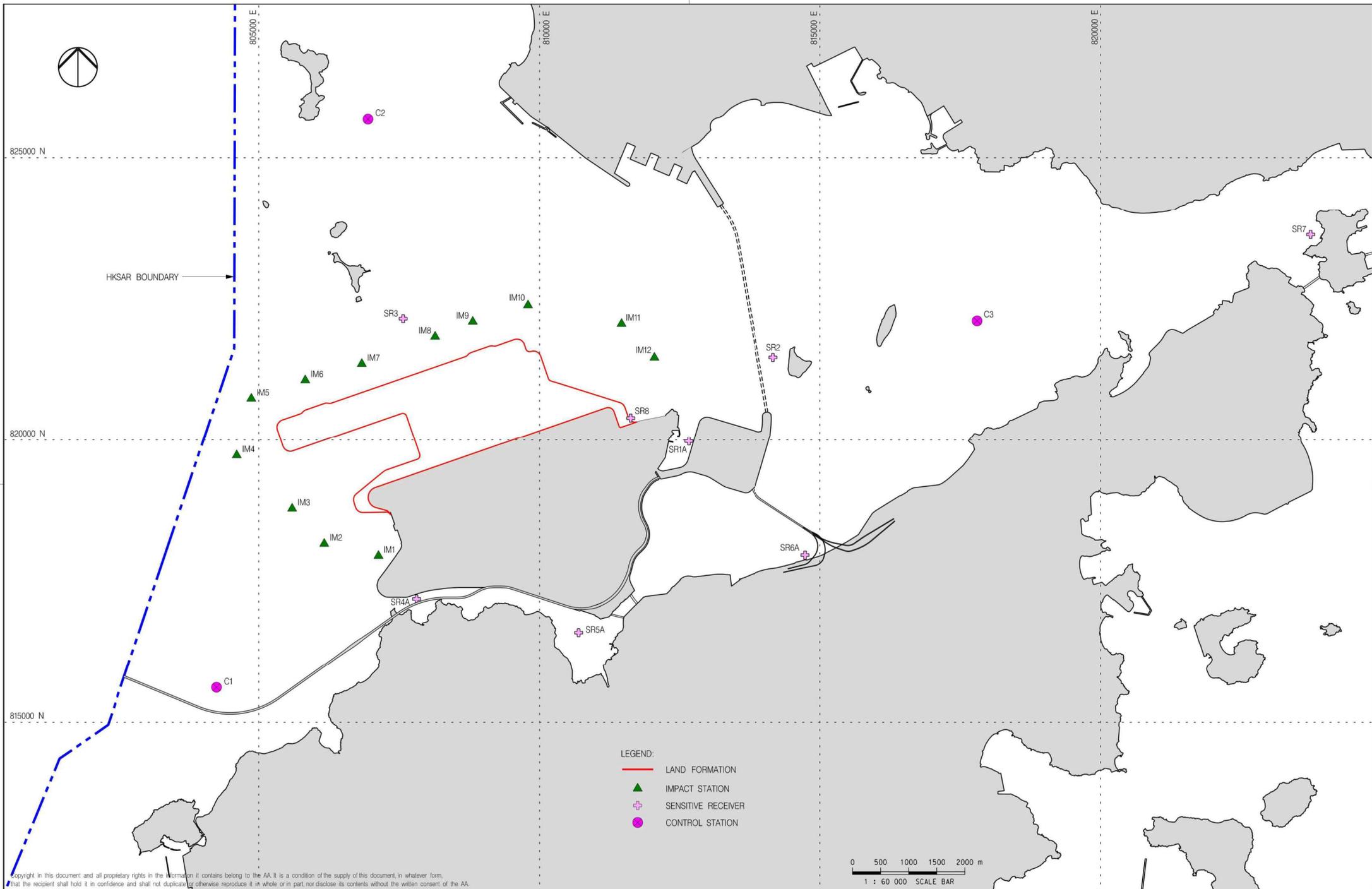
Rev.	Date	Description	Checked
A	25MAY17	FIRST ISSUE	HY
B	07AUG17	GENERAL REVISION	JL
C	25MAY18	GENERAL REVISION	SH
D	29OCT18	GENERAL REVISION	SH
E	23JAN19	GENERAL REVISION	SH



Title
 UPDATED WATER QUALITY MONITORING STATIONS (SINCE 5 JANUARY 2019)

Consultant's Signatures for Approval		Date
Design	DC	23JAN19
Checkers	DC / TK	23JAN19
Approver	EC	23JAN19

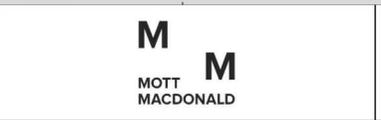
EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM	
Drawing No.	FIGURE 2.2b
Scale at A3	1 : 60000
Rev.	E



- LEGEND:
- LAND FORMATION
 - ▲ IMPACT STATION
 - + SENSITIVE RECEIVER
 - CONTROL STATION

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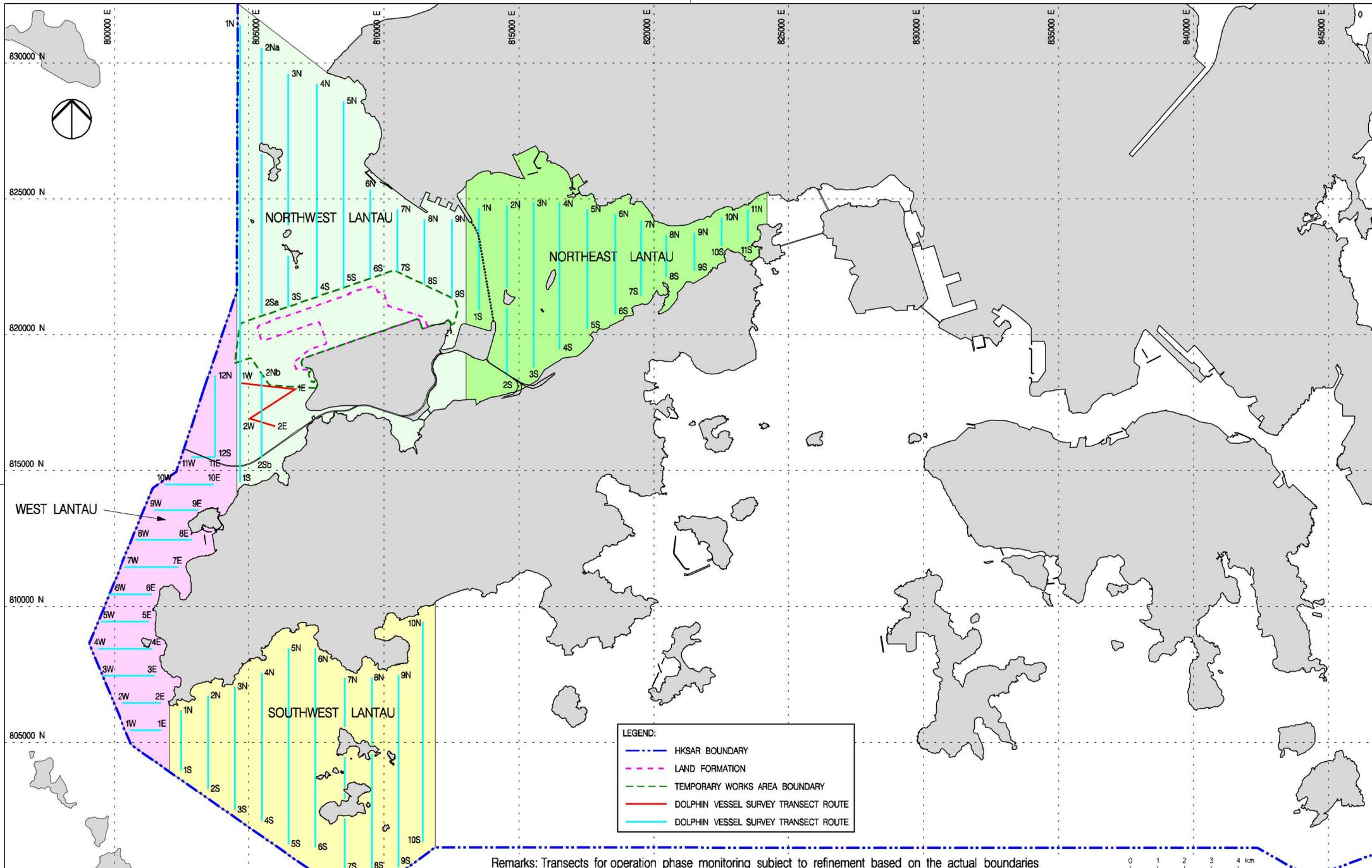
Rev.	Date	Description	Checked
A	21AUG19	FIRST ISSUE	VL



Title
UPDATED WATER QUALITY MONITORING STATIONS (SINCE 8 AUGUST 2019)

Consultant's Signatures for Approval		Date
Design	DC	21AUG19
Checkers	DC / TK	21AUG19
Approver	EC	21AUG19

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM		Scale at A3
Drawing No.		1 : 60000
FIGURE 2.2c		Rev. A



Remarks: Transects for operation phase monitoring subject to refinement based on the actual boundaries for the extension of Hong Kong International Airport Approach Areas (HKIAAA) and 3RS Marine Park

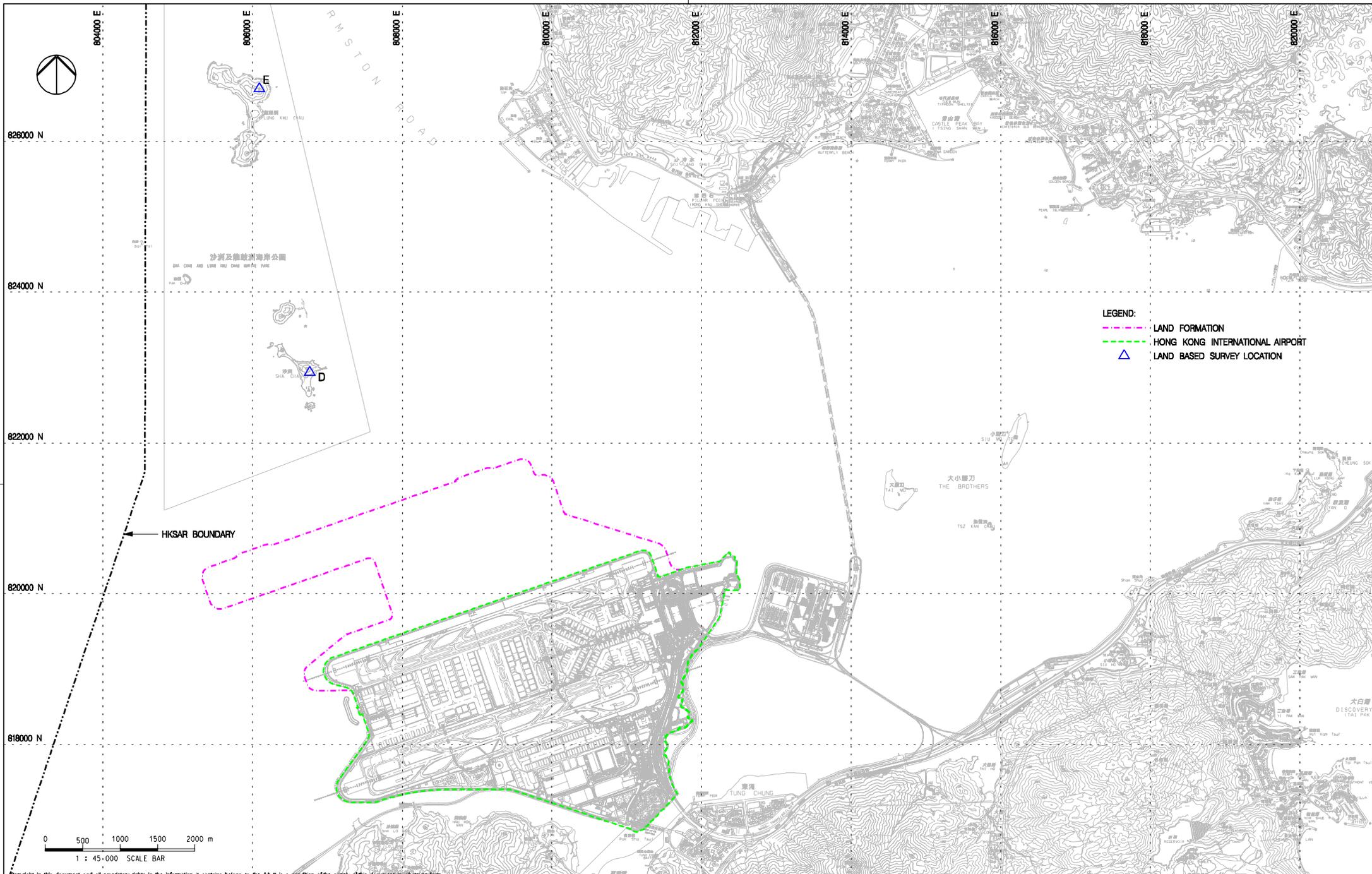
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B	27JUL16	GENERAL REVISION	JT
C	06FEB17	GENERAL REVISION	JT
D	01MAR17	GENERAL REVISION	JT
E	29OCT18	GENERAL REVISION	SH
F	04APR19	GENERAL REVISION	SH



Title
VESSEL BASED DOLPHIN MONITORING
TRANSECTS IN CONSTRUCTION,
POST-CONSTRUCTION AND OPERATION PHASES

Consultant's Signatures for Approval		Date	EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM
Design	JC	04APR19	
Checkers	JC / TK	04APR19	
Approver	EC	04APR19	
Drawing No.			Scale at A3 1 : 125000
FIGURE 2.3			Rev. F



- LEGEND:**
- - - LAND FORMATION
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 - ▲ LAND BASED SURVEY LOCATION

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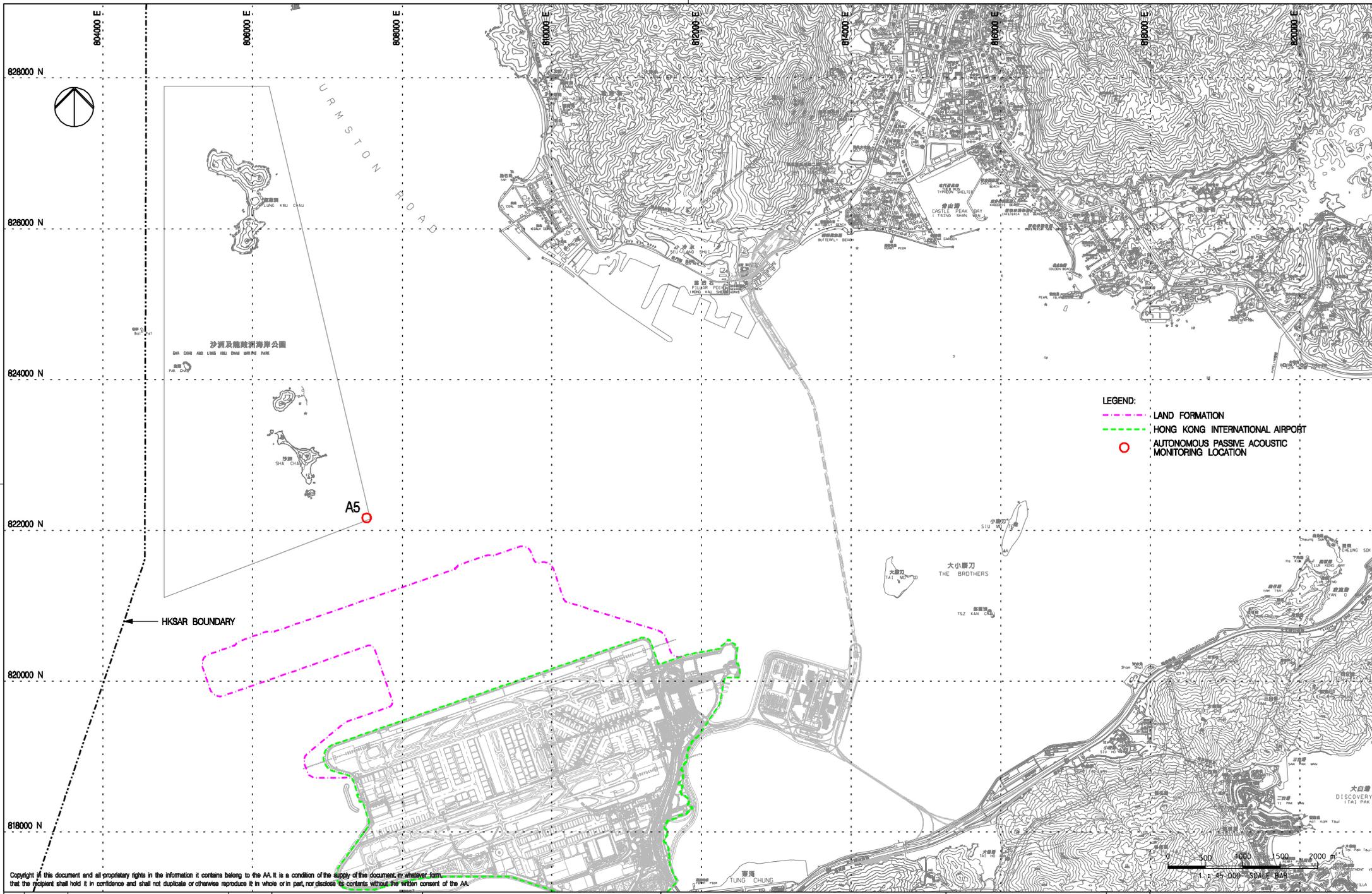
Rev.	Date	Description	Checked
A	02DEC15	FIRST ISSUE	JC
B	06FEB17	GENERAL REVISION	JC
C	29OCT18	GENERAL REVISION	SH



Title
**LAND BASED DOLPHIN MONITORING
 IN BASELINE AND CONSTRUCTION PHASES**

Consultant's Signatures for Approval		Date
Design	JC	29OCT18
Checkers	JC / TK	29OCT18
Approver	EC	29OCT18

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM	
Drawing No.	FIGURE 2.4
Scale at A3	1 : 45000
Rev.	C



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A	29AUG17	FIRST ISSUE	JT
B	10OCT17	GENERAL REVISION	PL
C	29OCT18	GENERAL REVISION	SH



Title
LOCATION FOR AUTONOMOUS PASSIVE ACOUSTIC MONITORING

Consultant's Signatures for Approval		Date
Design	JC	29OCT18
Checkers	JC / TK	29OCT18
Approver	EC	29OCT18

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM		Scale at A3
Drawing No.		1:45000
FIGURE 2.5		Rev. C

Appendix A. Construction Programme and Contract Description

Line	Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	
	Advanced Works										
1	Aviation Fuel Pipeline Diversion	1									
2	Power Cable Diversion		2								
3	Land Formation										
4	Mobilization	4									
5	Sand Blanket Laying		5								
6	Ground Improvement Works		6								
7	Construction of Seawall		7								
8	Marine Filling			8							
9	Land Filling			9							
10	Surcharge			10							
11	Works After Closure of Existing North Runway							11			
12	North Runway (New)				12						
13	Centre Runway Modification		13								
14	TRC/ Apron					14					
15	T2 Expansion (Advance Works)		15								
16	T2 Expansion (Main Works)				16						
17	Underground Tunnel (APM/ BHS)		17								
18	APM System			18							
19	BHS						19				
20	Operation Trials									20	
Programme No.	3-AAP-EPP-0-A0	3RS Phasing Programme								 香港 HONG KONG 國際機場 INTERNATIONAL AIRPORT	
Revision/Date	'A'/(12-Jul-16)										
Prepared	VT										
Checked	PY										

Contract Description

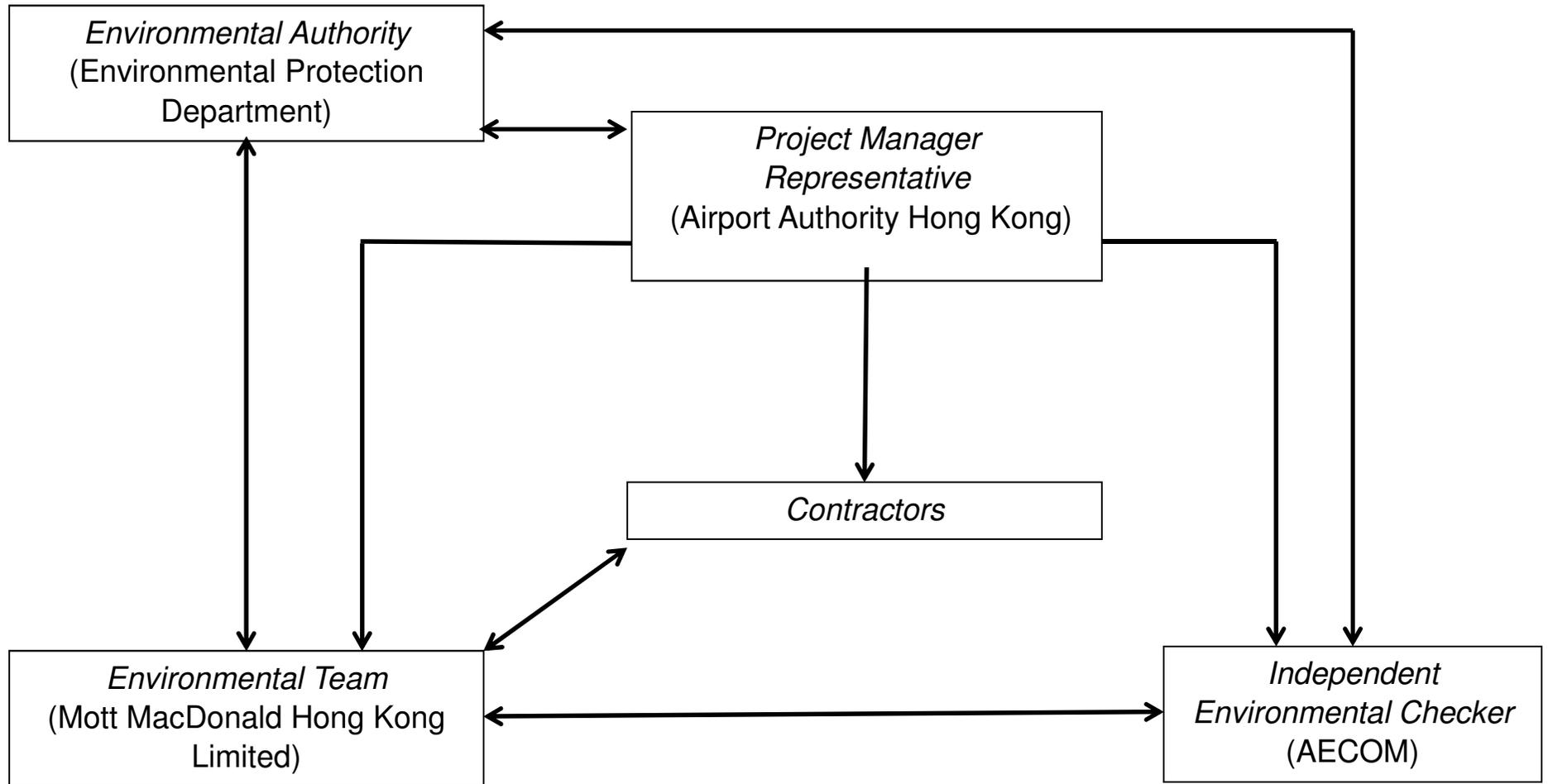
Contract No.	Contract Title	Contractor	Key Construction Activities
P560 (R)	Aviation Fuel Pipeline Diversion Works	Langfang Huayuan Mechanical and Electrical Engineering Co., Ltd.	Diversion of the existing submarine aviation fuel pipelines will use a horizontal directional drilling (HDD) method forming two rock drill holes by drilling through bedrock from a launching site located at the west of the airport island to a daylighting point adjacent to the offshore receiving platform at Sha Chau. Two new pipelines will be installed through the drilled tunnels. The total length is approximately 5 km. Drilling works will proceed from the HDD launching site at the airport island.
3201	Deep Cement Mixing (Package 1)	Penta-Ocean-China State-Dong-Ah Joint Venture	<p>The works covered by the Contract 3201, 3203 and 3205 comprise ground improvement of seabed using Deep Cement Mixing (DCM) method, the major construction activities including without limitation the following</p> <ul style="list-style-type: none"> • Geophysical surveys; • Supply and placing of geotextile and sand blanket under seawalls; • Supply, maintenance, installation and removal of silt curtain systems; • Preliminary construction trails; • Supply and installation of DCM clusters within the works areas; and • Coring, sampling and testing of DCM treated soils and reporting works.
3203	Deep Cement Mixing (Package 3)	Sambo E&C Co.,Ltd	
3205	Deep Cement Mixing (Package 5)	Bachy Soletanche- Sambo Joint Venture	
3206	Reclamation Contract	ZHEC-CCCC-CDC Joint Venture	<p>The works covered by the Contract 3206 comprise the formation of approximately 650 hectares of land north of the existing airport island for the project, the major construction activities including without limitation the following</p> <ul style="list-style-type: none"> • Site clearance and demolition; • Geotechnical and ground improvement works; • Seawall construction; • Marine and land filling works; and • Civil works.
3301	North Runway Crossover Taxiway	FJT-CHEC-ZHEC Joint Venture	The works covered by the Contract 3301 comprise the construction of a new dual taxiway across the existing north runway and utility services and cable

Contract No.	Contract Title	Contractor	Key Construction Activities
			ducting systems. The major construction activities include without limitation the following: <ul style="list-style-type: none"> • Construction of a new dual taxiway; • Cable ducting works; • Extension of existing portable water supply system; and • All associated works.
3302	Eastern Vehicular Tunnel Advance Works	China Road and Bridge Corporation	The works covered by the Contract 3302 comprise the design and construction of the first section of the new Eastern Vehicular Tunnel and a Road Tunnel Plant Building. The major construction activities include without limitation the following: <ul style="list-style-type: none"> • Foundation and structural works; • Cast-in / Underground electrical & mechanical works and utility services; and • All associated testing and commissioning works.
3303	Third Runway and Associated Works	SAPR Joint Venture	The works covered by the Contract 3303 comprise all elements of permanent works and temporary works required for the completion, commissioning and operation of the new North Runway and existing South Runway following the closure of the existing North Runway. The major construction activities include without limitation the following: <ul style="list-style-type: none"> • New runway, taxiways, and associated works; • Infrastructure works; • Construction of ancillary buildings and facilities; • Set up of various airport systems; and • All associated testing and commissioning works.
3402	New Integrated Airport Centers Enabling Works	Wing Hing Construction Co., Ltd.	The works covered by the Contract 3402 comprise the enabling works for the new Integrated Airport Centers. The major construction activities include without limitation the following: <ul style="list-style-type: none"> • Site clearance and demolition; • Building services works; • Utilities diversion and installation works; • Roadworks including associated facilities; and • All associated testing and commissioning works.

Contract No.	Contract Title	Contractor	Key Construction Activities
3501	Antenna Farm and Sewage Pumping Station	Build King Construction Limited	<p>The works covered by the Contract 3501 comprise the construction of antenna farm and sewage pumping station. The major construction activities include without limitation the following:</p> <ul style="list-style-type: none"> • Civil and structural engineering works; • Building services works; • Architectural builder's works and finishes; • Trenchless excavation for sewage rising mains; and • All associated works.
3502	Terminal 2 APM Depot Modification Works	Build King Construction Limited	<p>The works covered by the Contract 3502 comprise the modification of the existing Automatic People Mover (APM) Depot in the basement of T2, for the APM line running between T1 East Hall, West Hall and Midfield Concourse. The major construction activities include without limitation the following:</p> <ul style="list-style-type: none"> • Removal of the existing steel guide rails; • Removal of the existing mass concrete fill and re-construction of the reinforced concrete fill; • Construction of separation walls and walkways; • Removal of re-provision of existing building services and airport systems; and • All associated testing and commissioning works.
3503	Terminal 2 Foundation and Substructure Works	Leighton - Chun Wo Joint Venture	<p>The works covered by the Contract 3503 comprise the foundations for the new T2 terminal, two annex buildings and associated viaducts, construction of the new T2 basement and south annex building structures, diaphragm walls, utility services and other advance works. The major construction activities include without limitation the following:</p> <ul style="list-style-type: none"> • Re-configuration and demolition of existing utilities and structures; • Pile foundations for the expanded T2 Terminal Building, South Annex Building, and North Annex Building; • Construction of new South Annex Building; • Diversion and provisions of utilities; and • All associated testing and commissioning works.
3602	Existing APM System	Niigata Transys Co., Ltd.	<p>The works covered by the Contract 3602 comprise the detailed design, supply, manufacture, fabrication, implementation, testing and commissioning of the following modification works of the existing APM systems:</p>

Contract No.	Contract Title	Contractor	Key Construction Activities
	Modification Works		<ul style="list-style-type: none"> • Modification of existing APM depot and APM cars; • Modification of existing T1 & T2 tunnels; and • Preparation of new APM depot.
3603	3RS Baggage Handling System	VISH Consortium	The works covered by the Contract 3603 comprise the design, supply, manufacture, delivery, installation, testing and commissioning of the high-speed baggage handling system.
3721	Construction Support Infrastructure Works	China State Construction Engineering (Hong Kong) Limited	<p>The works covered by the Contract 3721 comprise the construction of the infrastructure works and building facilities on the reclaimed land formation. The major construction activities include without limitation the following:</p> <ul style="list-style-type: none"> • Project site road; • Utilities; • Cargo loading quays; and • Security fencing and hoarding.
3801	APM and BHS Tunnels on Existing Airport Island	China State Construction Engineering (Hong Kong) Limited	<p>The works covered by the Contract 3801 comprise the construction of the APM and Baggage Handling System (BHS) tunnels on existing airport island. The major construction activities include without limitation the following:</p> <ul style="list-style-type: none"> • Construction of APM and BHS tunnels; • Construction of ventilation building and associated infrastructure; and • Construction, testing and commissioning of sewerage pumping station; and • Civil and structural engineering works.

Appendix B. Project Organization Chart



Appendix C. Environmental Mitigation Implementation Schedule (EMIS) for Construction Phase

Environmental Mitigation Implementation Schedule (EMIS) for Construction Phase

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
Air Quality Impact – Construction Phase					
5.2.6.2	2.1	-	Dust Control Measures <ul style="list-style-type: none"> Water spraying for 12 times a day or once every two hours for 24-hour working at all active works area. 	Within construction site / Duration of the construction phase	I
5.2.6.3	2.1	-	<ul style="list-style-type: none"> Covering of at least 80% of the stockpiling area by impervious sheets. Water spraying of all dusty materials immediately prior to any loading transfer operation so as to keep the dusty material wet during material handling. 	Within construction site / Duration of the construction phase	I
5.2.6.4	2.1	-	Dust control practices as stipulated in the Air Pollution Control (Construction Dust) Regulation should be adopted. These practices include: Good Site Management <ul style="list-style-type: none"> Good site management is important to help reducing potential air quality impact down to an acceptable level. As a general guide, the Contractor should maintain high standard of housekeeping to prevent emission of fugitive dust. Loading, unloading, handling and storage of raw materials, wastes or by-products should be carried out in a manner so as to minimise the release of visible dust emission. Any piles of materials accumulated on or around the work areas should be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas should be carried out in a manner minimising generation of fugitive dust emissions. The material should be handled properly to prevent fugitive dust emission before cleaning. 	Within construction site / Duration of the construction phase	I
			Disturbed Parts of the Roads <ul style="list-style-type: none"> Each and every main temporary access should be paved with concrete, bituminous hardcore materials or metal plates and kept clear of dusty materials; or Unpaved parts of the road should be sprayed with water or a dust suppression chemical so as to keep the entire road surface wet. 	Within construction site / Duration of the construction phase	I
			Exposed Earth <ul style="list-style-type: none"> Exposed earth should be properly treated by compaction, hydroseeding, vegetation planting or seating with latex, vinyl, bitumen within six months after the last construction activity on the site or part of the site where the exposed earth lies. 	Within construction site / Duration of the construction phase	I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			Loading, Unloading or Transfer of Dusty Materials <ul style="list-style-type: none"> ▪ All dusty materials should be sprayed with water immediately prior to any loading or transfer operation so as to keep the dusty material wet. 	Within construction site / Duration of the construction phase	I
			Debris Handling <ul style="list-style-type: none"> ▪ Any debris should be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the three sides; and ▪ Before debris is dumped into a chute, water should be sprayed so that it remains wet when it is dumped. 	Within construction site / Duration of the construction phase	I
			Transport of Dusty Materials <ul style="list-style-type: none"> ▪ Vehicle used for transporting dusty materials/spoils should be covered with tarpaulin or similar material. The cover should extend over the edges of the sides and tailboards. 	Within construction site / Duration of the construction phase	I
			Wheel washing <ul style="list-style-type: none"> ▪ Vehicle wheel washing facilities should be provided at each construction site exit. Immediately before leaving the construction site, every vehicle should be washed to remove any dusty materials from its body and wheels. 	Within construction site / Duration of the construction phase	I
			Use of vehicles <ul style="list-style-type: none"> ▪ The speed of the trucks within the site should be controlled to about 10km/hour in order to reduce adverse dust impacts and secure the safe movement around the site; ▪ Immediately before leaving the construction site, every vehicle should be washed to remove any dusty materials from its body and wheels; and ▪ Where a vehicle leaving the construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle. 	Within construction site / Duration of the construction phase	I
			Site hoarding <ul style="list-style-type: none"> ▪ Where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of not less than 2.4m high from ground level should be provided along the entire length of that portion of the site boundary except for a site entrance or exit. 	Within construction site / Duration of the construction phase	I
5.2.6.5	2.1	-	Best Practices for Concrete Batching Plant The relevant best practices for dust control as stipulated in the Guidance Note on the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2 as well as in the future Specified Process licence should be adopted. The best practices are recommended to be applied to both the land based and floating concrete batching plants. Best practices include: Cement and other dusty materials	Within Concrete Batching Plant / Duration of the construction phase	N/A

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> ▪ The loading, unloading, handling, transfer or storage of cement, pulverised fuel ash (PFA) and/or other equally dusty materials shall be carried in a totally enclosed system acceptable to EPD. All dust-laden air or waste gas generated by the process operations shall be properly extracted and vented to fabric filtering system to meet the required emission limit; ▪ Cement, PFA and/or other equally dusty materials shall be stored in storage silo fitted with audible high level alarms to warn of over-filling. The high-level alarm indicators shall be interlocked with the material filling line such that in the event of the silo approaching an overfilling condition, an audible alarm will operate, and after 1 minute or less the material filling line will be closed; ▪ Vents of all silos shall be fitted with fabric filtering system to meet the required emission limit; ▪ Vents of cement/PFA weighing scale shall be fitted with fabric filtering system to meet the required emission limit; and ▪ Seating of pressure relief valves of all silos shall be checked, and the valves re-seated if necessary, before each delivery. 		
			<p>Other raw materials</p> <ul style="list-style-type: none"> ▪ The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rock, sand, stone aggregate, shall be carried out in such a manner to prevent or minimize dust emissions; ▪ The materials shall be adequately wetted prior to and during the loading, unloading and handling operations. Manual or automatic water spraying system shall be provided at all unloading areas, stock piles and material discharge points; ▪ All receiving hoppers for unloading relevant materials shall be enclosed on three sides up to 3 m above the unloading point. In no case shall these hoppers be used as the material storage devices; ▪ The belt conveyor for handling materials shall be enclosed on top and two sides with a metal board at the bottom to eliminate any dust emission due to wind-whipping effect. Other type of enclosure will also be accepted by EPD if it can be demonstrated that the proposed enclosure can achieve same performance; ▪ All conveyor transfer points shall be totally enclosed. Openings for the passage of conveyors shall be fitted with adequate flexible seals; ▪ Scrapers shall be provided at the turning points of all conveyors to remove dust adhered to the belt surface; ▪ Conveyors discharged to stockpiles of relevant materials shall be arranged to minimize free fall as far as practicable. All free falling transfer points from conveyors to stockpiles shall be enclosed with chute(s) and water sprayed; ▪ Aggregates with a nominal size less than or equal to 5 mm should be stored in totally enclosed structure such as storage bin and should not be handled in open area. Where there is sufficient buffer area surrounding the concrete batching plant, ground stockpiling may be used; 	<p>Within Concrete Batching Plant / Duration of the construction phase</p>	<p>N/A</p>

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> ▪ The stockpile shall be enclosed at least on top and three sides and with flexible curtain to cover the entrance side; ▪ Aggregates with a nominal size greater than 5 mm should preferably be stored in a totally enclosed structure. If open stockpiling is used, the stockpile shall be enclosed on three sides with the enclosure wall sufficiently higher than the top of the stockpile to prevent wind whipping; and ▪ The opening between the storage bin and weighing scale of the materials shall be fully enclosed. 		
			<p>Loading of materials for batching</p> <ul style="list-style-type: none"> ▪ Concrete truck shall be loaded in such a way as to minimise airborne dust emissions. The following control measures shall be implemented: <ul style="list-style-type: none"> (a) Pre-mixing the materials in a totally enclosed concrete mixer before loading the materials into the concrete truck is recommended. All dust-laden air generated by the pre-mixing process as well as the loading process shall be totally vented to fabric filtering system to meet the required emission limit; and (b) If truck mixing batching or other types of batching method is used, effective dust control measures acceptable to EPD shall be adopted. The dust control measures must have been demonstrated to EPD that they are capable to collect and vent all dust-laden air generated by the material loading/mixing to dust arrestment plant to meet the required emission limit. ▪ The loading bay shall be totally enclosed during the loading process. 	Within Concrete Batching Plant / Duration of the construction phase	N/A
			<p>Vehicles</p> <ul style="list-style-type: none"> ▪ All practicable measures shall be taken to prevent or minimize the dust emission caused by vehicle movement; and ▪ All access and route roads within the premises shall be paved and adequately wetted. 	Within Concrete Batching Plant / Duration of the construction phase	N/A
			<p>Housekeeping</p> <ul style="list-style-type: none"> ▪ A high standard of housekeeping shall be maintained. All spillages or deposits of materials on ground, support structures or roofs shall be cleaned up promptly by a cleaning method acceptable to EPD. Any dumping of materials at open area shall be prohibited. 	Within Concrete Batching Plant / Duration of the construction phase	N/A
5.2.6.6	2.1	-	<p>Best Practices for Asphaltic Concrete Plant</p> <p>The relevant best practices for dust control as stipulated in the Guidance Note on the Best Practicable Means for Tar and Bitumen Works (Asphaltic Concrete Plant) BPM 15 (94) as well as in the future Specified Process licence should be adopted. These include:</p> <p>Design of Chimney</p> <ul style="list-style-type: none"> ▪ The chimney shall not be less than 3 metres plus the building height or 8 metres above ground level, whichever is the greater; ▪ The efflux velocity of gases from the main chimney shall not be less than 12 m/s at full load condition; 	Within Concrete Batching Plant / Duration of the construction phase	N/A

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> ▪ The flue gas exit temperature shall not be less than the acid dew point; and ▪ Release of the chimney shall be directed vertically upwards and not be restricted or deflected. 		
			<p>Cold feed side</p> <ul style="list-style-type: none"> ▪ The aggregates with a nominal size less than or equal to 5 mm shall be stored in totally enclosed structure such as storage bin and shall not be handled in open area; ▪ Where there is sufficient buffer area surrounding the plant, ground stockpiling may be used. The stockpile shall be enclosed at least on top and three sides and with flexible curtain to cover the entrance side. If these aggregates are stored above the feeding hopper, they shall be enclosed at least on top and three sides and be wetted on the surface to prevent wind-whipping; ▪ The aggregates with a nominal size greater than 5 mm should preferably be stored in totally enclosed structure. Aggregates stockpile that is above the feeding hopper shall be enclosed at least on top and three sides. If open stockpiling is used, the stockpiles shall be enclosed on three sides with the enclosure wall sufficiently higher than the top of the stockpile to prevent wind whipping; ▪ Belt conveyors shall be enclosed on top and two sides and provided with a metal board at the bottom to eliminate any dust emission due to the wind-whipping effect. Other type of enclosure will also be accepted by EPD if it can be demonstrated that the proposed enclosure can be achieve the same performance; ▪ Scrapers shall be provided at the turning points of all belt conveyors inside the chute of the transfer points to remove dust adhered to the belt surface; ▪ All conveyor transfer points shall be totally enclosed. Openings for the passages of conveyors shall be fitted with adequate flexible seals; and ▪ All materials returned from dust collection system shall be transferred in enclosed system and shall be stored inside bins or enclosures. 	<p>Within Concrete Batching Plant / Duration of the construction phase</p>	N/A
			<p>Hot feed side</p> <ul style="list-style-type: none"> ▪ The inlet and outlet of the rotary dryer shall be enclosed and ducted to a dust extraction and collection system such as a fabric filter. The particulate and gaseous concentration at the exhaust outlet of the dust collector shall not exceed the required limiting values; ▪ The bucket elevator shall be totally enclosed and the air be extracted and ducted to a dust collection system to meet the required particulates limiting value; ▪ All vibratory screens shall be totally enclosed and dust tight with close-fitted access inspection opening. Gaskets shall be installed to seal off any cracks and edges of any inspection openings; ▪ Chutes for carrying hot material shall be rigid and preferably fitted with abrasion resistant plate inside. They shall be inspected daily for leakages; 	<p>Within Concrete Batching Plant / Duration of the construction phase</p>	N/A

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> ▪ All hot bins shall be totally enclosed and dust tight with close-fitted access inspection opening. Gaskets shall be installed to seal off any cracks and edges of any inspection openings. The air shall be extracted and ducted to a dust collection system to meet the required particulates limiting value; and ▪ Appropriate control measures shall be adopted in order to meet the required bitumen emission limit as well as the ambient odour level (2 odour units). 		
			<p>Material transportation</p> <ul style="list-style-type: none"> ▪ The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rocks, sands, stone aggregates, reject fines, shall be carried out in such a manner as to minimize dust emissions; ▪ Roadways from the entrance of the plant to the product loading points and/or any other working areas where there are regular movements of vehicles shall be paved or hard surfaced; and ▪ Haul roads inside the Works shall be adequately wetted with water and/or chemical suppressants by water trucks or water sprayers. 	Within Concrete Batching Plant / Duration of the construction phase	N/A
			<p>Control of emissions from bitumen decanting</p> <ul style="list-style-type: none"> ▪ The heating temperature of the particular bitumen type and grade shall not exceed the corresponding temperature limit of the same type listed in Appendix 1 of the Guidance Note; ▪ Tamper-free high temperature cut-off device shall be provided to shut off the fuel supply or electricity in case the upper limit for bitumen temperature is reached; ▪ Proper chimney for the discharge of bitumen fumes shall be provided at high level; ▪ The emission of bitumen fumes shall not exceed the required emission limit; and <p>The air-to-fuel ratio shall be properly controlled to allow complete combustion of the fuel. The fuel burners, if any, shall be maintained properly and free from carbon deposits in the burner nozzles.</p>	Within Concrete Batching Plant / Duration of the construction phase	N/A
			<p>Liquid fuel</p> <ul style="list-style-type: none"> ▪ The receipt, handling and storage of liquid fuel shall be carried out so as to prevent the release of emissions of organic vapours and/or other noxious and offensive emissions to the air. 	Within Concrete Batching Plant / Duration of the construction phase	N/A
			<p>Housekeeping</p> <ul style="list-style-type: none"> ▪ A high standard of housekeeping shall be maintained. Waste material, spillage and scattered piles gathered beneath belt conveyors, inside and around enclosures shall be cleared frequently. The minimum clearing frequency is on a weekly basis. 	Within Concrete Batching Plant / Duration of the construction phase	N/A
5.2.6.7	2.1	-	<p>Best Practices for Rock Crushing Plants</p> <p>The relevant best practices for dust control as stipulated in the Guidance Note on the Best Practicable Means for Mineral Works (Stone Crushing Plant) BPM 11/1 (95) as well as in the future Specified Process licence should be adopted. These include:</p>	Within Concrete Batching Plant / Duration of the construction phase	N/A

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<p>Crushers</p> <ul style="list-style-type: none"> ▪ The outlet of all primary crushers, and both inlet and outlet of all secondary and tertiary crushers, if not installed inside a reasonably dust tight housing, shall be enclosed and ducted to a dust extraction and collection system such as a fabric filter; ▪ The inlet hopper of the primary crushers shall be enclosed on top and 3 sides to contain the emissions during dumping of rocks from trucks. The rock while still on the trucks shall be wetted before dumping; ▪ Water sprayers shall be installed and operated in strategic locations at the feeding inlet of crushers; and ▪ Crusher enclosures shall be rigid and be fitted with self-closing doors and close-fitting entrances and exits. Where conveyors pass through the crusher enclosures, flexible covers shall be installed at entries and exits of the conveyors to the enclosure. 		
			<p>Vibratory screens and grizzlies</p> <ul style="list-style-type: none"> ▪ All vibratory screens shall be totally enclosed in a housing. Screenhouses shall be rigid and reasonably dust tight with self-closing doors or close-fitted entrances and exits for access. Where conveyors pass through the screenhouse, flexible covers shall be installed at entries and exits of the conveyors to the housing. Where containment of dust within the screenhouse structure is not successful then a dust extraction and collection system shall be provided; and ▪ All grizzlies shall be enclosed on top and 3 sides and sufficient water sprayers shall be installed at their feeding and outlet areas. 	<p>Within Concrete Batching Plant / Duration of the construction phase</p>	<p>N/A</p>
			<p>Belt conveyors</p> <ul style="list-style-type: none"> ▪ Except for those conveyors which are placed within a totally enclosed structure such as a screenhouse or those erected at the ground level, all conveyors shall be totally enclosed with windshield on top and 2 sides; ▪ Effective belt scraper such as the pre-cleaner blades made by hard wearing materials and provided with pneumatic tensioner, or equivalent device, shall be installed at the head pulley of designated conveyor as required to dislodge fine dust particles that may adhere to the belt surface and to reduce carry-back of fine materials on the return belt. Bottom plates shall also be provided for the conveyor unless it has been demonstrated that the corresponding belt scraper is effective and well maintained to prevent falling material from the return belt; and ▪ Except for those transfer points which are placed within a totally enclosed structure such as a screenhouse, all transfer points to and from conveyors shall be enclosed. Where containment of dust within the enclosure is not successful, then water sprayers shall be provided. Openings for any enclosed structure for the passage of conveyors shall be fitted with flexible seals. 	<p>Within Concrete Batching Plant / Duration of the construction phase</p>	<p>N/A</p>

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<p>Storage piles and bins</p> <ul style="list-style-type: none"> Where practicable, free falling transfer points from conveyors to stockpiles shall be fitted with flexible curtains or be enclosed with chutes designed to minimize the drop height. Water sprays shall also be used where required. The surface of all surge piles and stockpiles of blasted rocks or aggregates shall be kept sufficiently wet by water spraying wherever practicable; All open stockpiles for aggregates of size in excess of 5 mm shall be kept sufficiently wet by water spraying where practicable; or The stockpiles of aggregates 5 mm in size or less shall be enclosed on 3 sides or suitably located to minimize wind-whipping. Save for fluctuations in stock or production, the average stockpile shall stay within the enclosure walls and in no case the height of the stockpile shall exceed twice the height of the enclosure walls. Scattered piles gathered beneath belt conveyors, inside and around enclosures shall be cleared regularly. 	Within Concrete Batching Plant / Duration of the construction phase	N/A
			<p>Rock drilling equipment</p> <ul style="list-style-type: none"> Appropriate dust control equipment such as a dust extraction and collection system shall be used during rock drilling activities. 	Within Concrete Batching Plant / Duration of the construction phase	N/A
Hazard to Human Life – Construction Phase					
Table 6.40	3.2	-	<ul style="list-style-type: none"> Precautionary measures should be established to request barges to move away during typhoons. 	Construction Site / Construction Period	I
Table 6.40	3.2	-	<ul style="list-style-type: none"> An appropriate marine traffic management system should be established to minimize risk of ship collision. 	Construction Site / Construction Period	I
Table 6.40	3.2	-	<ul style="list-style-type: none"> Location of all existing hydrant networks should be clearly identified prior to any construction works. 	Construction Site / Construction Period	I
Noise Impact – Construction Phase					
7.5.6	4.3	-	<p>Good Site Practice</p> <p>Good site practice and noise management can significantly reduce the impact of construction site activities on nearby NSRs. The following package of measures should be followed during each phase of construction:</p> <ul style="list-style-type: none"> only well-maintained plant to be operated on-site and plant should be serviced regularly during the construction works; machines and plant that may be in intermittent use to be shut down between work periods or should be throttled down to a minimum; 	Within the Project site / During construction phase / Prior to commencement of operation	I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from the NSRs; mobile plant should be sited as far away from NSRs as possible; and material stockpiles and other structures to be effectively utilised, where practicable, to screen noise from on-site construction activities. 		
7.5.6	4.3	-	Adoption of QPME <ul style="list-style-type: none"> QPME should be adopted as far as applicable. 	Within the Project site / During construction phase / Prior to commencement of operation	I
7.5.6	4.3	-	Use of Movable Noise Barriers <ul style="list-style-type: none"> Movable noise barriers should be placed along the active works area and mobile plants to block the direct line of sight between PME and the NSRs. 	Within the Project site / During construction phase / Prior to commencement of operation	I
7.5.6	4.3	-	Use of Noise Enclosure/ Acoustic Shed <ul style="list-style-type: none"> Noise enclosure or acoustic shed should be used to cover stationary PME such as air compressor and generator. 	Within the Project site / During construction phase / Prior to commencement of operation	I
Water Quality Impact – Construction Phase					

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
8.8.1.2 and 8.8.1.3	5.1	2.26	<p>Marine Construction Activities</p> <p><u>General Measures to be Applied to All Works Areas</u></p> <ul style="list-style-type: none"> ▪ Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation; ▪ Use of Lean Material Overboard (LMOB) systems shall be prohibited; ▪ Excess materials shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessels are moved; ▪ Plants should not be operated with leaking pipes and any pipe leakages shall be repaired quickly; ▪ Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; ▪ All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash; ▪ The works shall not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the works site; and ▪ For ground improvement activities including DCM, the wash water from cleaning of the drilling shaft should be appropriately treated before discharge. The Contractor should ensure the waste water meets the WPCO/TM requirements before discharge. No direct discharge of contaminated water is permitted. 	Within construction site / Duration of the construction phase	I
			<p><u>Specific Measures to be Applied to All Works Areas</u></p> <ul style="list-style-type: none"> ▪ The daily maximum production rates shall not exceed those assumed in the water quality assessment in the EIA report; ▪ A maximum of 10 % fines content to be adopted for sand blanket and 20 % fines content for marine filling below +2.5 mPD prior to substantial completion of seawall (until end of Year 2017) shall be specified in the works contract document; 	Within construction site / Duration of the construction phase	I
			<ul style="list-style-type: none"> ▪ An advance seawall of at least 200m to be constructed (comprising either rows of contiguous permanent steel cells completed above high tide mark or partially completed seawalls with rock core to high tide mark and filter layer on the inner side) prior to commencement of marine filling activities; 		I
			<ul style="list-style-type: none"> ▪ Closed grab dredger shall be used to excavate marine sediment; ▪ Silt curtains surrounding the closed grab dredger shall be deployed in accordance with the Silt Curtain Deployment Plan; and 		N/A *(The arrangement of silt curtain has been modified. The details can be referred to Silt Curtain Deployment Plan)
			<ul style="list-style-type: none"> ▪ The Silt Curtain Deployment Plan shall be implemented. 		I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<p><u>Specific Measures to be Applied to Land Formation Activities prior to Commencement of Marine Filling Works</u></p> <ul style="list-style-type: none"> ▪ Double layer 'Type III' silt curtains to be applied around the active eastern works areas prior to commencement of sand blanket laying activities. The silt curtains shall be configured to minimise SS release during ebb tides. A silt curtain efficiency test shall be conducted to validate the performance of the silt curtains; 	<p>Within construction site / Duration of the construction phase</p>	<p>N/A</p> <p>*(The arrangement of silt curtain has been modified. The details can be referred to Silt Curtain Deployment Plan)</p>
			<ul style="list-style-type: none"> ▪ Double layer silt curtains to enclose WSRs C7a and silt screens installed at the intake points for both WSR C7a and C8 prior to commencement of construction; and 		<p>For C7a, I</p> <p>For C8, I</p> <p>*(The requirement of silt curtain / screen has been modified. The details can be referred to Silt Curtain Deployment Plan)</p>
			<ul style="list-style-type: none"> ▪ The silt curtains and silt screens should be regularly checked and maintained. 		<p>I</p>
			<p><u>Specific Measures to be Applied to Land Formation Activities during Marine Filling Works</u></p> <ul style="list-style-type: none"> ▪ Double layer 'Type II' or 'Type III' silt curtains to be applied around the eastern openings between partially completed seawalls prior to commencement of marine filling activities. The silt curtains shall be configured to minimise SS release during ebb tides; 	<p>Within construction site / Duration of the construction phase</p>	<p>I</p> <p>*(The arrangement of silt curtain has been modified. The details can be referred to Silt Curtain Deployment Plan)</p>
			<ul style="list-style-type: none"> ▪ Double layer silt curtains to be applied at the south-western opening prior to commencement of marine filling activities; 		<p>N/A</p> <p>*(The arrangement of silt curtain has been modified. The details can be referred to Silt Curtain Deployment Plan)</p>
			<ul style="list-style-type: none"> ▪ Double layer silt curtain to enclose WSR C7a and silt screens installed at the intake points for both WSR C7a and C8 prior to commencement of marine filling activities; and 		<p>N/A</p> <p>*(The requirement of silt curtain / screen has been modified. The details can be referred to Silt Curtain Deployment Plan)</p>
			<ul style="list-style-type: none"> ▪ The silt curtains and silt screens should be regularly checked and maintained. 		<p>I</p>

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<p><u>Specific Measures to be Applied to the Field Joint Excavation Works for the Submarine Cable Diversion</u></p> <ul style="list-style-type: none"> Only closed grabs designed and maintained to avoid spillage shall be used and should seal tightly when operated. Excavated materials shall be disposed at designated marine disposal area in accordance with the Dumping at Sea Ordinance (DASO) permit conditions; and Silt curtains surrounding the closed grab dredger to be deployed as a precautionary measure. 	Within construction site / Duration of the construction phase	N/A
8.8.1.4	5.1	-	<p>Modification of the Existing Seawall</p> <ul style="list-style-type: none"> Silt curtains shall be deployed around the seawall modification activities to completely enclose the active works areas, and care should be taken to avoid splashing of rockfill / rock armour into the surrounding marine environment. For the connecting sections with the existing outfalls, works for these connection areas should be undertaken during the dry season in order that individual drainage culvert cells may be isolated for interconnection works. 	At the existing northern seawall / Duration of the construction phase	N/A
8.8.1.5	5.1	-	<p>Construction of New Stormwater Outfalls and Modifications to Existing Outfalls</p> <ul style="list-style-type: none"> During operation of the temporary drainage channel, runoff control measures such as bunding or silt fence shall be provided on both sides of the channel to prevent accumulation and release of SS via the temporary channel. Measures should also be taken to minimise the ingress of site drainage into the culvert excavations. 	Within construction site / Duration of the construction phase	N/A
8.8.1.6 8.8.1.7	5.1	2.27	<p>Piling Activities for Construction of New Runway Approach Lights and HKIAAA Marker Beacons</p> <p>Silt curtains shall be deployed around the piling activities to completely enclose the piling works and care should be taken to avoid spillage of excavated materials into the surrounding marine environment.</p> <p><u>For construction of the eastern approach lights at the CMPs</u></p> <ul style="list-style-type: none"> Ground improvement via DCM using a close-spaced layout shall be completed prior to commencement of piling works; Steel casings shall be installed to enclose the excavation area prior to commencement of excavation; The excavated materials shall be removed using a closed grab within the steel casings; No discharge of the cement mixed materials into the marine environment will be allowed; and Excavated materials shall be treated and reused on-site. 	Within construction site / Duration of the construction phase	N/A
8.8.1.8	5.1	-	<p>Construction of Site Runoff and Drainage</p> <p>The site practices outlined in ProPECC Note PN 1/94 should be followed as far as practicable in order to minimise surface runoff and the chance of erosion. The following measures are recommended:</p> <ul style="list-style-type: none"> Install perimeter cut-off drains to direct off-site water around the site and implement internal drainage, erosion and sedimentation control facilities. Channels, earth bunds or sand bag barriers should be provided on site to direct storm water to silt removal facilities. The design of the temporary on-site 	Within construction site / Duration of the construction phase	I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<p>drainage system should be undertaken by the Contractors prior to the commencement of construction (for works areas located on the existing Airport island) or as soon as the new land is completed (for works areas located on the new landform);</p> <hr/> <ul style="list-style-type: none"> ▪ 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 standards under the WPCO. The design of efficient silt removal facilities should make reference to the guidelines in Appendix A1 of ProPECC Note PN 1/94. Sizes may vary depending upon the flow rate. The detailed design of the sand/silt traps should be undertaken by the Contractors prior to the commencement of construction; <hr/> <ul style="list-style-type: none"> ▪ All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit should be regularly removed, at the onset of and after each rainstorm to ensure that these facilities are functioning properly; <hr/> <ul style="list-style-type: none"> ▪ Measures should be taken to minimize the ingress of site drainage into excavations. If excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from foundation excavations should be discharged into storm drains via silt removal facilities; <hr/> <ul style="list-style-type: none"> ▪ In the event that contaminated groundwater is identified at excavation areas, this should be treated on-site using a suitable wastewater treatment process. The effluent should be treated according to the requirements of the TM-DSS standards under the WPCO prior to discharge to foul sewers or collected for proper disposal off-site. No direct discharge of contaminated groundwater is permitted; and <hr/> <ul style="list-style-type: none"> ▪ All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facility should be provided at construction site exits. Wash-water should have sand and silt settled out and removed regularly to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains. All washwater should be treated according to the requirements of the TM-DSS standards under the WPCO prior to discharge. 		I
8.8.1.9	5.1	-	<p>Sewage Effluent from Construction Workforce</p> <ul style="list-style-type: none"> ▪ Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site where necessary to handle sewage from the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance. 	Within construction site / During construction phase	I
8.8.1.10 8.8.1.11	5.1		<p>General Construction Activities</p> <ul style="list-style-type: none"> ▪ Construction solid waste, debris and refuse generated on-site should be collected, handled and disposed of properly to avoid entering any nearby storm water drain. Stockpiles of cement and other construction materials should be kept covered when not being used; and 	Within construction site / During construction phase	I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
8.8.1.12 8.8.1.13	5.1	2.28	<ul style="list-style-type: none"> ▪ Oils and fuels should only be stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to any nearby storm water drain, all fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund should be drained of rainwater after a rain event. <p>Drilling Activities for the Submarine Aviation Fuel Pipelines</p> <p>To prevent potential water quality impacts at Sha Chau, the following measures shall be applied:</p> <ul style="list-style-type: none"> ▪ A 'zero-discharge' policy shall be applied for all activities to be conducted at Sha Chau; ▪ No bulk storage of chemicals shall be permitted; and ▪ A containment pit shall be constructed around the drill holes. This containment pit shall be lined with impermeable lining and bunded on the outside to prevent inflow from off-site areas. 	Within construction site / During construction phase	I
			<p>At the airport island side of the drilling works, the following measures shall be applied for treatment of wastewater:</p> <ul style="list-style-type: none"> ▪ During pipe cleaning, appropriate desilting or sedimentation device should be provided on site for treatment before discharge. The Contractor should ensure discharge water from the sedimentation tank meet the WPCO/TM requirements before discharge; and ▪ Drilling fluid used in drilling activities should be reconditioned and reused as far as possible. Temporary enclosed storage locations should be provided on-site for any unused chemicals that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC Note PN 1/94 should be adhered to in the handling and disposal of bentonite slurries. 	Within construction site / During construction phase	I
Waste Management Implication – Construction Phase					
10.5.1.1	7.1	-	<p>Opportunities to minimise waste generation and maximise the reuse of waste materials generated by the project have been incorporated where possible into the planning, design and construction stages, and the following measures have been recommended:</p> <ul style="list-style-type: none"> ▪ The relevant construction methods (particularly for the tunnel works) and construction programme have been carefully planned and developed to minimise the extent of excavation and to maximise the on-site reuse of inert C&D materials generated by the project as far as practicable. Temporary stockpiling areas will also be provided to facilitate on-site reuse of inert C&D materials; ▪ Priority should be given to collect and reuse suitable inert C&D materials generated from other concurrent projects and the Government's PFRF as fill materials for the proposed land formation works; ▪ Only non-dredged ground improvement methods should be adopted in order to completely avoid the need for dredging and disposal of marine sediment for the proposed land formation work; ▪ Excavation work for constructing the APM tunnels, BHS tunnels and airside tunnels will not be down to the CMPs beneath the fill materials in order to avoid excavating any sediments; and 	Project Site Area / During design and construction phase	I
					I
					I
					I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> For the marine sediments expected to be excavated from the piling works of TRC, APM & BHS tunnels, airside tunnels and other facilities on the proposed land formation area, piling work of marine sections of the approach lights and HKIAAA beacons, basement works for some of T2 expansion area and excavation works for the proposed APM depot should be treated and reused on-site as backfilling materials, although required treatment level / detail and the specific re-use mode are under development. 		I
10.5.1.1	7.1	-	<p>The following good site practices should be performed during the construction activities include:</p> <ul style="list-style-type: none"> Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site; Training of site personnel in proper waste management and chemical waste handling procedures; Provision of sufficient waste disposal points and regular collection for disposal; Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks by tarpaulin/ similar material or by transporting wastes in enclosed containers. The cover should be extended over the edges of the sides and tailboards; Stockpiles of C&D materials should be kept wet or covered by impervious sheets to avoid wind-blown dust; All dusty materials including C&D materials should be sprayed with water immediately prior to any loading transfer operation so as to keep the dusty material wet during material handling at the barging points/ stockpile areas; C&D materials to be delivered to and from the project site by barges or by trucks should be kept wet or covered to avoid wind-blown dust; The speed of the trucks including dump trucks carrying C&D or waste materials within the site should be controlled to about 10 km/hour in order to reduce the adverse dust impact and secure the safe movement around the site; and To avoid or minimise dust emission during transport of C&D or waste materials within the site, each and every main temporary access should be paved with concrete, bituminous hardcore materials or metal plates and kept clear of dusty materials. Unpaved parts of the road should be sprayed with water or a dust suppression chemical so as to keep the entire road surface wet. 	Project Site Area / Construction Phase	I
10.5.1.3	7.1	-	<p>The following practices should be performed to achieve waste reduction include:</p> <ul style="list-style-type: none"> Use of steel or aluminium formworks and falseworks for temporary works as far as practicable; Adoption of repetitive design to allow reuse of formworks as far as practicable; 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; 	Project Site Area / Construction Phase	I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> Encourage collection of aluminium cans, PET bottles and paper by providing separate labelled bins to enable these wastes to be segregated from other general refuse generated by the work force; Any unused chemicals or those with remaining functional capacity should be collected for reused as far as practicable; Proper storage and site practices to minimise the potential for damage or contamination of construction materials; and Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste. 		
10.5.1.5	7.1		<ul style="list-style-type: none"> Inert and non-inert C&D materials should be handled and stored separately to avoid mixing the two types of materials. 	Project Site Area / Construction Phase	I
10.5.1.5	7.1	-	<ul style="list-style-type: none"> Any recyclable materials should be segregated from the non-inert C&D materials for collection by reputable licensed recyclers whereas the non-recyclable waste materials should be disposed of at the designated landfill site by a reputable licensed waste collector. 	Project Site Area / Construction Phase	I
10.5.1.6	7.1	-	<ul style="list-style-type: none"> A trip-ticket system promulgated shall be developed in order to monitor the off-site delivery of surplus inert C&D materials that could not be reused on-site for the proposed land formation work at the PFRF and to control fly tipping. 	Project Site Area / Construction Phase	I
10.5.1.6	7.1	2.32	<ul style="list-style-type: none"> The Contractor should prepare and implement a Waste Management Plan detailing various waste arising and waste management practices. 	Construction Phase	I
10.5.1.16	7.1	-	<p>The following mitigation measures are recommended during excavation and treatment of the sediments:</p> <ul style="list-style-type: none"> On-site remediation should be carried out in an enclosed area in order to minimise odour/dust emissions; The loading, unloading, handling, transfer or storage of treated and untreated sediment should be carried out in such a manner to prevent or minimise dust emissions; All practical measures, including but not limited to speed control for vehicles, should be taken to minimise dust emission; Good housekeeping should be maintained at all times at the sediment treatment facility and storage area; Treated and untreated sediment should be clearly separated and stored separately; and Surface runoff from the enclosed area should be properly collected and stored separately, and then properly treated to levels in compliance with the relevant effluent standards as required by the Water Pollution Control Ordinance before final discharge. 	Project Site Area / Construction Phase	I I I I I
10.5.1.18	7.1	-	<p>The marine sediments to be removed from the cable field joint area would be disposed of at the designated disposal sites to be allocated by the MFC. The following mitigation measures should be strictly</p>	Project Site Area / Construction Phase	N/A

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<p>followed to minimise potential impacts on water quality during transportation of the sediments requiring Type 1 disposal:</p> <ul style="list-style-type: none"> Bottom opening of barges shall be fitted with tight fitting seals to prevent leakage of material; 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 EPD; and Barges or hopper barges shall not be filled to a level that would cause the overflow of materials or sediment laden water during loading or transportation. 		
10.5.1.19	7.1	-	<p>Contractor should register with the EPD as a chemical waste producer and to follow the relevant guidelines. The following measures should be implemented:</p> <ul style="list-style-type: none"> Good quality containers compatible with the chemical wastes should be used; Incompatible chemicals should be stored separately; Appropriate labels must be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc.; and The contractor will use a licensed collector to transport and dispose of the chemical wastes at the approved Chemical Waste Treatment Centre or other licensed recycling facilities, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation. 	Project Site Area / Construction Phase	I
10.5.1.20	7.1	-	<ul style="list-style-type: none"> General refuse should be stored in enclosed bins or compaction units separated from inert C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site for disposal at designated landfill sites. An enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material. 	Project Site Area / Construction Phase	I
10.5.1.21	7.1	-	<ul style="list-style-type: none"> The construction contractors will be required to regularly check and clean any refuse trapped or accumulated along the newly constructed seawall. Such refuse will then be stored and disposed of together with the general refuse. 	Project Site Area / Construction Phase	I
Land Contamination – Construction Phase					
11.10.1.2 to 11.10.1.3	8.1	2.32	<p>For areas inaccessible during site reconnaissance survey</p> <ul style="list-style-type: none"> Further site reconnaissance would be conducted once the areas are accessible in order to identify any land contamination concern for the areas. 	Project Site Area inaccessible during site reconnaissance / Prior to Construction Phase	I
			<ul style="list-style-type: none"> Subject to further site reconnaissance findings, a supplementary Contamination Assessment Plan (CAP) for additional site investigation (SI) (if necessary) may be prepared and submitted to EPD for endorsement prior to the commencement of SI at these areas. 		I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> After completion of SI, the Contamination Assessment Report (CAR) will be prepared and submitted to EPD for approval prior to start of the proposed construction works at the golf course, the underground and above-ground fuel storage tank areas, emergency power generation units, airside petrol filling station and fuel tank room. 		I *(CAR for golf course and Terminal 2 Emergency Power Supply System No.1)
			<ul style="list-style-type: none"> Should remediation be required, Remediation Action Plan (RAP) and Remediation Report (RR) will be prepared for EPD's approval prior to commencement of the proposed remediation and any construction works respectively. 		N/A
11.8.1.2	8.1	-	<p>If contaminated soil is identified, the following mitigation measures are for the excavation and transportation of contaminated materials (if any):</p> <ul style="list-style-type: none"> To minimize the incidents of construction workers coming in contact with any contaminated materials, bulk earth-moving excavation equipment should be employed; Contact with contaminated materials can be minimised by wearing appropriate clothing and personal protective equipment such as gloves and masks (especially when working directly with contaminated material), provision of washing facilities and prohibition of smoking and eating on site; Stockpiling of contaminated excavated materials on site should be avoided as far as possible; The use of any contaminated soil for landscaping purpose should be avoided unless pre-treatment was carried out; Vehicles containing any excavated materials should be suitably covered to reduce dust emissions and/or release of contaminated wastewater; Truck bodies and tailgates should be sealed to prevent any discharge; Only licensed waste haulers should be used to collect and transport contaminated material to treatment/disposal site and should be equipped with tracking system to avoid fly tipping; Speed control for trucks carrying contaminated materials should be exercised. 8km/h is the recommended speed limit; Strictly observe all relevant regulations in relation to waste handling, such as Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354) and obtain all necessary permits where required; and Maintain records of waste generation and disposal quantities and disposal arrangements. 	Project Site Area / Construction Phase	N/A
Terrestrial Ecological – Construction Phase					
12.10.1.1	9.2	2.14	<p>Pre-construction Egretty Survey</p> <ul style="list-style-type: none"> Conduct ecological survey for Sha Chau egretty to update the latest boundary of the egretty. 	Breeding season (April - July) prior to commencement of	I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
				HDD drilling works at HKIA	
12.7.2.3 and 12.7.2.6	9.1	2.30	Avoidance and Minimisation of Direct Impact to Egret <ul style="list-style-type: none"> The daylighting location will avoid direct encroachment to the Sheung Sha Chau egret. The daylighting location and mooring of flat top barge, if required, will be kept away from the egret; In any event, controls such as demarcation of construction site boundary and confining the lighting within the site will be practised to minimise disturbance to off-site habitat at Sheung Sha Chau Island; and The containment pit at the daylighting location shall be covered or camouflaged. 	During construction phase at Sheung Sha Chau Island	
12.7.2.5	9.1	2.30	Preservation of Nesting Vegetation <ul style="list-style-type: none"> The proposed daylighting location and the arrangement of connecting pipeline will avoid the need of tree cutting, therefore the trees that are used by ardeids for nesting will be preserved. 	During construction phase at Sheung Sha Chau Island	
12.7.2.4 and 12.7.2.6	9.1	2.30	Timing the Pipe Connection Works outside Ardeid's Breeding Season <ul style="list-style-type: none"> All HDD and related construction works on Sheung Sha Chau Island will be scheduled outside the ardeids' breeding season (between April and July). No night-time construction work will be allowed on Sheung Sha Chau Island during all seasons. 	During construction phase at Sheung Sha Chau Island	
12.10.1.1	9.3	-	Ecological Monitoring <ul style="list-style-type: none"> During the HDD construction works period from August to March, ecological monitoring will be undertaken monthly at the HDD daylighting location on Sheung Sha Chau Island to identify and evaluate any impacts with appropriate actions taken as required to address and minimise any adverse impact found. 	at Sheung Sha Chau Island	
Marine Ecological Impact – Pre-construction Phase					
13.11.4.1	10.2.2	-	<ul style="list-style-type: none"> Pre-construction phase Coral Dive Survey. 	HKIAAA artificial seawall	
Marine Ecological Impact – Construction Phase					
13.11.1.3 to 13.11.1.6	-	-	Minimisation of Land Formation Area <ul style="list-style-type: none"> Minimise the overall size of the land formation needed for the additional facilities to minimise the overall loss of habitat for marine resources, especially the CWD population. 	Land formation footprint / during detailed design phase to completion of construction	
13.11.1.7 to 13.11.1.10	-	2.31	Use of Construction Methods with Minimal Risk/Disturbance <ul style="list-style-type: none"> Use of non-dredge method for the main land formation and ancillary works including the diversion of the aviation fuel pipeline to the AFRF; 	During construction phase at marine works area	

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> Use of Deep Cement Mixing (DCM) method instead of conventional seabed dredging for the land formation works to reduce the risk of negative impacts through the elevation of suspended solids and contaminants on CWDs, fisheries and the marine environment; 		I
			<ul style="list-style-type: none"> Use of bored piling in short duration to form the new approach lights and marker beacons for the new runway; 		N/A
			<ul style="list-style-type: none"> Avoid bored piling during CWD peak calving season (Mar to Jun); 		I
			<ul style="list-style-type: none"> Prohibition of underwater percussive piling; and 		I
			<ul style="list-style-type: none"> Use of horizontal directional drilling (HDD) method and water jetting methods for placement of submarine cables and pipelines to minimise the disturbance to the CWDs and other marine ecological resources. 		I
13.11.2.1 to 13.11.2.7	-	-	<p>Mitigation for Indirect Disturbance due to Deterioration of Water Quality</p> <ul style="list-style-type: none"> Water quality mitigation measures during construction phases include consideration of alternative construction methods, deployment of silt curtain and good site practices; Alternative construction methods including use of non-dredge methods for ground improvement (e.g. Deep Cement Mixing (DCM), prefabricated vertical drains (PVD), sand compaction piles, steel cells, stone columns and vertical sand drains); Use of bored piling in short duration to form the new approach lights and marker beacons for the new runway; and <p>Use of horizontal directional drilling (HDD) method and water jetting methods for placement of undersea cables and pipelines to minimise the disturbance to the CWDs and other marine ecological resources.</p>	All works area during the construction phase	I
					I
					N/A
					I
13.11.1.12	-	-	<p>Strict Enforcement of No-Dumping Policy</p> <ul style="list-style-type: none"> A policy prohibiting dumping of wastes, chemicals, oil, trash, plastic, or any other substance that would potentially be harmful to dolphins and/or their habitat in the work area; Mandatory educational programme of the no-dumping policy be made available to all construction site personnel for all project-related works; Fines for infractions should be implemented; and Unscheduled, on-site audits shall be implemented. 	All works area during the construction phase	I
13.11.1.13	-	-	<p>Good Construction Site Practices</p> <ul style="list-style-type: none"> Regular inspection of the integrity and effectiveness of all silt curtains and monitoring of effluents to ensure that any discharge meets effluent discharge guidelines; Keep the number of working or stationary vessels present on-site to the minimum anytime; and Unscheduled, on-site audits for all good site practice restrictions should be conducted, and fines or penalties sufficient to be an effective deterrent need to be levied against violators. 	All works area during the construction phase	I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
13.11.1.3 to 13.11.1.6	-	-	Minimisation of Land Formation Area <ul style="list-style-type: none"> Minimise the overall size of the land formation needed for the additional facilities to minimise the overall loss of habitat for marine resources, especially the CWD population. 	Land formation footprint / during detailed design phase to completion of construction	I
13.11.5.4 to 13.11.5.13	10.3.1	-	SkyPier High Speed Ferries' Speed Restrictions and Route Diversions <ul style="list-style-type: none"> SkyPier HSFs operating to / from Zhuhai and Macau would divert north of SCLKC Marine Park with a 15 knot speed limit to apply for the part-journeys that cross high CWD abundance grid squares as indicatively shown in Drawing No. MCL/P132/EIA/13-023 of the EIA Report. Both the alignment of the northerly route and the portion of routings to be subject to the speed limit of 15 knots shall be finalised prior to commencement of construction based on the future review of up-to-date CWD abundance and EM&A data and taking reference to changes in total SkyPier HSF numbers; and A maximum of 10 knots will be enforced through the designated SCLKC Marine Park area at all times. Other mitigation measures <ul style="list-style-type: none"> The ET will audit various parameters including actual daily numbers of HSFs, compliance with the 15-knot speed limit in the speed control zone and diversion compliance for SkyPier HSFs operating to / from Zhuhai and Macau; and The effectiveness of the CWD mitigation measures after implementation of initial six month SkyPier HSF diversion and speed restriction will be reviewed. 	Area between the footprint and SCLKC Marine Park during construction phase	I
13.11.5.14 to 13.11.5.18	10.3.1	2.31	Dolphin Exclusion Zone <ul style="list-style-type: none"> Establishment of a 24 hr Dolphin Exclusion Zone (DEZ) with a 250 m radius around the land formation works areas; A DEZ would also be implemented during ground improvement works (e.g. DCM), water jetting works for submarine cables diversion, open trench dredging at the field joint locations and seawall construction; and A DEZ would also be implemented during bored piling work but as a precautionary measure only. 	Marine waters around land formation works area during construction phase	I
13.11.5.19	10.4	2.31	Acoustic Decoupling of Construction Equipment <ul style="list-style-type: none"> Air compressors and other noisy equipment that must be mounted on steel barges should be acoustically-decoupled to the greatest extent feasible, for instance by using rubber or air-filled tyres; and Specific acoustic decoupling measures shall be specified during the detailed design of the project for use during the land formation works. 	Around coastal works area during construction phase	I
13.11.5.20	10.6.1	2.29	Spill Response Plan	Construction phase	I

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
			<ul style="list-style-type: none"> An oil and hazardous chemical spill response plan is proposed to be established during the construction phase as a precautionary measure so that appropriate actions to prevent or reduce risks to CWDs can be undertaken in the event of an accidental spillage. 		
13.11.5.21 to 13.11.5.23	10.6.1	-	<p>Construction Vessel Speed Limits and Skipper Training</p> <ul style="list-style-type: none"> A speed limit of 10 knots should be strictly observed for construction vessels at areas with the highest CWD densities; and Vessels traversing through the work areas should be required to use predefined and regular routes (which would presumably become known to resident dolphins) to reduce disturbance to cetaceans due to vessel movements. Specific marine routes shall be specified by the Contractor prior to construction commencing. 	All areas north and west of Lantau Island during construction phase	
Fisheries Impact – Construction Phase					
14.9.1.2 to 14.9.1.5	-	-	<p>Minimisation of Land Formation Area</p> <ul style="list-style-type: none"> Minimise the overall size of the land formation needed for the additional facilities to minimise the overall loss of habitat for fisheries resources. 	Land formation footprint / during detailed design phase to completion of construction	
14.9.1.6	-	-	<p>Use of Construction Methods with Minimal Risk/Disturbance</p> <ul style="list-style-type: none"> Use of non-dredge method for the main land formation and ancillary works including the diversion of the aviation fuel pipeline to the AFRF; 	During construction phase at marine works area	
			<ul style="list-style-type: none"> Use of Deep Cement Mixing (DCM) method instead of conventional seabed dredging for the land formation works to reduce the risk of negative impacts through the elevation of suspended solids and contaminants on fisheries and the marine environment; 		
			<ul style="list-style-type: none"> Use of bored piling in short duration to form the new approach lights and marker beacons for the new runway; and 		N/A
			<ul style="list-style-type: none"> Use of horizontal directional drilling (HDD) method and water jetting methods for placement of undersea cables and pipelines to minimise the disturbance to fisheries resources. 		
14.9.1.11	-	-	<p>Strict Enforcement of No-Dumping Policy</p> <ul style="list-style-type: none"> A policy prohibiting dumping of wastes, chemicals, oil, trash, plastic, or any other substance that would potentially be harmful to dolphins and/or their habitat in the work area; Mandatory educational programme of the no-dumping policy be made available to all construction site personnel for all project-related works; Fines for infractions should be implemented; and Unscheduled, on-site audits shall be implemented. 	All works area during the construction phase	

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
14.9.1.12	-		Good Construction Site Practices <ul style="list-style-type: none"> Regular inspection of the integrity and effectiveness of all silt curtains and monitoring of effluents to ensure that any discharge meets effluent discharge guidelines; Keep the number of working or stationary vessels present on-site to the minimum anytime; and Unscheduled, on-site audits for all good site practice restrictions should be conducted, and fines or penalties sufficient to be an effective deterrent need to be levied against violators. 	All works area during the construction phase	
14.9.1.13 to 14.9.1.18	-		Mitigation for Indirect Disturbance due to Deterioration of Water Quality <ul style="list-style-type: none"> Water quality mitigation measures during construction phases include consideration of alternative construction methods, deployment of silt curtain and good site practices; Alternative construction methods including use of non-dredge methods for ground improvement (e.g. Deep Cement Mixing (DCM), prefabricated vertical drains (PVD), sand compaction piles, steel cells, stone columns and vertical sand drains); Use of bored piling in short duration to form the new approach lights and marker beacons for the new runway; and Use of horizontal directional drilling (HDD) method and water jetting methods for placement of undersea cables and pipelines to minimise the disturbance to fisheries resources. 	All works area during the construction phase	
Landscape and Visual Impact – Construction Phase					
Table 15.6	12.3	-	CM1 - The construction area and contractor’s temporary works areas should be minimised to avoid impacts on adjacent landscape.	All works areas for duration of works; Upon handover and completion of works.	
Table 15.6	12.3	-	CM2 - Reduction of construction period to practical minimum.	All works areas for duration of works; Upon handover and completion of works.	
Table 15.6	12.3	-	CM3 - Phasing of the construction stage to reduce visual impacts during the construction phase.	All works areas for duration of works; Upon handover and completion of works.	
Table 15.6	12.3	-	CM4 - Construction traffic (land and sea) including construction plants, construction vessels and barges should be kept to a practical minimum.	All works areas for duration of works; Upon handover and completion of works.	

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
Table 15.6	12.3	-	CM5 - Erection of decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours.	All works areas for duration of works; Upon handover and completion of works. – may be disassembled in phases	I
Table 15.6	12.3	-	CM6 - Avoidance of excessive height and bulk of site buildings and structures.	New passenger concourse, terminal 2 expansion and other proposed airport related buildings and structures under the project; Upon handover and completion of works.	N/A
Table 15.6	12.3	-	CM7 - Control of night-time lighting by hooding all lights and through minimisation of night working periods.	All works areas for duration of works; Upon handover and completion of works. – may be disassembled in phases	I
Table 15.6	12.3	-	CM8 - All existing trees shall be carefully protected during construction. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works areas.	All existing trees to be retained; Upon handover and completion of works.	I
Table 15.6	12.3	-	CM9 - Trees unavoidably affected by the works shall be transplanted where practical. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, if applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme.	All existing trees to be affected by the works; Upon handover and completion of works.	I
Table 15.6	12.3	-	CM10 - Land formation works shall be followed with advanced hydroseeding around taxiways and runways as soon as practical.	All affected existing grass areas around runways and verges/Duration of works;	N/A

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Mitigation Measures Implemented?^
				Upon handover and completion of works.	
			Cultural Heritage Impact – Construction Phase		
			Not applicable.		
			Health Impact – Aircraft Emissions		
			Not applicable.		
			Health Impact – Aircraft Noise		
			Not applicable.		

Notes:

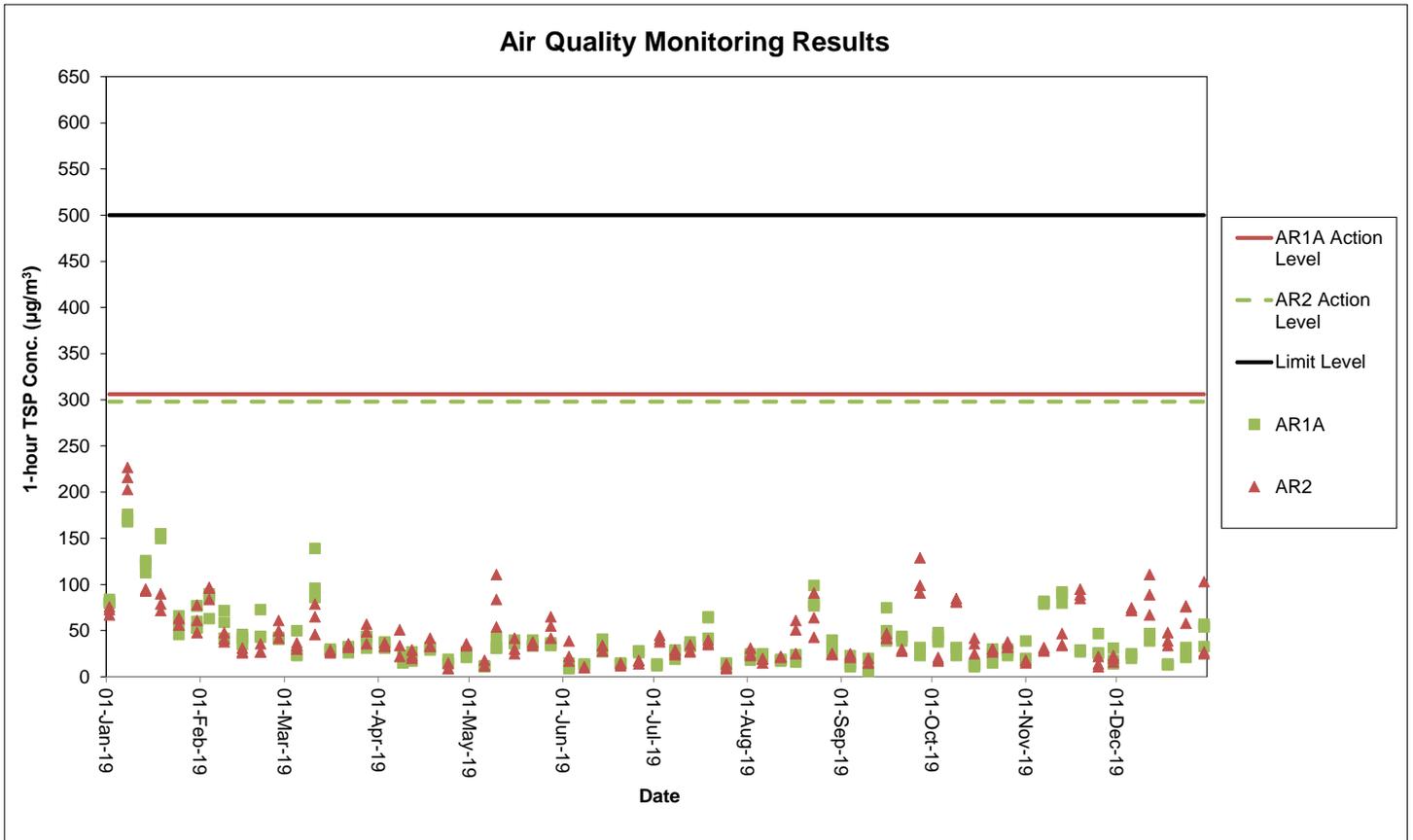
I= implemented where applicable;

N/A= not applicable to the construction works implemented during the reporting month.

^ Checked by ET through site inspection and record provided by the Contractor.

Appendix D. Monitoring Results

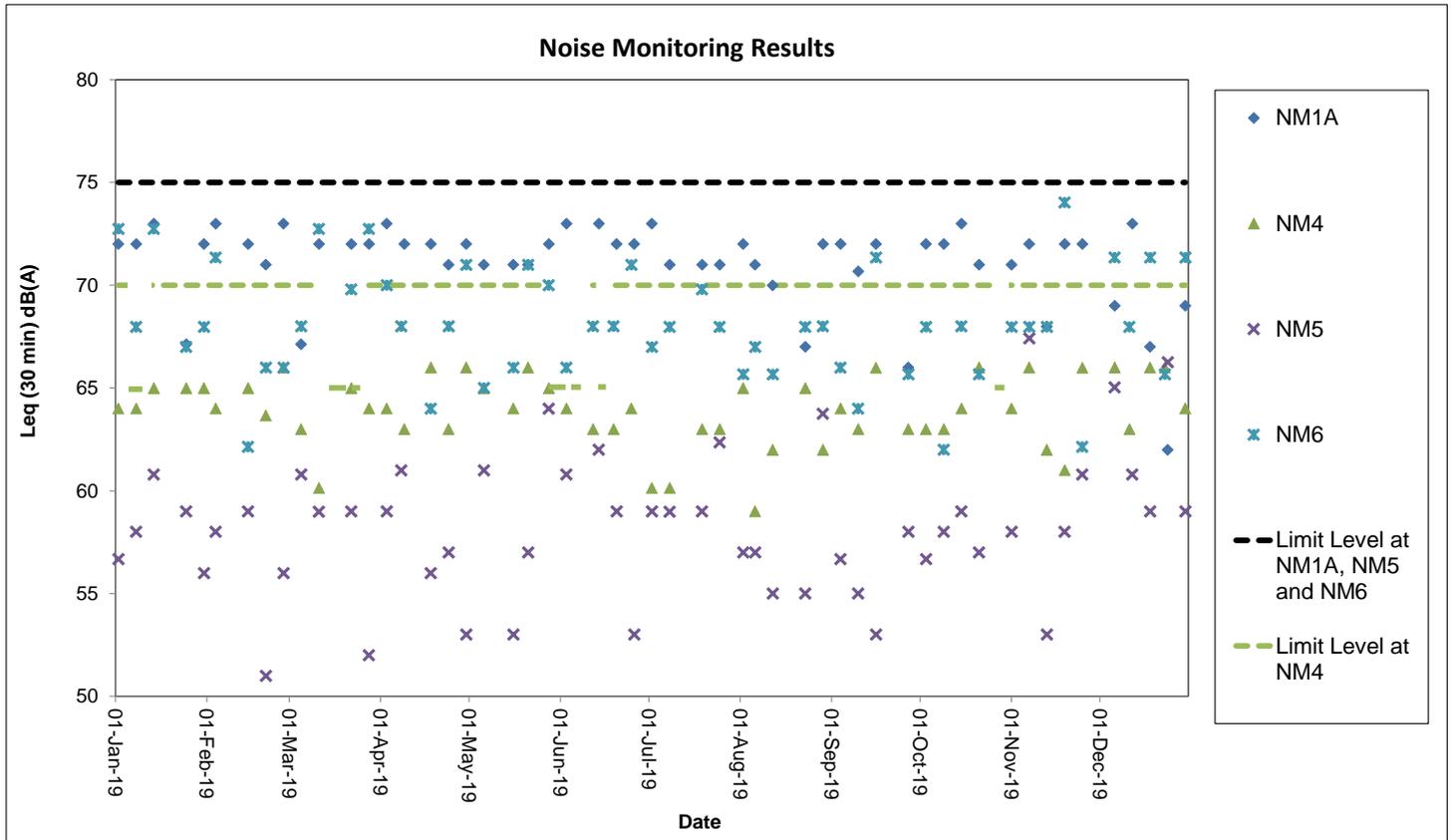
Air Quality Monitoring Results



Notes

1. The key activities of the Project during monitoring included reclamation works and land-side works. Reclamation works included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation. Land-side works involved mainly foundation and substructure works for Terminal 2 expansion, modification and tunnel work for APM and BHS, and preparation works for utilities.
2. General weather condition during monitoring ranged from sunny to drizzle. Detailed meteorological conditions should be referred to Table 2.3 of this Report and corresponding Monthly EM&A Reports.
3. QA/ QC requirements as stipulated in the EM&A Manual was carried out during measurement.

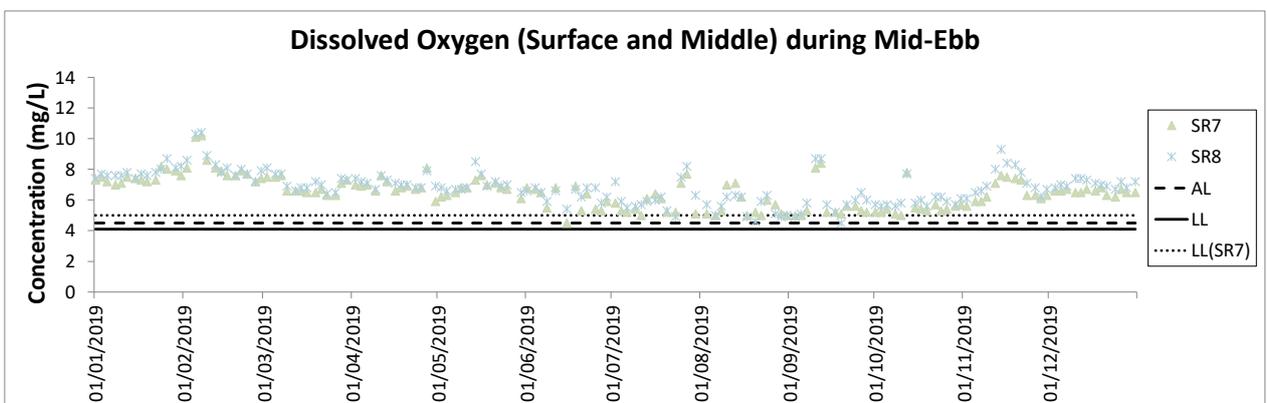
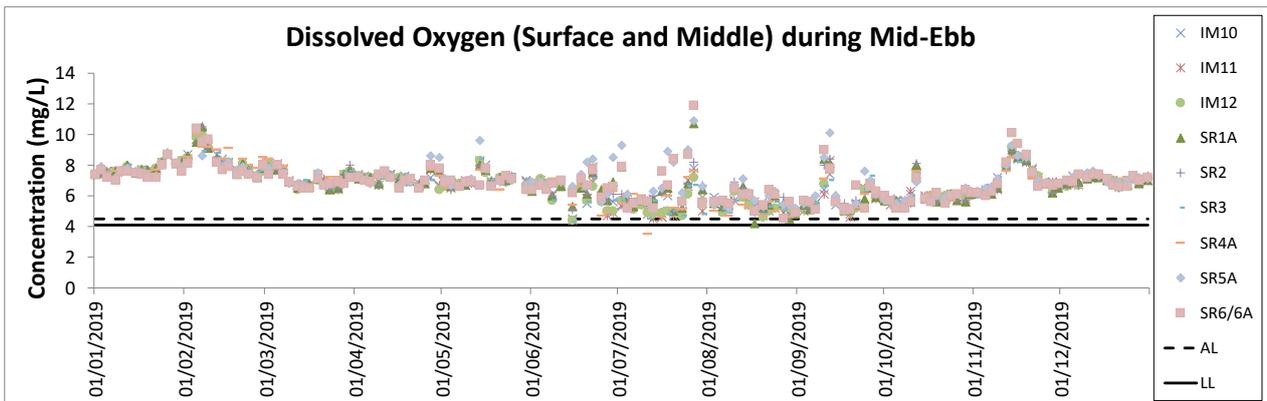
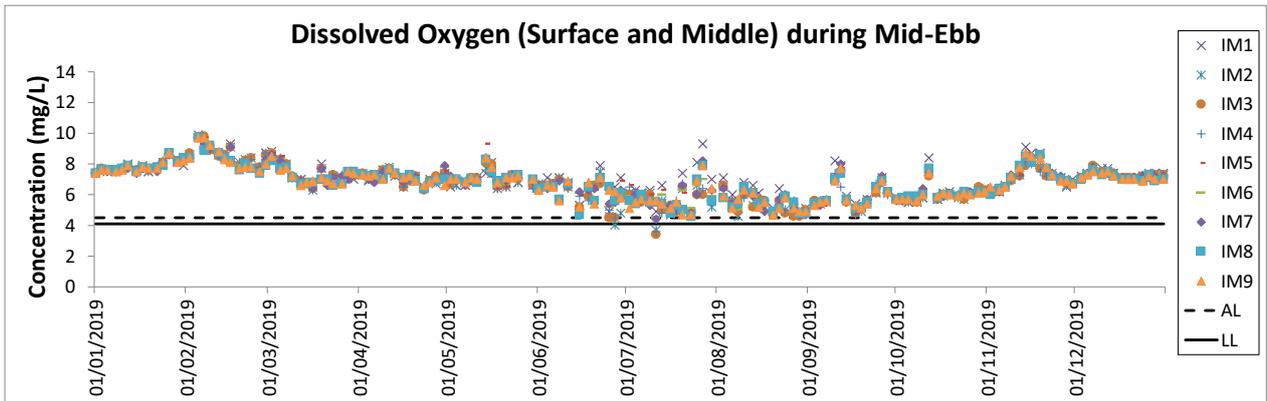
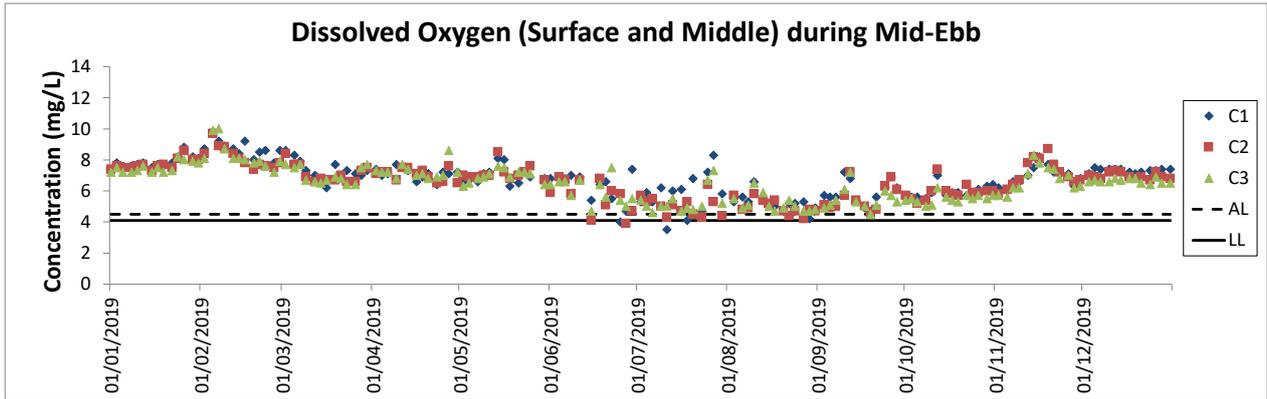
Noise Monitoring Results



Notes

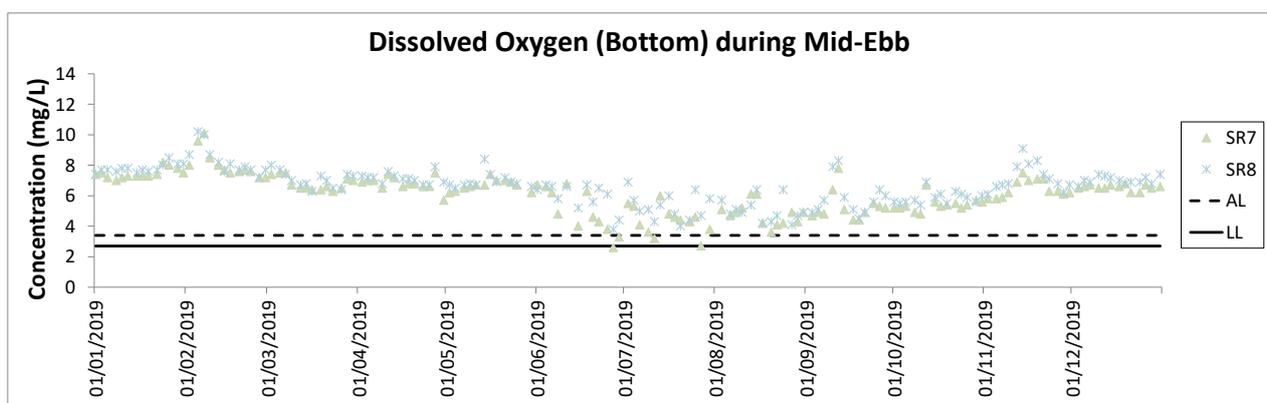
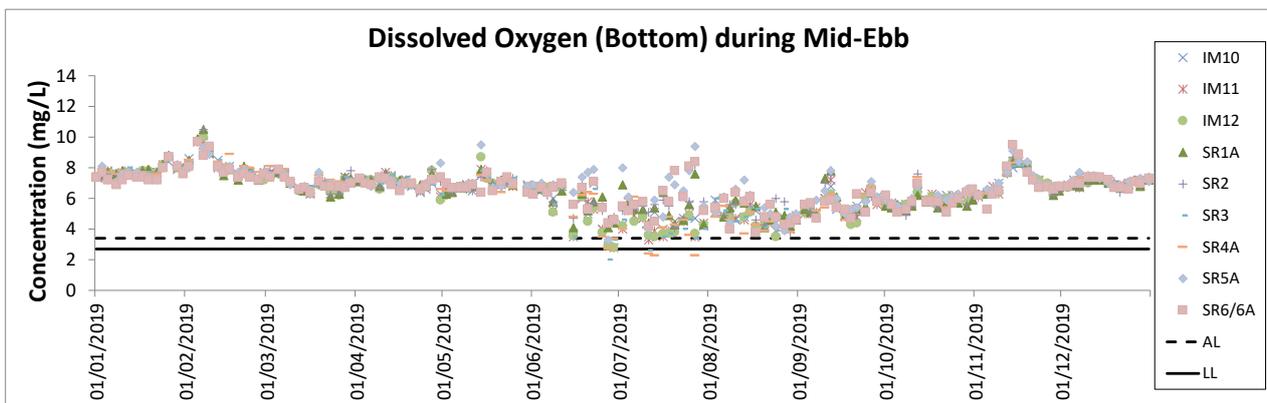
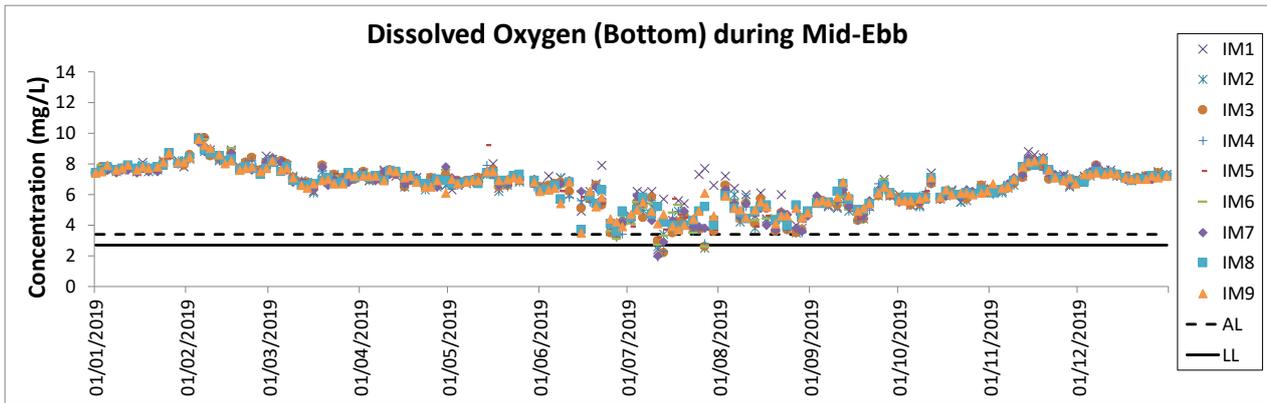
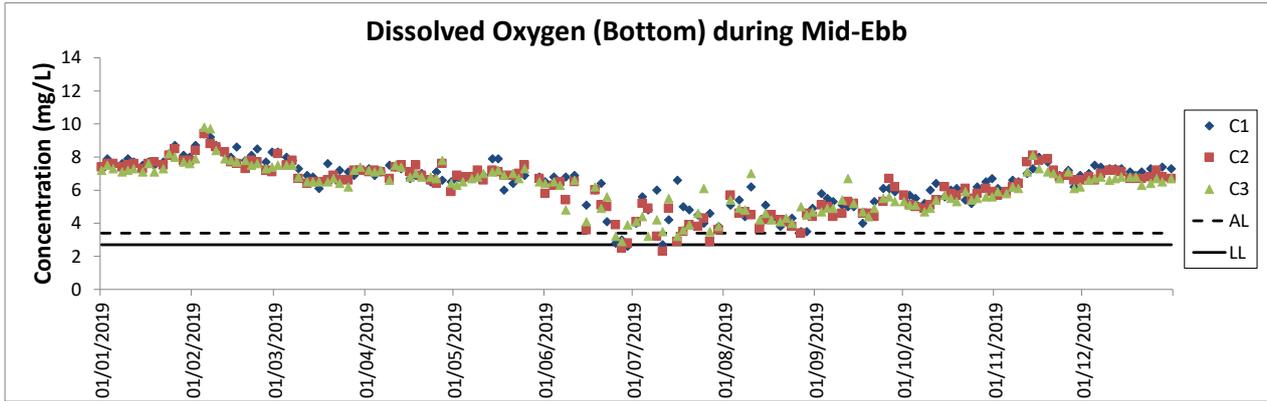
1. The Limit Level is reduced to 70dB(A) for school and 65db(A) during school examination period at NM4. School examination periods in the reporting period were 4/1 to 10/1, 22/3 to 29/3, 31/5 to 6/6, 11/6 to 12/6, 23/10 to 25/10, and 5/12 to 11/12. Monitoring at NM4 on 6 and 11 Dec 2019 were conducted after the end of school examination those days. The Limit Level adopted for the monitoring session was 70 dB(A).
2. Noise monitoring at NM3A was temporarily suspended starting from 1 Sep 2018 and would be resumed with the completion of the Tung Chung East Development.
3. The key activities of the Project during monitoring included reclamation works and land-side works. Reclamation works included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation. Land-side works involved mainly foundation and substructure works for Terminal 2 expansion, modification and tunnel work for APM and BHS, and preparation works for utilities.
4. General weather condition during monitoring ranged from sunny to drizzle. Detailed meteorological conditions should be referred to Table 2.6 of this Report and corresponding Monthly EM&A Reports.
5. QA/ QC requirements as stipulated in the EM&A Manual was carried out during measurement.

Water Quality Monitoring Results



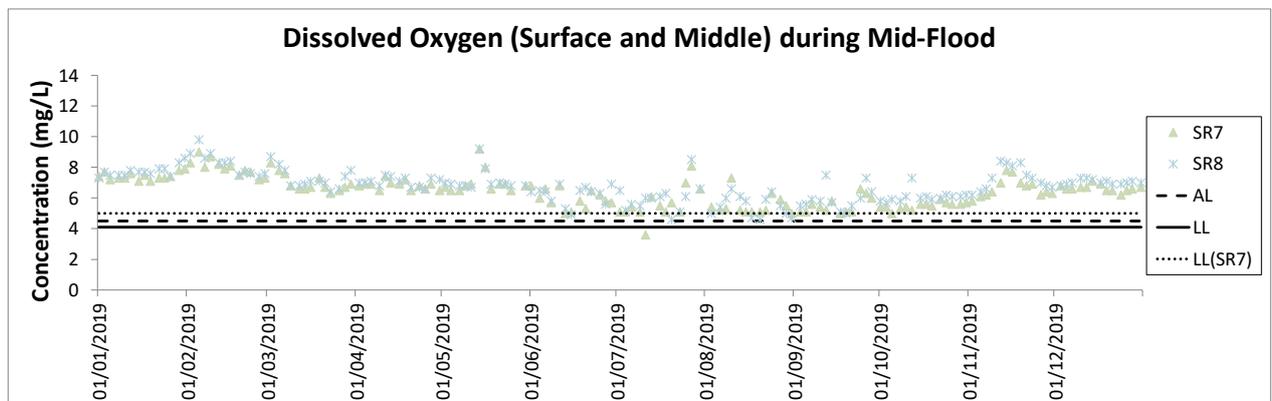
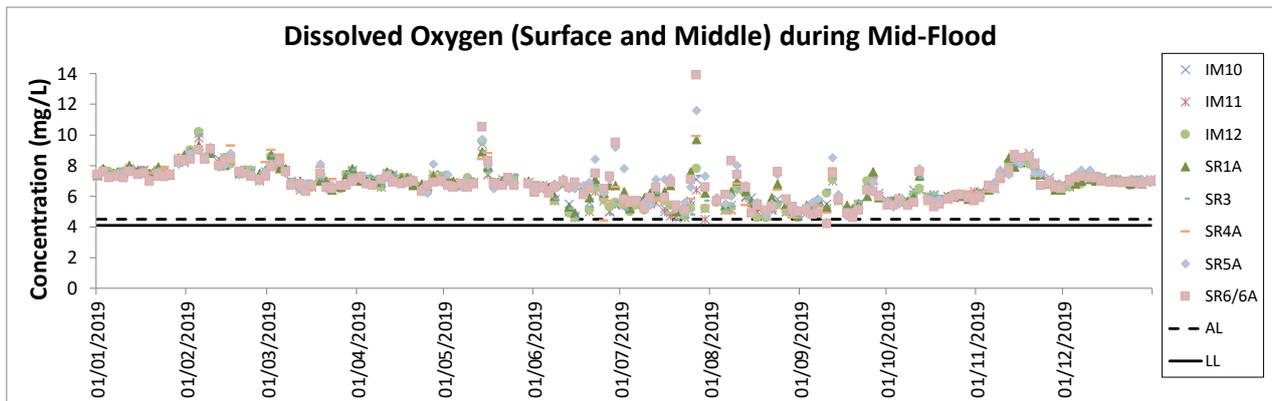
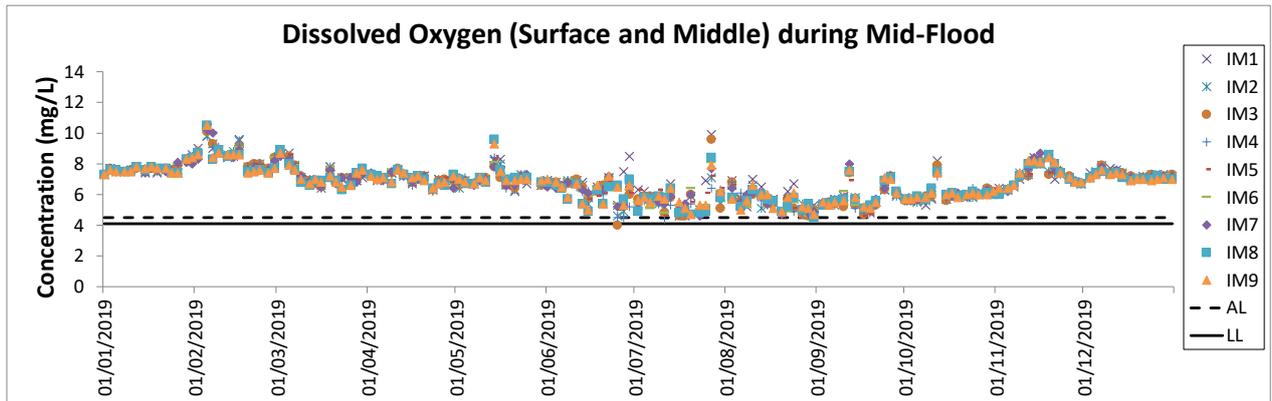
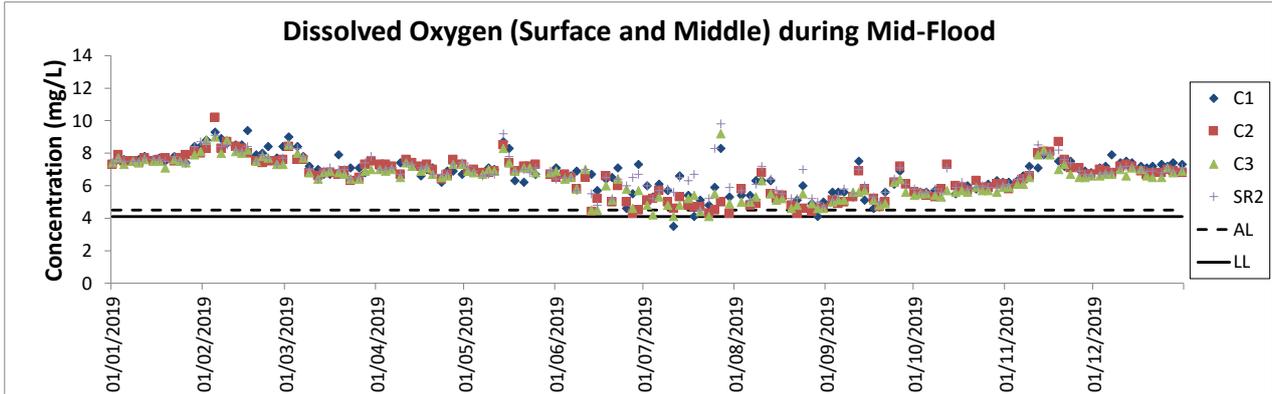
Notes:

1. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
2. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
3. QA/QC requirements as stipulated in the EM&A Manual was carried out during measurement.
4. As the access to SR6 was obstructed by the construction activities and temporary structures for Tung Chung New Town Extension, the monitoring location has been relocated to SR6A starting from 8 August 2019.



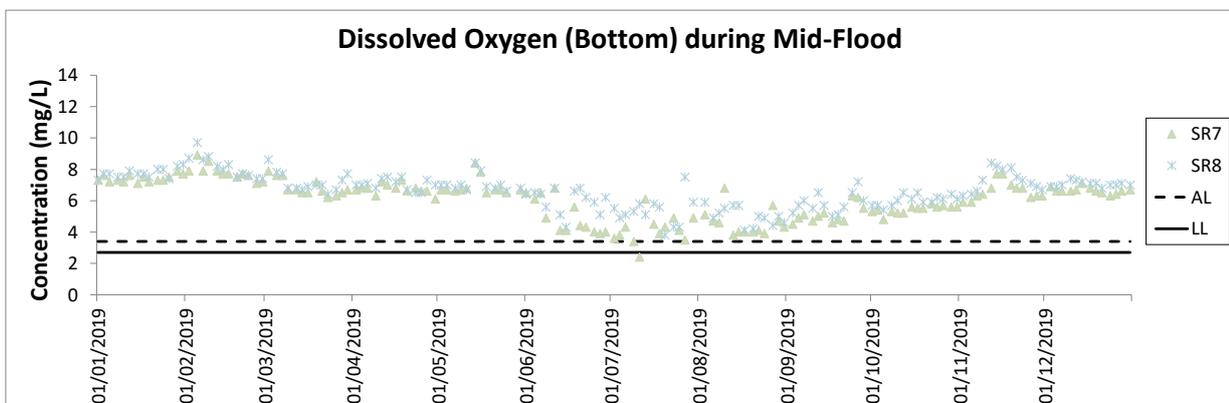
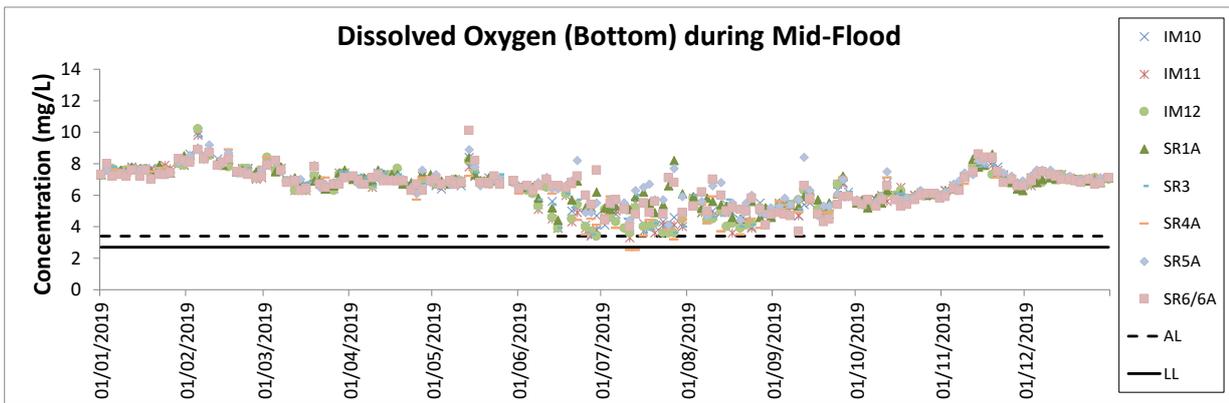
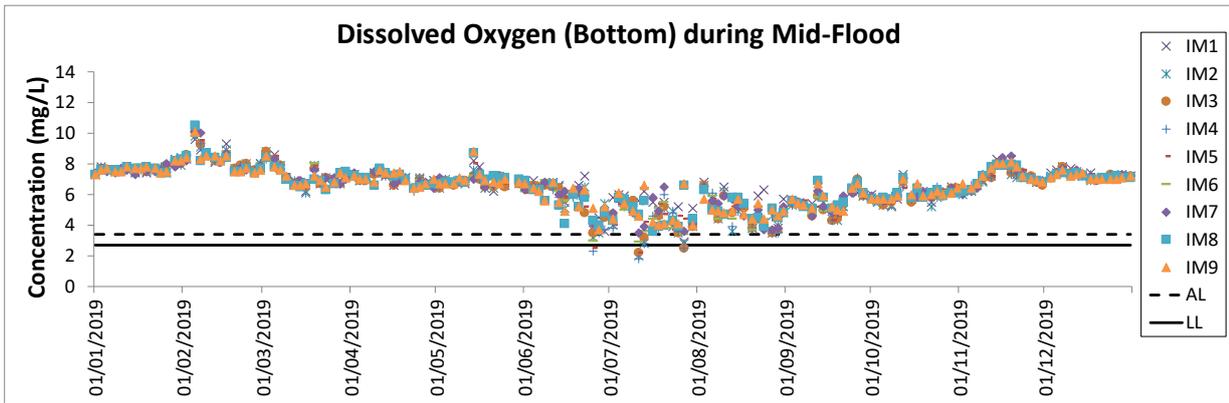
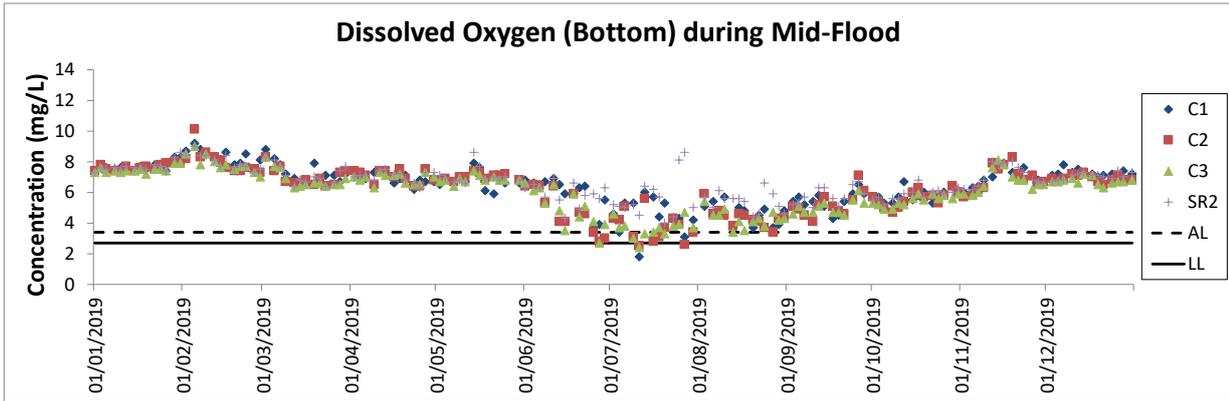
Notes:

1. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
2. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
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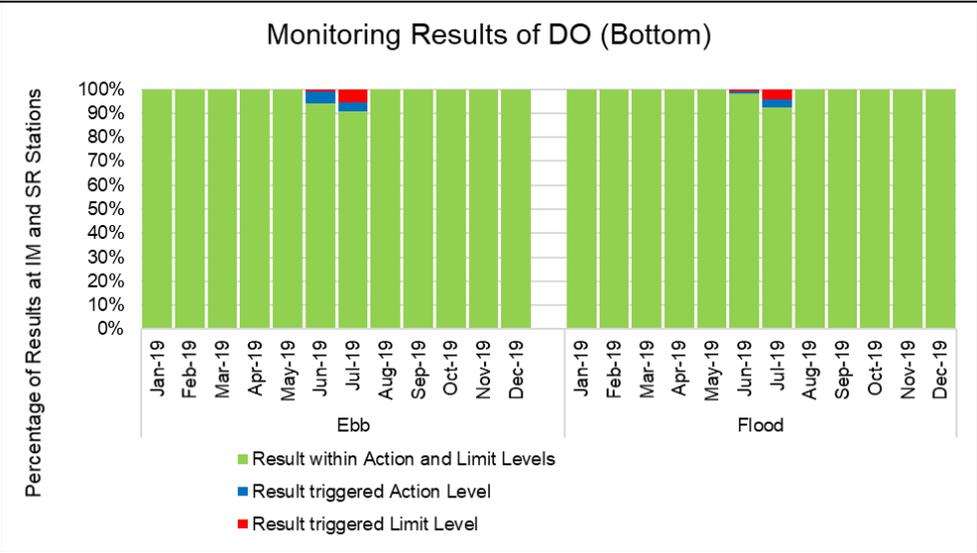
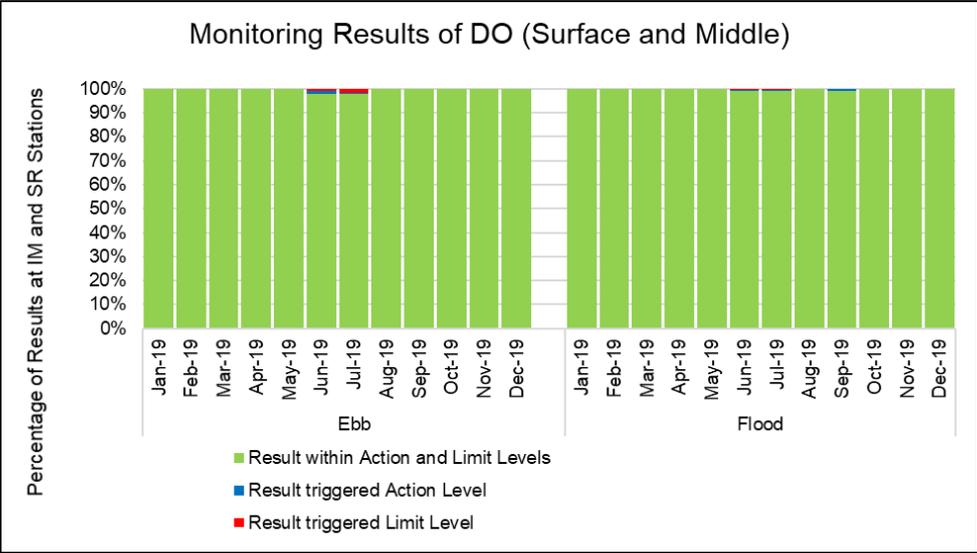
Notes:

1. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
2. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
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4. As the access to SR6 was obstructed by the construction activities and temporary structures for Tung Chung New Town Extension, the monitoring location has been relocated to SR6A starting from 8 August 2019.

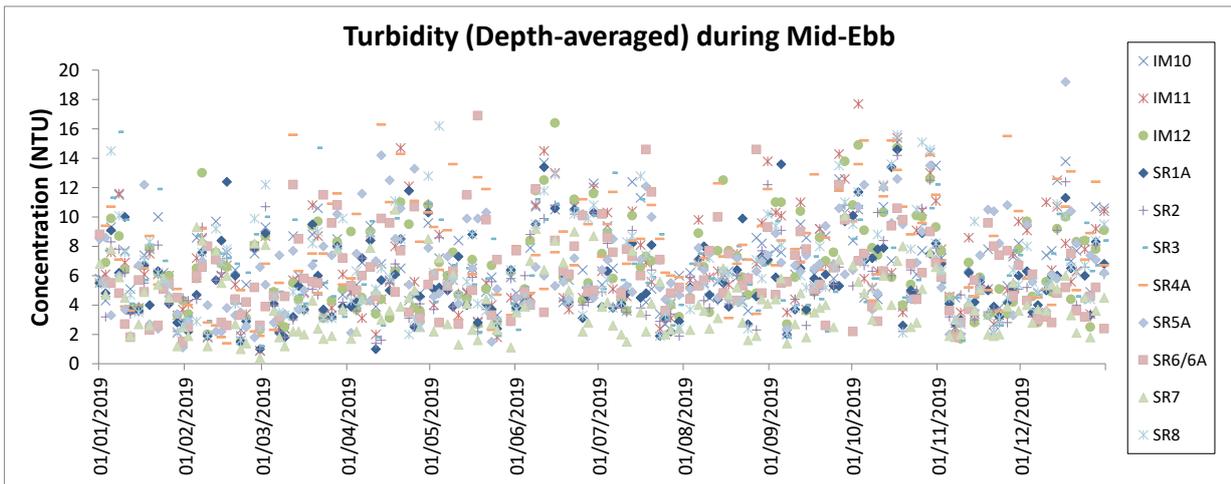
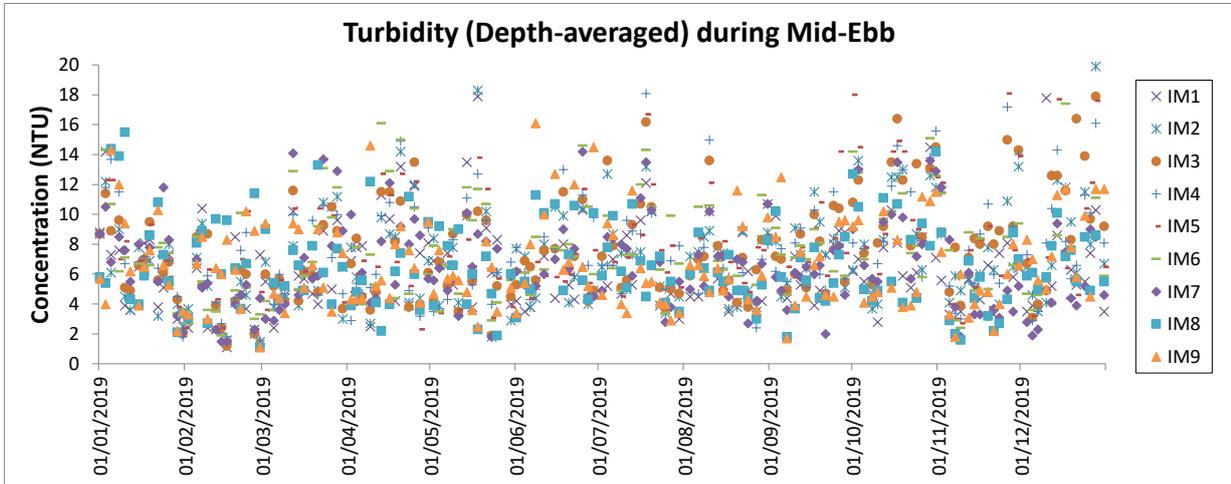
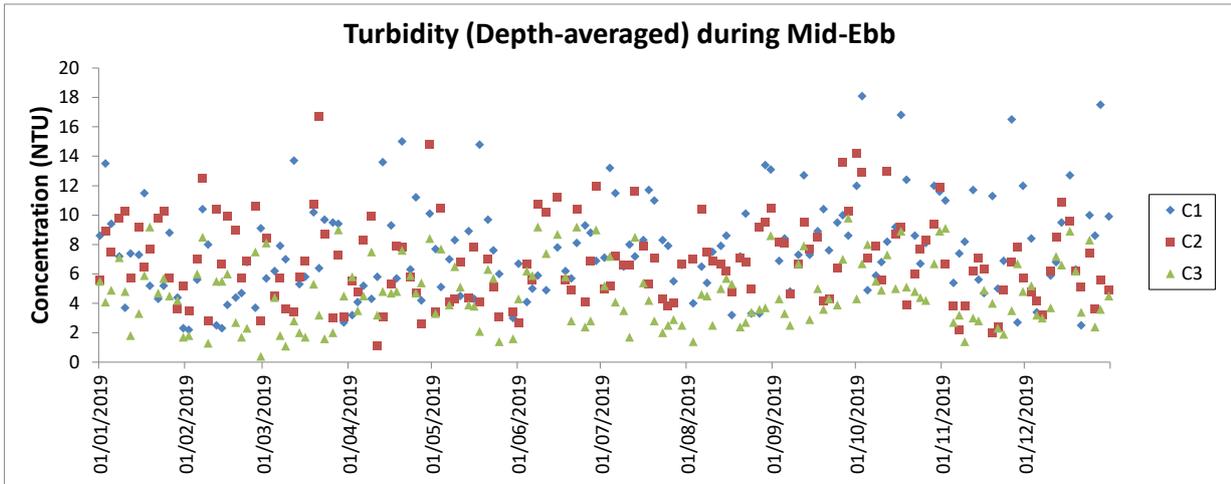


Notes:

1. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
2. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
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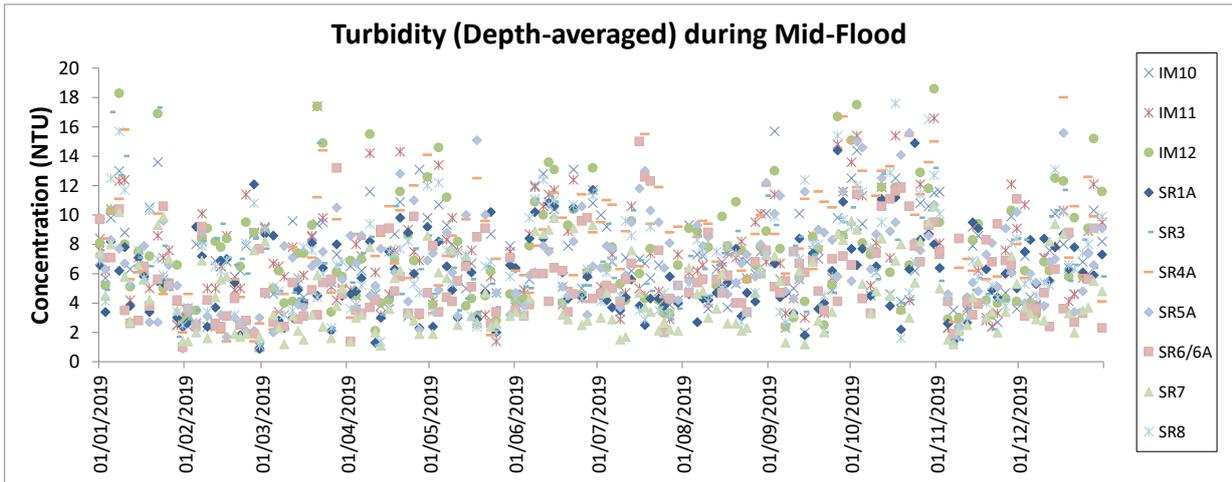
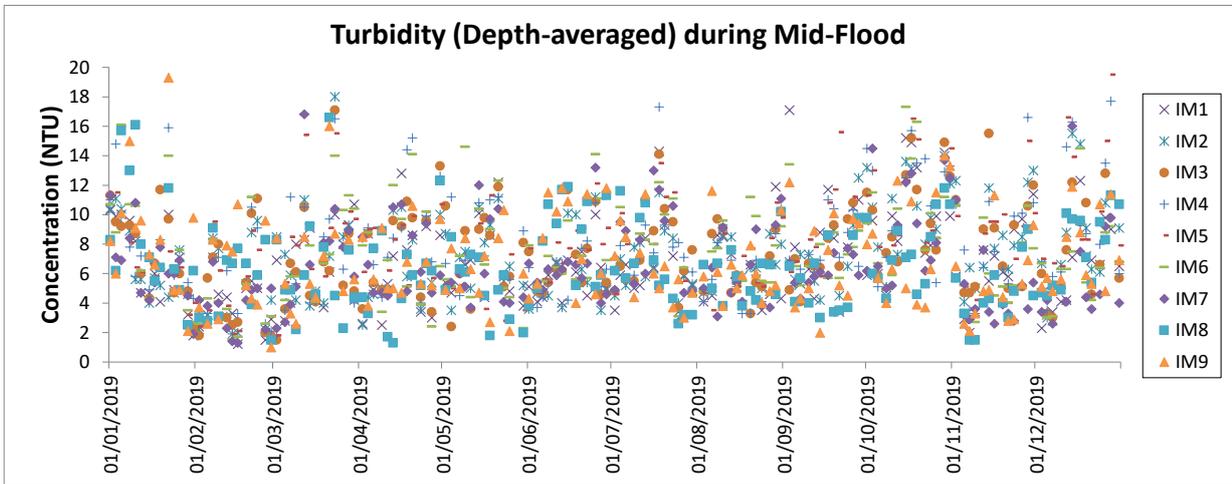
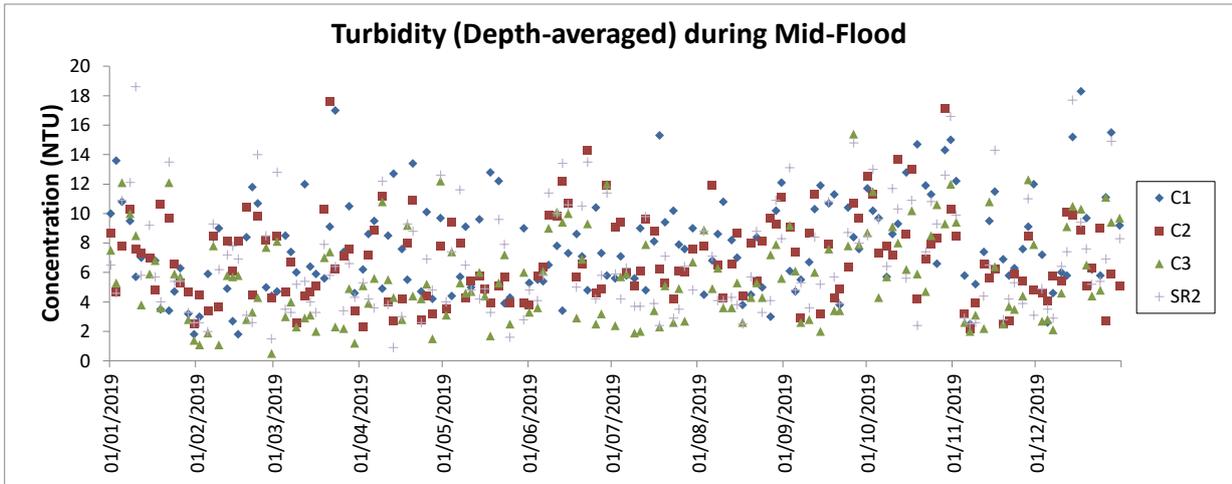


During the reporting period, 0.3% of the DO monitoring results at surface and middle water level and 1% of the DO monitoring results at bottom water level triggered the corresponding Action or Limit Level. All results triggering the corresponding Action or Limit level were collected during the wet season (April to October), particularly in June to September, which suggest the observation of seasonal effect on the DO monitoring results. Based on above observations, as well as the relevant investigation findings presented in the Construction Phase Monthly EM&A Reports, it is considered that the Project did not cause adverse impact on DO level at all water quality sensitive receivers.



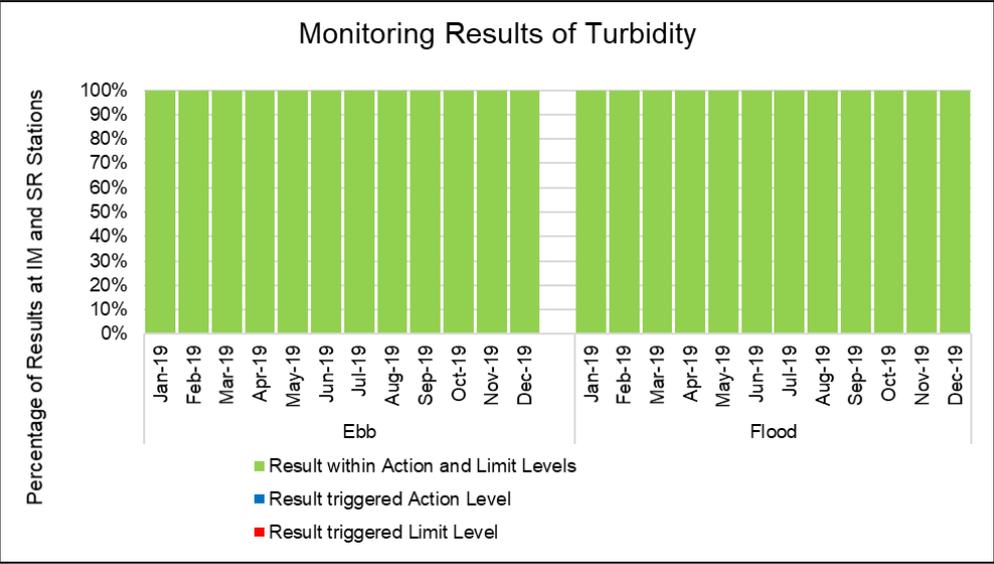
Notes:

1. The Action and Limit Levels can be referred to Table 2.8 of the Annual EM&A Report.
2. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
3. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
4. QA/ QC requirements as stipulated in the EM&A Manual was carried out during measurement.
5. As the access to SR6 was obstructed by the construction activities and temporary structures for Tung Chung New Town Extension, the monitoring location has been relocated to SR6A starting from 8 August 2019.

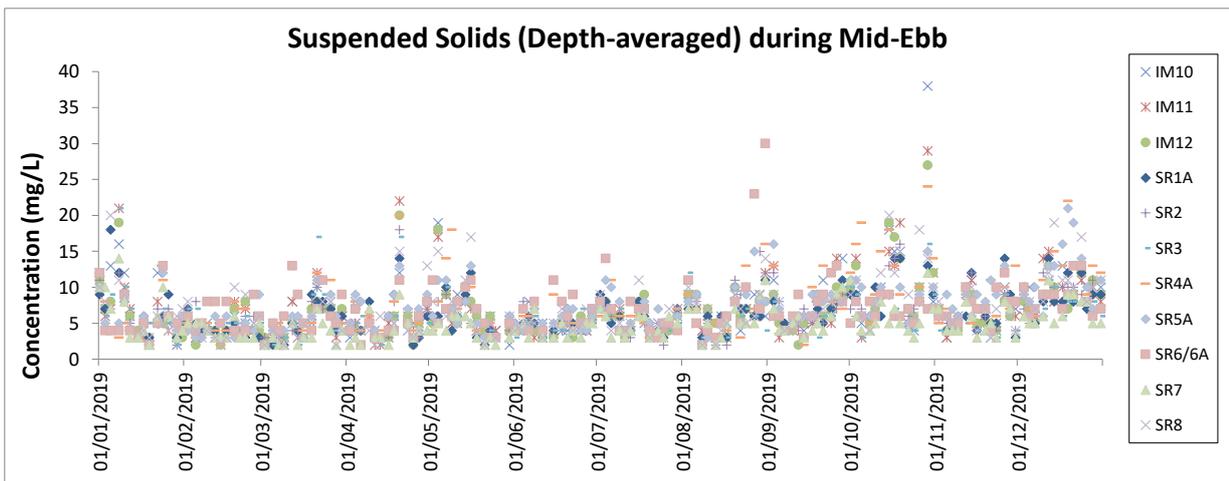
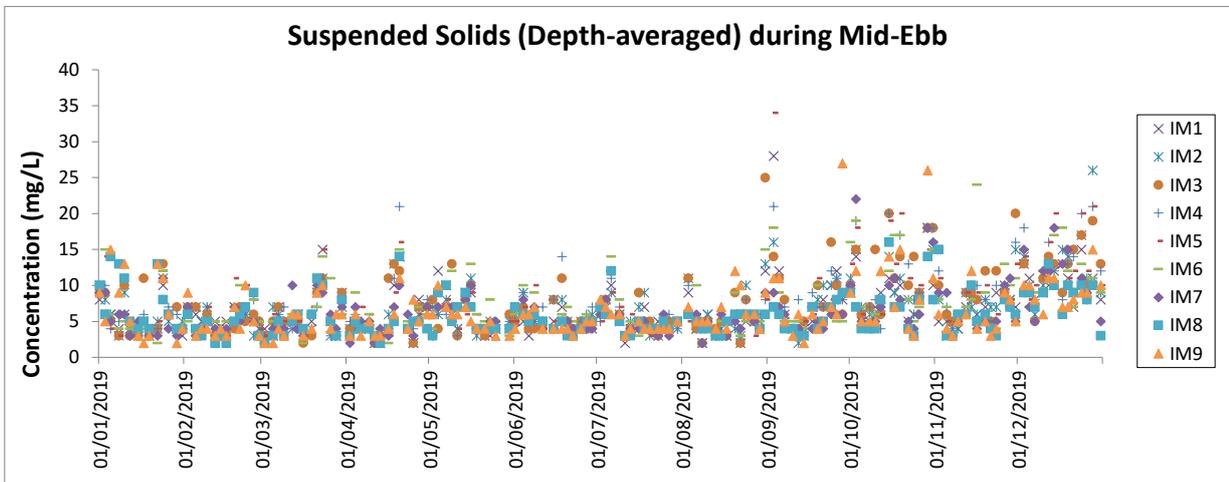
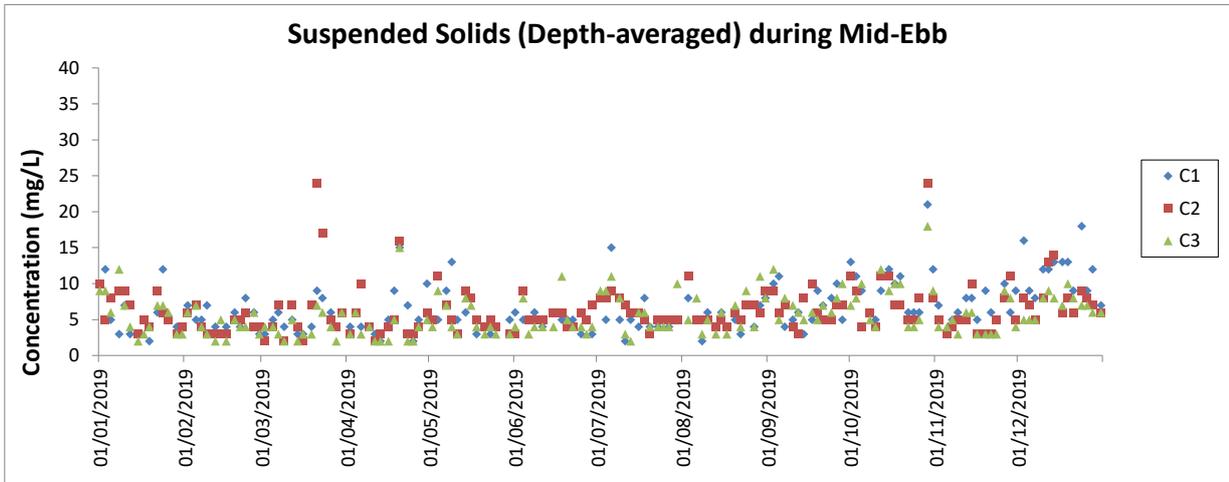


Notes:

1. The Action and Limit Levels can be referred to Table 2.8 of the Annual EM&A Report.
2. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
3. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
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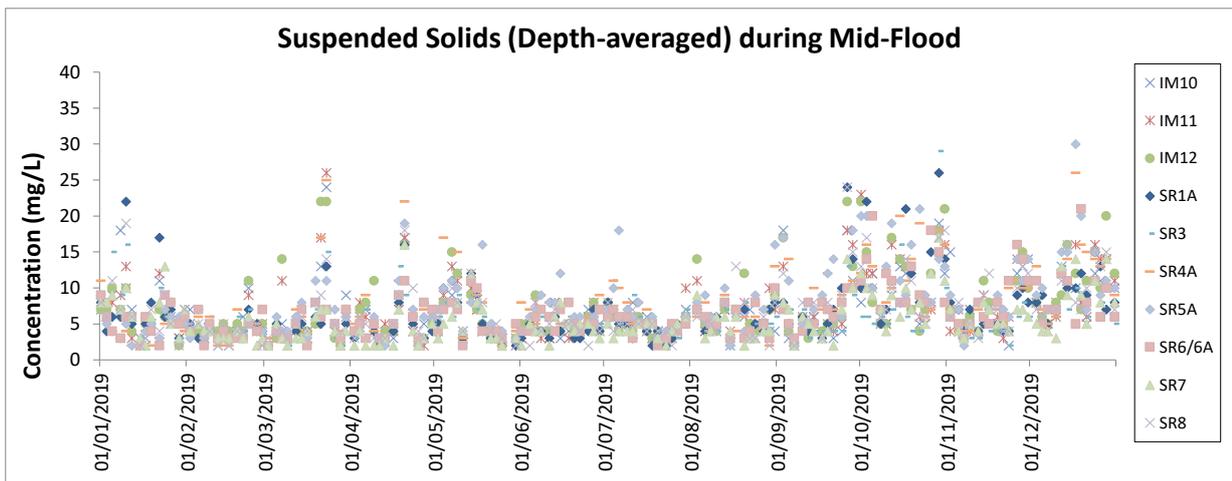
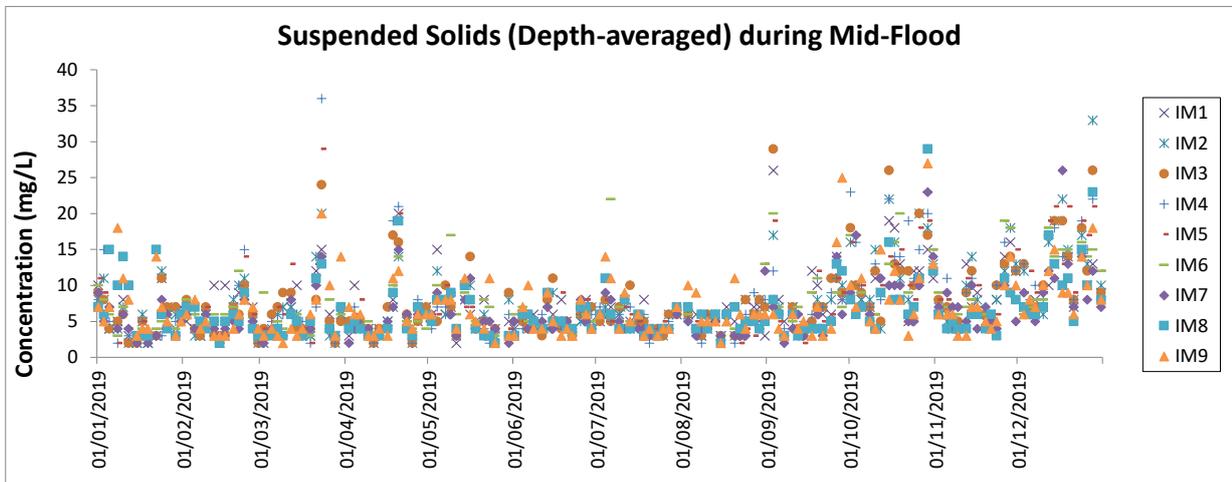
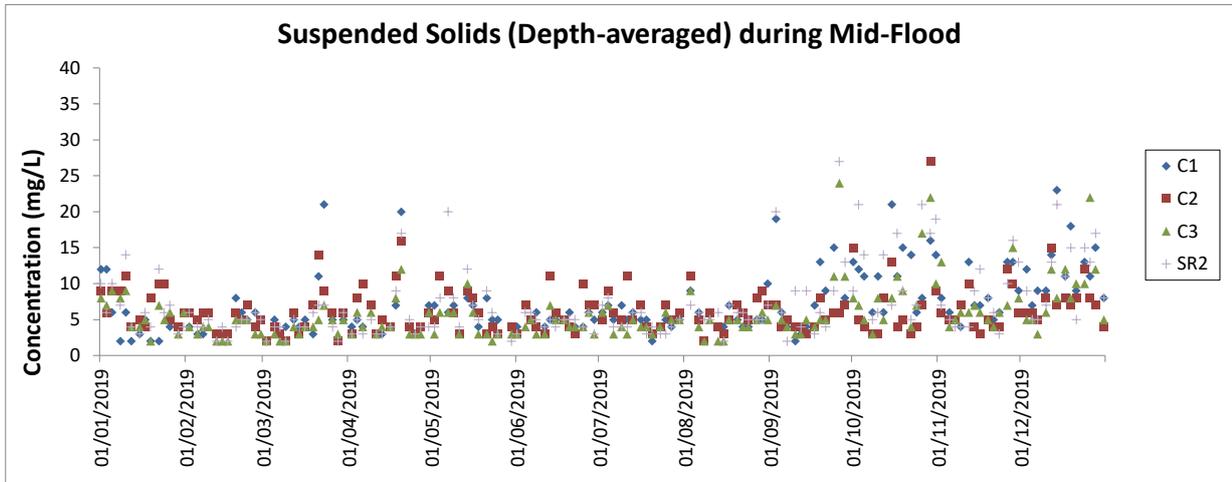


All turbidity monitoring results in the reporting period were within the corresponding Action and Limit Levels.



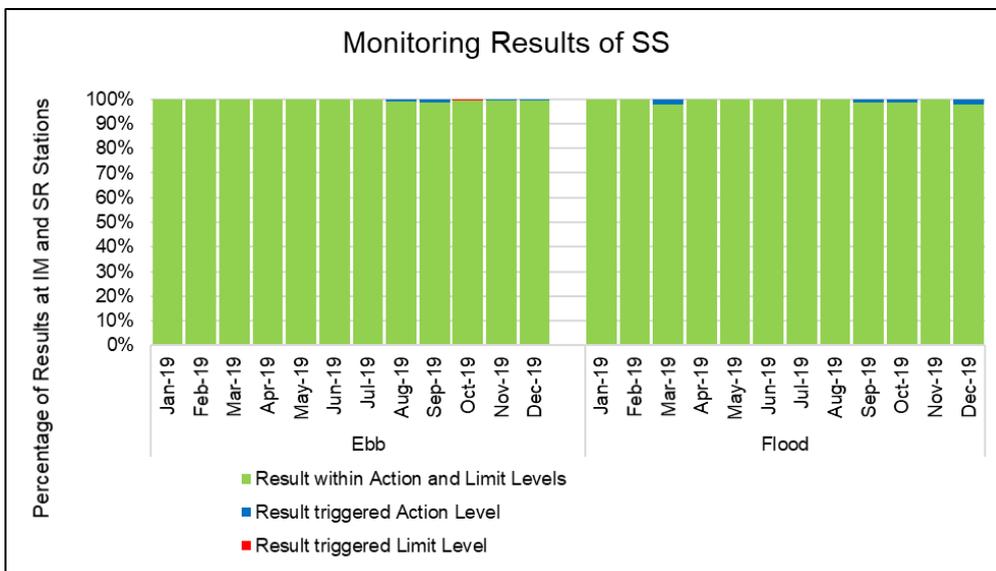
Notes:

1. The Action and Limit Levels can be referred to Table 2.8 of the Annual EM&A Report.
2. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
3. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
4. QA/ QC requirements as stipulated in the EM&A Manual was carried out during measurement.
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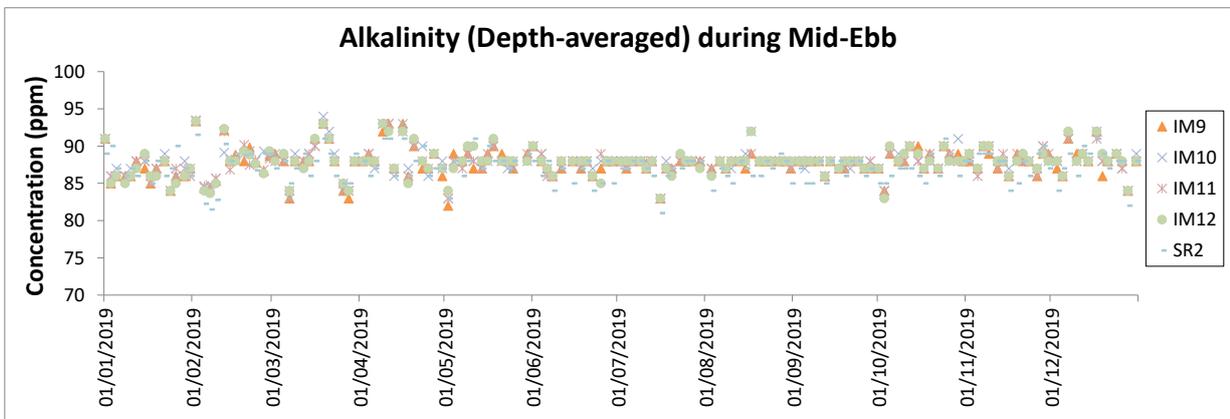
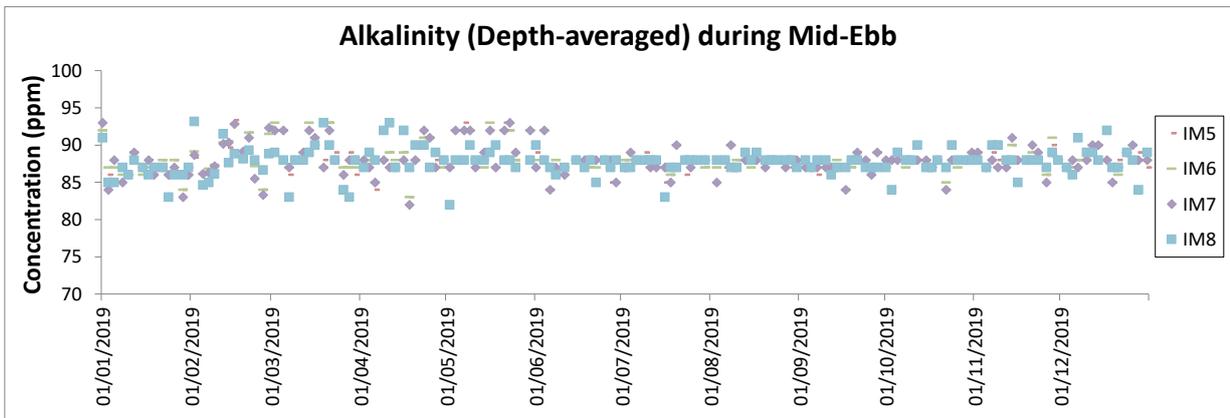
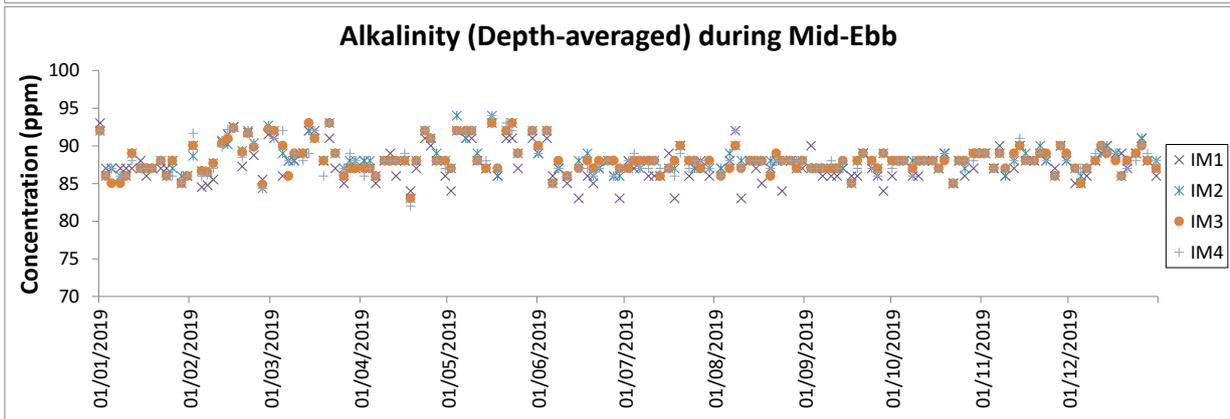
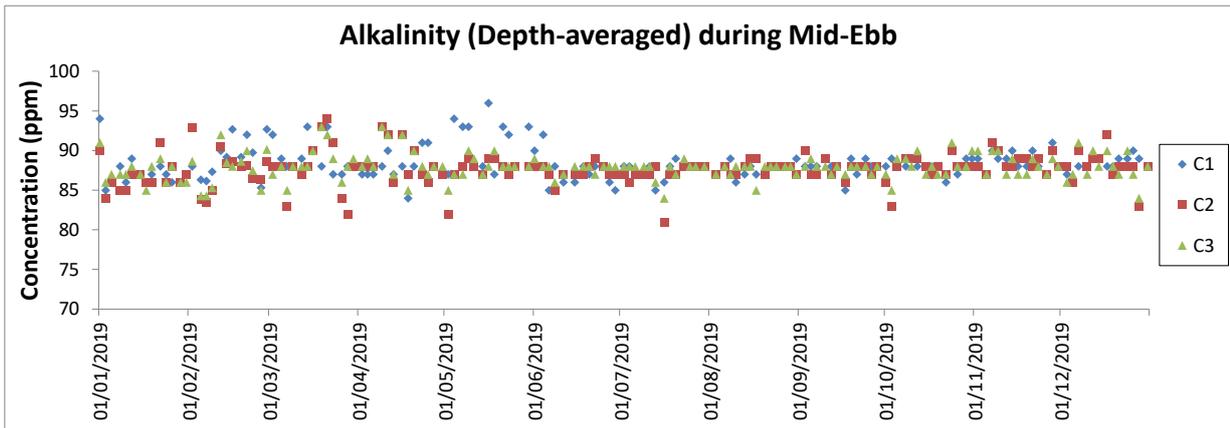


Notes:

1. The Action and Limit Levels can be referred to Table 2.8 of the Annual EM&A Report.
2. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
3. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
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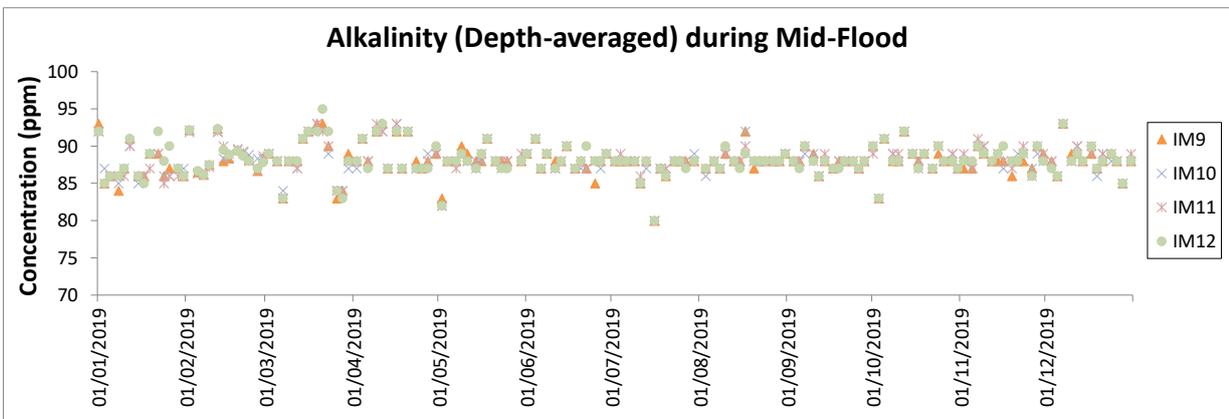
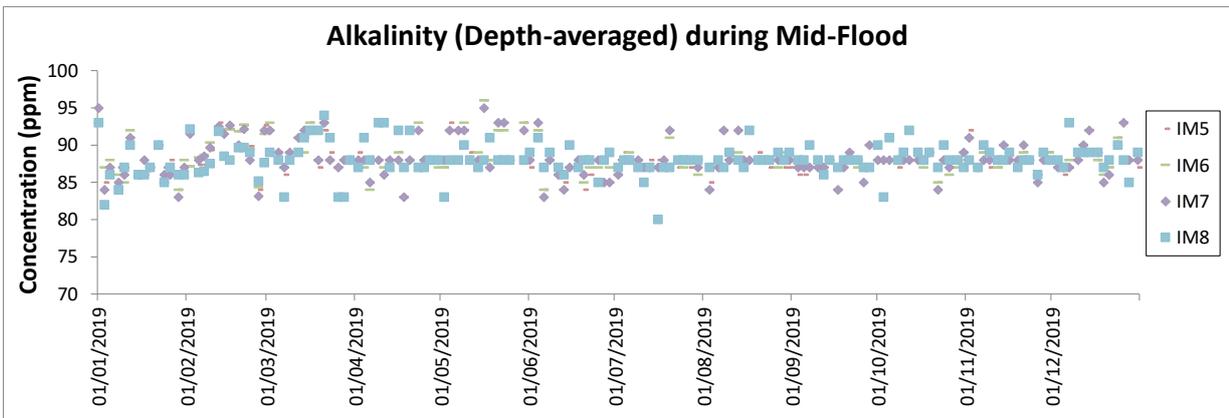
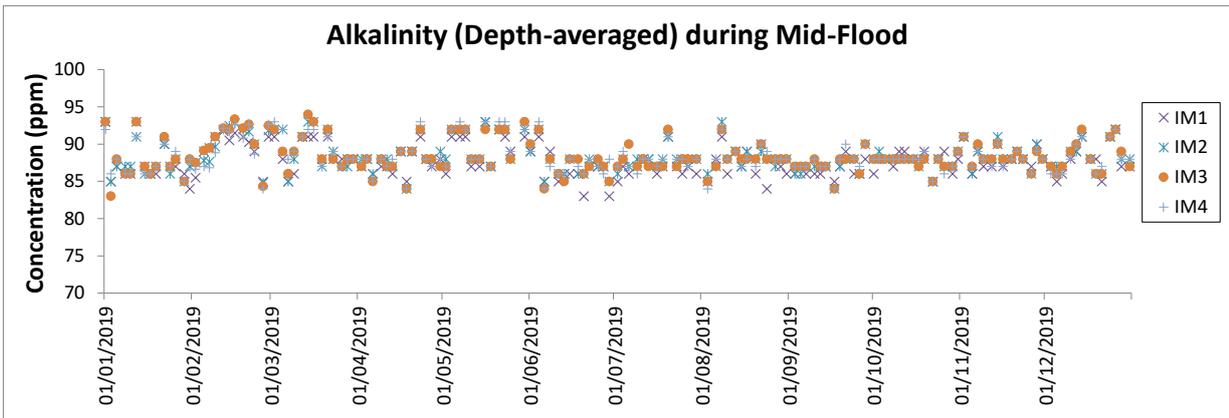
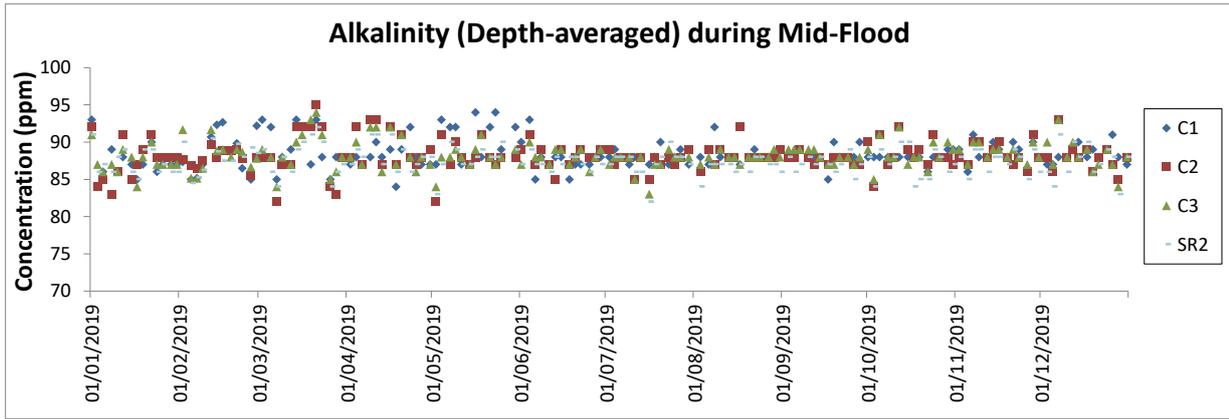


During the reporting period, 0.4% of the SS monitoring results triggered the corresponding Action Level, which was lower than that recorded in the previous reporting period. Due to the small number of results triggering the Action Level, and the relevant investigation findings presented in the Construction Phase Monthly EM&A Reports, it is considered that the Project did not cause adverse impact on SS level at all water quality sensitive receivers.



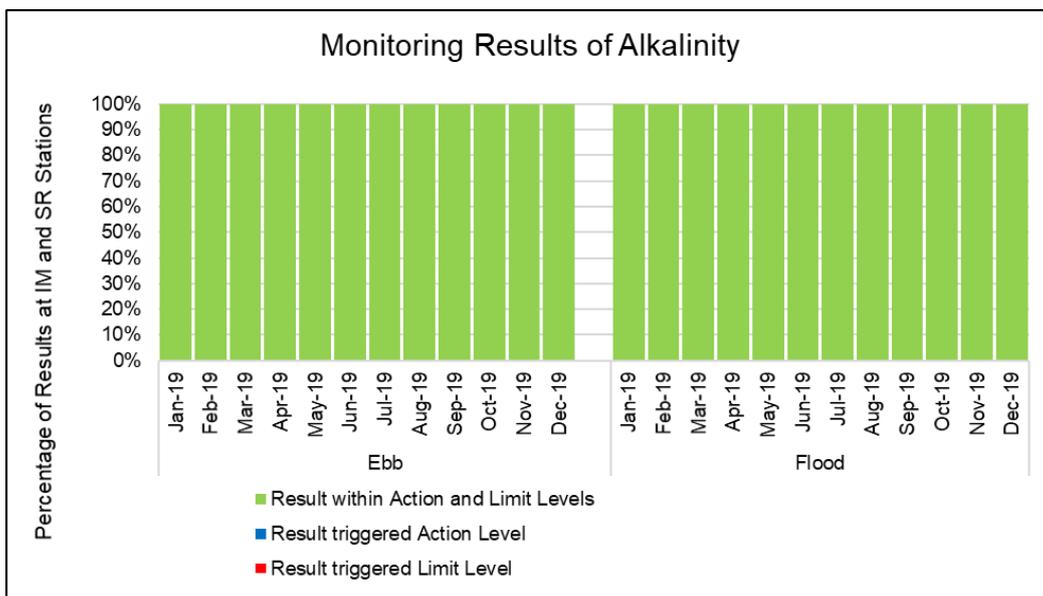
Notes:

1. The Action and Limit Levels can be referred to Table 2.8 of the Annual EM&A Report.
2. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
3. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
4. QA/ QC requirements as stipulated in the EM&A Manual was carried out during measurement.

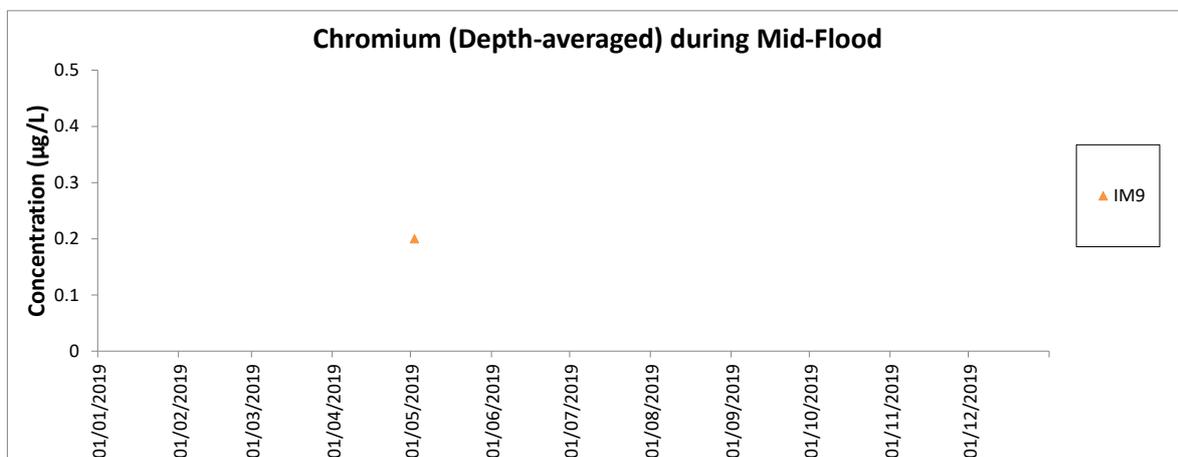


Notes:

1. The Action and Limit Levels can be referred to Table 2.8 of the Annual EM&A Report.
2. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
3. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
4. QA/ QC requirements as stipulated in the EM&A Manual was carried out during measurement.

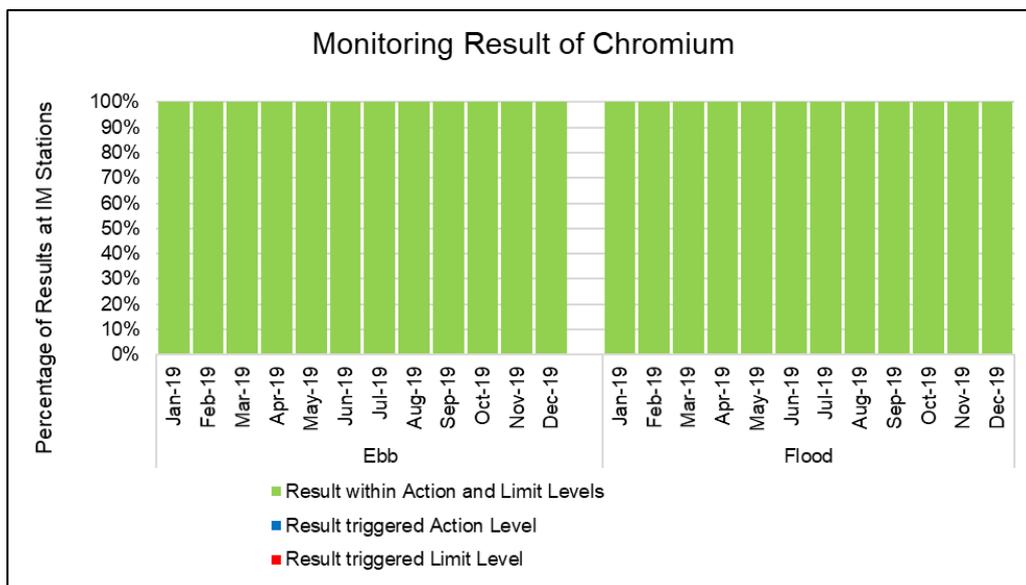


All alkalinity monitoring results in the reporting period were within the corresponding Action and Limit Levels.

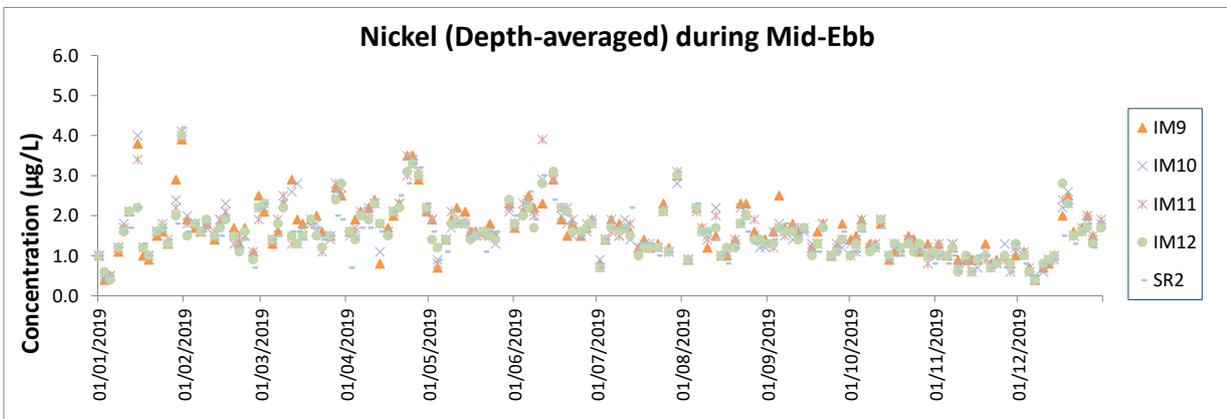
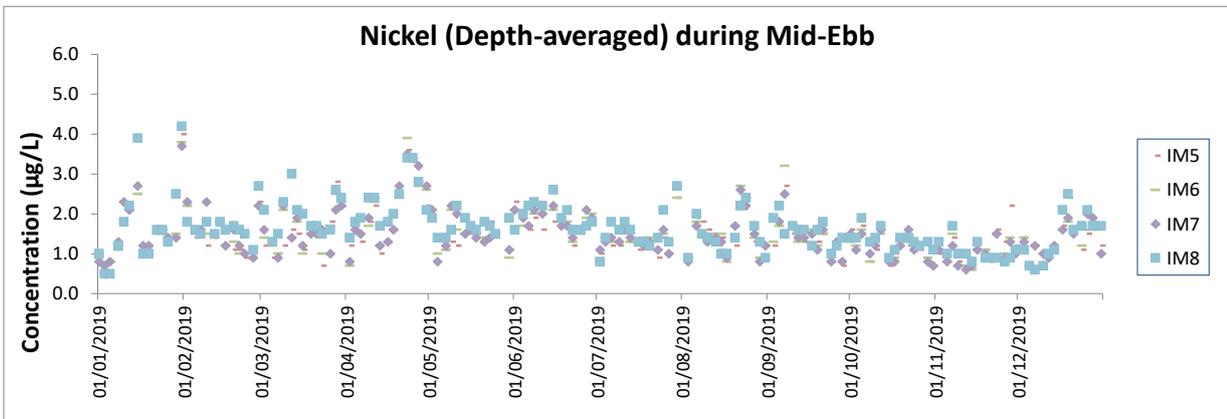
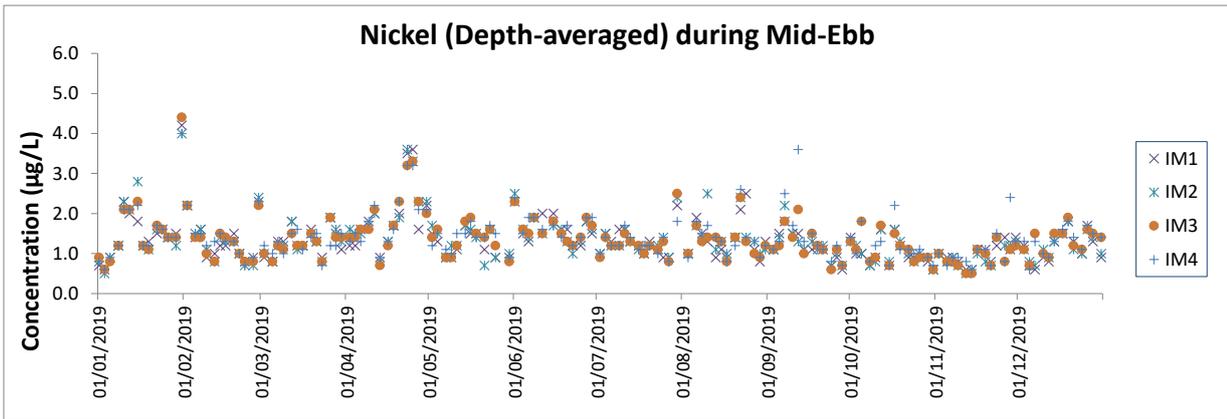
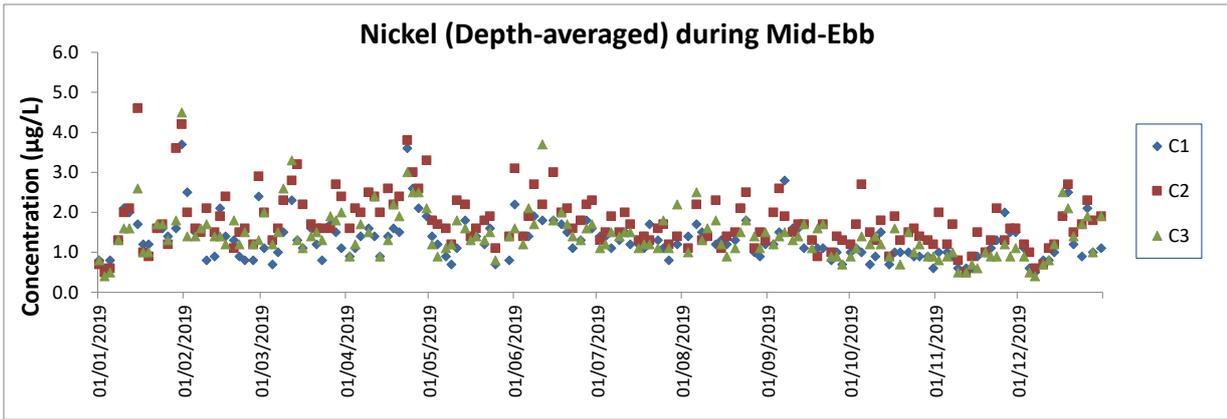


Notes:

1. The Action and Limit Levels can be referred to Table 2.8 of the Annual EM&A Report.
2. The monitoring results of chromium at all other monitoring stations were below the reporting limit of 0.2 µg/L.
3. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
4. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
5. QA/ QC requirements as stipulated in the EM&A Manual was carried out during measurement.

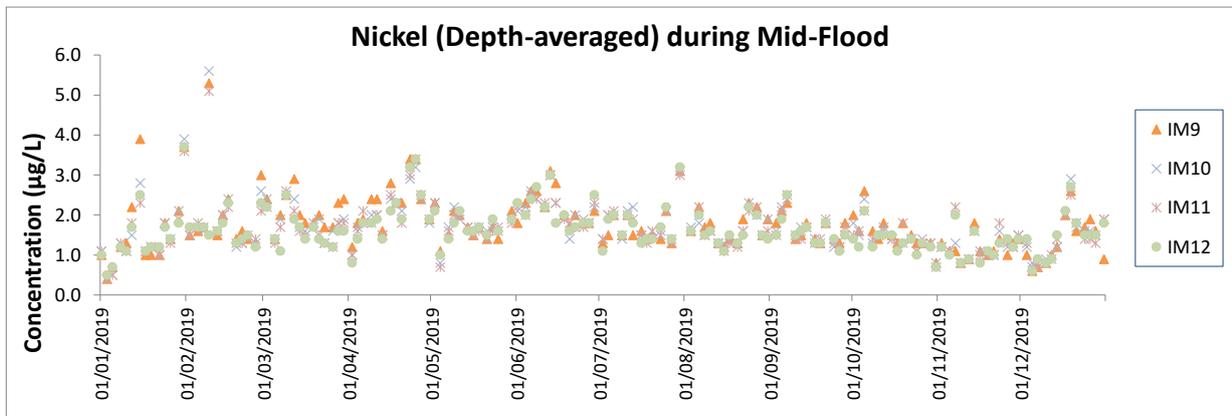
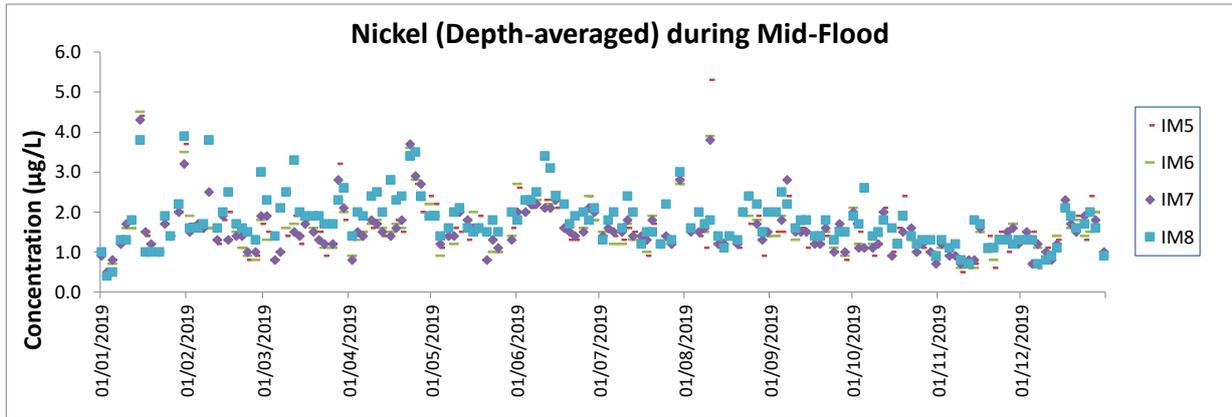
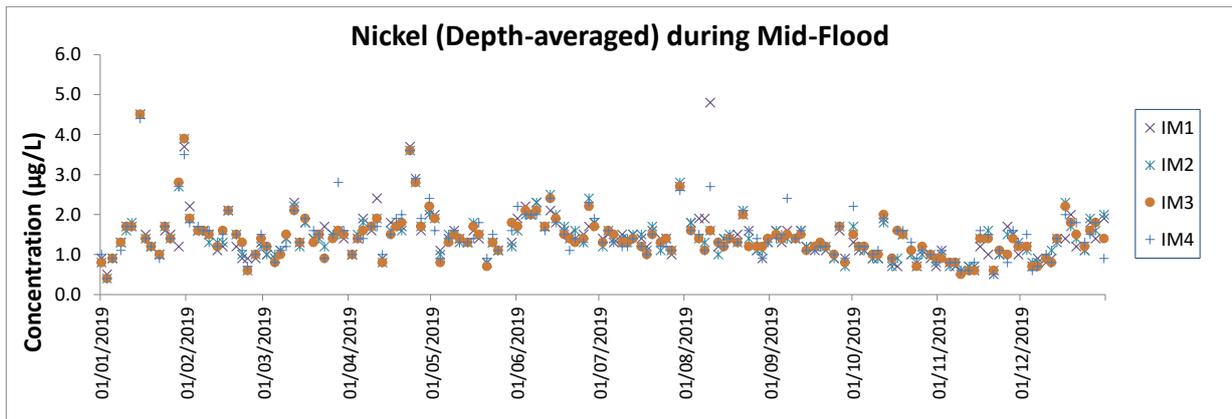
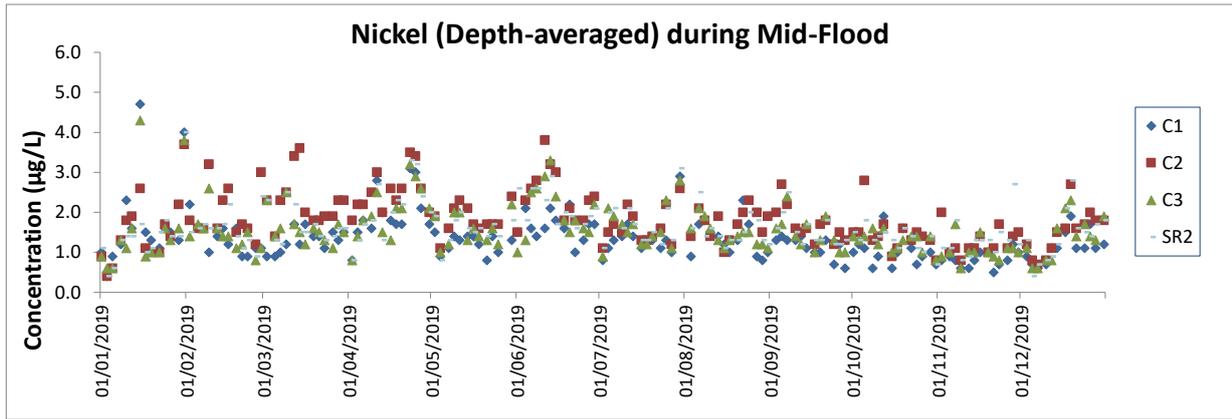


All chromium monitoring results in the reporting period were within the corresponding Action and Limit Levels.



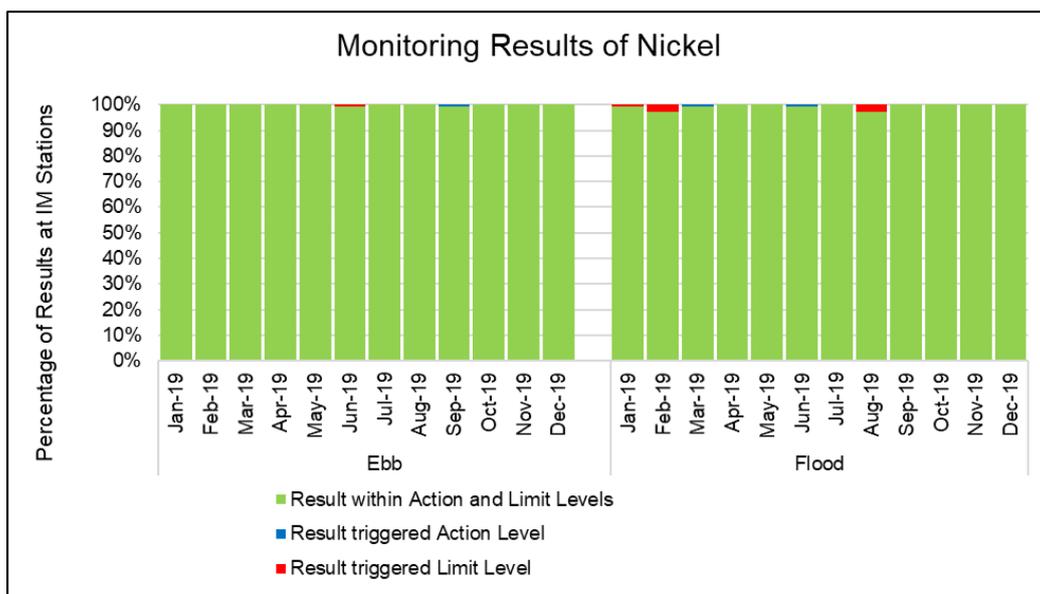
Notes:

1. The Action and Limit Levels can be referred to Table 2.8 of the Annual EM&A Report.
2. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
3. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
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2. The key marine works activities of the Project during monitoring included deep cement mixing (DCM) works, marine filling, seawall construction, and prefabricated vertical drain (PVD) installation.
3. General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions should be referred to Table 2.10 of this Report and corresponding Monthly EM&A Reports.
4. QA/ QC requirements as stipulated in the EM&A Manual was carried out during measurement.



During the reporting period, 0.4% of the nickel monitoring results triggered the corresponding Action or Limit Level, which was lower than that recorded in the previous reporting period. From the graph, it is noted that the majority of cases were recorded during mid-flood tide, which might suggest the existence of a tide-specific effect that could have led to episodes of relatively high nickel concentrations. This observation also concurred with that made in the previous reporting period, and therefore was considered not related to the Project activities.

Combining the observations from the monitoring results of the two representative heavy metals for DCM works (chromium and nickel), the low percentage of results triggering corresponding Action or Limit Level, as well as the investigation findings which concluded that these cases were not related to the Project, this indicates that DCM activities during the reporting period did not cause adverse water quality impact.

Appendix E. Chinese White Dolphin Monitoring Results

Figure 1: Sightings Distribution of Chinese White Dolphins

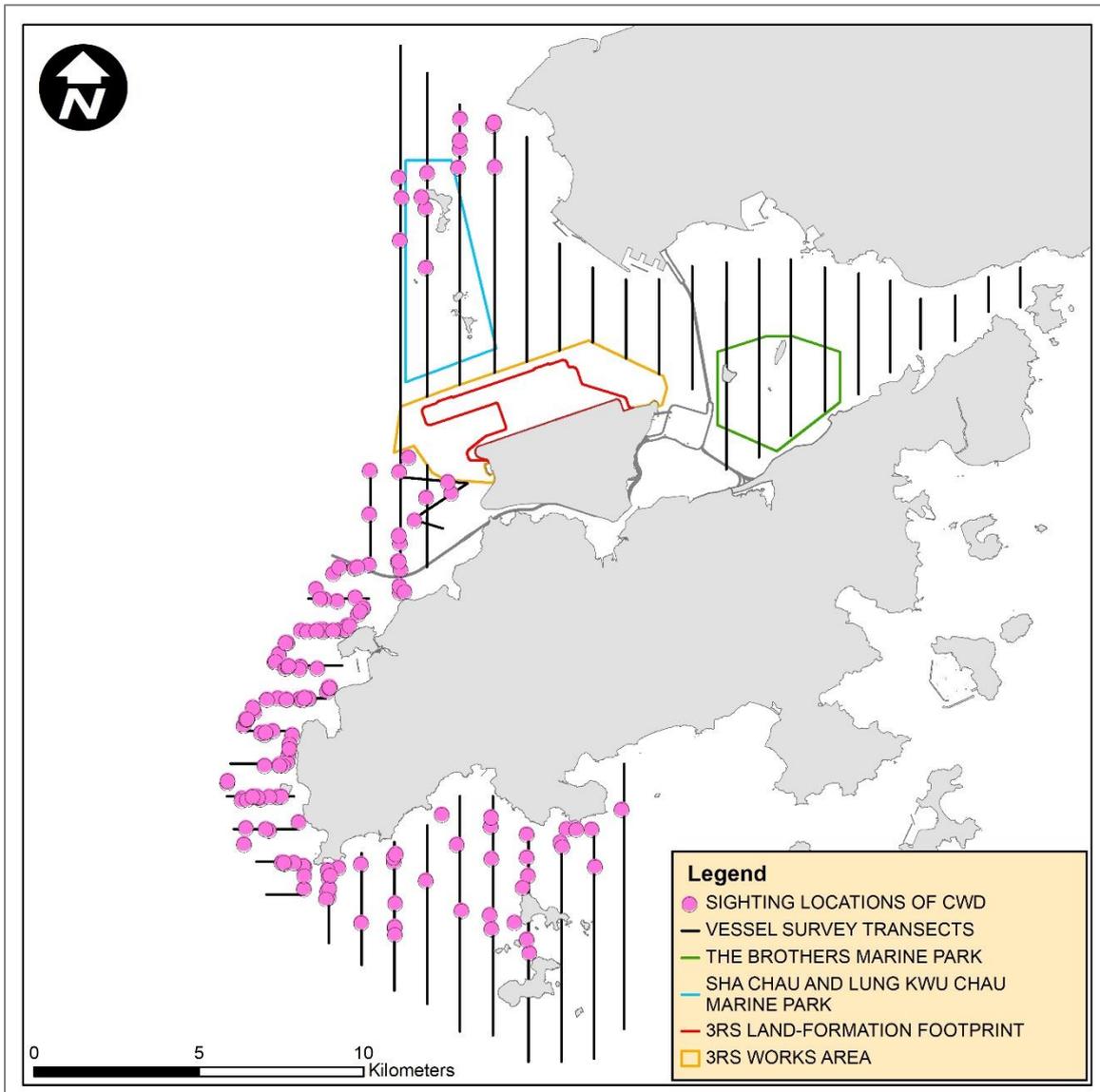
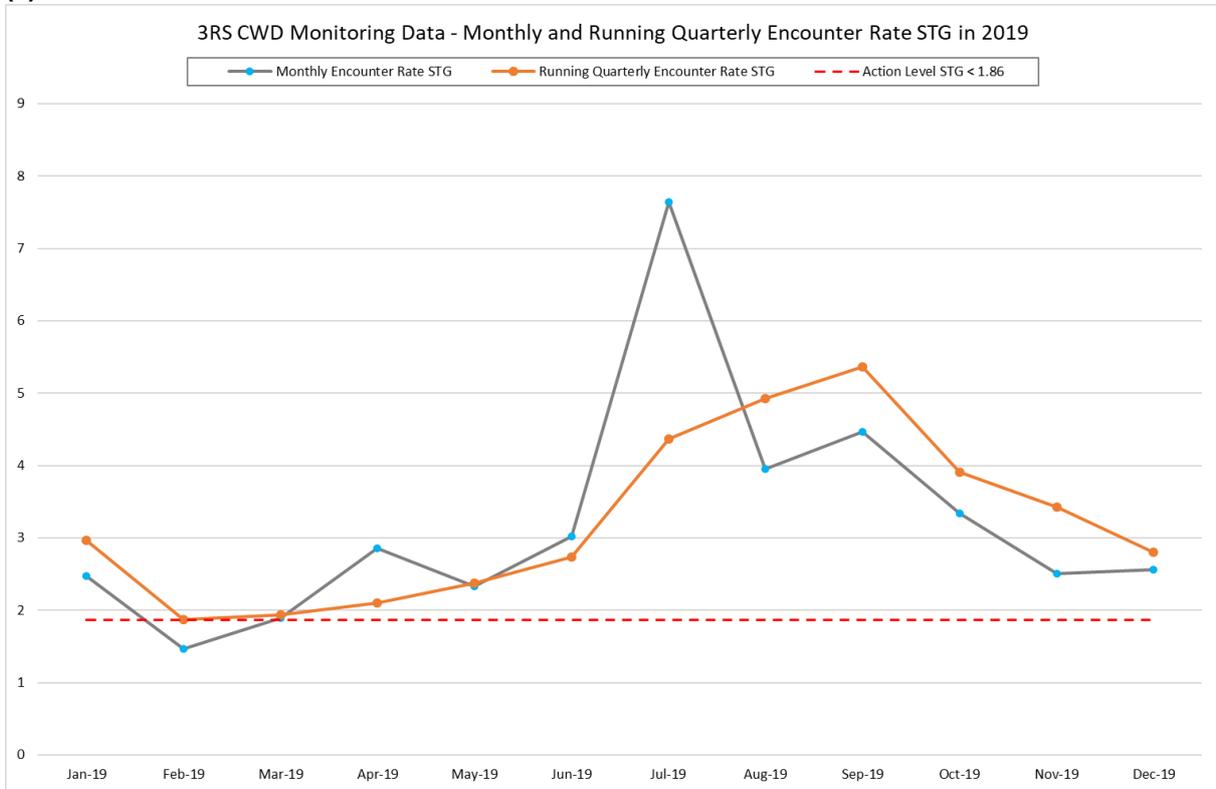


Figure 2: Graphical Presentation of Monthly and Running Quarterly Encounter Rates in the Reporting Period (January to December 2019)

(a) Encounter Rate STG



(b) Encounter Rate ANI

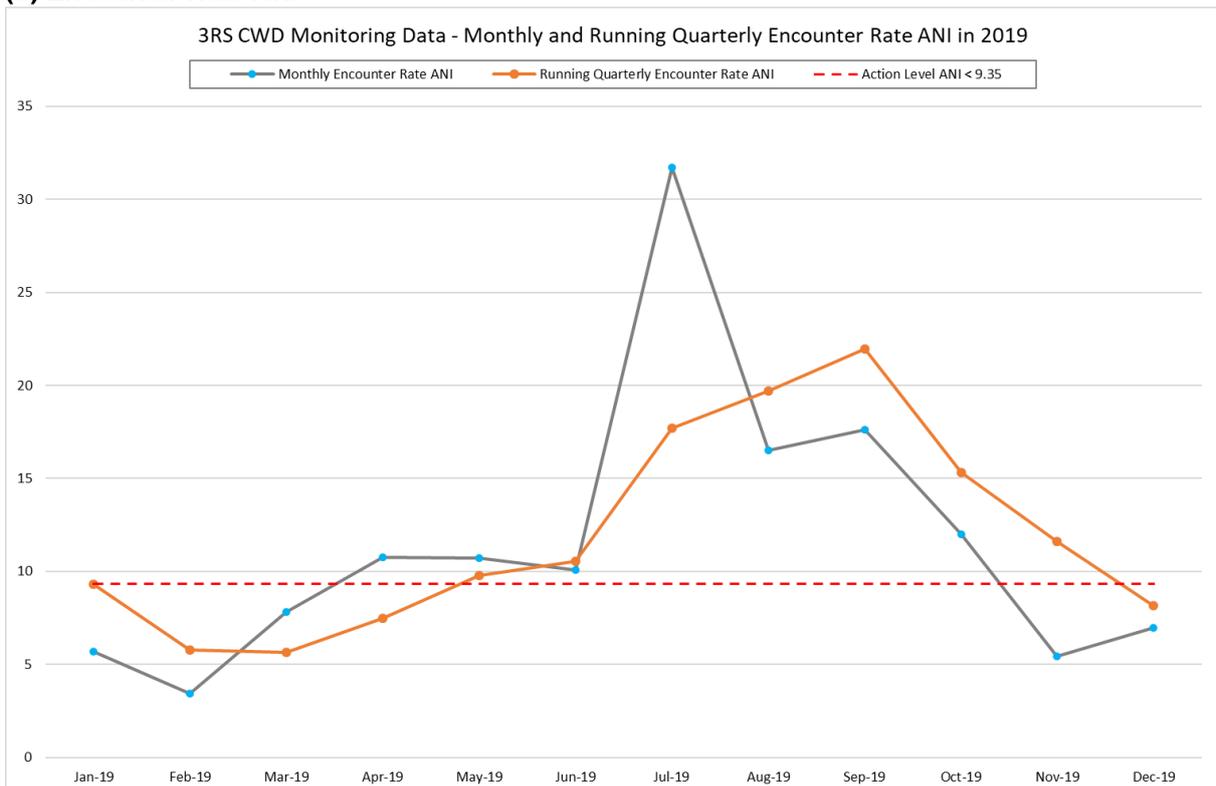
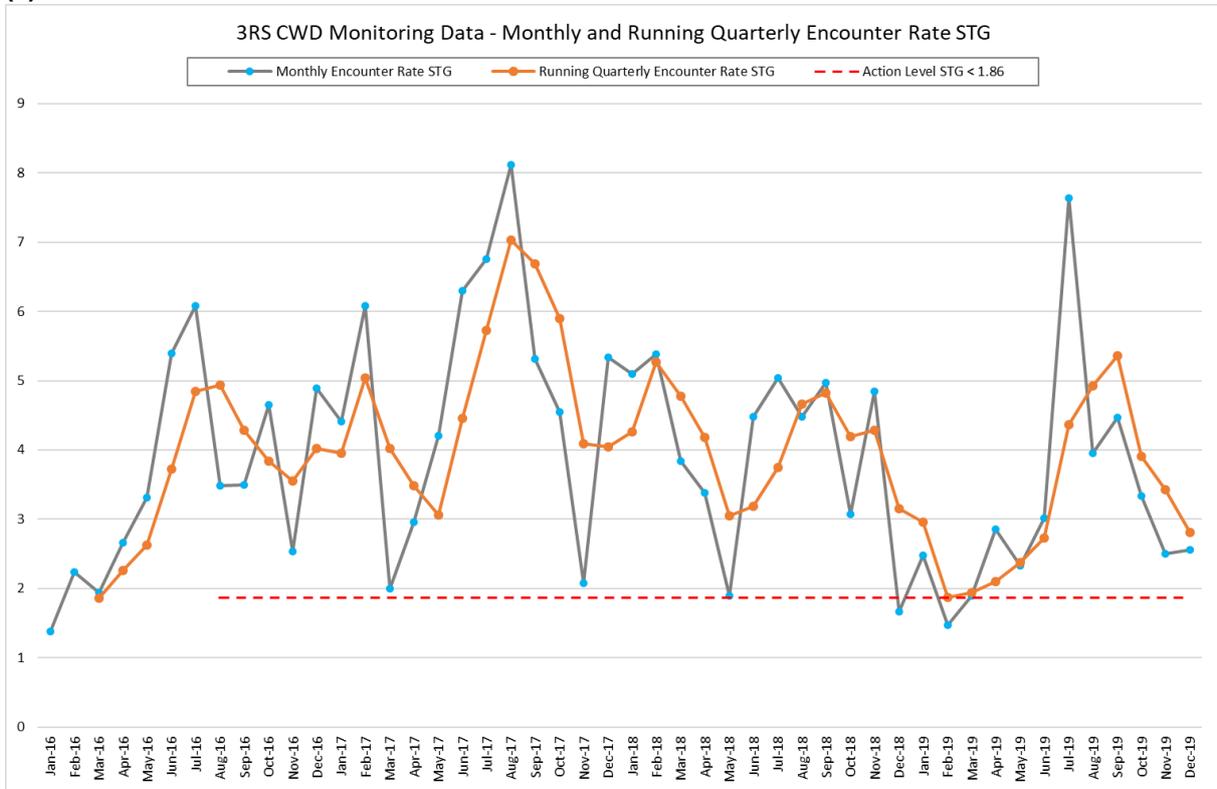


Figure 3: Graphical Presentation of Monthly and Running Quarterly Encounter Rates from January 2016 to December 2019

(a) Encounter Rate STG



(b) Encounter Rate ANI

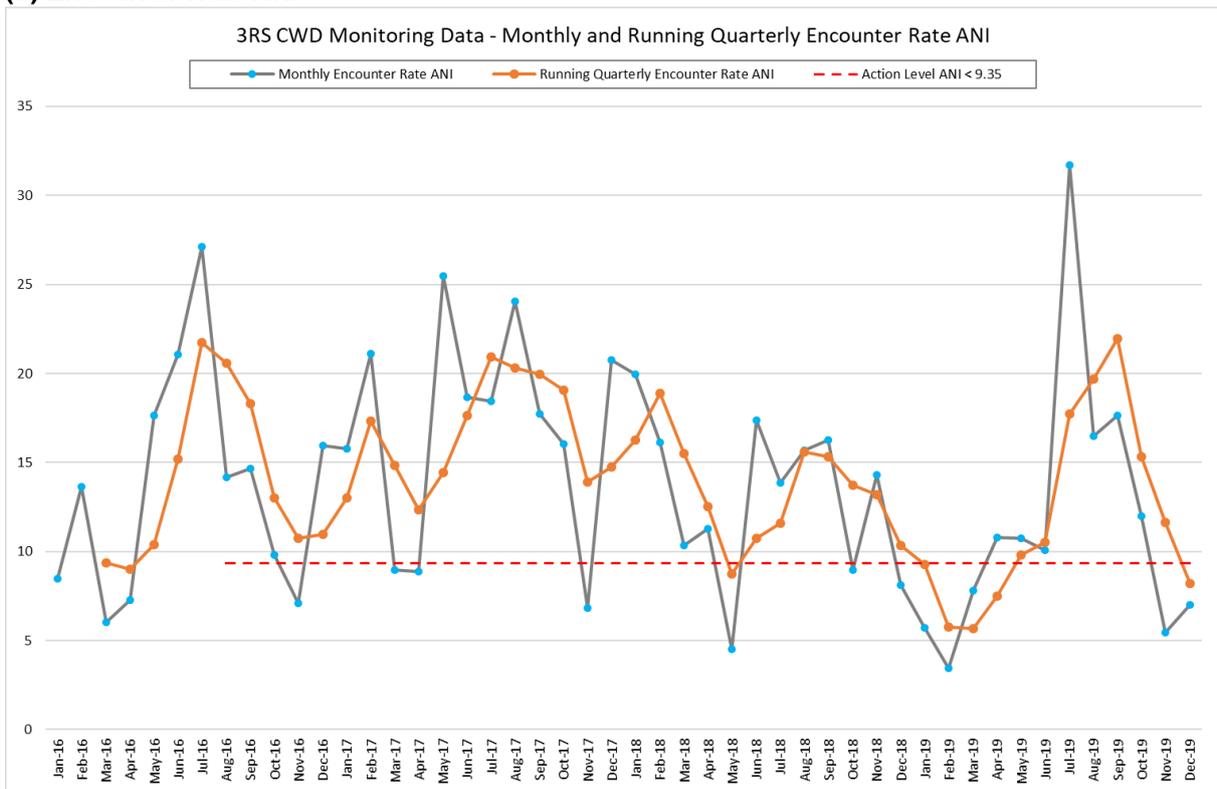
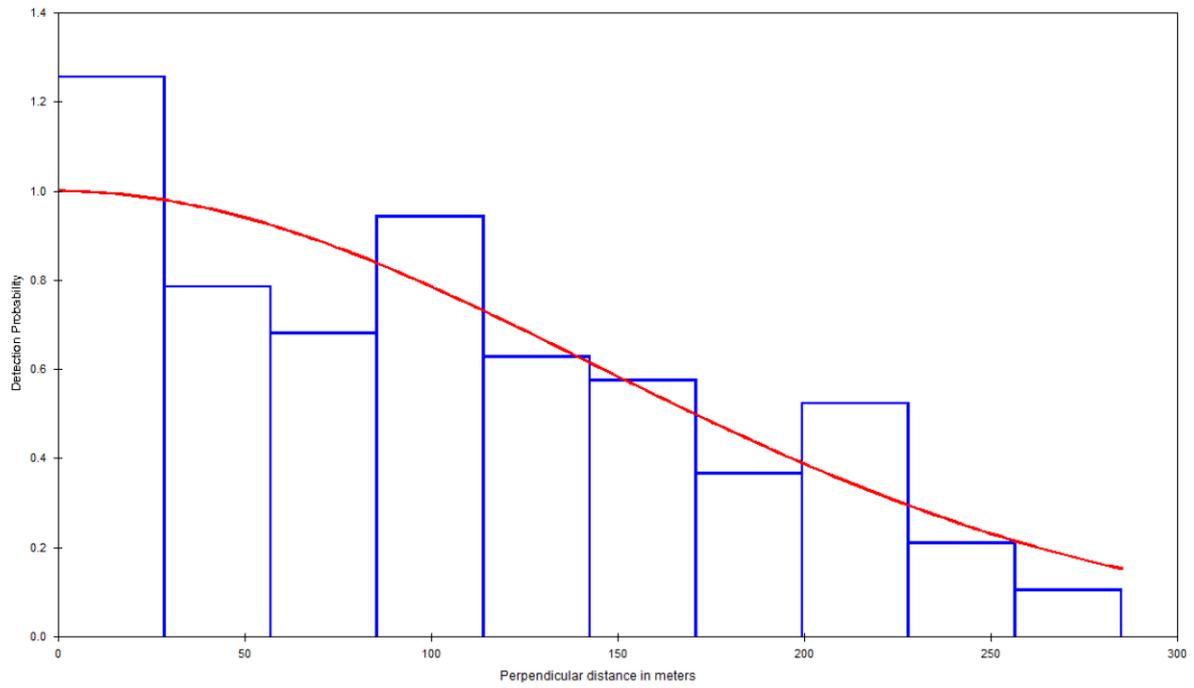


Figure 4: Fitted Detection Function of the 2019 CWD Sightings, Pooled from All Western Hong Kong Survey Areas (truncation distance = 285 m)



Note: Detection function used a half-normal model with a cosine adjustment.

Figure 5: Quantitative Grid Analysis – SPSE and DPSE of CWDs with Corrected Survey Effort per km² of Year 2018 and Year 2019

[SPSE = no. of on-effort dolphin sightings per 100 units of survey effort, DPSE = no. of dolphins per 100 units of survey effort]

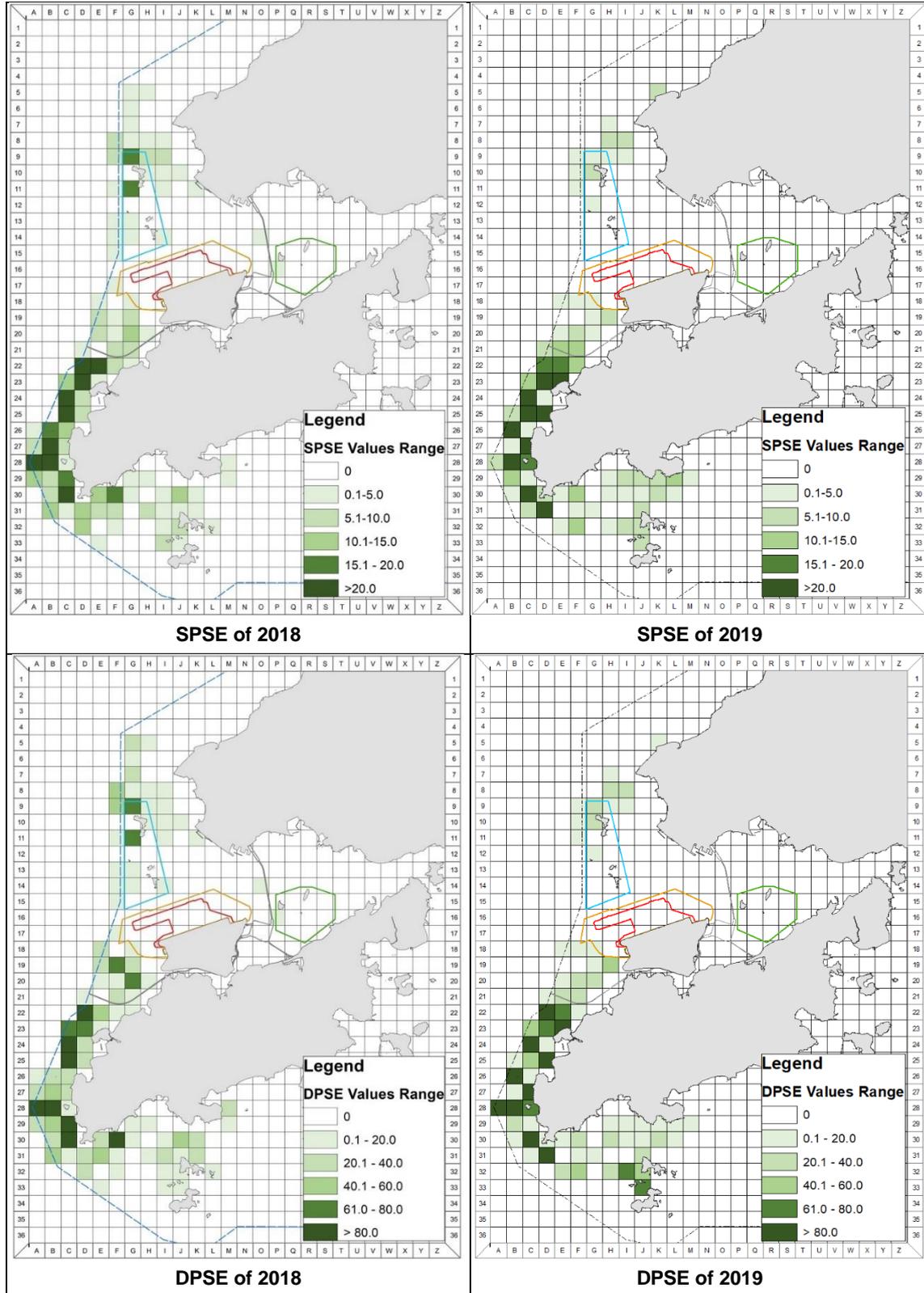


Figure 6: Cumulative SPSE and DPSE of CWDs with Corrected Survey Effort per km² from Dec 2015 to Dec 2019

[SPSE = no. of on-effort dolphin sightings per 100 units of survey effort, DPSE = no. of dolphins per 100 units of survey effort]

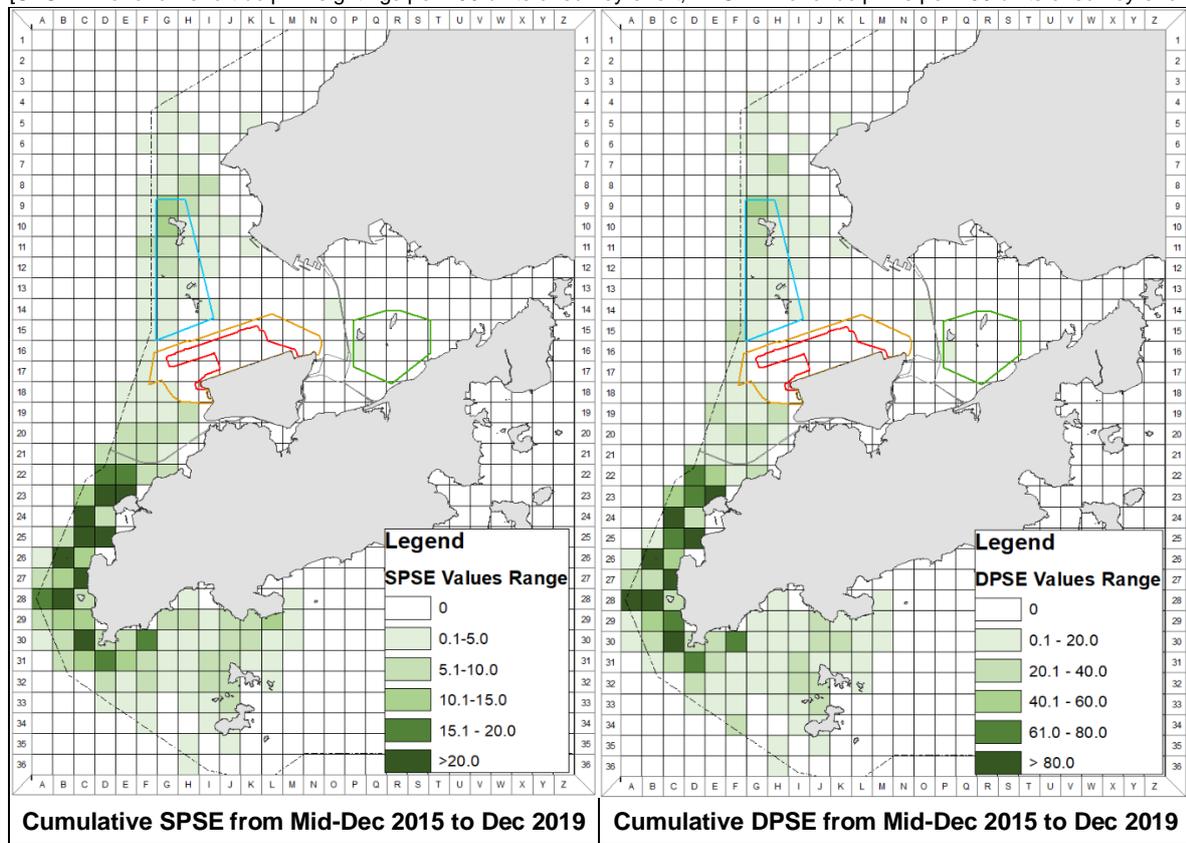
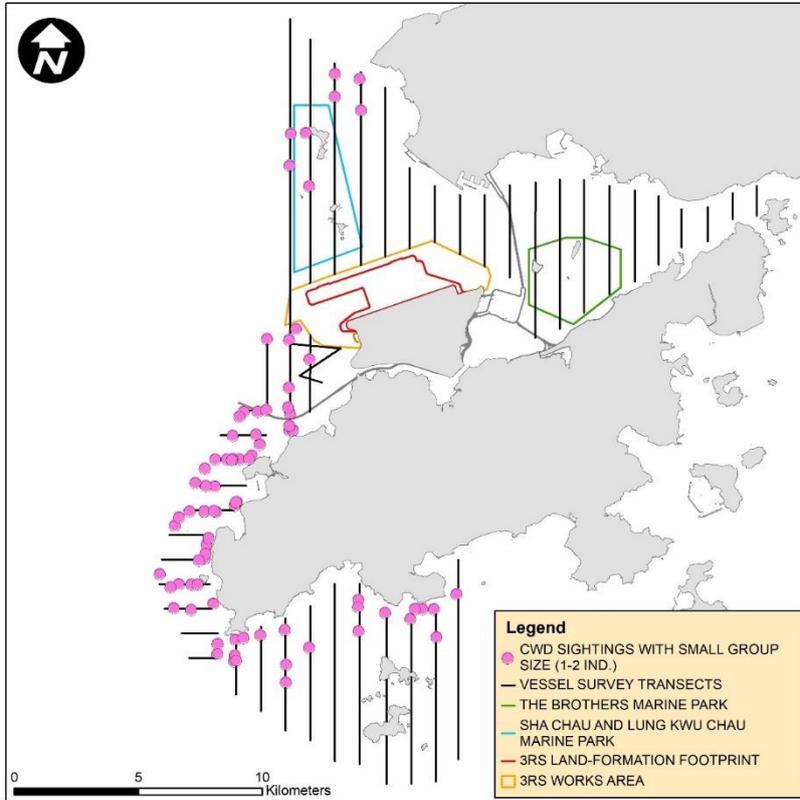


Figure 7: Sightings Distribution of Chinese White Dolphins with Different Group Sizes
(a) Small Group Size (1 to 2 dolphins)



(b) Medium Group Size (3 to 9 dolphins) and Large Group Size (10 or more dolphins)

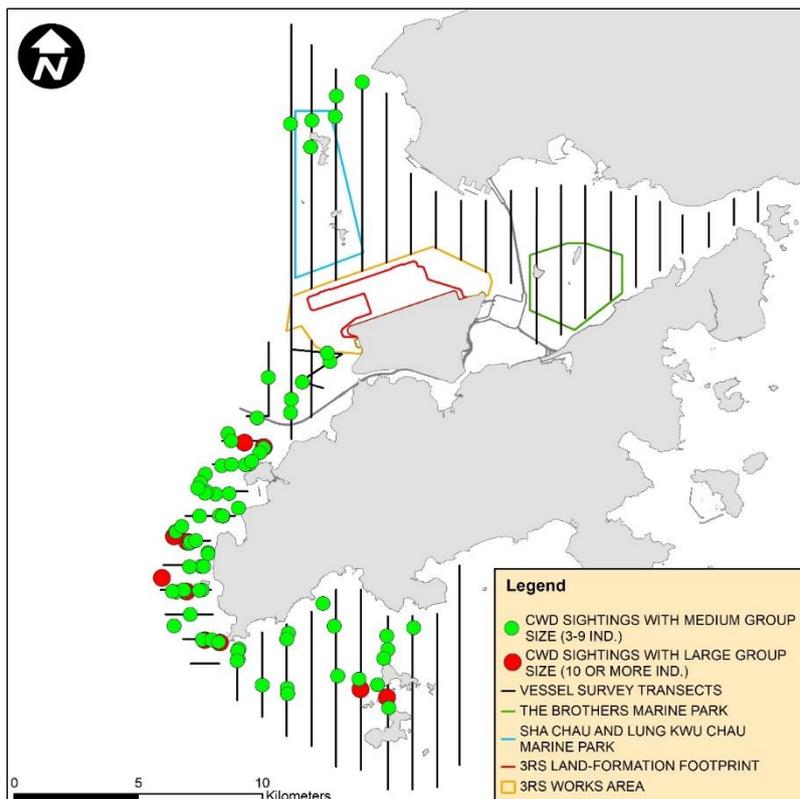


Figure 8: Sighting Locations of CWD Groups Engaged in Different Activities

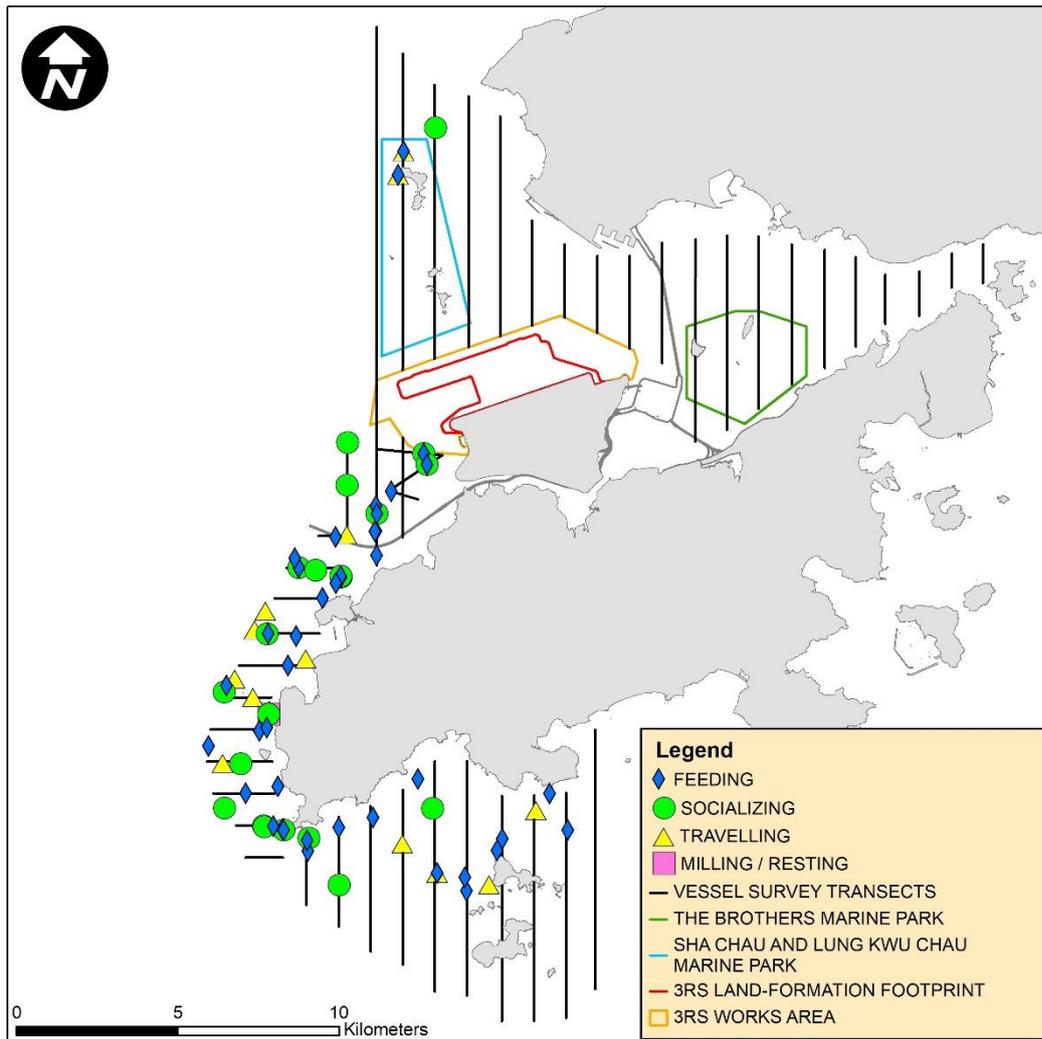


Figure 9: Sighting Locations of CWD Groups in Association with Fishing Boat

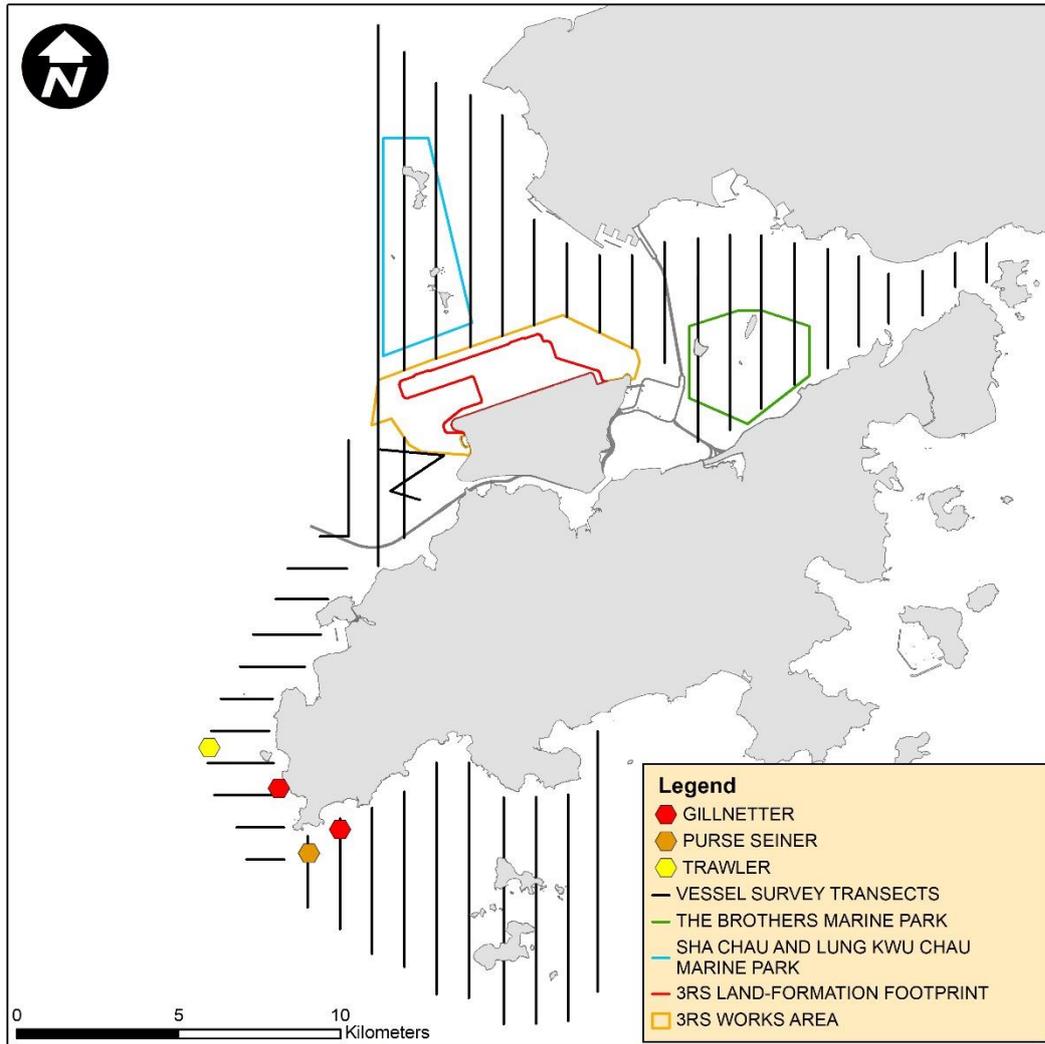


Figure 10: Sighting Locations of Mother-Calf Pairs

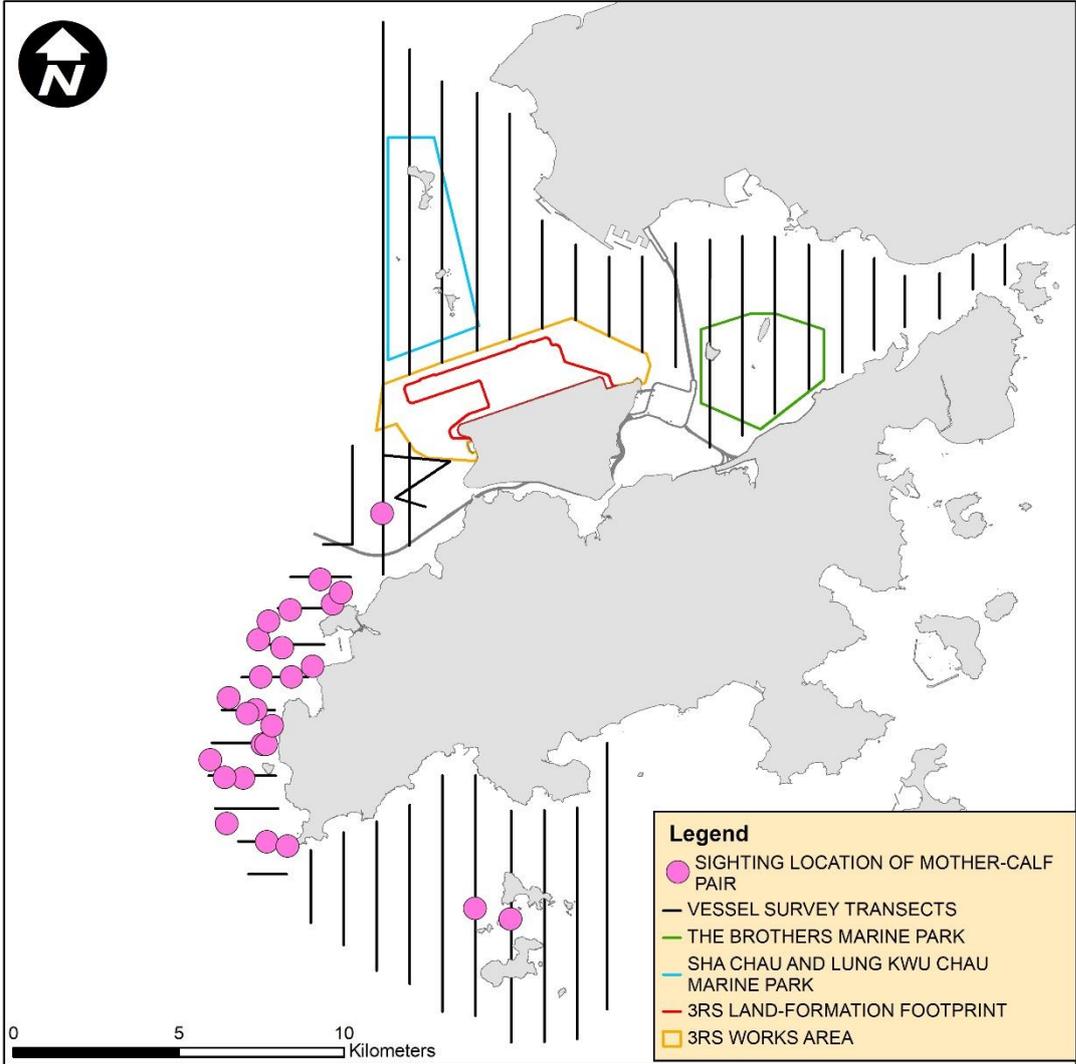
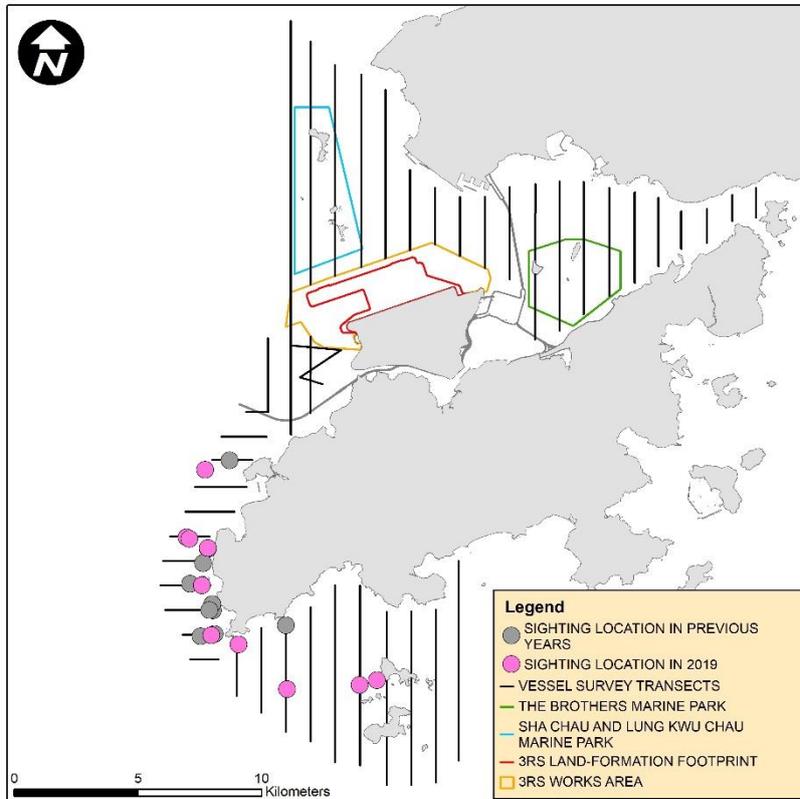
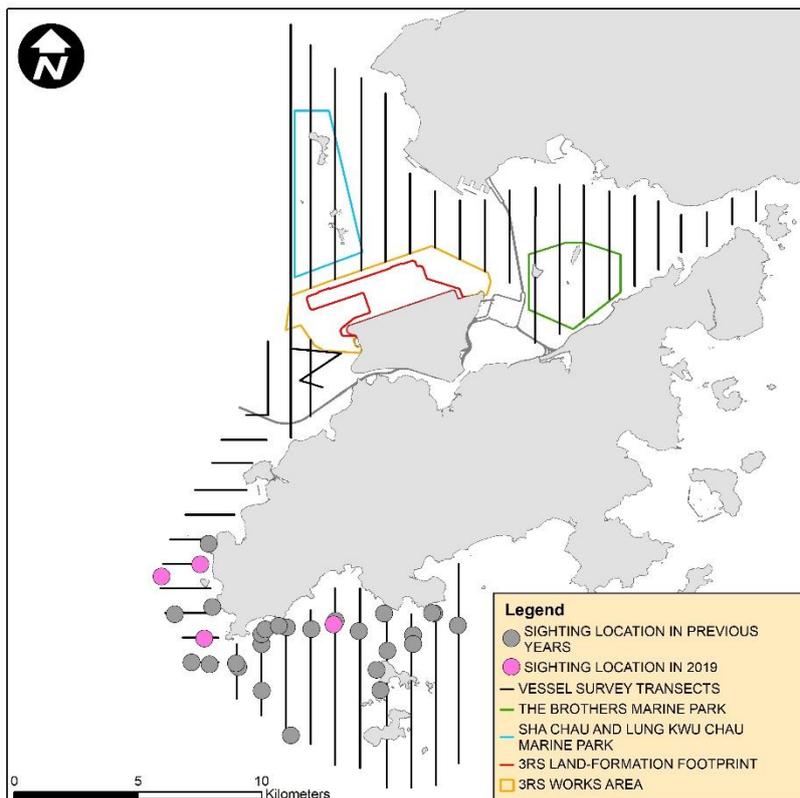


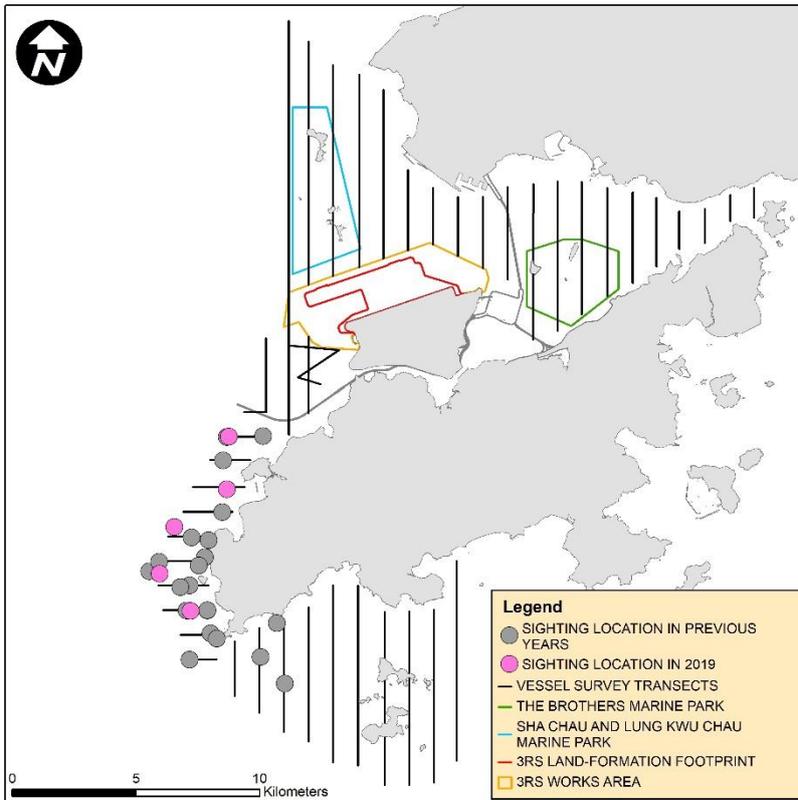
Figure 11 (batch): Photo Identification – Re-sighting Locations
 WLMM079 – the most frequently re-sighted animal in 2019



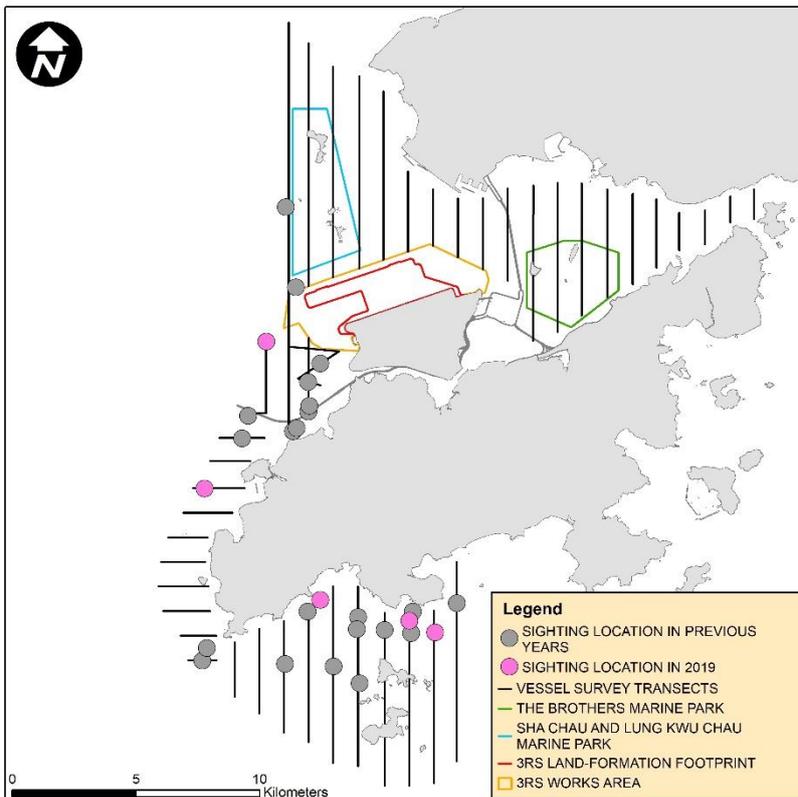
SLMM014 – the most frequently re-sighted animal since 2015



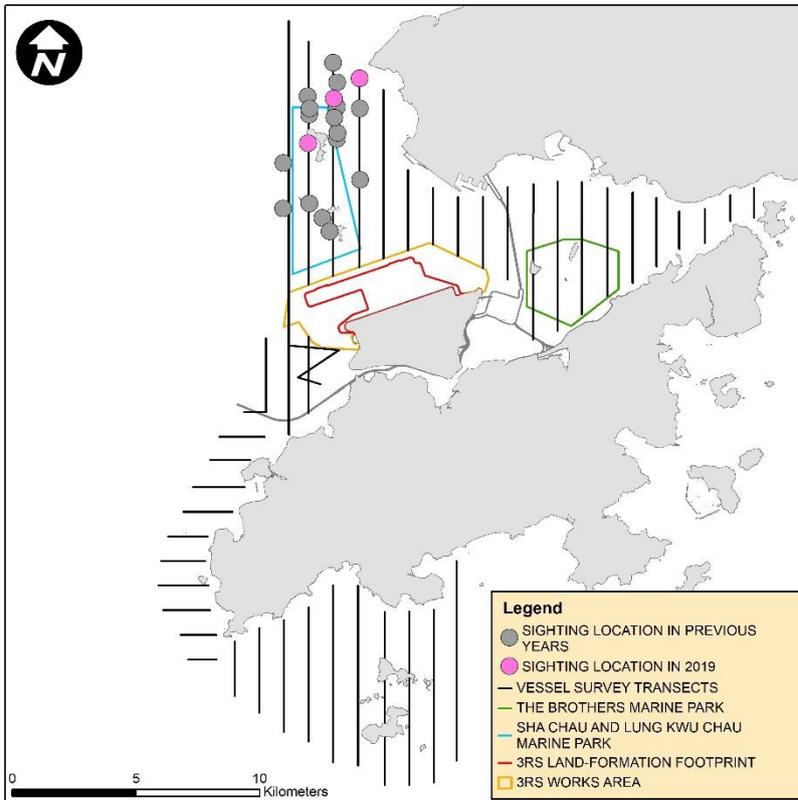
WLMM001 – the second most frequently re-sighted animal since 2015



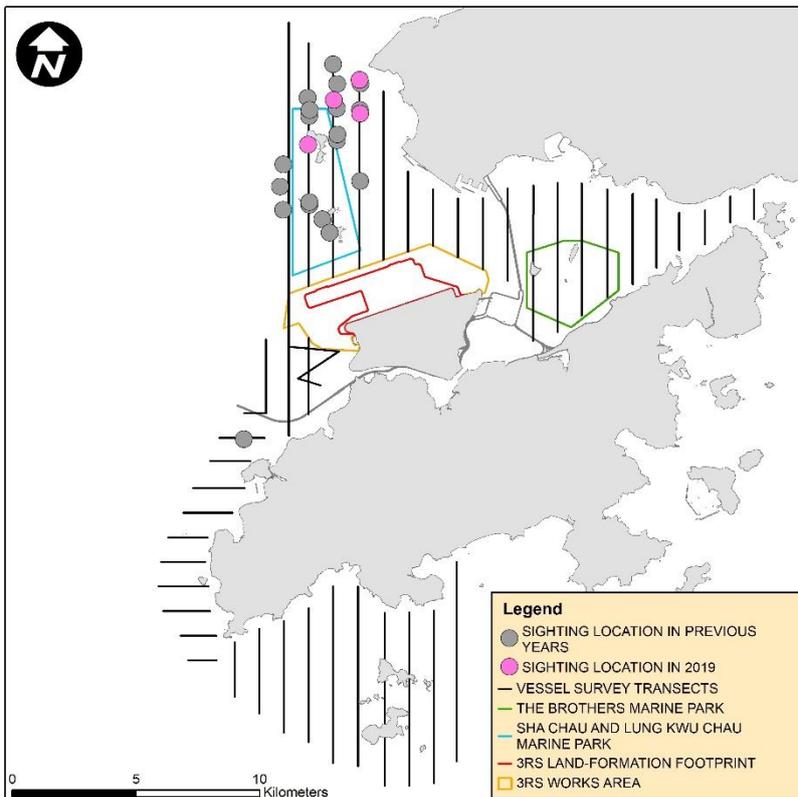
WLMM027 – the third most frequently re-sighted animal since 2015



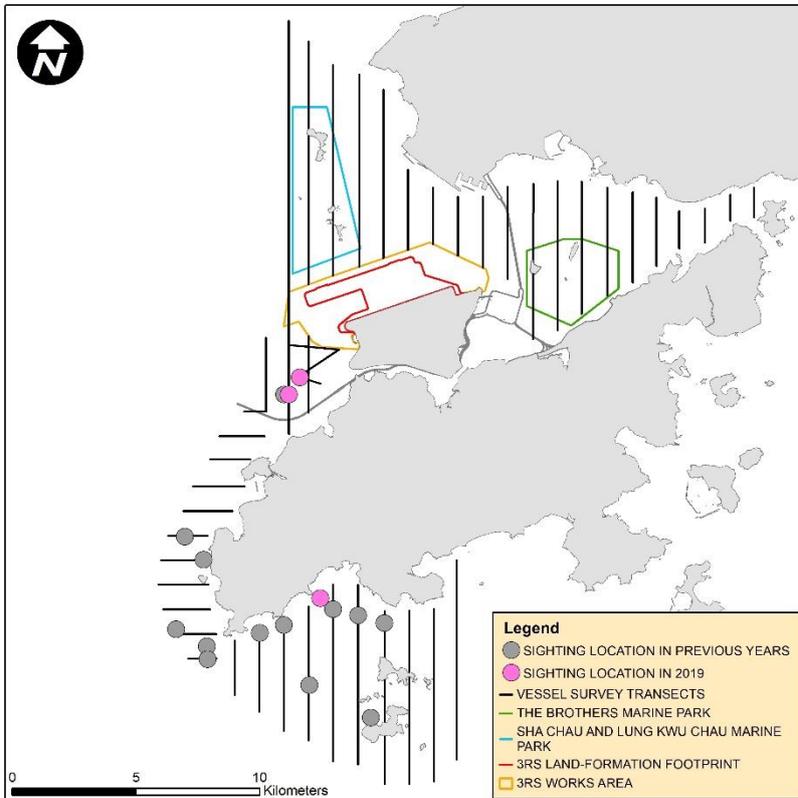
NLMM006 – the unspotted juvenile of the special mother-calf pair with prolonged bonding



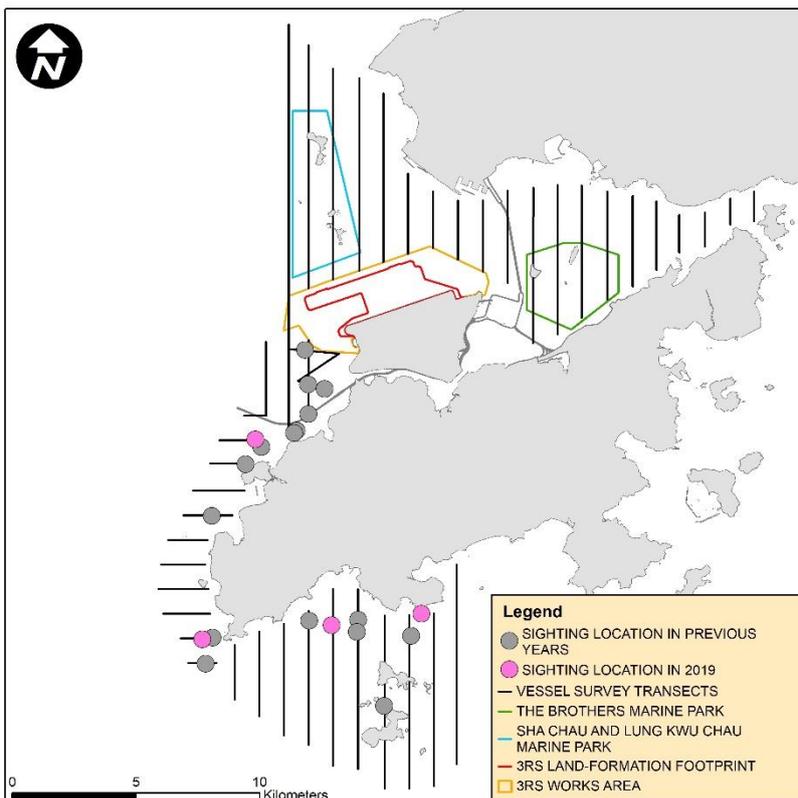
NLMM013 – the mother of the special mother-calf pair with prolonged bonding



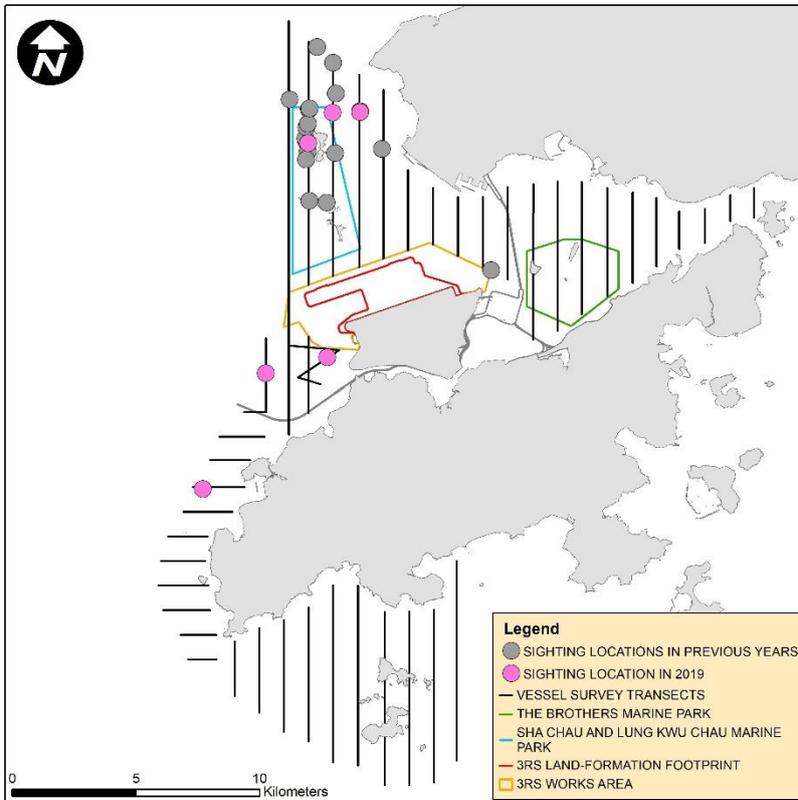
SLMM011 – the dolphin which returned to HK waters after complete disappearance in 2018, and re-sighted in NWL and SWL in 2019



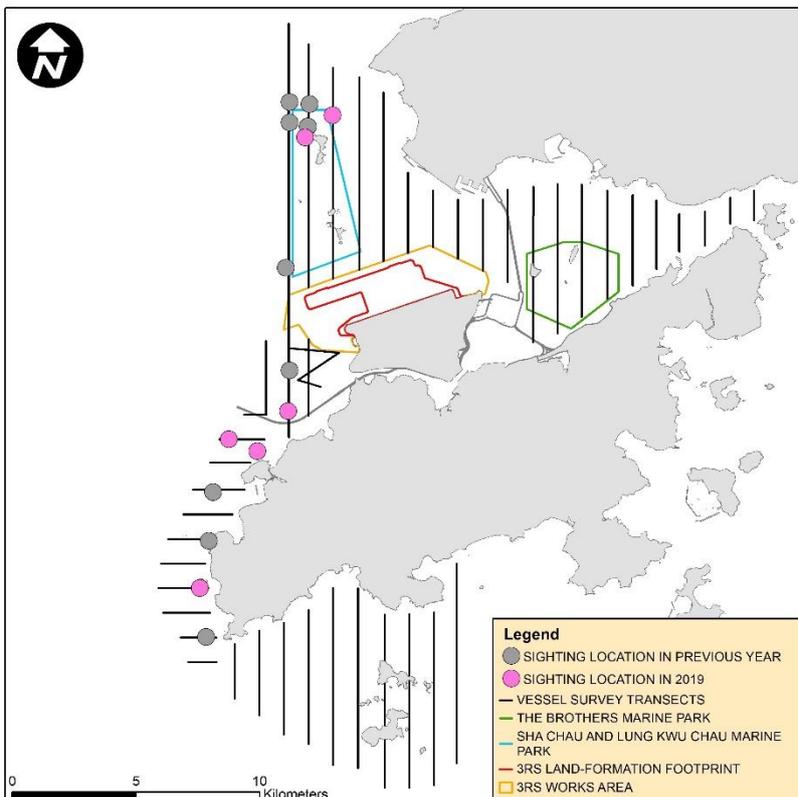
SLMM028 – the dolphin with good recovery from severe injury



NLMM004 – the dolphin which continued to use NWL waters with new re-sighting records in WL in 2019



NLMM063 – the dolphin which continued to use NWL and WL waters in 2019 after frequently re-sighted in 2018



NLMM020 – the dolphin re-sighted in NWL and SWL in 2019

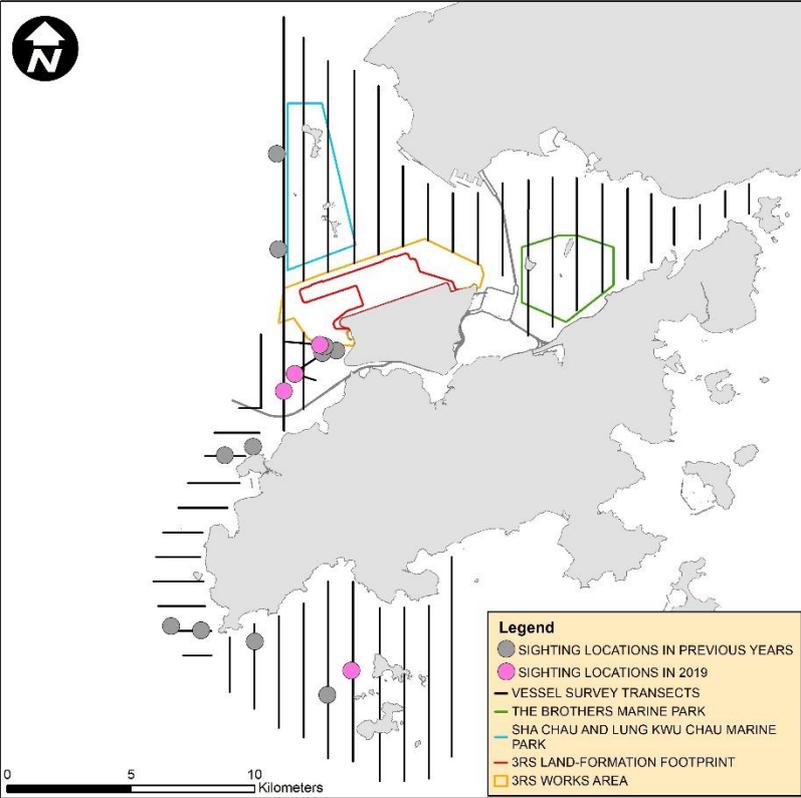


Figure 12: Plots of First Sightings of All CWD Groups (prior to filtering out short-track data) Obtained from Land-based Station at Lung Kwu Chau in 2019

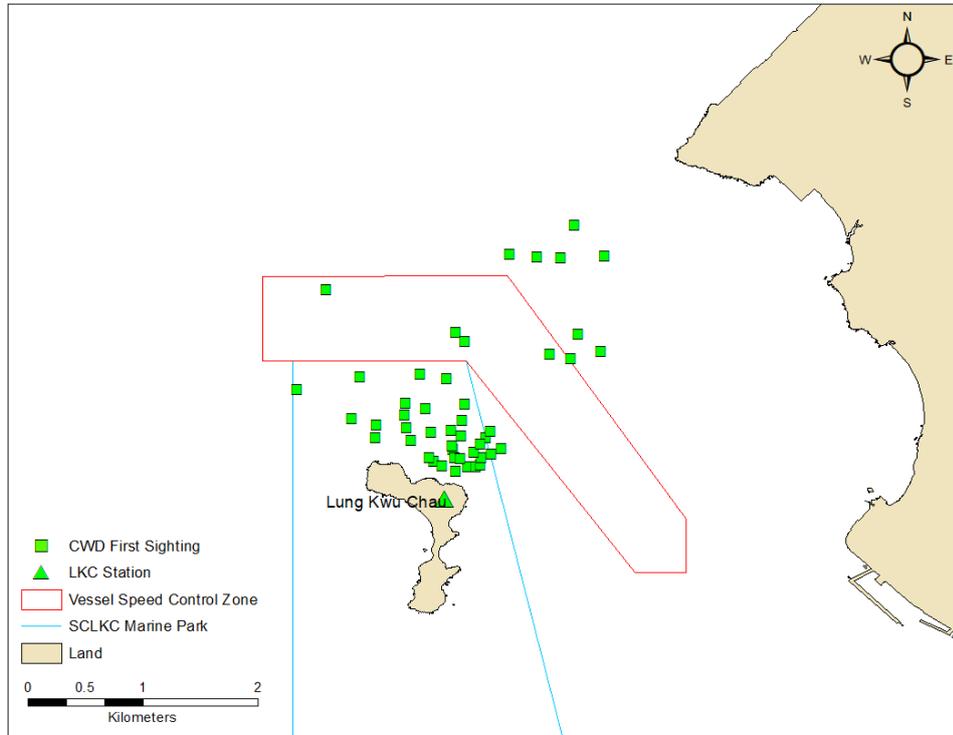


Figure 13: Total Duration of CWD Groups Tracked (per total effort time) from Lung Kwu Chau (prior to filtering short-track data) Based on Time of Day in 2019

[Time indicates the hour block during which CWD groups were tracked. The "n" in parentheses represents the number of days that survey effort was carried out during the associated hour block.]

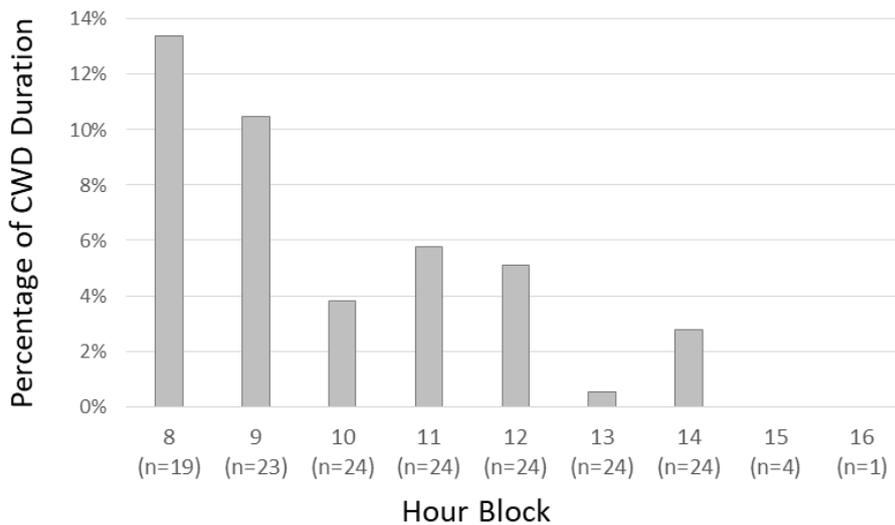


Figure 14: Total Number of CWD Groups Sighted and Tracked from Lung Kwu Chau Based on Month of the Year in 2019

[The grey bars represent the percentage of number of groups tracked per month, while the numbers above the bars indicate the total number of CWD groups tracked per study period (prior to filtering data). The orange line represents the percentage of total time spent tracking dolphins per month.]

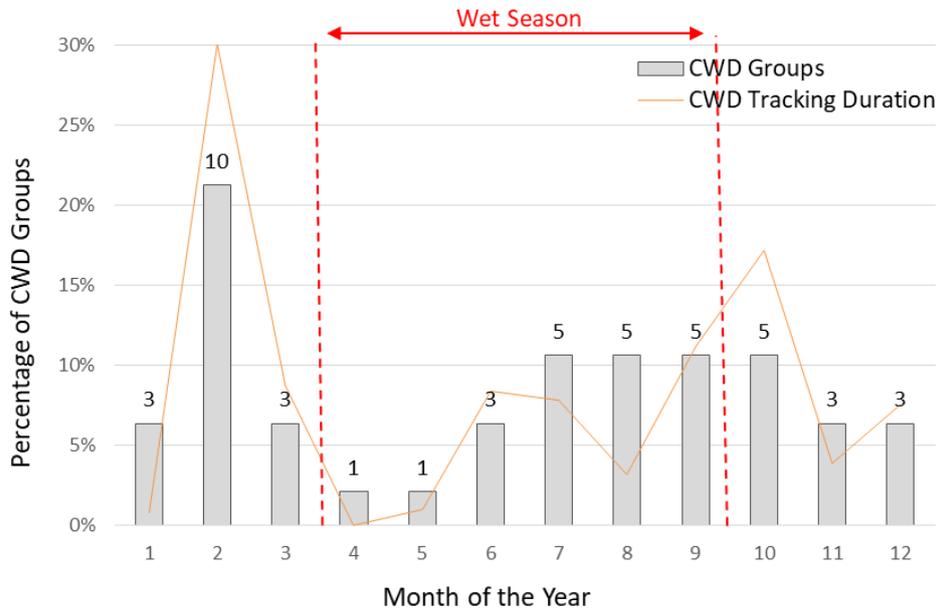


Figure 15: Plots of CWD Short-track Positions (Standardized Segments) relative to Group Size tracked within Sha Chau and Lung Kwu Chau Marine Park in 2019

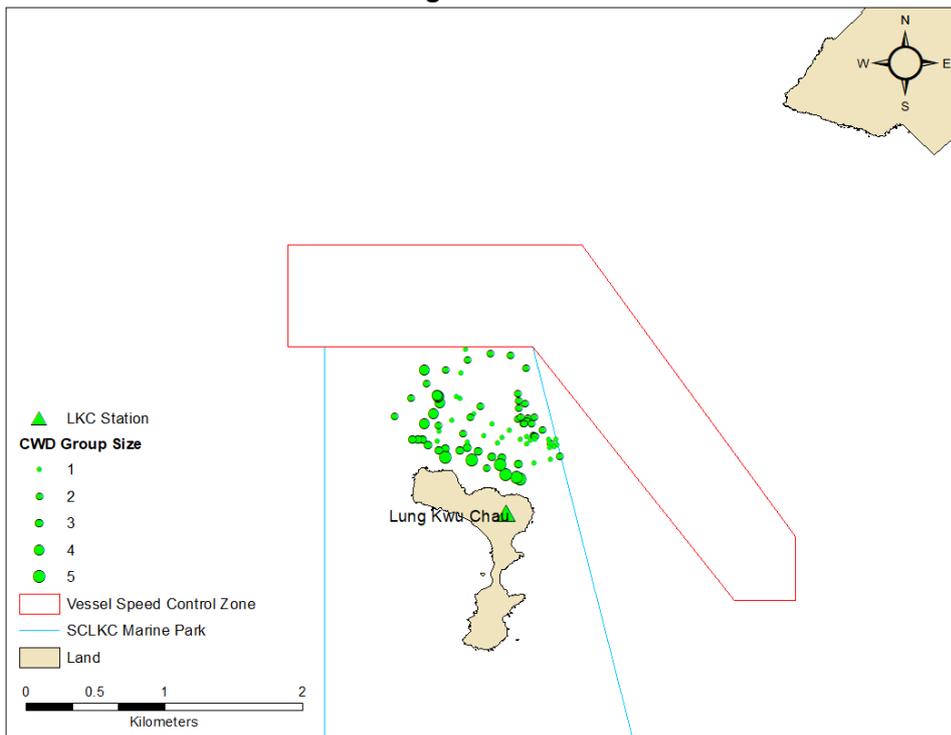


Figure 16: Plots of CWD Short-track Positions (Standardized Segments) relative to Group Size crossing the boundary of Sha Chau and Lung Kwu Chau Marine Park in 2019

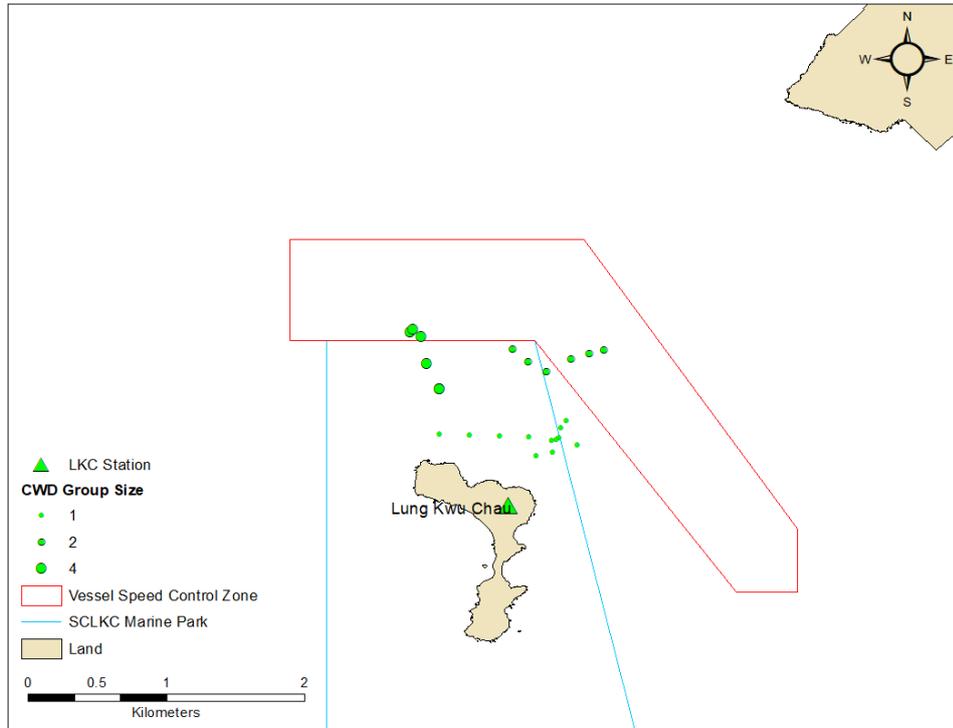


Figure 17: Plots of CWD Short-track Positions (Standardized Segments) relative to Group Size tracked outside Sha Chau and Lung Kwu Chau Marine Park in 2019

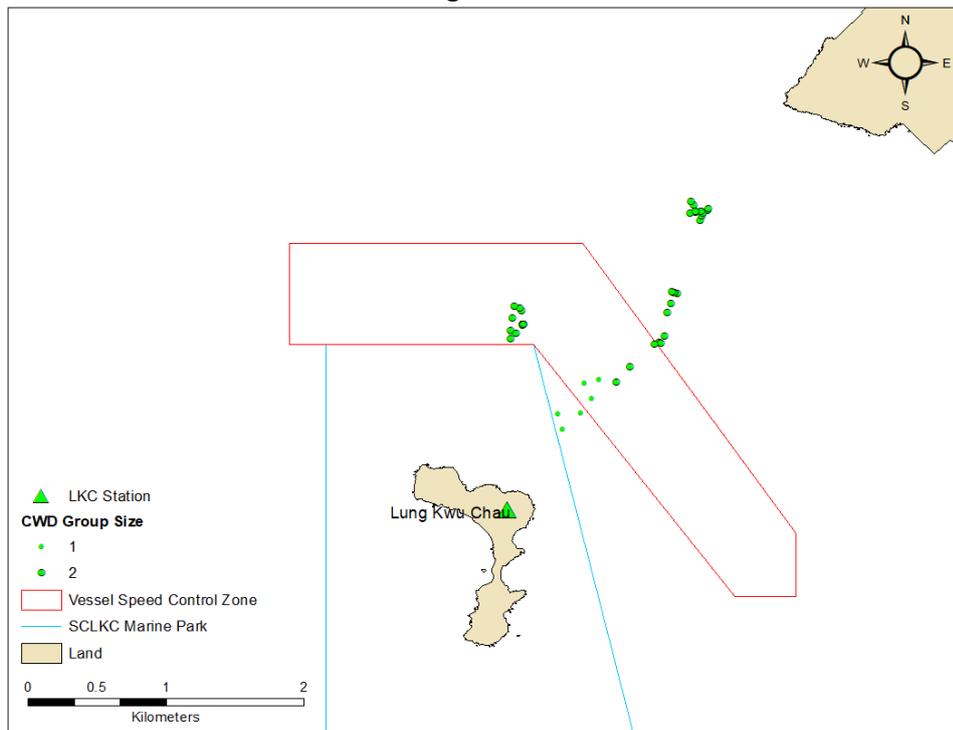


Figure 18: Percentages of CWD Behavioural States, excluding Unknown Category, recorded from Lung Kwu Chau in 2019

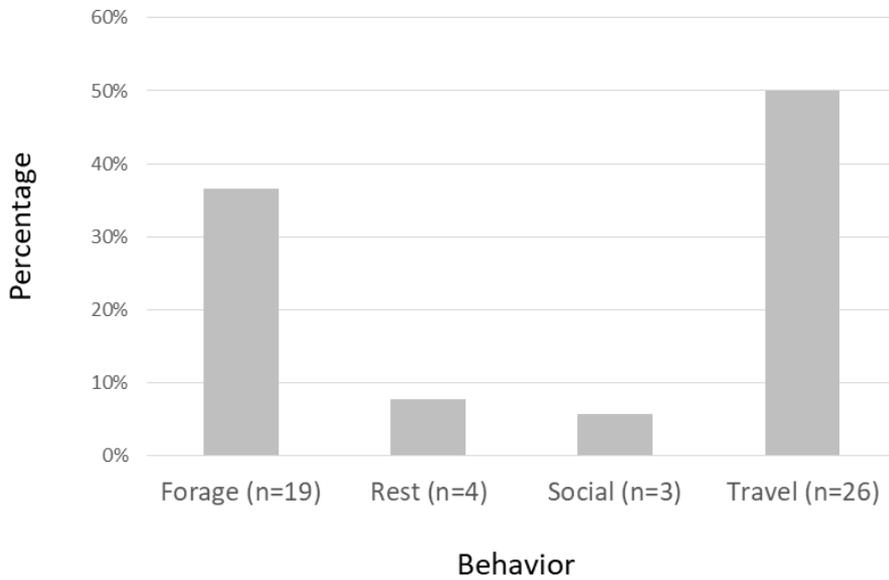


Figure 19: Stacked Bar Graph showing percentages of CWD Behavioural States, excluding Unknown Category, relative to the Sha Chau and Lung Kwu Chau Marine Park Location, recorded from Lung Kwu Chau in 2019

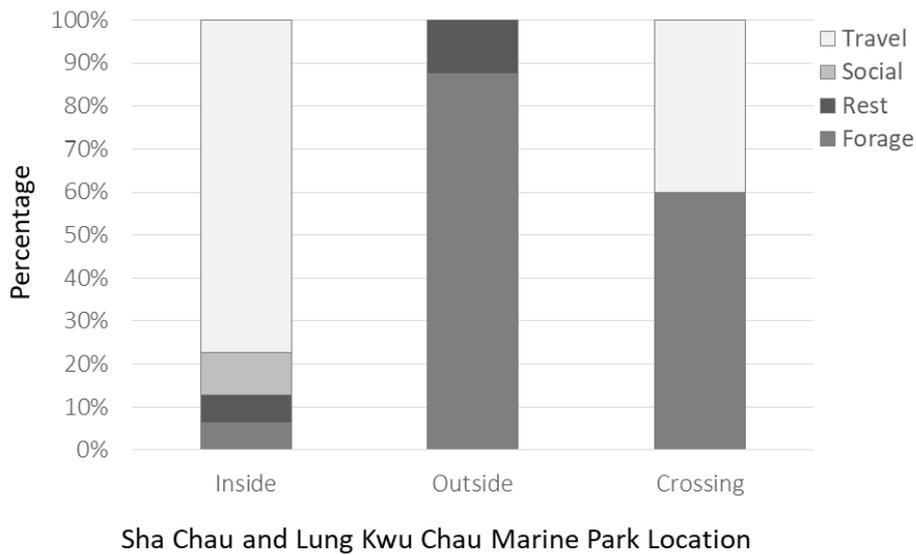


Figure 20: Plots of All Vessel Positions and All CWD Positions (prior to filtering out short-track data) obtained from Lung Kwu Chau in 2019

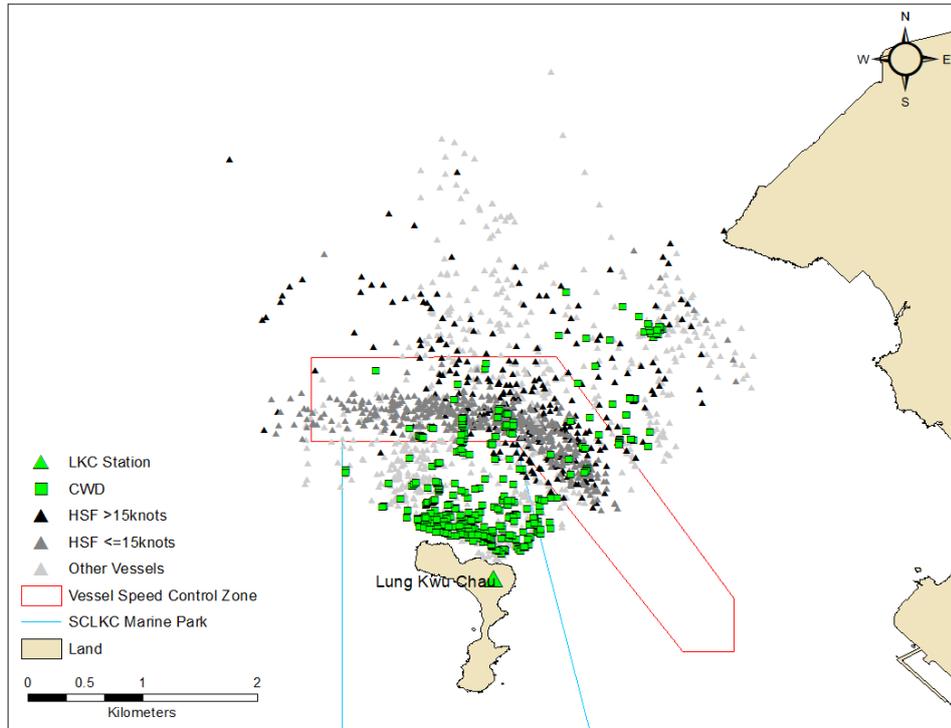
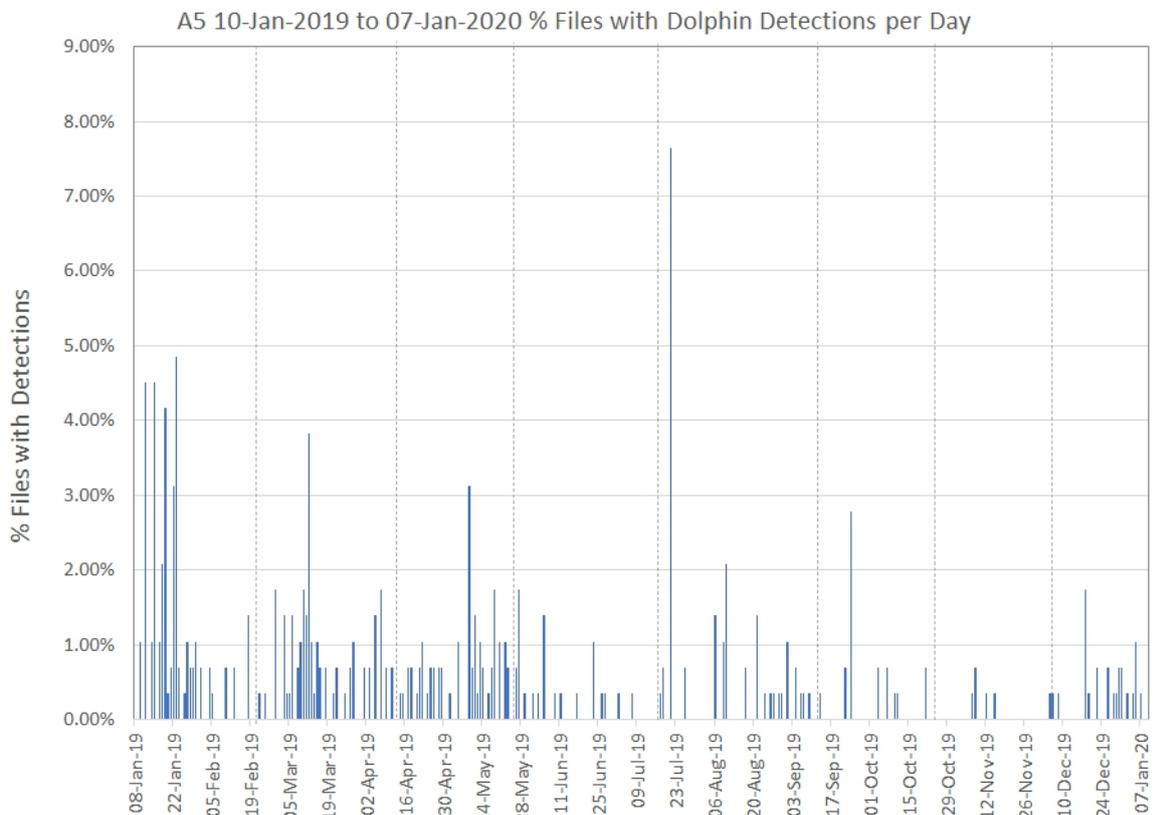


Figure 21: Dolphin Detections as Percentage of Files per day in 2019



[Grey dotted lines indicate retrieval/redeployment of EAR]

Figure 22: Dolphin Detections by Hour of Day in 2019

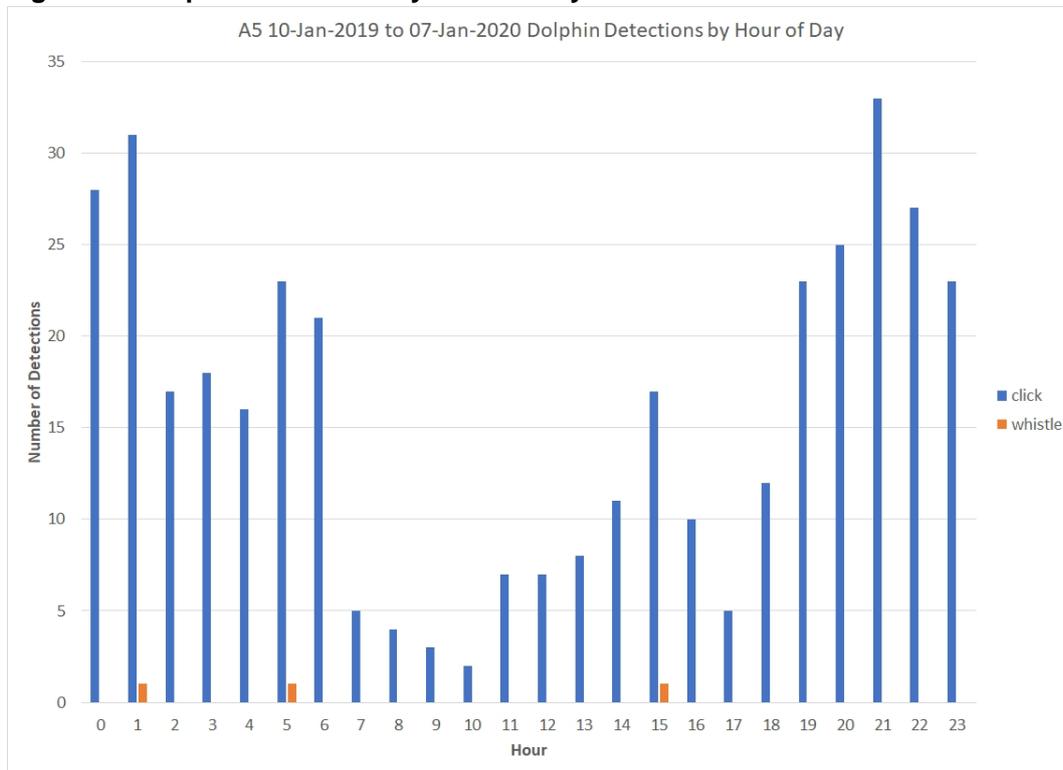
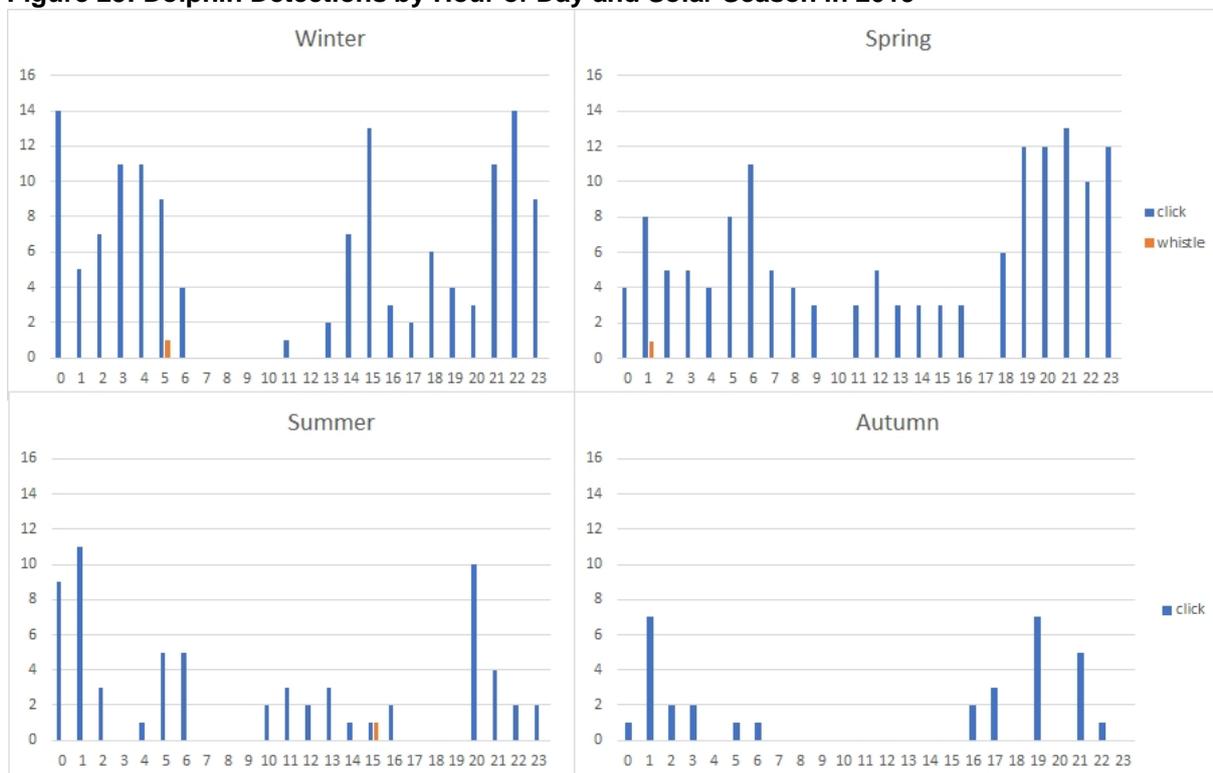


Figure 23: Dolphin Detections by Hour of Day and Solar Season in 2019



[Winter = Dec-Jan-Feb, Spring = Mar-Apr-May, Summer = Jun-Jul-Aug, Autumn = Sep-Oct-Nov]

Figure 24: Daily Mean Sound Pressure Level (SPL) (dB rms re 1 μ Pa) recorded in 2019

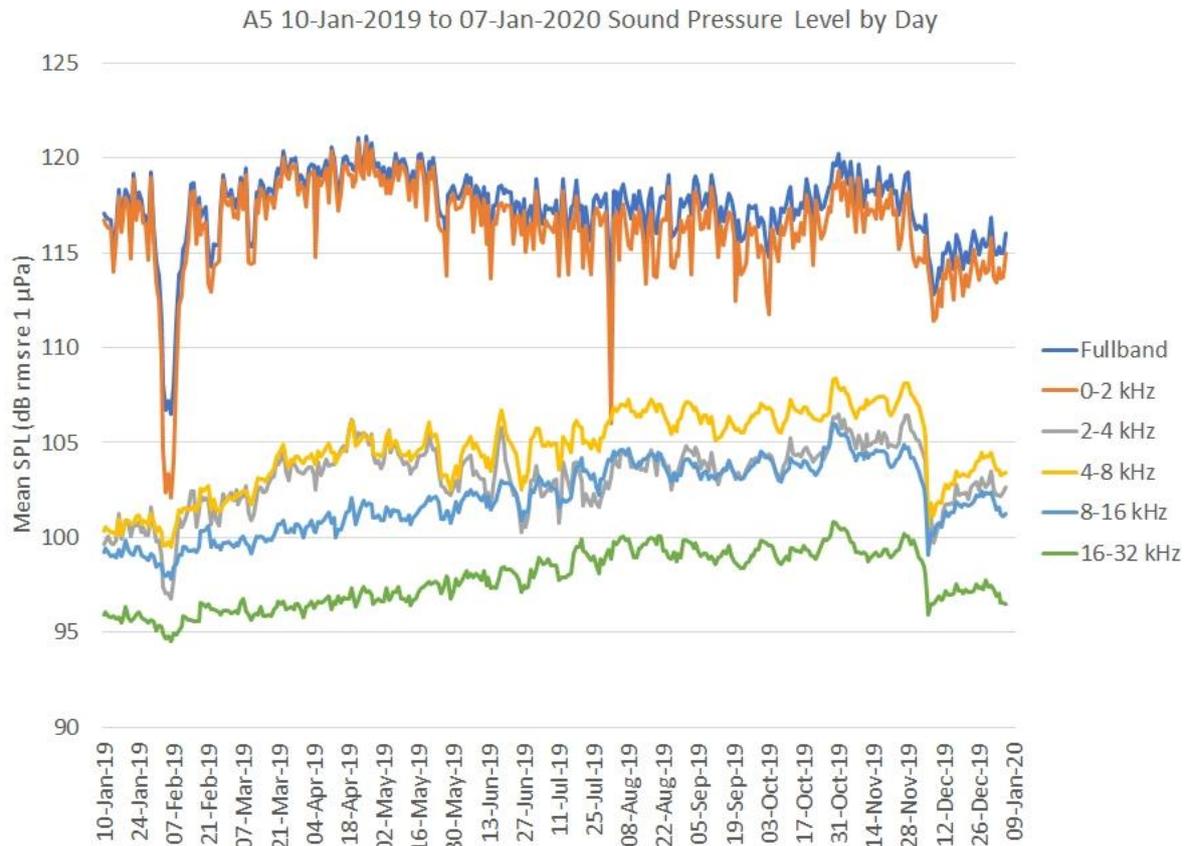


Figure 25: Sound Pressure Level (SPL) by Hour of Day recorded in 2019

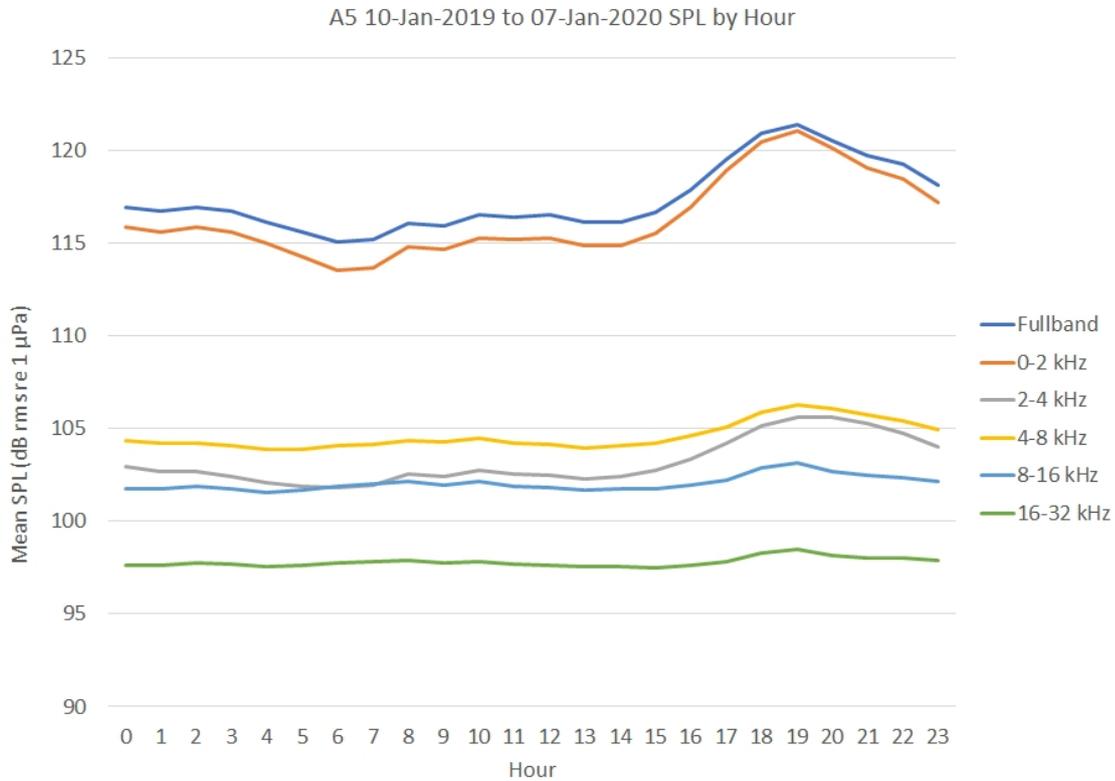
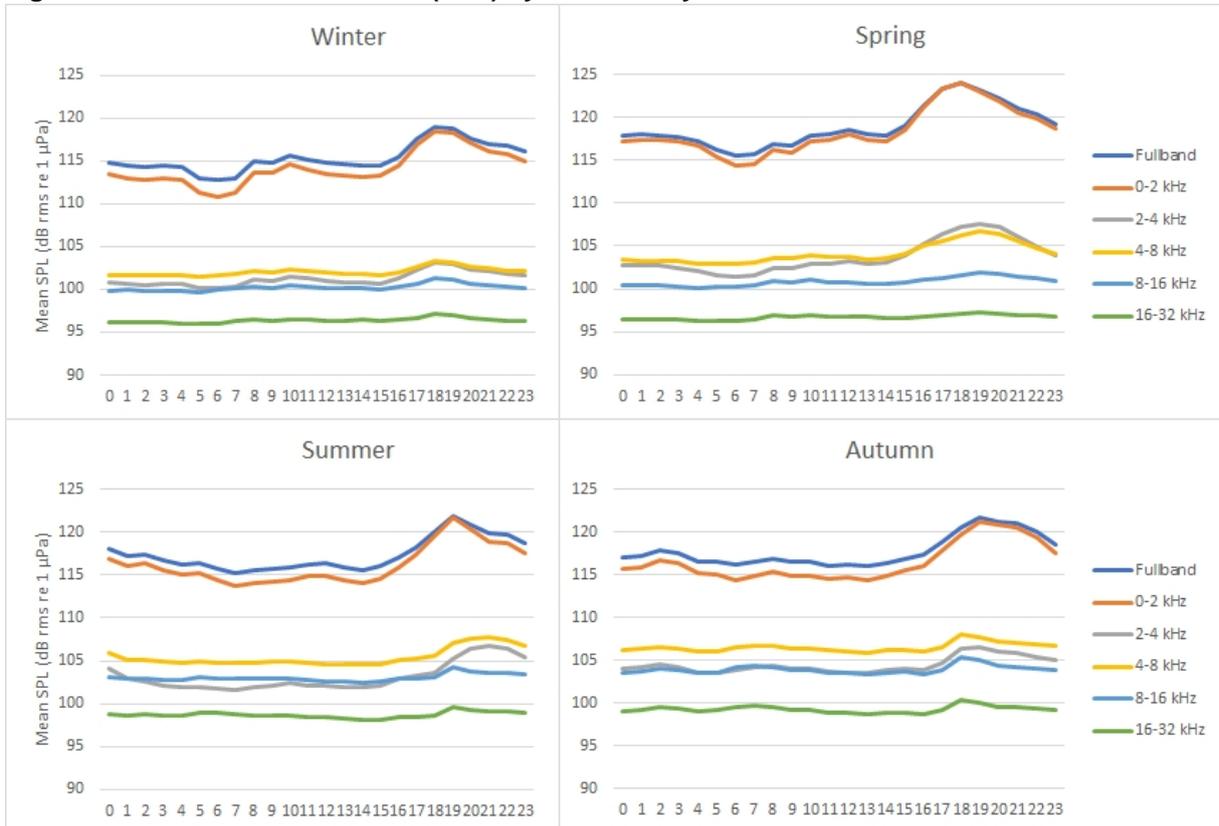


Figure 26: Sound Pressure Level (SPL) by Hour of Day and Solar Season recorded in 2019



[Winter = Dec-Jan-Feb, Spring = Mar-Apr-May, Summer = Jun-Jul-Aug, Autumn = Sep-Oct-Nov]

Table 1: CWD Encounter Rates by Survey Areas

Survey Area	Encounter Rate (STG)		Encounter Rate (ANI)	
	2018	2019	2018	2019
NEL	0.0018	0	0.0018	0
NWL	2.84	1.47	8.15	3.17
AW	4.62	2.74	19.42	15.51
WL	16.13	14.31	56.52	57.52
SWL	2.61	2.53	7.90	8.50
Combined	4.00	3.22	13.02	11.63

Table 2: Summary of Monthly and Running Quarterly Encounter Rates STG and ANI

Encounter Rate	Winter		Spring			Summer			Autumn			Winter
	Jan 19	Feb 19	Mar 19	Apr 19	May 19	Jun 19	Jul 19	Aug 19	Sep 19	Oct 19	Nov 19	Dec 19
Monthly STG	2.47	1.47	1.89	2.86	2.33	3.02	7.64	3.95	4.47	3.33	2.50	2.56
Monthly ANI	5.69	3.43	7.81	10.78	10.72	10.07	31.72	16.50	17.63	12.00	5.46	6.98
Running Quarterly STG	2.96	1.87	1.94	2.10	2.37	2.73	4.37	4.92	5.36	3.91	3.42	2.80
Running Quarterly ANI	9.29	5.76	5.67	7.47	9.80	10.54	17.72	19.69	21.98	15.32	11.63	8.18

Table 3: CWD Line Transects Parameters and Estimates of Density and Abundance for Western Hong Kong, 2019

Time Period	Stratum	No. of Sightings*	Average Group Size	Trackline Detection Prob. - g(0)	Individual Density (no./100km ²)	Abundance	95% CI (Abund.)	%CV
Jan-Dec 2019	AW	3	2.8	1.0	22.34	1	0-3	51.1
Jan-Dec 2019	DB	1	2.8	1.0	2.75	1	0-5	102.6
Jan-Dec 2019	NEL	0	2.8	1.0	0.00	0	N/A	N/A
Jan-Dec 2019	NWL	25	2.8	1.0	9.09	8	4-15	30.4
Jan-Dec 2019	SWL	39	2.8	1.0	13.78	9	5-15	26.4
Jan-Dec 2019	WL	98	2.8	1.0	79.83	22	16-31	16.6
Jan-Dec 2019	Pooled[^]	166	2.8	1.0	15.13	40	30-53	14.6
Jan-Dec 2019	Winter#	27	2.8	1.0	14.94	35	16-71	35.1
Jan-Dec 2019	Spring#	32	2.8	1.0	11.52	27	17-44	22.2
Jan-Dec 2019	Summer#	62	2.8	1.0	31.16	73	49-107	19.3
Jan-Dec 2019	Autumn#	45	2.8	1.0	20.49	48	28-80	25.2

* Before truncation

[^] Pooled abundance not including Airport West (AW). Note that the pooled estimates do not necessarily add up to the sum of the individual stratum estimates, as these are computed separately.

The seasonal estimates do not include AW or DB.

Table 4: Average Group Sizes of CWDs by Survey Areas

Survey Area	Average Group Size of CWDs
NEL	0.00
NWL	2.16
AW	5.67
WL	4.02
SWL	3.44
Overall	3.63 ± 3.13

Table 5: Average Group Sizes of CWDs by Seasons

Solar Season	Average Group Size of CWDs
Spring	4.13
Summer	4.00
Autumn	3.37
Winter	2.68

Table 6: Percentage of CWD Groups recorded as Exhibiting Various Behaviours/Activities, and recorded as having Association with Fishing Boat

Survey Area	Year	Activity				Fishing Boat Association
		Feeding	Travelling	Socialising	Resting/Milling	
AW	2018	67%	-	17%	-	-
	2019	100%	-	-	-	-
NEL	2018	50%	-	-	-	-
	2019	-	-	-	-	-
NWL	2018	38%	3%	4%	-	13%
	2019	28%	8%	8%	-	-
WL	2018	22%	8%	10%	-	20%
	2019	19%	8%	14%	1%	11%
SWL	2018	17%	5%	7%	2%	14%
	2019	29%	10%	7%	-	17%
Overall	2018	25%	7%	10%	1%	4%
	2019	25%	8%	13%	1%	2%

Table 7: Summary of Photo Identification

Individual ID	Date of sighting (dd/mmm/yy)	Sighting No.	Area
NLMM001	16-Jul-19	6	WL
	18-Jul-19	1	SWL
		3	SWL
	18-Dec-19	3	WL
NLMM002	11-Feb-19	1	NWL
NLMM004	17-Apr-19	1	WL
	3-Oct-19	1	AW
		2	WL
	10-Oct-19	3	NWL
	11-Nov-19	3	NWL
	16-Dec-19	3	NWL
NLMM006	15-May-19	3	NWL
	10-Oct-19	3	NWL
	16-Dec-19	2	NWL
NLMM009	11-Feb-19	1	NWL
NLMM012	21-Aug-19	1	WL
NLMM013	15-May-19	3	NWL
	10-Oct-19	3	NWL
	11-Nov-19	3	NWL
	16-Dec-19	2	NWL
NLMM015	9-Sep-19	6	SWL
	12-Sep-19	1	WL
NLMM016	28-Jan-19	1	WL
	3-Apr-19	2	WL
	17-Apr-19	4	WL
	14-May-19	1	WL
	3-Oct-19	6	WL
	18-Dec-19	2	WL
NLMM018	3-Oct-19	1	AW
		2	WL
NLMM019	24-Jan-19	1	AW
	13-Feb-19	1	AW
	19-Jun-19	1	NWL
	3-Oct-19	1	AW
	11-Nov-19	1	NWL
	22-Nov-19	4	WL
NLMM020	24-Jan-19	1	AW
	13-Feb-19	1	AW
	9-Sep-19	6	SWL
	11-Nov-19	1	NWL
NLMM021	19-Jun-19	1	NWL
	21-Aug-19	2	WL
NLMM023	10-Oct-19	2	NWL
NLMM027	19-Jun-19	1	NWL
	21-Aug-19	2	WL
NLMM033	8-Aug-19	1	WL
NLMM034	26-Jun-19	1	WL
NLMM037	24-Jul-19	1	NWL
NLMM039	25-Apr-19	2	NWL
	15-May-19	1	NWL
NLMM040	8-Aug-19	2	WL
NLMM041	8-Aug-19	2	WL
NLMM043	13-Feb-19	1	AW
	25-Sep-19	1	WL
NLMM046	26-Jun-19	1	WL
	8-Aug-19	2	WL
NLMM049	23-Jul-19	6	WL
NLMM052	3-Oct-19	1	AW
NLMM053	3-Oct-19	1	AW
NLMM056	12-Mar-19	3	WL

Individual ID	Date of sighting (dd/mmm/yy)	Sighting No.	Area
NLMM060	8-Aug-19	1	WL
	12-Mar-19	2	WL
	3-Apr-19	3	WL
NLMM061	14-May-19	4	WL
	17-Jul-19	9	SWL
NLMM062	17-Jan-19	1	NWL
NLMM063	24-Jan-19	4	WL
	25-Apr-19	3	NWL
	24-Jul-19	1	NWL
	21-Aug-19	5	WL
	12-Sep-19	1	WL
	16-Dec-19	3	NWL
NLMM065	17-Apr-19	1	WL
NLMM067	8-Aug-19	1	WL
NLMM068	3-Oct-19	1	AW
NLMM069	25-Apr-19	1	NWL
NLMM070	25-Apr-19	1	NWL
	26-Jun-19	1	WL
NLMM071	3-Oct-19	1	AW
NLMM072	16-Dec-19	3	NWL
SLMM002	21-Jan-19	2	SWL
	22-Jan-19	4	SWL
	3-Apr-19	3	WL
	8-May-19	1	WL
	25-Sep-19	9	WL
SLMM003	22-Jan-19	4	SWL
	12-Mar-19	5	WL
	16-Jul-19	6	WL
	21-Aug-19	5	WL
	12-Sep-19	2	WL
		3	WL
		7	WL
3-Oct-19	1	WL	
SLMM007	21-Jan-19	2	SWL
	22-Jan-19	4	SWL
	16-Jul-19	6	WL
	12-Sep-19	2	WL
	25-Sep-19	9	WL
SLMM010	24-Jan-19	6	WL
	13-Feb-19	3	WL
	21-Aug-19	5	WL
	3-Oct-19	8	WL
	10-Dec-19	2	SWL
SLMM011	13-Feb-19	1	AW
	18-Jun-19	2	SWL
	11-Nov-19	1	NWL
SLMM012	22-Jan-19	4	SWL
	13-Feb-19	2	WL
	17-Jul-19	2	SWL
	18-Jul-19	1	SWL
	9-Sep-19	6	SWL
	21-Nov-19	4	SWL
	18-Dec-19	3	WL
SLMM014	3-Apr-19	3	WL
	18-Jul-19	4	SWL
	3-Oct-19	8	WL
	18-Dec-19	4	WL
SLMM022	3-Apr-19	3	WL
	23-Jul-19	7	WL
	25-Sep-19	8	WL
		9	WL
	3-Oct-19	8	WL

Individual ID	Date of sighting (dd/mmm/yy)	Sighting No.	Area
SLMM023	14-May-19	4	WL
SLMM025	26-Jun-19	2	WL
	21-Aug-19	2	WL
	3-Oct-19	8	WL
SLMM027	25-Sep-19	9	WL
SLMM028	18-Jun-19	1	SWL
	18-Jul-19	4	SWL
	3-Oct-19	8	WL
	22-Nov-19	1	WL
SLMM029	17-Jul-19	3	SWL
	18-Jul-19	1	SWL
	3-Oct-19	8	WL
SLMM030	14-May-19	3	WL
	27-May-19	3	SWL
SLMM031	17-Jul-19	1	SWL
	21-Nov-19	4	SWL
SLMM034	3-Apr-19	3	WL
	8-May-19	1	WL
	14-May-19	5	WL
SLMM035	17-Jul-19	4	SWL
SLMM037	17-Jul-19	5	SWL
	18-Jul-19	1	SWL
		3	SWL
	3-Oct-19	7	WL
	12-Nov-19	1	WL
SLMM044	18-Dec-19	3	WL
SLMM045	14-May-19	4	WL
	12-Sep-19	5	WL
SLMM049	14-May-19	4	WL
	17-Jul-19	4	SWL
	18-Jul-19	1	SWL
		3	SWL
	25-Sep-19	9	WL
	3-Oct-19	8	WL
	22-Nov-19	6	SWL
	3-Apr-19	3	WL
SLMM050	23-Jul-19	5	WL
	18-Dec-19	3	WL
	22-Jan-19	4	SWL
SLMM052	25-Mar-19	1	WL
	17-Jul-19	2	SWL
		5	SWL
	18-Jul-19	1	SWL
		3	SWL
	3-Oct-19	4	WL
	12-Nov-19	1	WL
	21-Jan-19	2	SWL
SLMM053	18-Jul-19	4	SWL
	21-Aug-19	2	WL
	25-Sep-19	8	WL
	3-Oct-19	8	WL
	22-Nov-19	4	WL
	25-Mar-19	1	WL
SLMM058	25-Sep-19	7	WL
	3-Apr-19	3	WL
SLMM060	2-Oct-19	3	SWL
	21-Nov-19	2	SWL
SLMM062	17-Jul-19	4	SWL
	18-Jul-19	3	SWL
SLMM064	12-Mar-19	3	WL
	17-Jul-19	4	SWL
	8-Aug-19	1	WL

Individual ID	Date of sighting (dd/mmm/yy)	Sighting No.	Area
SLMM068	17-Jul-19	2	SWL
SLMM070	17-Jul-19	4	SWL
	18-Jul-19	3	SWL
SLMM071	18-Jul-19	1	SWL
SLMM072	22-Aug-19	2	SWL
WLMM001	24-Jan-19	4	WL
	28-Jan-19	1	WL
	3-Apr-19	3	WL
	25-Sep-19	7	WL
WLMM003	22-Nov-19	2	WL
	3-Apr-19	3	WL
WLMM004	10-Dec-19	3	SWL
	3-Apr-19	3	WL
WLMM005	17-Jul-19	4	SWL
	12-Sep-19	2	WL
		3	WL
WLMM006	14-May-19	4	WL
	25-Sep-19	8	WL
WLMM007	14-May-19	2	WL
	18-Jul-19	4	SWL
	22-Nov-19	2	WL
WLMM008	22-Jan-19	4	SWL
	3-Apr-19	3	WL
	8-May-19	1	WL
	25-Sep-19	9	WL
	3-Oct-19	8	WL
WLMM009	18-Dec-19	5	WL
	17-Jul-19	3	SWL
	22-Nov-19	5	WL
WLMM010	18-Dec-19	5	WL
WLMM011	14-May-19	2	WL
WLMM012	3-Oct-19	6	WL
WLMM013	3-Oct-19	8	WL
WLMM014	12-Mar-19	3	WL
	17-Apr-19	2	WL
WLMM015	25-Mar-19	1	WL
	18-Jun-19	2	SWL
	17-Jul-19	6	SWL
	9-Sep-19	2	SWL
WLMM016	18-Dec-19	1	WL
WLMM017	24-Jan-19	4	WL
WLMM018	24-Jan-19	4	WL
	18-Jul-19	4	SWL
	3-Oct-19	8	WL
WLMM019	22-Nov-19	2	WL
	3-Apr-19	3	WL
WLMM020	8-Aug-19	4	WL
	3-Apr-19	3	WL
WLMM021	3-Apr-19	3	WL
	17-Apr-19	6	WL
	16-Jul-19	5	WL
	8-Aug-19	7	WL
WLMM022	21-Aug-19	3	WL
	17-Jul-19	6	SWL
WLMM023	12-Mar-19	3	WL
WLMM024	3-Apr-19	1	WL
	17-Apr-19	1	WL
		5	WL
	14-May-19	1	WL
	6-Jun-19	2	WL
	26-Jun-19	1	WL
WLMM025	16-Jul-19	1	WL

Individual ID	Date of sighting (dd/mmm/yy)	Sighting No.	Area
	25-Sep-19	6	WL
WLMM046	17-Apr-19	3	WL
	18-Jul-19	3	SWL
WLMM049	16-Jul-19	3	WL
	25-Sep-19	5	WL
	10-Oct-19	1	NWL
WLMM051	8-Aug-19	1	WL
WLMM052	12-Mar-19	3	WL
	26-Jun-19	1	WL
	16-Jul-19	5	WL
WLMM054	12-Mar-19	1	WL
	3-Apr-19	3	WL
	9-Sep-19	1	SWL
	4-Oct-19	5	SWL
	11-Oct-19	1	WL
		2	WL
	18-Dec-19	1	WL
WLMM056	22-Jan-19	4	SWL
	13-Feb-19	2	WL
	3-Apr-19	3	WL
	17-Jul-19	2	SWL
	21-Aug-19	5	WL
	9-Sep-19	6	SWL
	21-Nov-19	4	SWL
WLMM060	13-Mar-19	1	NWL
	12-Sep-19	3	WL
WLMM061	15-May-19	2	NWL
WLMM062	12-Mar-19	2	WL
	25-Sep-19	2	WL
WLMM063	3-Apr-19	3	WL
	14-May-19	4	WL
	17-Jul-19	10	SWL
	22-Nov-19	2	WL
WLMM064	17-Jan-19	1	NWL
WLMM065	17-Jul-19	9	SWL
	12-Sep-19	3	WL
	25-Sep-19	5	WL
	18-Dec-19	3	WL
WLMM067	21-Jan-19	2	SWL
	12-Mar-19	3	WL
	25-Mar-19	1	WL
	17-Jul-19	2	SWL
	25-Sep-19	9	WL
	18-Dec-19	3	WL
WLMM068	6-Jun-19	1	WL
WLMM069	24-Jan-19	5	WL
	3-Apr-19	3	WL
	14-May-19	4	WL
	17-Jul-19	4	SWL
	18-Jul-19	3	SWL
WLMM070	14-May-19	3	WL
WLMM071	13-Mar-19	1	NWL
	12-Sep-19	5	WL
	3-Oct-19	5	WL
WLMM073	26-Jun-19	2	WL
	3-Oct-19	7	WL
WLMM075	25-Sep-19	2	WL
WLMM076	14-May-19	3	WL
	27-May-19	3	SWL
WLMM078	24-Jan-19	3	WL
	27-May-19	3	SWL
	18-Jun-19	2	SWL

Individual ID	Date of sighting (dd/mmm/yy)	Sighting No.	Area
WLMM079	18-Jul-19	4	SWL
	25-Sep-19	8	WL
	3-Oct-19	8	WL
	22-Jan-19	4	SWL
	8-May-19	1	WL
	18-Jun-19	3	SWL
	18-Jul-19	1	SWL
		3	SWL
	23-Jul-19	7	WL
	21-Aug-19	5	WL
12-Sep-19	2	WL	
	3	WL	
	3-Oct-19	7	WL
WLMM081	16-Jul-19	4	WL
	8-Aug-19	4	WL
WLMM082	16-Jul-19	4	WL
	23-Jul-19	3	WL
	8-Aug-19	4	WL
WLMM083	14-May-19	2	WL
	6-Jun-19	2	WL
	16-Jul-19	1	WL
WLMM085	12-Mar-19	3	WL
	17-Jul-19	4	SWL
WLMM086	17-Apr-19	4	WL
	17-Jul-19	11	SWL
WLMM090	17-Apr-19	4	WL
	8-Aug-19	7	WL
	12-Sep-19	1	WL
WLMM094	16-Jul-19	5	WL
	8-Aug-19	7	WL
	25-Sep-19	2	WL
WLMM095	14-May-19	2	WL
	23-Jul-19	1	WL
WLMM100	8-Aug-19	1	WL
WLMM102	23-Jul-19	1	WL
WLMM103	14-May-19	2	WL
WLMM104	18-Jul-19	2	SWL
	23-Jul-19	6	WL
	8-Aug-19	7	WL
	3-Oct-19	3	WL
WLMM106	3-Apr-19	3	WL
	17-Jul-19	10	SWL
	25-Sep-19	9	WL
WLMM107	3-Oct-19	6	WL
WLMM109	23-Jul-19	5	WL
WLMM113	25-Mar-19	1	WL
WLMM114	12-Mar-19	4	WL
	25-Sep-19	9	WL
WLMM115	24-Apr-19	1	NWL
	22-Jul-19	1	NWL
	23-Jul-19	1	WL
		3	WL
WLMM118	17-Apr-19	6	WL
WLMM121	8-Aug-19	4	WL
WLMM122	26-Jun-19	1	WL
	16-Jul-19	1	WL
	8-Aug-19	1	WL
WLMM127	25-Apr-19	1	NWL
WLMM129	14-May-19	4	WL
WLMM131	12-Mar-19	5	WL
	6-Jun-19	3	WL
	17-Jul-19	2	SWL

Individual ID	Date of sighting (dd/mmm/yy)	Sighting No.	Area
		7	SWL
		10	SWL
	3-Oct-19	7	WL
WLMM132	24-Jan-19	5	WL
	3-Apr-19	3	WL
	17-Jul-19	4	SWL
	18-Jul-19	3	SWL
	3-Oct-19	7	WL
WLMM133	12-Mar-19	2	WL
	25-Sep-19	2	WL
WLMM134	12-Mar-19	3	WL
WLMM135	12-Mar-19	3	WL
WLMM136	12-Mar-19	3	WL
	16-Jul-19	5	WL
WLMM137	8-May-19	1	WL
	16-Jul-19	5	WL
WLMM138	6-Jun-19	2	WL
WLMM139	16-Jul-19	4	WL
WLMM140	16-Jul-19	4	WL
WLMM141	16-Jul-19	5	WL
WLMM142	23-Jul-19	5	WL
WLMM143	8-Aug-19	4	WL
WLMM144	8-Aug-19	7	WL
WLMM145	21-Aug-19	2	WL
WLMM146	12-Sep-19	2	WL
WLMM147	12-Sep-19	2	WL
		3	WL
WLMM148	12-Sep-19	4	WL
WLMM149	3-Oct-19	6	WL

Table 8: Land-based Survey, Theodolite Effort and CWD Group Summary in 2019

Land-based Station	# of Survey Sessions	Survey Effort (hh:mm)	# CWD Groups Sighted	CWD Group Sighting per Survey Hr	# Groups After Filtering	# of 10-minutes segments
Sha Chau	12	72:00	0	0.0	0	0
Lung Kwu Chau	24	144:04	47	0.33	16	23
TOTAL	36	216:04	47	0.22	16	23

Table 9: Land-based CWD Focal Group Size Summary in 2019 (Standardised Segments)

Category	n (sample size)	Minimum # Individuals	Maximum # Individuals	Mean Grp Size	Standard Deviation
Lung Kwu Chau Station Total	138	1	5	2.13	1.04
Winter	54	1	5	2.67	1.26
Spring	12	2	2	2.00	0
Summer	24	2	3	2.50	0.51
Autumn	48	1	2	1.38	0.49
Dry	90	1	5	2.27	1.13
Wet	48	1	3	1.88	0.79
Inside SCLKCMP boundary	72	1	5	2.33	1.19
Crossing SCLKCMP boundary	24	1	4	2.00	1.25
Outside SCLKCMP boundary	42	1	2	1.86	0.35
No boats present	96	1	5	2.19	1.08
High speed ferry within 500 m	18	2	2	2.00	0
High speed ferry under speed restriction within 500 m	6	1	1	1.00	0
Other boats within 500 m	18	1	4	2.33	1.28

Table 10: CWD Mean Swimming Speed, Reorientation Rate, and Linearity based on Vessel Presence record from Lung Kwu Chau in 2019

Vessel Type	Segment Sample Size	Mean Speed (Std. dev.)	Mean Reorientation Rate (Std. dev.)	Mean Linearity (Std. dev.)
No Vessel	16	2.79 (1.63)	25.53 (18.51)	0.79 (0.26)
High Speed Ferry	3	1.89 (1.18)	60.32 (10.04)	0.51 (0.25)
High Speed Ferry Under Speed Restriction	1	4.71 (N/A)	46.27 (N/A)	0.22 (N/A)
Other	3	3.91 (0.80)	18.27 (17.40)	0.89 (0.16)

Table 11: Summary of PAM Deployments and Dolphin Detections, 10 Jan 2019 to 07 Jan 2020

Site	Dep #	Data start (dd/mm/yyyy)	Data end (dd/mm/yyyy)	# recording days	# files	Days with dolphins (%)	Files with dolphins (%)
A5	1	10/01/2019	21/02/2019	43	12232	23 (53%)	105 (0.86%)
A5	2	22/02/2019	12/04/2019	50	14166	28 (56%)	79 (0.56%)
A5	3	13/04/2019	24/05/2019	42	11954	26 (62%)	62 (0.52%)
A5	4	25/05/2019	16/07/2019	53	15113	14 (26%)	24 (0.16%)
A5	5	17/07/2019	10/09/2019	56	16128	19 (34%)	59 (0.37%)
A5	6	12/09/2019	22/10/2019	41	11808	8 (20%)	19 (0.16%)
A5	7	24/10/2019	06/12/2019	44	12384	6 (14%)	7 (0.06%)
A5	8	06/12/2019	07/01/2020	33	9729	13 (39%)	23 (0.24%)
A5	Total	10/01/2019	07/01/2020	362	103514	137 (38%)	378 (0.37%)

Table 12: Summary of PAM Deployments and Dolphin Detections in the Previous Year (16 Dec 2017 to 09 Jan 2019)

Site	Dep #	Data start (dd/mm/yyyy)	Data end (dd/mm/yyyy)	# recording days	# files	Days with dolphins (%)	Files with dolphins (%)
A5	1	16/12/2017	16/01/2018	32	9153	18 (56%)	46 (0.50%)
A5	2	17/01/2018	04/02/2018	19	5427	13 (68%)	34 (0.63%)
A5	3	07/03/2018	02/05/2018	57	16370	27 (47%)	54 (0.33%)
A5	4	08/05/2018	23/06/2018	47	13311	8 (17%)	10 (0.08%)
A5	5	05/09/2018	15/10/2018	41	11808	16 (39%)	29 (0.25%)
A5	6	17/10/2018	28/11/2018	43	12226	17 (40%)	38 (0.31%)
A5	7	29/11/2018	09/01/2019	42	11951	24 (57%)	75 (0.63%)
A5	Total	16/12/2017	09/01/2019	281	80246	123 (44%)	286 (0.36%)

CWD Small Vessel Line-transect Survey

Survey Effort Data

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
7-Jan-19	NWL	2	20.930	WINTER	32166	3RS ET	P
7-Jan-19	NWL	3	43.070	WINTER	32166	3RS ET	P
7-Jan-19	NWL	2	4.300	WINTER	32166	3RS ET	S
7-Jan-19	NWL	3	7.100	WINTER	32166	3RS ET	S
8-Jan-19	DB	2	8.250	WINTER	32166	3RS ET	P
8-Jan-19	DB	3	2.070	WINTER	32166	3RS ET	P
8-Jan-19	DB	2	4.410	WINTER	32166	3RS ET	S
8-Jan-19	DB	3	0.970	WINTER	32166	3RS ET	S
8-Jan-19	NEL	2	34.190	WINTER	32166	3RS ET	P
8-Jan-19	NEL	3	3.500	WINTER	32166	3RS ET	P
8-Jan-19	NEL	2	10.310	WINTER	32166	3RS ET	S
15-Jan-19	AW	1	4.830	WINTER	32166	3RS ET	P
15-Jan-19	WL	1	1.210	WINTER	32166	3RS ET	P
15-Jan-19	WL	2	19.630	WINTER	32166	3RS ET	P
15-Jan-19	WL	2	11.260	WINTER	32166	3RS ET	S
16-Jan-19	NEL	2	20.580	WINTER	32166	3RS ET	P
16-Jan-19	NEL	3	16.890	WINTER	32166	3RS ET	P
16-Jan-19	NEL	2	7.160	WINTER	32166	3RS ET	S
16-Jan-19	NEL	3	3.170	WINTER	32166	3RS ET	S
16-Jan-19	DB	2	1.900	WINTER	32166	3RS ET	P
16-Jan-19	DB	3	5.880	WINTER	32166	3RS ET	P
16-Jan-19	DB	4	2.010	WINTER	32166	3RS ET	P
16-Jan-19	DB	2	1.500	WINTER	32166	3RS ET	S
16-Jan-19	DB	3	2.870	WINTER	32166	3RS ET	S
16-Jan-19	DB	4	1.140	WINTER	32166	3RS ET	S
17-Jan-19	NWL	3	63.630	WINTER	32166	3RS ET	P
17-Jan-19	NWL	2	0.900	WINTER	32166	3RS ET	S
17-Jan-19	NWL	3	10.670	WINTER	32166	3RS ET	S
21-Jan-19	SWL	2	1.230	WINTER	32166	3RS ET	P
21-Jan-19	SWL	3	32.659	WINTER	32166	3RS ET	P
21-Jan-19	SWL	4	21.736	WINTER	32166	3RS ET	P
21-Jan-19	SWL	3	8.780	WINTER	32166	3RS ET	S
21-Jan-19	SWL	4	5.765	WINTER	32166	3RS ET	S
22-Jan-19	SWL	2	15.148	WINTER	32166	3RS ET	P
22-Jan-19	SWL	3	25.163	WINTER	32166	3RS ET	P
22-Jan-19	SWL	4	19.730	WINTER	32166	3RS ET	P
22-Jan-19	SWL	2	2.289	WINTER	32166	3RS ET	S
22-Jan-19	SWL	3	3.160	WINTER	32166	3RS ET	S
22-Jan-19	SWL	4	4.930	WINTER	32166	3RS ET	S
24-Jan-19	WL	1	3.950	WINTER	32166	3RS ET	P
24-Jan-19	WL	2	1.670	WINTER	32166	3RS ET	P
24-Jan-19	WL	3	1.480	WINTER	32166	3RS ET	P
24-Jan-19	WL	1	2.240	WINTER	32166	3RS ET	S
24-Jan-19	WL	2	1.240	WINTER	32166	3RS ET	S
24-Jan-19	AW	1	4.480	WINTER	32166	3RS ET	P
28-Jan-19	WL	2	8.141	WINTER	32166	3RS ET	P
28-Jan-19	WL	3	2.710	WINTER	32166	3RS ET	P
28-Jan-19	WL	4	0.680	WINTER	32166	3RS ET	P

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
28-Jan-19	WL	2	4.949	WINTER	32166	3RS ET	S
28-Jan-19	WL	3	1.530	WINTER	32166	3RS ET	S
11-Feb-19	NWL	3	56.030	WINTER	32166	3RS ET	P
11-Feb-19	NWL	4	5.200	WINTER	32166	3RS ET	P
11-Feb-19	NWL	5	1.800	WINTER	32166	3RS ET	P
11-Feb-19	NWL	3	9.170	WINTER	32166	3RS ET	S
11-Feb-19	NWL	4	3.300	WINTER	32166	3RS ET	S
12-Feb-19	NEL	1	24.190	WINTER	32166	3RS ET	P
12-Feb-19	NEL	2	12.260	WINTER	32166	3RS ET	P
12-Feb-19	NEL	3	1.200	WINTER	32166	3RS ET	P
12-Feb-19	NEL	1	6.760	WINTER	32166	3RS ET	S
12-Feb-19	NEL	2	2.690	WINTER	32166	3RS ET	S
12-Feb-19	DB	1	1.530	WINTER	32166	3RS ET	P
12-Feb-19	DB	2	8.360	WINTER	32166	3RS ET	P
12-Feb-19	DB	2	4.390	WINTER	32166	3RS ET	S
12-Feb-19	DB	3	0.820	WINTER	32166	3RS ET	S
13-Feb-19	AW	2	5.048	WINTER	32166	3RS ET	P
13-Feb-19	WL	1	1.980	WINTER	32166	3RS ET	P
13-Feb-19	WL	2	18.238	WINTER	32166	3RS ET	P
13-Feb-19	WL	1	1.410	WINTER	32166	3RS ET	S
13-Feb-19	WL	2	7.462	WINTER	32166	3RS ET	S
18-Feb-19	NEL	3	15.320	WINTER	32166	3RS ET	P
18-Feb-19	NEL	4	12.170	WINTER	32166	3RS ET	P
18-Feb-19	NEL	5	9.810	WINTER	32166	3RS ET	P
18-Feb-19	NEL	3	8.270	WINTER	32166	3RS ET	S
18-Feb-19	NEL	4	1.930	WINTER	32166	3RS ET	S
18-Feb-19	DB	2	1.200	WINTER	32166	3RS ET	P
18-Feb-19	DB	3	7.450	WINTER	32166	3RS ET	P
18-Feb-19	DB	4	1.560	WINTER	32166	3RS ET	P
18-Feb-19	DB	2	2.900	WINTER	32166	3RS ET	S
18-Feb-19	DB	3	1.790	WINTER	32166	3RS ET	S
20-Feb-19	SWL	2	41.440	WINTER	32166	3RS ET	P
20-Feb-19	SWL	3	11.900	WINTER	32166	3RS ET	P
20-Feb-19	SWL	2	15.540	WINTER	32166	3RS ET	S
20-Feb-19	SWL	3	1.100	WINTER	32166	3RS ET	S
21-Feb-19	SWL	2	9.600	WINTER	32166	3RS ET	P
21-Feb-19	SWL	3	44.290	WINTER	32166	3RS ET	P
21-Feb-19	SWL	4	1.000	WINTER	32166	3RS ET	P
21-Feb-19	SWL	2	5.100	WINTER	32166	3RS ET	S
21-Feb-19	SWL	3	10.810	WINTER	32166	3RS ET	S
22-Feb-19	NWL	2	15.900	WINTER	32166	3RS ET	P
22-Feb-19	NWL	3	43.000	WINTER	32166	3RS ET	P
22-Feb-19	NWL	4	4.900	WINTER	32166	3RS ET	P
22-Feb-19	NWL	2	4.100	WINTER	32166	3RS ET	S
22-Feb-19	NWL	3	3.500	WINTER	32166	3RS ET	S
22-Feb-19	NWL	4	3.700	WINTER	32166	3RS ET	S
26-Feb-19	AW	3	2.920	WINTER	32166	3RS ET	P
26-Feb-19	AW	4	1.950	WINTER	32166	3RS ET	P
26-Feb-19	WL	2	5.060	WINTER	32166	3RS ET	P

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
26-Feb-19	WL	3	12.840	WINTER	32166	3RS ET	P
26-Feb-19	WL	4	2.280	WINTER	32166	3RS ET	P
26-Feb-19	WL	2	3.960	WINTER	32166	3RS ET	S
26-Feb-19	WL	3	6.840	WINTER	32166	3RS ET	S
6-Mar-19	NWL	2	7.760	SPRING	32166	3RS ET	P
6-Mar-19	NWL	3	45.090	SPRING	32166	3RS ET	P
6-Mar-19	NWL	4	9.860	SPRING	32166	3RS ET	P
6-Mar-19	NWL	2	2.390	SPRING	32166	3RS ET	S
6-Mar-19	NWL	3	9.400	SPRING	32166	3RS ET	S
8-Mar-19	NEL	2	7.210	SPRING	32166	3RS ET	P
8-Mar-19	NEL	3	15.470	SPRING	32166	3RS ET	P
8-Mar-19	NEL	4	14.300	SPRING	32166	3RS ET	P
8-Mar-19	NEL	2	1.100	SPRING	32166	3RS ET	S
8-Mar-19	NEL	3	9.020	SPRING	32166	3RS ET	S
8-Mar-19	DB	2	2.860	SPRING	32166	3RS ET	P
8-Mar-19	DB	3	5.550	SPRING	32166	3RS ET	P
8-Mar-19	DB	4	1.500	SPRING	32166	3RS ET	P
8-Mar-19	DB	2	3.840	SPRING	32166	3RS ET	S
8-Mar-19	DB	3	0.950	SPRING	32166	3RS ET	S
12-Mar-19	AW	2	4.790	SPRING	32166	3RS ET	P
12-Mar-19	WL	2	17.206	SPRING	32166	3RS ET	P
12-Mar-19	WL	3	1.200	SPRING	32166	3RS ET	P
12-Mar-19	WL	2	8.012	SPRING	32166	3RS ET	S
12-Mar-19	WL	3	0.890	SPRING	32166	3RS ET	S
13-Mar-19	NWL	2	25.190	SPRING	32166	3RS ET	P
13-Mar-19	NWL	3	37.650	SPRING	32166	3RS ET	P
13-Mar-19	NWL	2	9.060	SPRING	32166	3RS ET	S
13-Mar-19	NWL	3	2.600	SPRING	32166	3RS ET	S
15-Mar-19	NEL	2	22.660	SPRING	32166	3RS ET	P
15-Mar-19	NEL	3	15.030	SPRING	32166	3RS ET	P
15-Mar-19	NEL	2	8.010	SPRING	32166	3RS ET	S
15-Mar-19	NEL	3	1.700	SPRING	32166	3RS ET	S
15-Mar-19	DB	2	1.100	SPRING	32166	3RS ET	P
15-Mar-19	DB	3	8.560	SPRING	32166	3RS ET	P
15-Mar-19	DB	2	3.870	SPRING	32166	3RS ET	S
15-Mar-19	DB	3	0.970	SPRING	32166	3RS ET	S
21-Mar-19	SWL	1	6.680	SPRING	32166	3RS ET	P
21-Mar-19	SWL	2	49.790	SPRING	32166	3RS ET	P
21-Mar-19	SWL	3	4.000	SPRING	32166	3RS ET	P
21-Mar-19	SWL	2	9.960	SPRING	32166	3RS ET	S
22-Mar-19	SWL	1	3.850	SPRING	32166	3RS ET	P
22-Mar-19	SWL	2	56.301	SPRING	32166	3RS ET	P
22-Mar-19	SWL	2	9.689	SPRING	32166	3RS ET	S
25-Mar-19	AW	3	4.650	SPRING	32166	3RS ET	P
25-Mar-19	WL	2	3.400	SPRING	32166	3RS ET	P
25-Mar-19	WL	3	12.070	SPRING	32166	3RS ET	P
25-Mar-19	WL	4	4.800	SPRING	32166	3RS ET	P
25-Mar-19	WL	2	4.640	SPRING	32166	3RS ET	S
25-Mar-19	WL	3	6.190	SPRING	32166	3RS ET	S

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
2-Apr-19	NEL	2	3.760	SPRING	32166	3RS ET	P
2-Apr-19	NEL	3	32.560	SPRING	32166	3RS ET	P
2-Apr-19	NEL	4	1.300	SPRING	32166	3RS ET	P
2-Apr-19	NEL	2	2.950	SPRING	32166	3RS ET	S
2-Apr-19	NEL	3	6.330	SPRING	32166	3RS ET	S
2-Apr-19	DB	2	6.940	SPRING	32166	3RS ET	P
2-Apr-19	DB	3	2.710	SPRING	32166	3RS ET	P
2-Apr-19	DB	2	3.950	SPRING	32166	3RS ET	S
2-Apr-19	DB	3	0.900	SPRING	32166	3RS ET	S
3-Apr-19	AW	3	4.860	SPRING	32166	3RS ET	P
3-Apr-19	WL	2	16.868	SPRING	32166	3RS ET	P
3-Apr-19	WL	3	6.320	SPRING	32166	3RS ET	P
3-Apr-19	WL	2	5.681	SPRING	32166	3RS ET	S
3-Apr-19	WL	3	3.930	SPRING	32166	3RS ET	S
9-Apr-19	SWL	2	4.100	SPRING	32166	3RS ET	P
9-Apr-19	SWL	3	50.530	SPRING	32166	3RS ET	P
9-Apr-19	SWL	4	1.000	SPRING	32166	3RS ET	P
9-Apr-19	SWL	2	1.200	SPRING	32166	3RS ET	S
9-Apr-19	SWL	3	13.470	SPRING	32166	3RS ET	S
11-Apr-19	SWL	2	50.110	SPRING	32166	3RS ET	P
11-Apr-19	SWL	3	5.000	SPRING	32166	3RS ET	P
11-Apr-19	SWL	2	13.420	SPRING	32166	3RS ET	S
11-Apr-19	SWL	3	2.340	SPRING	32166	3RS ET	S
17-Apr-19	AW	2	4.700	SPRING	32166	3RS ET	P
17-Apr-19	WL	1	3.160	SPRING	32166	3RS ET	P
17-Apr-19	WL	2	6.754	SPRING	32166	3RS ET	P
17-Apr-19	WL	3	13.978	SPRING	32166	3RS ET	P
17-Apr-19	WL	1	2.450	SPRING	32166	3RS ET	S
17-Apr-19	WL	2	2.196	SPRING	32166	3RS ET	S
17-Apr-19	WL	3	3.312	SPRING	32166	3RS ET	S
18-Apr-19	NEL	2	3.820	SPRING	32166	3RS ET	P
18-Apr-19	NEL	3	32.970	SPRING	32166	3RS ET	P
18-Apr-19	NEL	2	3.510	SPRING	32166	3RS ET	S
18-Apr-19	NEL	3	6.500	SPRING	32166	3RS ET	S
18-Apr-19	DB	2	4.790	SPRING	32166	3RS ET	P
18-Apr-19	DB	3	5.260	SPRING	32166	3RS ET	P
18-Apr-19	DB	2	0.940	SPRING	32166	3RS ET	S
18-Apr-19	DB	3	3.610	SPRING	32166	3RS ET	S
24-Apr-19	NWL	2	24.330	SPRING	32166	3RS ET	P
24-Apr-19	NWL	3	38.410	SPRING	32166	3RS ET	P
24-Apr-19	NWL	2	7.110	SPRING	32166	3RS ET	S
24-Apr-19	NWL	3	5.150	SPRING	32166	3RS ET	S
25-Apr-19	NWL	2	15.581	SPRING	32166	3RS ET	P
25-Apr-19	NWL	3	45.251	SPRING	32166	3RS ET	P
25-Apr-19	NWL	4	1.100	SPRING	32166	3RS ET	P
25-Apr-19	NWL	2	4.530	SPRING	32166	3RS ET	S
25-Apr-19	NWL	3	7.379	SPRING	32166	3RS ET	S
3-May-19	DB	2	0.400	SPRING	32166	3RS ET	P
3-May-19	DB	3	9.240	SPRING	32166	3RS ET	P

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
3-May-19	DB	2	1.200	SPRING	32166	3RS ET	S
3-May-19	DB	3	3.560	SPRING	32166	3RS ET	S
3-May-19	NEL	2	9.550	SPRING	32166	3RS ET	P
3-May-19	NEL	3	27.830	SPRING	32166	3RS ET	P
3-May-19	NEL	2	5.120	SPRING	32166	3RS ET	S
3-May-19	NEL	3	5.300	SPRING	32166	3RS ET	S
8-May-19	AW	3	2.330	SPRING	32166	3RS ET	P
8-May-19	AW	4	2.340	SPRING	32166	3RS ET	P
8-May-19	WL	2	8.310	SPRING	32166	3RS ET	P
8-May-19	WL	3	5.280	SPRING	32166	3RS ET	P
8-May-19	WL	4	7.050	SPRING	32166	3RS ET	P
8-May-19	WL	2	5.150	SPRING	32166	3RS ET	S
8-May-19	WL	3	2.580	SPRING	32166	3RS ET	S
8-May-19	WL	4	3.130	SPRING	32166	3RS ET	S
9-May-19	NEL	1	2.300	SPRING	32166	3RS ET	P
9-May-19	NEL	2	32.170	SPRING	32166	3RS ET	P
9-May-19	NEL	3	3.160	SPRING	32166	3RS ET	P
9-May-19	NEL	1	1.000	SPRING	32166	3RS ET	S
9-May-19	NEL	2	8.970	SPRING	32166	3RS ET	S
9-May-19	DB	2	8.250	SPRING	32166	3RS ET	P
9-May-19	DB	3	1.410	SPRING	32166	3RS ET	P
9-May-19	DB	2	4.750	SPRING	32166	3RS ET	S
10-May-19	SWL	2	6.600	SPRING	32166	3RS ET	P
10-May-19	SWL	3	48.980	SPRING	32166	3RS ET	P
10-May-19	SWL	2	2.120	SPRING	32166	3RS ET	S
10-May-19	SWL	3	13.300	SPRING	32166	3RS ET	S
14-May-19	AW	2	4.730	SPRING	32166	3RS ET	P
14-May-19	WL	2	12.245	SPRING	32166	3RS ET	P
14-May-19	WL	3	6.915	SPRING	32166	3RS ET	P
14-May-19	WL	2	5.880	SPRING	32166	3RS ET	S
14-May-19	WL	3	4.048	SPRING	32166	3RS ET	S
15-May-19	NWL	2	36.790	SPRING	32166	3RS ET	P
15-May-19	NWL	3	26.720	SPRING	32166	3RS ET	P
15-May-19	NWL	2	7.310	SPRING	32166	3RS ET	S
15-May-19	NWL	3	4.710	SPRING	32166	3RS ET	S
16-May-19	NWL	2	4.080	SPRING	32166	3RS ET	P
16-May-19	NWL	3	44.920	SPRING	32166	3RS ET	P
16-May-19	NWL	4	13.900	SPRING	32166	3RS ET	P
16-May-19	NWL	3	11.800	SPRING	32166	3RS ET	S
16-May-19	NWL	4	0.300	SPRING	32166	3RS ET	S
27-May-19	SWL	2	29.957	SPRING	32166	3RS ET	P
27-May-19	SWL	3	24.860	SPRING	32166	3RS ET	P
27-May-19	SWL	2	12.763	SPRING	32166	3RS ET	S
27-May-19	SWL	3	1.400	SPRING	32166	3RS ET	S
4-Jun-19	NEL	2	27.350	SUMMER	32166	3RS ET	P
4-Jun-19	NEL	3	7.700	SUMMER	32166	3RS ET	P
4-Jun-19	NEL	4	2.600	SUMMER	32166	3RS ET	P
4-Jun-19	NEL	2	7.050	SUMMER	32166	3RS ET	S
4-Jun-19	NEL	3	3.200	SUMMER	32166	3RS ET	S

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
4-Jun-19	DB	2	9.650	SUMMER	32166	3RS ET	P
4-Jun-19	DB	2	4.950	SUMMER	32166	3RS ET	S
6-Jun-19	AW	2	4.730	SUMMER	32166	3RS ET	P
6-Jun-19	WL	2	7.467	SUMMER	32166	3RS ET	P
6-Jun-19	WL	3	12.575	SUMMER	32166	3RS ET	P
6-Jun-19	WL	2	1.850	SUMMER	32166	3RS ET	S
6-Jun-19	WL	3	7.388	SUMMER	32166	3RS ET	S
6-Jun-19	WL	4	0.570	SUMMER	32166	3RS ET	S
11-Jun-19	DB	2	4.400	SUMMER	32166	3RS ET	P
11-Jun-19	DB	3	5.420	SUMMER	32166	3RS ET	P
11-Jun-19	DB	2	0.940	SUMMER	32166	3RS ET	S
11-Jun-19	DB	3	3.940	SUMMER	32166	3RS ET	S
11-Jun-19	NEL	1	1.600	SUMMER	32166	3RS ET	P
11-Jun-19	NEL	2	34.960	SUMMER	32166	3RS ET	P
11-Jun-19	NEL	1	1.200	SUMMER	32166	3RS ET	S
11-Jun-19	NEL	2	10.140	SUMMER	32166	3RS ET	S
17-Jun-19	SWL	3	10.690	SUMMER	32166	3RS ET	P
17-Jun-19	SWL	4	44.330	SUMMER	32166	3RS ET	P
17-Jun-19	SWL	2	0.900	SUMMER	32166	3RS ET	S
17-Jun-19	SWL	3	2.800	SUMMER	32166	3RS ET	S
17-Jun-19	SWL	4	12.480	SUMMER	32166	3RS ET	S
18-Jun-19	SWL	2	51.312	SUMMER	32166	3RS ET	P
18-Jun-19	SWL	3	2.970	SUMMER	32166	3RS ET	P
18-Jun-19	SWL	2	10.560	SUMMER	32166	3RS ET	S
18-Jun-19	SWL	3	3.830	SUMMER	32166	3RS ET	S
19-Jun-19	NWL	1	7.700	SUMMER	32166	3RS ET	P
19-Jun-19	NWL	2	30.077	SUMMER	32166	3RS ET	P
19-Jun-19	NWL	3	24.682	SUMMER	32166	3RS ET	P
19-Jun-19	NWL	1	3.900	SUMMER	32166	3RS ET	S
19-Jun-19	NWL	2	6.050	SUMMER	32166	3RS ET	S
19-Jun-19	NWL	3	2.491	SUMMER	32166	3RS ET	S
26-Jun-19	AW	2	5.100	SUMMER	32166	3RS ET	P
26-Jun-19	WL	2	18.167	SUMMER	32166	3RS ET	P
26-Jun-19	WL	3	2.710	SUMMER	32166	3RS ET	P
26-Jun-19	WL	2	9.143	SUMMER	32166	3RS ET	S
26-Jun-19	WL	3	1.810	SUMMER	32166	3RS ET	S
27-Jun-19	NWL	2	4.700	SUMMER	32166	3RS ET	P
27-Jun-19	NWL	3	58.800	SUMMER	32166	3RS ET	P
27-Jun-19	NWL	2	2.200	SUMMER	32166	3RS ET	S
27-Jun-19	NWL	3	9.600	SUMMER	32166	3RS ET	S
8-Jul-19	DB	3	2.850	SUMMER	32166	3RS ET	P
8-Jul-19	DB	4	6.640	SUMMER	32166	3RS ET	P
8-Jul-19	DB	3	2.250	SUMMER	32166	3RS ET	S
8-Jul-19	DB	4	2.460	SUMMER	32166	3RS ET	S
8-Jul-19	NEL	2	6.410	SUMMER	32166	3RS ET	P
8-Jul-19	NEL	3	27.530	SUMMER	32166	3RS ET	P
8-Jul-19	NEL	4	3.400	SUMMER	32166	3RS ET	P
8-Jul-19	NEL	2	2.960	SUMMER	32166	3RS ET	S
8-Jul-19	NEL	3	7.500	SUMMER	32166	3RS ET	S

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
9-Jul-19	DB	4	7.100	SUMMER	32166	3RS ET	P
9-Jul-19	DB	5	2.640	SUMMER	32166	3RS ET	P
9-Jul-19	DB	4	4.560	SUMMER	32166	3RS ET	S
9-Jul-19	NEL	2	4.100	SUMMER	32166	3RS ET	P
9-Jul-19	NEL	3	26.300	SUMMER	32166	3RS ET	P
9-Jul-19	NEL	4	6.700	SUMMER	32166	3RS ET	P
9-Jul-19	NEL	2	2.000	SUMMER	32166	3RS ET	S
9-Jul-19	NEL	3	7.500	SUMMER	32166	3RS ET	S
9-Jul-19	NEL	4	0.900	SUMMER	32166	3RS ET	S
16-Jul-19	AW	1	4.980	SUMMER	32166	3RS ET	P
16-Jul-19	WL	1	5.410	SUMMER	32166	3RS ET	P
16-Jul-19	WL	2	5.206	SUMMER	32166	3RS ET	P
16-Jul-19	WL	3	7.009	SUMMER	32166	3RS ET	P
16-Jul-19	WL	4	1.137	SUMMER	32166	3RS ET	P
16-Jul-19	WL	1	1.570	SUMMER	32166	3RS ET	S
16-Jul-19	WL	2	2.237	SUMMER	32166	3RS ET	S
16-Jul-19	WL	3	4.340	SUMMER	32166	3RS ET	S
16-Jul-19	WL	4	0.223	SUMMER	32166	3RS ET	S
17-Jul-19	SWL	2	39.559	SUMMER	32166	3RS ET	P
17-Jul-19	SWL	3	11.290	SUMMER	32166	3RS ET	P
17-Jul-19	SWL	1	0.930	SUMMER	32166	3RS ET	S
17-Jul-19	SWL	2	10.694	SUMMER	32166	3RS ET	S
17-Jul-19	SWL	3	4.140	SUMMER	32166	3RS ET	S
18-Jul-19	SWL	1	1.882	SUMMER	32166	3RS ET	P
18-Jul-19	SWL	2	40.279	SUMMER	32166	3RS ET	P
18-Jul-19	SWL	3	13.740	SUMMER	32166	3RS ET	P
18-Jul-19	SWL	1	0.398	SUMMER	32166	3RS ET	S
18-Jul-19	SWL	2	10.003	SUMMER	32166	3RS ET	S
18-Jul-19	SWL	3	3.490	SUMMER	32166	3RS ET	S
22-Jul-19	NWL	1	8.700	SUMMER	32166	3RS ET	P
22-Jul-19	NWL	2	53.140	SUMMER	32166	3RS ET	P
22-Jul-19	NWL	3	0.800	SUMMER	32166	3RS ET	P
22-Jul-19	NWL	1	1.100	SUMMER	32166	3RS ET	S
22-Jul-19	NWL	2	9.860	SUMMER	32166	3RS ET	S
23-Jul-19	AW	2	4.840	SUMMER	32166	3RS ET	P
23-Jul-19	WL	2	14.693	SUMMER	32166	3RS ET	P
23-Jul-19	WL	3	3.892	SUMMER	32166	3RS ET	P
23-Jul-19	WL	2	5.815	SUMMER	32166	3RS ET	S
23-Jul-19	WL	3	3.119	SUMMER	32166	3RS ET	S
24-Jul-19	NWL	2	38.660	SUMMER	32166	3RS ET	P
24-Jul-19	NWL	3	23.760	SUMMER	32166	3RS ET	P
24-Jul-19	NWL	2	6.300	SUMMER	32166	3RS ET	S
24-Jul-19	NWL	3	5.780	SUMMER	32166	3RS ET	S
7-Aug-19	SWL	2	24.140	SUMMER	32166	3RS ET	P
7-Aug-19	SWL	3	29.880	SUMMER	32166	3RS ET	P
7-Aug-19	SWL	2	6.300	SUMMER	32166	3RS ET	S
7-Aug-19	SWL	3	9.480	SUMMER	32166	3RS ET	S
8-Aug-19	AW	2	4.820	SUMMER	32166	3RS ET	P
8-Aug-19	WL	2	17.412	SUMMER	32166	3RS ET	P

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
8-Aug-19	WL	3	1.230	SUMMER	32166	3RS ET	P
8-Aug-19	WL	2	6.241	SUMMER	32166	3RS ET	S
8-Aug-19	WL	3	1.330	SUMMER	32166	3RS ET	S
12-Aug-19	NWL	2	3.080	SUMMER	32166	3RS ET	P
12-Aug-19	NWL	3	49.260	SUMMER	32166	3RS ET	P
12-Aug-19	NWL	4	9.700	SUMMER	32166	3RS ET	P
12-Aug-19	NWL	2	1.240	SUMMER	32166	3RS ET	S
12-Aug-19	NWL	3	9.320	SUMMER	32166	3RS ET	S
12-Aug-19	NWL	4	1.400	SUMMER	32166	3RS ET	S
13-Aug-19	DB	2	3.100	SUMMER	32166	3RS ET	P
13-Aug-19	DB	3	6.500	SUMMER	32166	3RS ET	P
13-Aug-19	DB	2	3.130	SUMMER	32166	3RS ET	S
13-Aug-19	DB	3	1.670	SUMMER	32166	3RS ET	S
13-Aug-19	NEL	2	32.600	SUMMER	32166	3RS ET	P
13-Aug-19	NEL	3	4.800	SUMMER	32166	3RS ET	P
13-Aug-19	NEL	2	7.900	SUMMER	32166	3RS ET	S
13-Aug-19	NEL	3	2.300	SUMMER	32166	3RS ET	S
16-Aug-19	NEL	2	18.650	SUMMER	32166	3RS ET	P
16-Aug-19	NEL	3	18.620	SUMMER	32166	3RS ET	P
16-Aug-19	NEL	2	8.230	SUMMER	32166	3RS ET	S
16-Aug-19	NEL	3	2.000	SUMMER	32166	3RS ET	S
16-Aug-19	DB	3	0.900	SUMMER	32166	3RS ET	P
16-Aug-19	DB	4	8.520	SUMMER	32166	3RS ET	P
16-Aug-19	DB	3	1.400	SUMMER	32166	3RS ET	S
16-Aug-19	DB	4	3.480	SUMMER	32166	3RS ET	S
21-Aug-19	AW	2	1.850	SUMMER	32166	3RS ET	P
21-Aug-19	AW	3	2.850	SUMMER	32166	3RS ET	P
21-Aug-19	WL	2	19.158	SUMMER	32166	3RS ET	P
21-Aug-19	WL	3	1.440	SUMMER	32166	3RS ET	P
21-Aug-19	WL	2	10.752	SUMMER	32166	3RS ET	S
22-Aug-19	SWL	2	54.700	SUMMER	32166	3RS ET	P
22-Aug-19	SWL	2	16.000	SUMMER	32166	3RS ET	S
26-Aug-19	NWL	2	14.600	SUMMER	32166	3RS ET	P
26-Aug-19	NWL	3	38.000	SUMMER	32166	3RS ET	P
26-Aug-19	NWL	4	10.340	SUMMER	32166	3RS ET	P
26-Aug-19	NWL	2	2.000	SUMMER	32166	3RS ET	S
26-Aug-19	NWL	3	10.060	SUMMER	32166	3RS ET	S
9-Sep-19	SWL	2	41.156	AUTUMN	32166	3RS ET	P
9-Sep-19	SWL	3	10.484	AUTUMN	32166	3RS ET	P
9-Sep-19	SWL	2	13.766	AUTUMN	32166	3RS ET	S
9-Sep-19	SWL	3	2.924	AUTUMN	32166	3RS ET	S
11-Sep-19	NWL	2	48.170	AUTUMN	32166	3RS ET	P
11-Sep-19	NWL	3	15.330	AUTUMN	32166	3RS ET	P
11-Sep-19	NWL	2	11.300	AUTUMN	32166	3RS ET	S
11-Sep-19	NWL	3	1.200	AUTUMN	32166	3RS ET	S
12-Sep-19	AW	2	4.730	AUTUMN	32166	3RS ET	P
12-Sep-19	WL	2	14.440	AUTUMN	32166	3RS ET	P
12-Sep-19	WL	3	4.590	AUTUMN	32166	3RS ET	P
12-Sep-19	WL	2	6.600	AUTUMN	32166	3RS ET	S

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
12-Sep-19	WL	3	2.360	AUTUMN	32166	3RS ET	S
16-Sep-19	SWL	2	30.230	AUTUMN	32166	3RS ET	P
16-Sep-19	SWL	3	4.000	AUTUMN	32166	3RS ET	P
16-Sep-19	SWL	4	19.940	AUTUMN	32166	3RS ET	P
16-Sep-19	SWL	5	1.340	AUTUMN	32166	3RS ET	P
16-Sep-19	SWL	2	10.170	AUTUMN	32166	3RS ET	S
16-Sep-19	SWL	3	1.300	AUTUMN	32166	3RS ET	S
16-Sep-19	SWL	4	4.020	AUTUMN	32166	3RS ET	S
17-Sep-19	DB	2	9.740	AUTUMN	32166	3RS ET	P
17-Sep-19	DB	3	4.460	AUTUMN	32166	3RS ET	S
17-Sep-19	NEL	2	24.290	AUTUMN	32166	3RS ET	P
17-Sep-19	NEL	3	12.650	AUTUMN	32166	3RS ET	P
17-Sep-19	NEL	2	10.660	AUTUMN	32166	3RS ET	S
18-Sep-19	NEL	1	3.200	AUTUMN	32166	3RS ET	P
18-Sep-19	NEL	2	33.030	AUTUMN	32166	3RS ET	P
18-Sep-19	NEL	3	1.410	AUTUMN	32166	3RS ET	P
18-Sep-19	NEL	1	0.800	AUTUMN	32166	3RS ET	S
18-Sep-19	NEL	2	6.150	AUTUMN	32166	3RS ET	S
18-Sep-19	NEL	3	2.810	AUTUMN	32166	3RS ET	S
18-Sep-19	DB	2	9.470	AUTUMN	32166	3RS ET	P
18-Sep-19	DB	2	4.730	AUTUMN	32166	3RS ET	S
23-Sep-19	NWL	2	24.000	AUTUMN	32166	3RS ET	P
23-Sep-19	NWL	3	37.600	AUTUMN	32166	3RS ET	P
23-Sep-19	NWL	2	9.400	AUTUMN	32166	3RS ET	S
23-Sep-19	NWL	3	4.500	AUTUMN	32166	3RS ET	S
25-Sep-19	AW	2	4.870	AUTUMN	32166	3RS ET	P
25-Sep-19	WL	2	18.147	AUTUMN	32166	3RS ET	P
25-Sep-19	WL	2	9.262	AUTUMN	32166	3RS ET	S
2-Oct-19	SWL	2	21.630	AUTUMN	32166	3RS ET	P
2-Oct-19	SWL	3	32.292	AUTUMN	32166	3RS ET	P
2-Oct-19	SWL	2	4.878	AUTUMN	32166	3RS ET	S
2-Oct-19	SWL	3	11.810	AUTUMN	32166	3RS ET	S
3-Oct-19	AW	2	3.470	AUTUMN	32166	3RS ET	P
3-Oct-19	WL	2	17.515	AUTUMN	32166	3RS ET	P
3-Oct-19	WL	2	9.401	AUTUMN	32166	3RS ET	S
4-Oct-19	SWL	2	49.551	AUTUMN	32166	3RS ET	P
4-Oct-19	SWL	3	2.100	AUTUMN	32166	3RS ET	P
4-Oct-19	SWL	2	16.128	AUTUMN	32166	3RS ET	S
4-Oct-19	SWL	3	1.100	AUTUMN	32166	3RS ET	S
10-Oct-19	NWL	2	40.510	AUTUMN	32166	3RS ET	P
10-Oct-19	NWL	3	21.930	AUTUMN	32166	3RS ET	P
10-Oct-19	NWL	2	10.970	AUTUMN	32166	3RS ET	S
10-Oct-19	NWL	3	0.900	AUTUMN	32166	3RS ET	S
11-Oct-19	AW	2	4.930	AUTUMN	32166	3RS ET	P
11-Oct-19	WL	2	19.410	AUTUMN	32166	3RS ET	P
11-Oct-19	WL	2	10.760	AUTUMN	32166	3RS ET	S
16-Oct-19	NEL	2	15.140	AUTUMN	32166	3RS ET	P
16-Oct-19	NEL	3	22.770	AUTUMN	32166	3RS ET	P
16-Oct-19	NEL	2	5.040	AUTUMN	32166	3RS ET	S

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
16-Oct-19	NEL	3	5.350	AUTUMN	32166	3RS ET	S
16-Oct-19	DB	2	5.110	AUTUMN	32166	3RS ET	P
16-Oct-19	DB	3	4.900	AUTUMN	32166	3RS ET	P
16-Oct-19	DB	2	1.830	AUTUMN	32166	3RS ET	S
16-Oct-19	DB	3	2.460	AUTUMN	32166	3RS ET	S
17-Oct-19	DB	3	1.200	AUTUMN	32166	3RS ET	P
17-Oct-19	DB	4	8.520	AUTUMN	32166	3RS ET	P
17-Oct-19	DB	3	1.200	AUTUMN	32166	3RS ET	S
17-Oct-19	DB	4	3.180	AUTUMN	32166	3RS ET	S
17-Oct-19	NEL	2	37.340	AUTUMN	32166	3RS ET	P
17-Oct-19	NEL	2	10.060	AUTUMN	32166	3RS ET	S
22-Oct-19	NWL	2	41.400	AUTUMN	32166	3RS ET	P
22-Oct-19	NWL	3	21.600	AUTUMN	32166	3RS ET	P
22-Oct-19	NWL	2	8.700	AUTUMN	32166	3RS ET	S
22-Oct-19	NWL	3	3.300	AUTUMN	32166	3RS ET	S
7-Nov-19	NEL	2	5.760	AUTUMN	32166	3RS ET	P
7-Nov-19	NEL	3	27.790	AUTUMN	32166	3RS ET	P
7-Nov-19	NEL	4	3.700	AUTUMN	32166	3RS ET	P
7-Nov-19	NEL	2	2.990	AUTUMN	32166	3RS ET	S
7-Nov-19	NEL	3	7.460	AUTUMN	32166	3RS ET	S
7-Nov-19	DB	3	9.310	AUTUMN	32166	3RS ET	P
7-Nov-19	DB	3	4.690	AUTUMN	32166	3RS ET	S
8-Nov-19	DB	3	5.900	AUTUMN	32166	3RS ET	P
8-Nov-19	DB	4	2.900	AUTUMN	32166	3RS ET	P
8-Nov-19	DB	3	2.070	AUTUMN	32166	3RS ET	S
8-Nov-19	DB	4	2.530	AUTUMN	32166	3RS ET	S
8-Nov-19	NEL	2	11.100	AUTUMN	32166	3RS ET	P
8-Nov-19	NEL	3	25.840	AUTUMN	32166	3RS ET	P
8-Nov-19	NEL	2	6.500	AUTUMN	32166	3RS ET	S
8-Nov-19	NEL	3	4.160	AUTUMN	32166	3RS ET	S
11-Nov-19	NWL	2	56.549	AUTUMN	32166	3RS ET	P
11-Nov-19	NWL	3	2.200	AUTUMN	32166	3RS ET	P
11-Nov-19	NWL	4	2.900	AUTUMN	32166	3RS ET	P
11-Nov-19	NWL	2	11.051	AUTUMN	32166	3RS ET	S
11-Nov-19	NWL	4	0.900	AUTUMN	32166	3RS ET	S
12-Nov-19	AW	3	4.760	AUTUMN	32166	3RS ET	P
12-Nov-19	WL	2	3.570	AUTUMN	32166	3RS ET	P
12-Nov-19	WL	3	14.600	AUTUMN	32166	3RS ET	P
12-Nov-19	WL	4	2.600	AUTUMN	32166	3RS ET	P
12-Nov-19	WL	2	2.990	AUTUMN	32166	3RS ET	S
12-Nov-19	WL	3	5.730	AUTUMN	32166	3RS ET	S
12-Nov-19	WL	4	1.300	AUTUMN	32166	3RS ET	S
13-Nov-19	NWL	2	57.200	AUTUMN	32166	3RS ET	P
13-Nov-19	NWL	3	6.000	AUTUMN	32166	3RS ET	P
13-Nov-19	NWL	2	11.800	AUTUMN	32166	3RS ET	S
21-Nov-19	SWL	2	5.700	AUTUMN	32166	3RS ET	P
21-Nov-19	SWL	3	48.558	AUTUMN	32166	3RS ET	P
21-Nov-19	SWL	2	1.300	AUTUMN	32166	3RS ET	S
21-Nov-19	SWL	3	14.822	AUTUMN	32166	3RS ET	S

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
22-Nov-19	AW	1	2.900	AUTUMN	32166	3RS ET	P
22-Nov-19	AW	2	2.070	AUTUMN	32166	3RS ET	P
22-Nov-19	WL	2	6.843	AUTUMN	32166	3RS ET	P
22-Nov-19	WL	3	12.828	AUTUMN	32166	3RS ET	P
22-Nov-19	WL	2	1.987	AUTUMN	32166	3RS ET	S
22-Nov-19	WL	3	7.842	AUTUMN	32166	3RS ET	S
29-Nov-19	SWL	2	22.710	AUTUMN	32166	3RS ET	P
29-Nov-19	SWL	3	28.090	AUTUMN	32166	3RS ET	P
29-Nov-19	SWL	4	3.600	AUTUMN	32166	3RS ET	P
29-Nov-19	SWL	2	9.890	AUTUMN	32166	3RS ET	S
29-Nov-19	SWL	3	6.210	AUTUMN	32166	3RS ET	S
9-Dec-19	AW	3	4.860	WINTER	32166	3RS ET	P
9-Dec-19	WL	3	21.298	WINTER	32166	3RS ET	P
9-Dec-19	WL	4	2.800	WINTER	32166	3RS ET	P
9-Dec-19	WL	3	9.102	WINTER	32166	3RS ET	S
9-Dec-19	WL	4	0.900	WINTER	32166	3RS ET	S
10-Dec-19	SWL	2	30.840	WINTER	32166	3RS ET	P
10-Dec-19	SWL	3	23.200	WINTER	32166	3RS ET	P
10-Dec-19	SWL	2	7.990	WINTER	32166	3RS ET	S
10-Dec-19	SWL	3	8.100	WINTER	32166	3RS ET	S
13-Dec-19	DB	3	5.730	WINTER	32166	3RS ET	P
13-Dec-19	DB	4	3.460	WINTER	32166	3RS ET	P
13-Dec-19	DB	3	3.010	WINTER	32166	3RS ET	S
13-Dec-19	DB	4	1.400	WINTER	32166	3RS ET	S
13-Dec-19	NEL	2	1.500	WINTER	32166	3RS ET	P
13-Dec-19	NEL	3	35.350	WINTER	32166	3RS ET	P
13-Dec-19	NEL	4	0.400	WINTER	32166	3RS ET	P
13-Dec-19	NEL	3	10.350	WINTER	32166	3RS ET	S
16-Dec-19	NWL	2	37.711	WINTER	32166	3RS ET	P
16-Dec-19	NWL	3	25.070	WINTER	32166	3RS ET	P
16-Dec-19	NWL	2	8.660	WINTER	32166	3RS ET	S
16-Dec-19	NWL	3	2.860	WINTER	32166	3RS ET	S
17-Dec-19	SWL	2	46.934	WINTER	32166	3RS ET	P
17-Dec-19	SWL	3	8.050	WINTER	32166	3RS ET	P
17-Dec-19	SWL	2	12.746	WINTER	32166	3RS ET	S
17-Dec-19	SWL	3	3.170	WINTER	32166	3RS ET	S
18-Dec-19	AW	1	4.530	WINTER	32166	3RS ET	P
18-Dec-19	WL	1	10.510	WINTER	32166	3RS ET	P
18-Dec-19	WL	2	6.930	WINTER	32166	3RS ET	P
18-Dec-19	WL	1	4.850	WINTER	32166	3RS ET	S
18-Dec-19	WL	2	4.940	WINTER	32166	3RS ET	S
19-Dec-19	DB	1	0.900	WINTER	32166	3RS ET	P
19-Dec-19	DB	2	5.950	WINTER	32166	3RS ET	P
19-Dec-19	DB	3	2.060	WINTER	32166	3RS ET	P
19-Dec-19	DB	1	2.020	WINTER	32166	3RS ET	S
19-Dec-19	DB	2	2.370	WINTER	32166	3RS ET	S
19-Dec-19	NEL	1	2.700	WINTER	32166	3RS ET	P
19-Dec-19	NEL	2	15.000	WINTER	32166	3RS ET	P
19-Dec-19	NEL	3	18.090	WINTER	32166	3RS ET	P

DATE	AREA	BEAU	KM SEARCHED	SEASON	VESSEL	TYPE	P/S
19-Dec-19	NEL	4	1.670	WINTER	32166	3RS ET	P
19-Dec-19	NEL	1	1.300	WINTER	32166	3RS ET	S
19-Dec-19	NEL	2	2.700	WINTER	32166	3RS ET	S
19-Dec-19	NEL	3	6.240	WINTER	32166	3RS ET	S
23-Dec-19	NWL	2	1.830	WINTER	32166	3RS ET	P
23-Dec-19	NWL	3	45.110	WINTER	32166	3RS ET	P
23-Dec-19	NWL	4	17.460	WINTER	32166	3RS ET	P
23-Dec-19	NWL	3	7.300	WINTER	32166	3RS ET	S
23-Dec-19	NWL	4	4.600	WINTER	32166	3RS ET	S

CWD Small Vessel Line-transect Survey

Sighting Data

DATE	STG #	TIME	CWD/FP	GP SZ	AREA	BEAU	PSD	EFFORT	TYPE	DEC LAT	DEC LON	SEASON	BOAT ASSOC.	P/S
17-Jan-19	1	1055	CWD	2	NWL	3	8	ON	3RS ET	22.3081	113.8727	WINTER	NONE	S
21-Jan-19	1	1057	FP	3	SWL	3	20	ON	3RS ET	22.1425	113.9280	WINTER	NONE	S
21-Jan-19	2	1449	CWD	5	SWL	3	327	ON	3RS ET	22.1796	113.8591	WINTER	NONE	P
22-Jan-19	1	1036	FP	4	SWL	3	115	ON	3RS ET	22.1850	113.9360	WINTER	NONE	P
22-Jan-19	2	1100	FP	1	SWL	2	88	ON	3RS ET	22.1483	113.9341	WINTER	NONE	S
22-Jan-19	3	1230	FP	1	SWL	3	8	ON	3RS ET	22.1705	113.9084	WINTER	NONE	P
22-Jan-19	4	1519	CWD	8	SWL	4	105	ON	3RS ET	22.1928	113.8499	WINTER	NONE	P
24-Jan-19	1	0942	CWD	4	AW	1	87	ON	3RS ET	22.3014	113.8843	WINTER	NONE	P
24-Jan-19	2	1044	CWD	1	WL	1	110	ON	3RS ET	22.2778	113.8578	WINTER	NONE	P
24-Jan-19	3	1054	CWD	1	WL	1	161	ON	3RS ET	22.2778	113.8524	WINTER	NONE	P
24-Jan-19	4	1106	CWD	4	WL	1	325	ON	3RS ET	22.2691	113.8467	WINTER	NONE	P
24-Jan-19	5	1131	CWD	2	WL	1	91	ON	3RS ET	22.2617	113.8554	WINTER	NONE	S
24-Jan-19	6	1152	CWD	1	WL	2	97	ON	3RS ET	22.2505	113.8375	WINTER	NONE	P
28-Jan-19	1	1002	CWD	2	WL	2	24	ON	3RS ET	22.2359	113.8254	WINTER	NONE	S
28-Jan-19	2	1052	CWD	1	WL	2	336	ON	3RS ET	22.2145	113.8270	WINTER	NONE	P
11-Feb-19	1	1153	CWD	2	NWL	3	1	ON	3RS ET	22.4017	113.8877	WINTER	NONE	P
13-Feb-19	1	0941	CWD	6	AW	2	77	ON	3RS ET	22.2907	113.8745	WINTER	NONE	P
13-Feb-19	2	1042	CWD	2	WL	2	114	ON	3RS ET	22.2690	113.8480	WINTER	NONE	P
13-Feb-19	3	1203	CWD	1	WL	2	1	ON	3RS ET	22.2074	113.8406	WINTER	GILLNETTER	S
20-Feb-19	1	1033	FP	2	SWL	2	7	ON	3RS ET	22.2022	113.9362	WINTER	NONE	P
20-Feb-19	2	1511	CWD	1	SWL	2	127	ON	3RS ET	22.1862	113.8488	WINTER	NONE	P
21-Feb-19	1	1313	FP	2	SWL	2	3	ON	3RS ET	22.1482	113.8935	WINTER	NONE	S
26-Feb-19	1	1031	CWD	2	WL	3	64	ON	3RS ET	22.2603	113.8506	WINTER	NONE	P
6-Mar-19	1	1204	CWD	3	NWL	2	244	ON	3RS ET	22.3957	113.8876	SPRING	NONE	P
12-Mar-19	1	1014	CWD	1	WL	2	434	ON	3RS ET	22.2760	113.8506	SPRING	NONE	S
12-Mar-19	2	1026	CWD	5	WL	2	9	ON	3RS ET	22.2718	113.8455	SPRING	NONE	S
12-Mar-19	3	1051	CWD	11	WL	2	313	ON	3RS ET	22.2684	113.8518	SPRING	NONE	P
12-Mar-19	4	1137	CWD	1	WL	2	53	ON	3RS ET	22.2412	113.8370	SPRING	NONE	P
12-Mar-19	5	1216	CWD	4	WL	2	295	ON	3RS ET	22.2142	113.8286	SPRING	NONE	P
13-Mar-19	1	1032	CWD	2	NWL	2	76	ON	3RS ET	22.2866	113.8699	SPRING	NONE	P
21-Mar-19	1	1039	FP	6	SWL	1	230	ON	3RS ET	22.1842	113.9354	SPRING	NONE	P

DATE	STG #	TIME	CWD/FP	GP SZ	AREA	BEAU	PSD	EFFORT	TYPE	DEC LAT	DEC LON	SEASON	BOAT ASSOC.	P/S
21-Mar-19	2	1220	FP	3	SWL	2	103	ON	3RS ET	22.1539	113.9068	SPRING	NONE	P
22-Mar-19	1	1032	FP	3	SWL	2	81	ON	3RS ET	22.1998	113.9356	SPRING	NONE	P
22-Mar-19	2	1041	FP	5	SWL	2	103	ON	3RS ET	22.1822	113.9365	SPRING	NONE	P
22-Mar-19	3	1114	FP	9	SWL	2	296	ON	3RS ET	22.1637	113.9278	SPRING	NONE	P
22-Mar-19	4	1207	FP	2	SWL	2	2	ON	3RS ET	22.1482	113.9175	SPRING	NONE	P
22-Mar-19	5	1413	FP	1	SWL	2	199	ON	3RS ET	22.1820	113.8780	SPRING	NONE	P
22-Mar-19	6	1425	FP	1	SWL	2	45	ON	3RS ET	22.1766	113.8781	SPRING	NONE	P
22-Mar-19	7	1433	FP	2	SWL	2	70	ON	3RS ET	22.1626	113.8784	SPRING	NONE	P
22-Mar-19	8	1447	FP	4	SWL	2	85	ON	3RS ET	22.1710	113.8688	SPRING	NONE	P
25-Mar-19	1	1052	CWD	6	WL	2	206	ON	3RS ET	22.2504	113.8372	SPRING	NONE	P
3-Apr-19	1	1028	CWD	1	WL	2	355	ON	3RS ET	22.2658	113.8586	SPRING	NONE	S
3-Apr-19	2	1043	CWD	1	WL	2	202	ON	3RS ET	22.2603	113.8457	SPRING	NONE	P
3-Apr-19	3	1148	CWD	21	WL	3	728	ON	3RS ET	22.2187	113.8197	SPRING	PAIR TRAWLER	S
11-Apr-19	1	1041	FP	4	SWL	3	256	ON	3RS ET	22.1688	113.8569	SPRING	NONE	S
17-Apr-19	1	1043	CWD	3	WL	2	195	ON	3RS ET	22.2499	113.8366	SPRING	NONE	P
17-Apr-19	2	1059	CWD	1	WL	2	474	ON	3RS ET	22.2413	113.8370	SPRING	NONE	P
17-Apr-19	3	1114	CWD	2	WL	2	567	ON	3RS ET	22.2390	113.8271	SPRING	NONE	S
17-Apr-19	4	1127	CWD	4	WL	2	55	ON	3RS ET	22.2358	113.8250	SPRING	NONE	S
17-Apr-19	5	1143	CWD	3	WL	2	224	ON	3RS ET	22.2322	113.8308	SPRING	NONE	P
17-Apr-19	6	1200	CWD	4	WL	3	246	ON	3RS ET	22.2230	113.8306	SPRING	NONE	P
24-Apr-19	1	1038	CWD	1	NWL	3	33	ON	3RS ET	22.2711	113.8716	SPRING	NONE	S
25-Apr-19	1	0946	CWD	3	NWL	2	182	ON	3RS ET	22.3854	113.8697	SPRING	NONE	P
25-Apr-19	2	1000	CWD	2	NWL	2	319	ON	3RS ET	22.3797	113.8705	SPRING	NONE	P
25-Apr-19	3	1055	CWD	3	NWL	3	473	ON	3RS ET	22.2795	113.8699	SPRING	NONE	P
8-May-19	1	1120	CWD	12	WL	3	72	ON	3RS ET	22.2321	113.8295	SPRING	NONE	P
9-May-19	1	1325	CWD	2	DB	2	68	ON	3RS ET	22.4222	113.9131	SPRING	NONE	P
14-May-19	1	1038	CWD	2	WL	2	169	ON	3RS ET	22.2606	113.8545	SPRING	NONE	S
14-May-19	2	1102	CWD	7	WL	2	505	ON	3RS ET	22.2496	113.8407	SPRING	NONE	P
14-May-19	3	1229	CWD	4	WL	3	171	ON	3RS ET	22.2012	113.8245	SPRING	NONE	S
14-May-19	4	1249	CWD	8	WL	3	126	ON	3RS ET	22.1962	113.8363	SPRING	NONE	P
14-May-19	5	1318	CWD	2	WL	2	396	ON	3RS ET	22.1926	113.8423	SPRING	NONE	S
15-May-19	1	0955	CWD	2	NWL	2	305	ON	3RS ET	22.3681	113.8700	SPRING	NONE	P
15-May-19	2	1054	CWD	1	NWL	3	1539	ON	3RS ET	22.2727	113.8701	SPRING	NONE	P

DATE	STG #	TIME	CWD/FP	GP SZ	AREA	BEAU	PSD	EFFORT	TYPE	DEC LAT	DEC LON	SEASON	BOAT ASSOC.	P/S
15-May-19	3	1348	CWD	4	NWL	2	6	ON	3RS ET	22.4008	113.8978	SPRING	NONE	P
27-May-19	1	1210	FP	2	SWL	2	171	ON	3RS ET	22.1536	113.9084	SPRING	NONE	P
27-May-19	2	1316	FP	1	SWL	2	4	ON	3RS ET	22.1584	113.8976	SPRING	NONE	P
27-May-19	3	1443	CWD	4	SWL	2	15	ON	3RS ET	22.1987	113.8692	SPRING	NONE	P
6-Jun-19	1	1052	CWD	3	WL	3	325	ON	3RS ET	22.2518	113.8337	SUMMER	NONE	S
6-Jun-19	2	1123	CWD	6	WL	2	214	ON	3RS ET	22.2445	113.8496	SUMMER	NONE	S
6-Jun-19	3	1221	CWD	2	WL	2	82	ON	3RS ET	22.2144	113.8319	SUMMER	NONE	P
18-Jun-19	1	1134	CWD	1	SWL	2	22	ON	3RS ET	22.2055	113.9224	SUMMER	NONE	S
18-Jun-19	2	1406	CWD	3	SWL	2	89	ON	3RS ET	22.2096	113.8827	SUMMER	NONE	S
18-Jun-19	3	1505	CWD	4	SWL	2	348	ON	3RS ET	22.1764	113.8690	SUMMER	NONE	P
18-Jun-19	4	1603	CWD	1	SWL	2	70	ON	3RS ET	22.1866	113.8494	SUMMER	NONE	P
18-Jun-19	5	1609	CWD	4	SWL	2	225	ON	3RS ET	22.1892	113.8496	SUMMER	PURSE SEINER	P
19-Jun-19	1	1131	CWD	5	NWL	2	70	ON	3RS ET	22.3867	113.8780	SUMMER	NONE	P
19-Jun-19	2	1323	CWD	1	NWL	3	119	ON	3RS ET	22.3999	113.8974	SUMMER	NONE	P
26-Jun-19	1	1052	CWD	7	WL	2	117	ON	3RS ET	22.2231	113.8350	SUMMER	NONE	P
26-Jun-19	2	1211	CWD	3	WL	3	664	ON	3RS ET	22.2054	113.8309	SUMMER	NONE	P
16-Jul-19	1	1034	CWD	5	WL	1	134	ON	3RS ET	22.2665	113.8595	SUMMER	NONE	S
16-Jul-19	2	1123	CWD	1	WL	3	40	ON	3RS ET	22.2411	113.8416	SUMMER	NONE	P
16-Jul-19	3	1133	CWD	2	WL	3	73	ON	3RS ET	22.2412	113.8312	SUMMER	NONE	P
16-Jul-19	4	1159	CWD	5	WL	2	54	ON	3RS ET	22.2277	113.8378	SUMMER	NONE	S
16-Jul-19	5	1229	CWD	11	WL	3	473	ON	3RS ET	22.2137	113.8294	SUMMER	NONE	P
16-Jul-19	6	1313	CWD	3	WL	3	114	ON	3RS ET	22.1953	113.8420	SUMMER	NONE	P
17-Jul-19	1	1123	CWD	1	SWL	2	565	ON	3RS ET	22.1952	113.9279	SUMMER	NONE	P
17-Jul-19	2	1148	CWD	6	SWL	2	41	ON	3RS ET	22.2008	113.9183	SUMMER	NONE	P
17-Jul-19	3	1244	CWD	4	SWL	2	289	ON	3RS ET	22.1714	113.9086	SUMMER	NONE	P
17-Jul-19	4	1258	CWD	10	SWL	2	24	ON	3RS ET	22.1751	113.9078	SUMMER	NONE	P
17-Jul-19	5	1326	CWD	4	SWL	2	371	ON	3RS ET	22.1927	113.9082	SUMMER	NONE	S
17-Jul-19	6	1339	CWD	3	SWL	2	143	ON	3RS ET	22.1977	113.9078	SUMMER	NONE	P
17-Jul-19	7	1355	CWD	1	SWL	2	35	ON	3RS ET	22.2089	113.8973	SUMMER	NONE	P
17-Jul-19	8	1446	CWD	5	SWL	2	88	ON	3RS ET	22.1830	113.8885	SUMMER	NONE	P
17-Jul-19	9	1519	CWD	2	SWL	3	23	ON	3RS ET	22.1913	113.8780	SUMMER	NONE	P
17-Jul-19	10	1552	CWD	6	SWL	3	97	ON	3RS ET	22.1784	113.8689	SUMMER	NONE	P
17-Jul-19	11	1645	CWD	3	SWL	3	233	ON	3RS ET	22.1922	113.8494	SUMMER	NONE	P

DATE	STG #	TIME	CWD/FP	GP SZ	AREA	BEAU	PSD	EFFORT	TYPE	DEC LAT	DEC LON	SEASON	BOAT ASSOC.	P/S
18-Jul-19	1	1220	CWD	8	SWL	2	435	ON	3RS ET	22.1798	113.9042	SUMMER	NONE	S
18-Jul-19	2	1238	CWD	3	SWL	2	16	ON	3RS ET	22.1894	113.9066	SUMMER	NONE	S
18-Jul-19	3	1315	CWD	11	SWL	2	24	ON	3RS ET	22.1780	113.8975	SUMMER	NONE	P
18-Jul-19	4	1409	CWD	9	SWL	2	403	ON	3RS ET	22.2013	113.8871	SUMMER	NONE	P
18-Jul-19	5	1514	CWD	2	SWL	2	31	ON	3RS ET	22.1785	113.8690	SUMMER	NONE	P
18-Jul-19	6	1527	CWD	2	SWL	2	68	ON	3RS ET	22.1850	113.8690	SUMMER	NONE	P
18-Jul-19	7	1542	CWD	1	SWL	2	462	ON	3RS ET	22.1978	113.8685	SUMMER	NONE	P
22-Jul-19	1	1035	CWD	1	NWL	2	131	ON	3RS ET	22.2771	113.8704	SUMMER	NONE	P
23-Jul-19	1	1031	CWD	7	WL	2	142	ON	3RS ET	22.2606	113.8539	SUMMER	NONE	P
23-Jul-19	2	1111	CWD	1	WL	2	85	ON	3RS ET	22.2447	113.8497	SUMMER	NONE	S
23-Jul-19	3	1126	CWD	4	WL	2	77	ON	3RS ET	22.2418	113.8423	SUMMER	NONE	P
23-Jul-19	4	1153	CWD	3	WL	2	1245	ON	3RS ET	22.2357	113.8252	SUMMER	NONE	S
23-Jul-19	5	1203	CWD	3	WL	2	107	ON	3RS ET	22.2325	113.8330	SUMMER	NONE	P
23-Jul-19	6	1230	CWD	3	WL	3	20	ON	3RS ET	22.2145	113.8282	SUMMER	NONE	P
23-Jul-19	7	1305	CWD	5	WL	2	123	ON	3RS ET	22.1962	113.8392	SUMMER	NONE	P
24-Jul-19	1	1129	CWD	2	NWL	2	217	ON	3RS ET	22.3800	113.8764	SUMMER	NONE	P
7-Aug-19	1	1500	CWD	2	SWL	2	511	ON	3RS ET	22.1883	113.8491	SUMMER	NONE	P
8-Aug-19	1	1029	CWD	10	WL	2	78	ON	3RS ET	22.2668	113.8594	SUMMER	NONE	S
8-Aug-19	2	1052	CWD	5	WL	2	272	ON	3RS ET	22.2600	113.8430	SUMMER	NONE	P
8-Aug-19	3	1120	CWD	1	WL	2	611	ON	3RS ET	22.2434	113.8488	SUMMER	NONE	S
8-Aug-19	4	1127	CWD	8	WL	2	836	ON	3RS ET	22.2415	113.8435	SUMMER	NONE	P
8-Aug-19	5	1211	CWD	2	WL	2	48	ON	3RS ET	22.2290	113.8379	SUMMER	NONE	S
8-Aug-19	6	1230	CWD	5	WL	2	413	ON	3RS ET	22.2136	113.8254	SUMMER	NONE	P
8-Aug-19	7	1250	CWD	6	WL	2	140	ON	3RS ET	22.2143	113.8344	SUMMER	NONE	P
8-Aug-19	8	1328	CWD	1	WL	2	333	ON	3RS ET	22.1890	113.8422	SUMMER	NONE	S
12-Aug-19	1	1051	CWD	1	NWL	3	472	ON	3RS ET	22.2794	113.8696	SUMMER	NONE	P
21-Aug-19	1	1039	CWD	3	WL	2	126	ON	3RS ET	22.2604	113.8523	SUMMER	NONE	P
21-Aug-19	2	1137	CWD	10	WL	2	501	ON	3RS ET	22.2340	113.8244	SUMMER	NONE	P
21-Aug-19	3	1203	CWD	5	WL	2	186	ON	3RS ET	22.2231	113.8360	SUMMER	NONE	P
21-Aug-19	4	1231	CWD	1	WL	2	21	ON	3RS ET	22.2144	113.8344	SUMMER	NONE	P
21-Aug-19	5	1251	CWD	7	WL	2	13	ON	3RS ET	22.2145	113.8355	SUMMER	NONE	P
21-Aug-19	6	1310	CWD	2	WL	2	162	ON	3RS ET	22.2057	113.8251	SUMMER	NONE	P
22-Aug-19	1	1106	FP	2	SWL	2	119	ON	3RS ET	22.1563	113.9277	SUMMER	NONE	P

DATE	STG #	TIME	CWD/FP	GP SZ	AREA	BEAU	PSD	EFFORT	TYPE	DEC LAT	DEC LON	SEASON	BOAT ASSOC.	P/S
22-Aug-19	2	1511	CWD	2	SWL	2	94	ON	3RS ET	22.1942	113.8492	SUMMER	NONE	P
9-Sep-19	1	1029	CWD	1	SWL	2	173	ON	3RS ET	22.2110	113.9357	AUTUMN	NONE	P
9-Sep-19	2	1146	CWD	1	SWL	2	426	ON	3RS ET	22.2020	113.9177	AUTUMN	NONE	P
9-Sep-19	3	1240	FP	7	SWL	2	2	ON	3RS ET	22.1551	113.9078	AUTUMN	NONE	P
9-Sep-19	4	1312	CWD	1	SWL	2	41	ON	3RS ET	22.2041	113.9078	AUTUMN	NONE	P
9-Sep-19	5	1332	CWD	2	SWL	2	851	ON	3RS ET	22.1974	113.8974	AUTUMN	NONE	P
9-Sep-19	6	1351	CWD	7	SWL	2	1298	ON	3RS ET	22.1819	113.8970	AUTUMN	NONE	P
12-Sep-19	1	1035	CWD	4	WL	2	253	ON	3RS ET	22.2648	113.8579	AUTUMN	NONE	S
12-Sep-19	2	1057	CWD	8	WL	2	687	ON	3RS ET	22.2569	113.8366	AUTUMN	NONE	S
12-Sep-19	3	1137	CWD	9	WL	2	656	ON	3RS ET	22.2315	113.8305	AUTUMN	NONE	P
12-Sep-19	4	1208	CWD	2	WL	2	163	ON	3RS ET	22.2240	113.8372	AUTUMN	NONE	S
12-Sep-19	5	1240	CWD	3	WL	2	92	ON	3RS ET	22.2139	113.8239	AUTUMN	NONE	P
16-Sep-19	1	1422	FP	1	SWL	5	14	ON	3RS ET	22.1717	113.9268	AUTUMN	NONE	P
25-Sep-19	1	1019	CWD	1	WL	2	167	ON	3RS ET	22.2785	113.8611	AUTUMN	NONE	P
25-Sep-19	2	1037	CWD	6	WL	2	698	ON	3RS ET	22.2776	113.8569	AUTUMN	NONE	P
25-Sep-19	3	1110	CWD	1	WL	2	163	ON	3RS ET	22.2601	113.8477	AUTUMN	NONE	P
25-Sep-19	4	1129	CWD	1	WL	2	2	ON	3RS ET	22.2516	113.8334	AUTUMN	NONE	S
25-Sep-19	5	1207	CWD	2	WL	2	353	ON	3RS ET	22.2315	113.8387	AUTUMN	NONE	P
25-Sep-19	6	1234	CWD	1	WL	2	486	ON	3RS ET	22.2134	113.8238	AUTUMN	NONE	P
25-Sep-19	7	1259	CWD	2	WL	2	24	ON	3RS ET	22.2051	113.8319	AUTUMN	NONE	P
25-Sep-19	8	1320	CWD	6	WL	2	166	ON	3RS ET	22.1962	113.8356	AUTUMN	NONE	P
25-Sep-19	9	1329	CWD	17	WL	2	390	ON	3RS ET	22.1951	113.8424	AUTUMN	NONE	S
2-Oct-19	1	1101	FP	2	SWL	3	1	ON	3RS ET	22.1476	113.9274	AUTUMN	NONE	P
2-Oct-19	2	1114	FP	1	SWL	3	25	ON	3RS ET	22.1706	113.9277	AUTUMN	NONE	P
2-Oct-19	3	1131	CWD	1	SWL	2	36	ON	3RS ET	22.2055	113.9269	AUTUMN	NONE	P
3-Oct-19	1	0937	CWD	7	AW	2	165	ON	3RS ET	22.2983	113.8853	AUTUMN	NONE	P
3-Oct-19	2	1026	CWD	4	WL	2	485	ON	3RS ET	22.2924	113.8612	AUTUMN	NONE	P
3-Oct-19	3	1110	CWD	2	WL	2	155	ON	3RS ET	22.2605	113.8479	AUTUMN	NONE	P
3-Oct-19	4	1122	CWD	1	WL	2	127	ON	3RS ET	22.2603	113.8411	AUTUMN	NONE	P
3-Oct-19	5	1146	CWD	3	WL	2	181	ON	3RS ET	22.2416	113.8434	AUTUMN	NONE	P
3-Oct-19	6	1157	CWD	4	WL	2	207	ON	3RS ET	22.2416	113.8344	AUTUMN	NONE	P
3-Oct-19	7	1220	CWD	7	WL	2	382	ON	3RS ET	22.2282	113.8378	AUTUMN	NONE	S
3-Oct-19	8	1308	CWD	14	WL	2	265	ON	3RS ET	22.1960	113.8365	AUTUMN	NONE	P

DATE	STG #	TIME	CWD/FP	GP SZ	AREA	BEAU	PSD	EFFORT	TYPE	DEC LAT	DEC LON	SEASON	BOAT ASSOC.	P/S
4-Oct-19	1	1103	FP	16	SWL	2	112	ON	3RS ET	22.1428	113.9283	AUTUMN	NONE	S
4-Oct-19	2	1154	FP	2	SWL	2	114	ON	3RS ET	22.1899	113.9181	AUTUMN	NONE	P
4-Oct-19	3	1233	FP	3	SWL	2	65	ON	3RS ET	22.1542	113.9067	AUTUMN	NONE	S
4-Oct-19	4	1242	FP	2	SWL	2	19	ON	3RS ET	22.1568	113.8996	AUTUMN	NONE	S
4-Oct-19	5	1321	CWD	1	SWL	2	296	ON	3RS ET	22.2063	113.8972	AUTUMN	NONE	P
4-Oct-19	6	1356	FP	2	SWL	2	270	ON	3RS ET	22.1486	113.8921	AUTUMN	NONE	S
4-Oct-19	7	1411	FP	1	SWL	2	223	ON	3RS ET	22.1727	113.8882	AUTUMN	NONE	P
10-Oct-19	1	1047	CWD	2	NWL	3	16	ON	3RS ET	22.2709	113.8702	AUTUMN	NONE	P
10-Oct-19	2	1107	CWD	1	NWL	2	100	ON	3RS ET	22.2970	113.8779	AUTUMN	NONE	P
10-Oct-19	3	1205	CWD	4	NWL	2	112	ON	3RS ET	22.3769	113.8775	AUTUMN	NONE	P
11-Oct-19	1	1050	CWD	2	WL	2	214	ON	3RS ET	22.2503	113.8411	AUTUMN	NONE	P
11-Oct-19	2	1114	CWD	1	WL	2	26	ON	3RS ET	22.2414	113.8408	AUTUMN	NONE	P
11-Nov-19	1	1051	CWD	3	NWL	2	142	ON	3RS ET	22.2844	113.8702	AUTUMN	NONE	P
11-Nov-19	2	1155	CWD	1	NWL	2	112	ON	3RS ET	22.3605	113.8777	AUTUMN	NONE	P
11-Nov-19	3	1339	CWD	2	NWL	2	55	ON	3RS ET	22.3884	113.8980	AUTUMN	NONE	P
12-Nov-19	1	1039	CWD	3	WL	3	20	ON	3RS ET	22.2617	113.8548	AUTUMN	NONE	S
21-Nov-19	1	1113	FP	1	SWL	3	55	ON	3RS ET	22.1514	113.9361	AUTUMN	NONE	P
21-Nov-19	2	1151	CWD	1	SWL	3	23	ON	3RS ET	22.2056	113.9194	AUTUMN	NONE	S
21-Nov-19	3	1223	FP	1	SWL	3	151	ON	3RS ET	22.1518	113.9175	AUTUMN	NONE	P
21-Nov-19	4	1503	CWD	4	SWL	3	50	ON	3RS ET	22.1965	113.8686	AUTUMN	NONE	P
22-Nov-19	1	1020	CWD	1	WL	2	39	ON	3RS ET	22.2694	113.8571	AUTUMN	NONE	P
22-Nov-19	2	1100	CWD	4	WL	3	484	ON	3RS ET	22.2498	113.8460	AUTUMN	NONE	P
22-Nov-19	3	1127	CWD	1	WL	3	988	ON	3RS ET	22.2446	113.8493	AUTUMN	NONE	S
22-Nov-19	4	1145	CWD	3	WL	3	175	ON	3RS ET	22.2377	113.8275	AUTUMN	NONE	S
22-Nov-19	5	1216	CWD	1	WL	3	112	ON	3RS ET	22.2258	113.8375	AUTUMN	NONE	S
22-Nov-19	6	1329	CWD	2	SWL	2	N/A	OFF	3RS ET	22.1948	113.8524	AUTUMN	NONE	N/A
29-Nov-19	1	1321	FP	3	SWL	3	294	ON	3RS ET	22.1638	113.8972	AUTUMN	NONE	P
9-Dec-19	1	1101	CWD	2	WL	3	438	ON	3RS ET	22.2569	113.8371	WINTER	NONE	S
10-Dec-19	1	1114	FP	2	SWL	3	76	ON	3RS ET	22.1592	113.9281	WINTER	NONE	P
10-Dec-19	2	1450	CWD	1	SWL	2	216	ON	3RS ET	22.1958	113.8589	WINTER	GILLNETTER	P
10-Dec-19	3	1526	CWD	3	SWL	2	182	ON	3RS ET	22.1885	113.8492	WINTER	NONE	P
16-Dec-19	1	1033	CWD	1	NWL	3	107	ON	3RS ET	22.3041	113.8700	WINTER	NONE	P
16-Dec-19	2	1213	CWD	2	NWL	2	219	ON	3RS ET	22.3934	113.8876	WINTER	NONE	P

DATE	STG #	TIME	CWD/FP	GP SZ	AREA	BEAU	PSD	EFFORT	TYPE	DEC LAT	DEC LON	SEASON	BOAT ASSOC.	P/S
16-Dec-19	3	1227	CWD	3	NWL	2	301	ON	3RS ET	22.3882	113.8871	WINTER	NONE	P
17-Dec-19	1	1132	FP	1	SWL	2	187	ON	3RS ET	22.1704	113.8785	WINTER	NONE	P
17-Dec-19	2	1336	FP	2	SWL	2	199	ON	3RS ET	22.1451	113.9083	WINTER	NONE	P
17-Dec-19	3	1435	FP	2	SWL	2	472	ON	3RS ET	22.1677	113.9269	WINTER	NONE	P
18-Dec-19	1	0954	CWD	2	WL	1	4	ON	3RS ET	22.3045	113.8613	WINTER	NONE	P
18-Dec-19	2	1036	CWD	5	WL	2	107	ON	3RS ET	22.2605	113.8468	WINTER	NONE	P
18-Dec-19	3	1104	CWD	8	WL	1	18	ON	3RS ET	22.2538	113.8347	WINTER	NONE	S
18-Dec-19	4	1153	CWD	1	WL	2	40	ON	3RS ET	22.2232	113.8349	WINTER	NONE	P
18-Dec-19	5	1212	CWD	2	WL	2	5	ON	3RS ET	22.2182	113.8196	WINTER	NONE	S

Abbreviations: STG# = Sighting Number; GP SZ = Dolphin Group Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance (in metres); N/A = Not Applicable; DEC LAT = Latitude (WGS84 in Decimal), DEC LON = Longitude (WGS84 in Decimal); BOAT ASSOC. = Fishing Boat Association

CWD Land-based Theodolite Tracking

CWD Groups by Survey Date

Date	Station	Start Time	End Time	Duration	Beaufort Range	Visibility Range	No. of Focal Follow Dolphin Groups Tracked	Group Size Range
8/Jan/19	Lung Kwu Chau	9:13	15:13	6:00	3	4	1	2
11/Jan/19	Lung Kwu Chau	8:53	14:53	6:00	2-3	4	2	1
23/Jan/19	Sha Chau	9:02	15:02	6:00	2-3	3	0	N/A
14/Feb/19	Lung Kwu Chau	8:38	14:38	6:00	2-3	3	3	2-4
22/Feb/19	Sha Chau	9:10	15:10	6:00	2-3	3	0	N/A
27/Feb/19	Lung Kwu Chau	8:52	14:52	6:00	3-4	2	1	1
11/Mar/19	Lung Kwu Chau	8:59	14:59	6:00	2-3	3	1	1
19/Mar/19	Sha Chau	8:45	14:45	6:00	2	3-4	0	N/A
20/Mar/19	Lung Kwu Chau	8:48	14:52	6:04	2-3	3	2	2
4/Apr/19	Lung Kwu Chau	8:50	14:50	6:00	2-3	3	1	1
10/Apr/19	Lung Kwu Chau	8:53	14:53	6:00	2	2	0	N/A
24/Apr/19	Sha Chau	9:04	15:04	6:00	2	2	0	-
3/May/19	Sha Chau	8:37	14:37	6:00	2-3	2-3	0	N/A
30/May/19	Lung Kwu Chau	8:45	14:45	6:00	3	3	0	N/A

Date	Station	Start Time	End Time	Duration	Beaufort Range	Visibility Range	No. of Focal Follow Dolphin Groups Tracked	Group Size Range
31/May/19	Lung Kwu Chau	8:43	14:43	6:00	2	2-4	1	6
5/Jun/19	Lung Kwu Chau	8:51	14:51	6:00	2	2	3	2-3
18/Jun/19	Sha Chau	9:30	15:30	6:00	2	2	0	N/A
21/Jun/19	Lung Kwu Chau	8:55	14:55	6:00	2-3	2	0	N/A
16/Jul/19	Lung Kwu Chau	8:45	14:45	6:00	2	1-2	1	1
25/Jul/19	Lung Kwu Chau	8:50	14:50	6:00	2-3	1	2	2
26/Jul/19	Sha Chau	8:45	14:45	6:00	2-3	1	0	N/A
15/Aug/19	Lung Kwu Chau	8:55	14:55	6:00	2-3	1-2	2	1-3
22/Aug/19	Lung Kwu Chau	8:50	14:50	6:00	2	2	3	1
27/Aug/19	Sha Chau	9:10	15:10	6:00	2-3	1-2	0	N/A
9/Sep/19	Lung Kwu Chau	8:45	14:45	6:00	2-3	2-3	1	1
16/Sep/19	Lung Kwu Chau	8:54	14:54	6:00	2-3	3	4	1-2
20/Sep/19	Sha Chau	8:53	14:53	6:00	2	2	0	N/A
11/Oct/19	Lung Kwu Chau	9:21	15:21	6:00	2-3	3	1	1
21/Oct/19	Lung Kwu Chau	8:45	14:45	6:00	2	2-3	4	1-2
22/Oct/19	Sha Chau	8:40	14:40	6:00	2	2	0	N/A
12/Nov/19	Lung Kwu Chau	10:08	16:08	6:00	2-3	2-3	2	2-5
21/Nov/19	Lung Kwu Chau	8:56	14:56	6:00	3	3	0	N/A
28/Nov/19	Sha Chau	8:55	14:55	6:00	2-3	2	0	N/A
11/Dec/19	Lung Kwu Chau	9:10	15:10	6:00	2-3	3	1	1
18/Dec/19	Lung Kwu Chau	9:00	15:00	6:00	1-2	2	2	1-5
30/Dec/19	Sha Chau	9:02	15:02	6:00	2-3	4	0	N/A

Visibility Range: 1=Excellent, 2=Good, 3=Fair, 4=Poor

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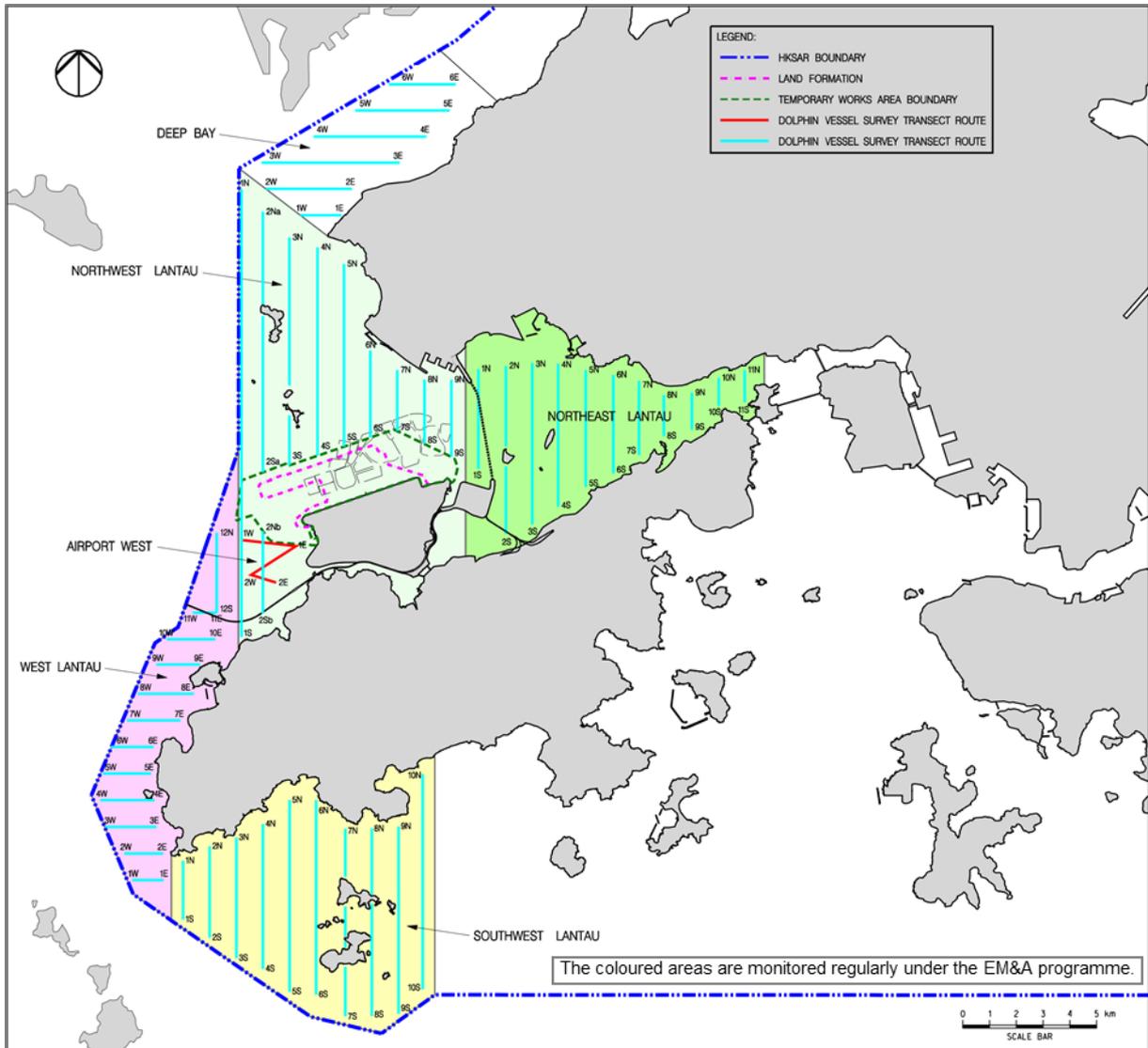
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Reference: Additional Vessel Survey for CWD Monitoring in Deep Bay Area



The additional survey in Deep Bay (DB) was conducted on a voluntary basis at the same frequency of two surveys per month.

All DB data were for reference and used only for density and abundance estimation.

(Note: The transect route in the DB survey area could not be fully travelled due to obstruction by the existing oyster culture rafts.)

Appendix F. Summary of Environmental Complaints and Cumulative Statistics on Exceedances, Notification of Summons, and Prosecution

Summary of Environmental Complaints

Date of Complaint Received	Details	Analysis / Remedial Actions	Status
12 Apr 2019	A complaint regarding suspected open burning at airport runway, outlying island.	ET investigated all work contracts that carried out construction activities at or near the alleged area. Based on information provided by contractors, no open burning activities were carried out in the period of 3 to 10 April 2019.	Closed

Cumulative Statistics for Valid Exceedances for the Environmental Monitoring

		Total no. recorded in the reporting month	Total no. recorded since the project commenced
1-hr TSP	Action	0	0
	Limit	0	0
Noise	Action	0	0
	Limit	0	0
Waste	Action	0	0
	Limit	0	0
Water	Action	0	0
	Limit	0	0
CWD	Action	0	0
	Limit	0	0

Remark: Exceedances, which are not found project related, are not shown in this table.

Cumulative Statistics for Non-compliance, Complaints, Notifications of Summons and Prosecution

Reporting Period	Cumulative Statistics			
	Non-compliance	Complaints	Notifications of Summons	Prosecutions
This reporting period	0	1	0	0
From 28 December 2015 to end of the reporting period	0	17	1	1