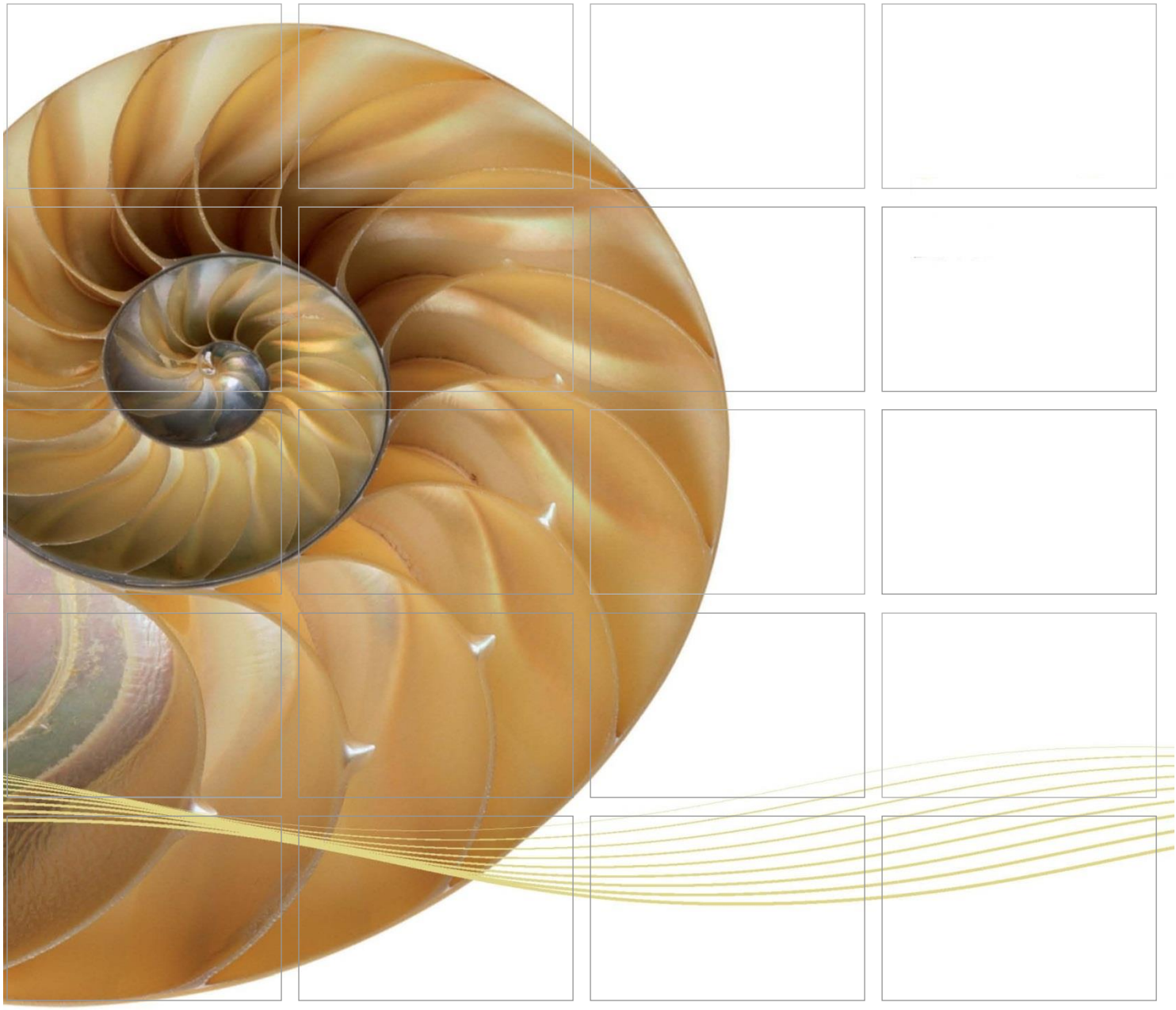
Report



Agreement No. HMWSD 1/2021 (EP) Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area - Investigation

Third Quarterly Environmental Monitoring & Audit (EM&A) Report

11 August 2022

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Agreement No. HMWSD 1/2021 (EP) Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area - Investigation

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Third Quarterly Environmental Monitoring & Audit (EM&A) Report

Document Code: 0611663_3rd Quarterly EM&A_20220811.doc

Client:	Project No:
Highways Department	0611663
Summary: This document presents the Third Quarterly EM&A Report for Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area - Investigation	Date: 11 August 2022 Approved by: *Mr Craig Reid* *Partner* Certified by: *Dr Jasmine Ng* *ET Leader*

Revision	Description	By	Checked	Approved	Date
	3rd Quarterly EM&A Report	VAR	JN	CAR	11/08/22

This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.	Distribution ☐ Internal ☒ Public ☐ Confidential

Ref.: HYDHZMBEEM00_0_8823L.22

11 August 2022

By Fax (2293 6300) and By Post

AECOM Asia Co. Ltd.
Supervising Officer Representative's Office
No.8 Mong Fat Street, Tuen Mun, New Territories, Hong Kong

Attention: Mr. K P Wong

Dear Mr. Wong,

Re: Agreement No. CE 48/2011 (EP)
Environmental Project Office for the
HZMB Hong Kong Link Road, HZMB Hong Kong Boundary Crossing Facilities, and Tuen Mun-Chek Lap Kok Link – Investigation

Agreement No. HMWSD 1/2021 (EP)
Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area – Investigation
3rd Quarterly EM&A Summary Report for March 2022 to May 2022

Reference is made to the ET's submission of 3rd Quarterly EM&A Summary Report for March 2022 to May 2022 (ET's ref.: "*0611663_3rd Quarterly EM&A_20220811.doc*" dated 11 August 2022) certified by the ET Leader.

Please be informed that we have no adverse comments on the captioned Report.

Thank you for your attention. Please do not hesitate to contact the undersigned or the ENPO Leader Mr. Y. H. Hui should you have any queries.

Yours sincerely,

Brian Tam
Independent Environmental Checker
Tuen Mun – Chek Lap Kok Link

c.c.

HyD	Mr. Eric Wong	(By Fax: 3188 6614)
HyD	Mr. Maggie Lai	(By Fax: 3188 6614)
ERM	Dr. Jasmine Ng	(By Fax: 2723 5660)

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Ramboll Hong Kong Limited 英環香港有限公司
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www.Ramboll.com

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EXECUTIVE SUMMARY

Under *Agreement No. HMWSD 1/2021 (EP)*, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) by the Highways Department (HyD) to undertaken the implementation of post-construction monitoring for the Chinese White Dolphin (CWD) in accordance with *Environmental Permit No. EP-354/2009/D* for the Tuen Mun – Chek Lap Kok Link Project (TM-CLK Link Project). AECOM Asia Company Limited was appointed by HyD as the Supervising Officer while Ramboll Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO).

The post-construction monitoring for the CWD commenced in June 2020 and completed in May 2022.

This is the Third Quarterly EM&A report presenting the EM&A works carried out during the period from 1 March to 31 May 2022 for the *Agreement No. HMWSD 1/2021 (EP) Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area – Investigation* (the "Contract") in accordance with the Updated EM&A Manual of the TM-CLK Link Contract.

In order to fulfil the EP's and EM&A Manual's requirements for TM-CLKL Project, *Agreement No. HMWSD 1/2021 (EP)* took over the responsibility for implementation of operational phase dolphin monitoring from *Contract No. HY/2012/08* from 1 September 2021 to 31 May 2022.

A summary of monitoring and audit activities conducted in the reporting period is listed below:

Operational Phase Dolphin Monitoring 6 sessions

<u>Summary of Breaches of Action/Limit Levels</u>

One (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between March and May 2022.

<u>Environmental Complaints, Non-compliance & Summons</u>

No non-compliance with EIA recommendations, EP conditions and other requirements associated with the construction of this Contract was recorded in this reporting period.

No environmental complaint was received in this reporting period.

No environmental summons was received in this reporting period.

<u>Reporting Change</u>

In order to fulfil the EP's and EM&A Manual's requirements for TM-CLKL Project, *Agreement No. HMWSD 1/2021 (EP)* took over the responsibility for implementation of operational phase dolphin monitoring from *Contract No. HY/2012/08* from 1 September 2021 to 31 May 2022.

1 INTRODUCTION

1.1 BACKGROUND

According to the findings of the Northwest New Territories (NWNT) Traffic and Infrastructure Review conducted by the Transport Department, Tuen Mun Road, Ting Kau Bridge, Lantau Link and North Lantau Highway would be operating beyond capacity after 2016. This forecast has been based on the estimated increase in cross boundary traffic, developments in the Northwest New Territories (NWNT), and possible developments in North Lantau, including the Airport developments, the Lantau Logistics Park (LLP) and the Hong Kong – Zhuhai – Macao Bridge (HZMB). In order to cope with the anticipated traffic demand, two new road sections between NWNT and North Lantau – Tuen Mun – Chek Lap Kok Link (TM-CLKL) and Tuen Mun Western Bypass (TMWB) are proposed.

An Environmental Impact Assessment (EIA) of TM-CLKL (the Project) was prepared in accordance with the EIA Study Brief (No. ESB-175/2007) and the *Technical Memorandum of the Environmental Impact Assessment Process* (*EIAO-TM*). The EIA Report was submitted under the Environmental Impact Assessment Ordinance (EIAO) in August 2009. Subsequent to the approval of the EIA Report (EIAO Register Number AEIAR-146/2009), an Environmental Permit (EP-354/2009) for TM-CLKL was granted by the Director of Environmental Protection (DEP) on 4 November 2009, and EP variation (VEP) (EP-354/2009/A) was issued on 8 December 2010. Subsequent applications for variation of environmental permits (VEP), *EP-354/2009/B, EP-354/2009/C* and *EP-354/2009/D*, were granted on 28 January 2014, 10 December 2014 and 13 March 2015, respectively.

Under *Agreement No. HMWSD 1/2021 (EP)*, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) by the Highways Department (HyD) to undertaken the implementation of post-construction monitoring for the Chinese White Dolphin (CWD) in accordance with *Environmental Permit No. EP-354/2009/D* for the Tuen Mun – Chek Lap Kok Link Project (TM-CLK Link Project). AECOM Asia Company Limited was appointed by HyD as the Supervising Officer while Ramboll Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO).

The post-construction monitoring for the CWD commenced on June 2020 and completed in May 2022.

In order to fulfil the EP's and EM&A Manual's requirements for TM-CLKL Project, *Agreement No. HMWSD 1/2021 (EP)* took over the responsibility for implementation of operational phase dolphin monitoring from Contract No. HY/2012/08 from 1 September 2021 to 31 May 2022.

1.2 SCOPE OF REPORT

This is the Third Quarterly EM&A Report under the *Agreement No. HMWSD 1/2021 (EP) Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area – Investigation*. This report presents a summary of the environmental monitoring and audit works from 1 March and 31 May 2022.

1.3 ORGANIZATION STRUCTURE

The organization structure of the Contract is shown in *Appendix A*. The key personnel contact names and contact details are summarized in *Table 1.1* below.

Table 1.1 Contact Information of Key Personnel

Party	Position	Name	Telephone	Fax
Highways Department	PC 16/SD	Sally W.M. Choi	2762 3643	3188 6614
SOR (AECOM Asia Company Limited)	Senior Resident Engineer	K P Wong	2293 6403	2293 6300
ENPO / IEC (Ramboll Hong Kong Ltd.)	ENPO Leader	Y.H. Hui	3465 2850	3465 2899
	IEC	Brian Tam	9700 6767	3465 2899
ET (ERM-HK)	ET Leader	Jasmine Ng	2271 3311	2723 5660

2 EM&A RESULTS

The EM&A programme required environmental monitoring for marine ecology. The EM&A requirements and related findings for the component are summarized in the following sections.

2.1 DOLPHIN MONITORING

2.1.1 Monitoring Requirements

Operational phase dolphin monitoring is required to be conducted by a qualified dolphin specialist team to evaluate whether there have been any effects on the dolphins. According to the EM&A Manual, operational phase monitoring on dolphin monitoring shall be undertaken based upon the frequency of forty-eight, one-day survey events at a frequency of 2 per month over a period of 24 months following cessation of the construction.

In order to fulfil the EM&A requirements and make good use of available resources, *Agreement No. HMWSD 1/2021 (EP)* has taken over the responsibility for implementation of dolphin monitoring from HZMB HKLR *Contract No. HY/2011/03* since October 2019 and *Contract No. HY/2012/08* since September 2021.

2.1.2 Monitoring Equipment

Table 2.1 summarizes the equipment used for the post construction (operational) phase dolphin monitoring.

Table 2.1 Dolphin Monitoring Equipment

Equipment	Model
Global Positioning System (GPS)	Garmin 18X-PC Geo One Phottix
Camera	Nikon D90 300m 2.8D fixed focus Nikon D90 20-300m zoom lens
Laser Binoculars	Infinitor LRF 1000
Marine Binocular	Bushell 7 x 50 marine binocular with compass and reticules
Vessel for Monitoring	65 foot single engine motor vessel with viewing platform 4.5m above water level

2.1.3 Monitoring Parameter, Frequencies & Duration

Dolphin monitoring should cover all transect lines in Northeast Lantau (NEL) and the Northwest Lantau (NWL) survey areas twice per month throughout the entire construction period and operational phase. The monitoring data should be compatible with, and should be made available for, long-term studies of small cetacean ecology in Hong Kong. In order to provide a suitable long-term dataset for comparison, identical methodology and line

transects employed in baseline dolphin monitoring was followed in the impact dolphin monitoring and operational phase dolphin monitoring.

2.1.4 *Monitoring Location*

The operational phase dolphin monitoring was carried out in the NEL and NWL along the line transect as depicted in *Figure 2.1*. The co-ordinates of all transect lines are shown in *Table 2.2* below.

Table 2.2 Operational Phase Dolphin Monitoring Line Transect Co-ordinates

Line No.		Easting	Northing	Line No.		Easting	Northing
1	Start Point	804671	815456	13	Start Point	816506	819480
1	End Point	804671	831404	13	End Point	816506	824859
2	Start Point	805476	820800*	14	Start Point	817537	820220
2	End Point	805476	826654	14	End Point	817537	824613
3	Start Point	806464	821150*	15	Start Point	818568	820735
3	End Point	806464	822911	15	End Point	818568	824433
4	Start Point	807518	821500*	16	Start Point	819532	821420
4	End Point	807518	829230	16	End Point	819532	824209
5	Start Point	808504	821850*	17	Start Point	820451	822125
5	End Point	808504	828602	17	End Point	820451	823671
6	Start Point	809490	822150*	18	Start Point	821504	822371
6	End Point	809490	825352	18	End Point	821504	823761
7	Start Point	810499	822000*	19	Start Point	822513	823268
7	End Point	810499	824613	19	End Point	822513	824321
8	Start Point	811508	821123	20	Start Point	823477	823402
8	End Point	811508	824254	20	End Point	823477	824613
9	Start Point	812516	821303	21	Start Point	805476	827081
9	End Point	812516	824254	21	End Point	805476	830562
10	Start Point	813525	821176	22	Start Point	806464	824033
10	End Point	813525	824657	22	End Point	806464	829598
11	Start Point	814556	818853	23	Start Point	814559	821739
11	End Point	814556	820992	23	End Point	814559	824768
12	Start Point	815542	818807	24*	Start Point	805476*	815900*
12	End Point	815542	824882	24*	End Point	805476*	819100*

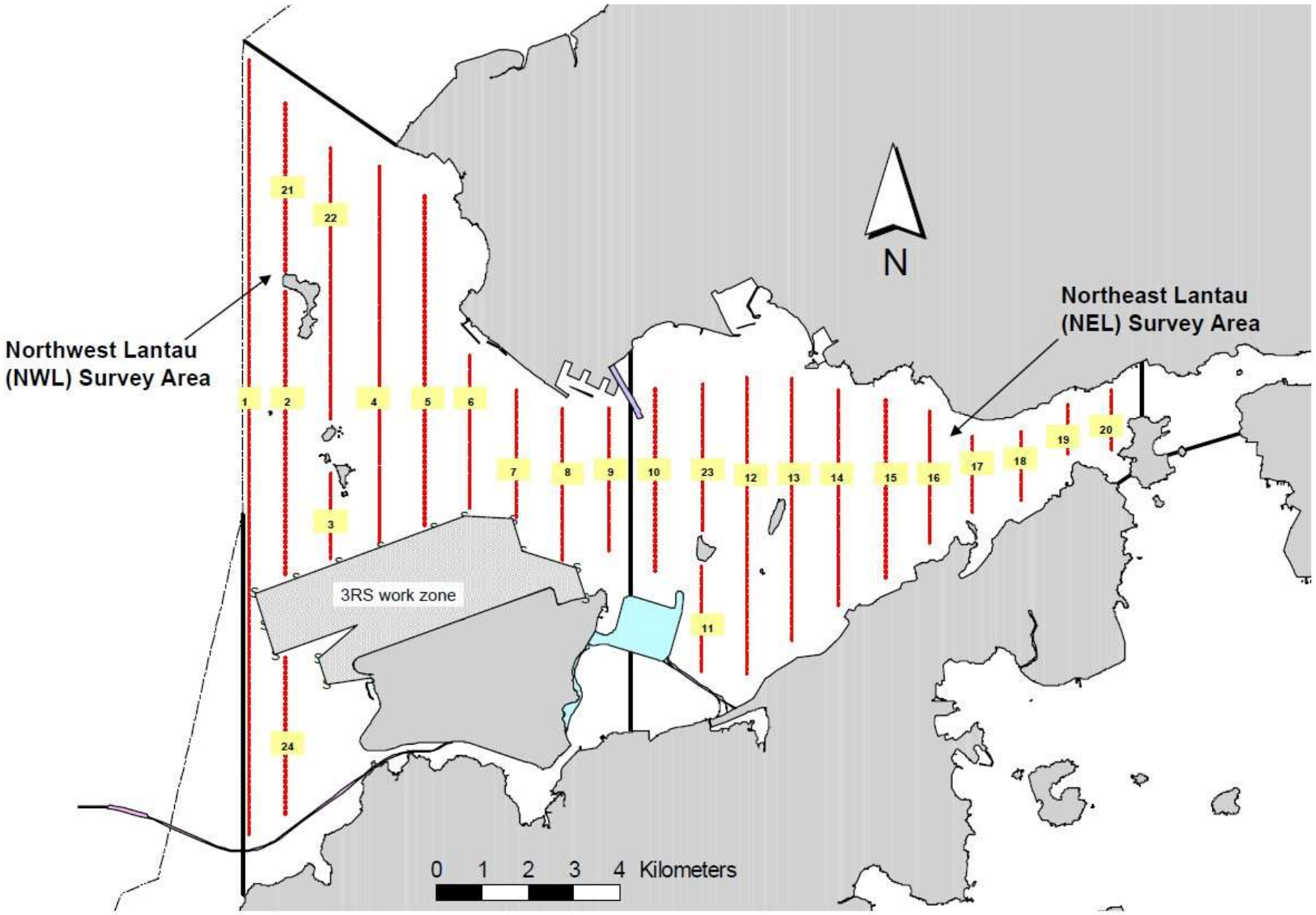

Figure 2.1

Layout of Transect Lines of Dolphin Monitoring in Northwest and Northeast Lantau Areas

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Date: 29/11/2013

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Remarks: The coordinates of several starting and ending points have been revised since August 2017 due to the presence of a work zone to the north of the airport platform with intense construction activities in association with the construction of the third runway expansion for the Hong Kong International Airport. Co-ordinates in red and marked with asterisk are revised co-ordinates of transect line.

2.1.5 Monitoring Schedule for the Reporting Period

The dolphin monitoring schedules for the reporting period are shown in *Appendix B*.

2.1.6 Results & Observations

A total of 838.31 km of survey effort was conducted, with 100% of the total survey effort being conducted under favourable weather conditions (ie Beaufort Sea State 3 or below with good visibility) in this reporting quarter. Amongst the two areas, 327.00 km and 511.31 km of survey effort were conducted from NEL and NWL survey areas, respectively. The total survey effort conducted on primary and secondary lines were 580.29 km and 258.02 km, respectively. The survey efforts are summarized in *Appendix C.*

No Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter.

Encounter rates of Chinese White Dolphins are deduced from the survey effort and on-effort sighting data made under favorable conditions (Beaufort 3 or below with good visibility) in the reporting quarter with the results and comparison with baseline results present in *Tables 2.3* and *2.4*.

Table 2.3 Individual Survey Event Encounter Rates

		Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	**Encounter rate (ANI)** (no. of dolphins from all on-effort sightings per 100 km of survey effort)
		Primary Lines Only	**Primary Lines Only**
NEL	Set 1 (8 &11 Mar 2022)	0.00	0.00
	Set 2 (14 & 15 Mar 2022)	0.00	0.00
	Set 3 (12 & 13 Apr 2022)	0.00	0.00
	Set 4 (21 & 25 Apr 2022)	0.00	0.00
	Set 5 (3 & 5 May 2022)	0.00	0.00
	Set 6 (17 & 19 May 2022)	0.00	0.00
NWL	Set 1 (8 &11 Mar 2022)	0.00	0.00
	Set 2 (14 & 15 Mar 2022)	0.00	0.00
	Set 3 (12 & 13 Apr 2022)	0.00	0.00
	Set 4 (21 & 25 Apr	0.00	0.00

	2022)		
	Set 5 (3 & 5 May 2022)	0.00	0.00
	Set 6 (17 & 19 May 2022)	0.00	0.00

Note: Dolphin Encounter Rates are deduced from the Three Sets of Surveys (Two Surveys in Each Set) in the reporting quarter in Northeast (NEL) and Northwest Lantau (NWL)

Table 2.4 Quarterly Average Encounter Rates

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		**Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)**	
	March - May 2022	**September – November 2011**	**March - May 2022**	**September – November 2011**
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	0.0	9.85 ± 5.85	0.0	44.66 ± 29.85

Note: Encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions.

One limit level exceedance was observed for the quarterly dolphin monitoring data between March and May 2022.

2.2 ENVIRONMENTAL LICENSES AND PERMITS

The status of environmental licensing and permit is summarized in *Table 2.5* below.

Table 2.5 Summary of Environmental Licensing and Permit Status

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
Environmental Permit	EP-354/2009/D	13 March 2015	Throughout the Contract	HyD	Application for VEP on 3 March 2015 to supersede EP-354/2009/C

Notes:
HyD = Highways Department
VEP = Variation of Environmental Permit

2.3 *SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT*

One (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between March and May 2022.

Cumulative statistics are provided in *Appendix D*.

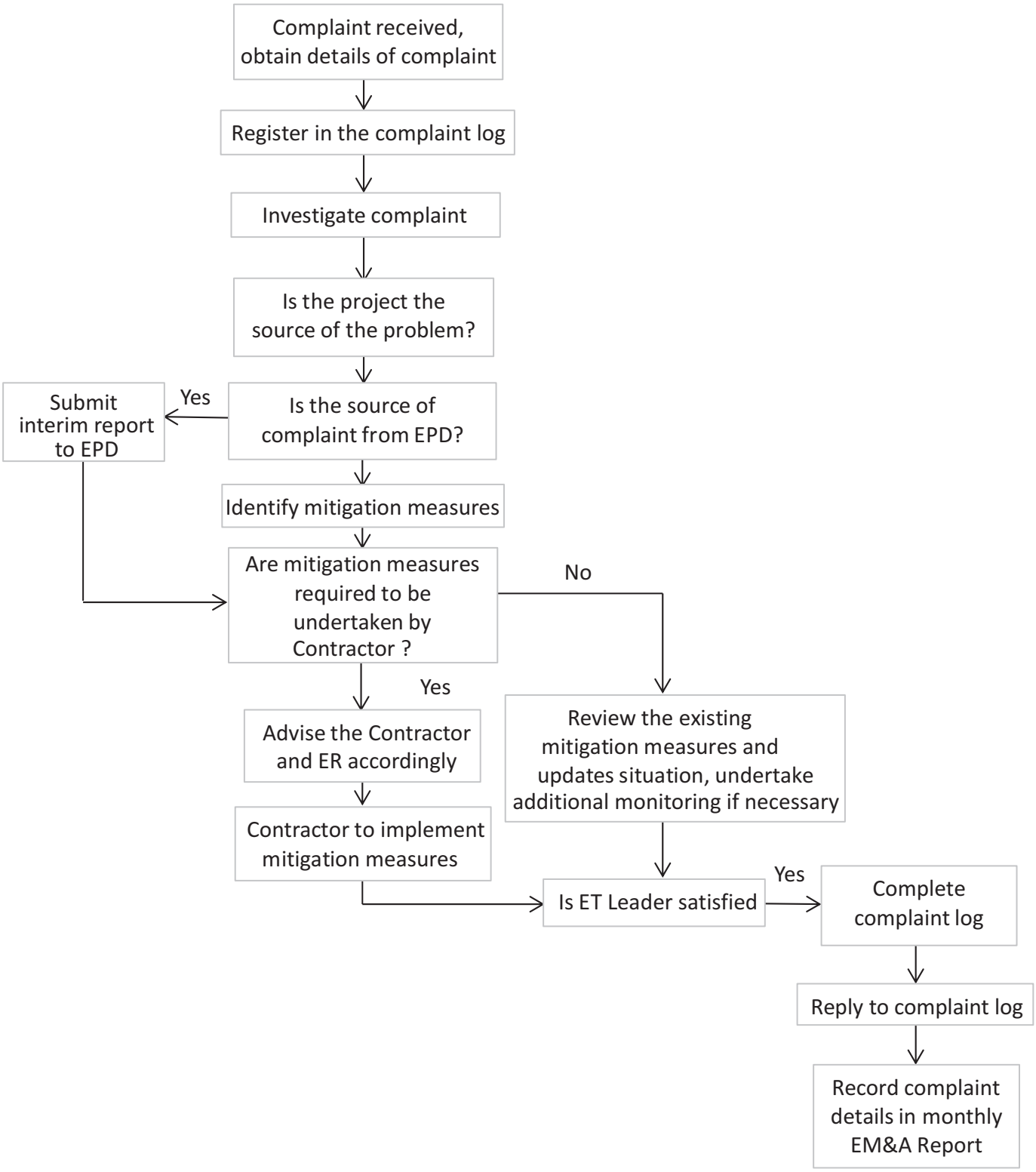
2.4 *SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS*

The Environmental Complaint Handling Procedure is provided in *Figure 2.2*.

No environmental complaint was received in this reporting period.

No environmental summons was received in this reporting period.

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



Environmental Complaint Handling Procedure

Figure 2.2

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3 FUTURE KEY ISSUES

3.1 MONITORING SCHEDULE FOR THE COMING QUARTER

The post-construction monitoring for the CWD commenced on June 2020 and completed in May 2022.

4 CONCLUSIONS

This Third Quarterly EM&A Report presents the findings of the monitoring works undertaken during the period from 1 March to 31 May 2022, in accordance with the Updated EM&A Manual and the requirements of *EP-354/2009/D*.

Operational phase dolphin monitoring was carried out in this reporting month.

No Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. One limit level exceedance was observed for the quarterly dolphin monitoring data between March and May 2022.

No environmental complaint was received in this reporting period.

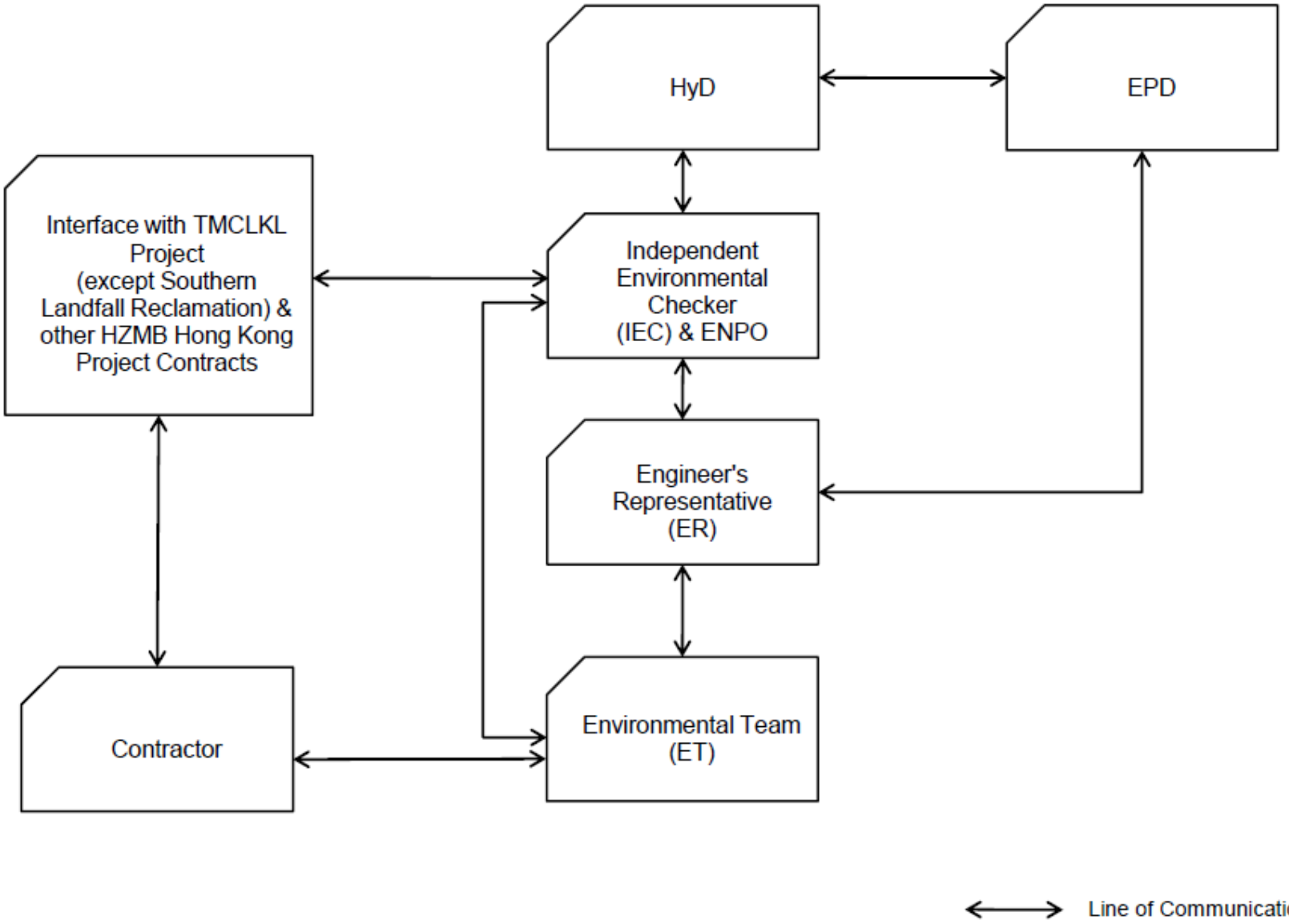
No environmental summons was received in this reporting period.

In order to fulfil the EP's and EM&A Manual's requirements for TM-CLKL Project, *Agreement No. HMWSD 1/2021 (EP)* took over the responsibility for implementation of operational phase dolphin monitoring from *Contract No. HY/2012/08* from 1 September 2021 to 31 May 2022.

The post-construction monitoring for the CWD commenced on June 2020 and completed in May 2022.

Appendix A

Project Organization for Environmental Works



Appendix A1

Contract No. HY/2012/08 Northern Connection Sub-sea Tunnel Section
Project Organization

DATE: 06/03/2013

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Appendix B

EM&A Monitoring Schedules

Agreement No. HMWSD 1/2021 (EP) Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area – Investigation
Operational Phase Dolphin Monitoring Survey Monitoring Schedule - March 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Mar	02-Mar	03-Mar	04-Mar	05-Mar
06-Mar	07-Mar	08-Mar	09-Mar	10-Mar	11-Mar	12-Mar
		Operational Phase Dolphin Monitoring			**Operational Phase Dolphin Monitoring**	
13-Mar	14-Mar	15-Mar	16-Mar	17-Mar	18-Mar	19-Mar
	Operational Phase Dolphin Monitoring	**Operational Phase Dolphin Monitoring**				
20-Mar	21-Mar	22-Mar	23-Mar	24-Mar	25-Mar	26-Mar
27-Mar	28-Mar	29-Mar	30-Mar	31-Mar		

Agreement No. HMWSD 1/2021 (EP) Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area – Investigation
Operational Phase Dolphin Monitoring Survey Monitoring Schedule - April 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					01-Apr	02-Apr
03-Apr	04-Apr	05-Apr	06-Apr	07-Apr	08-Apr	09-Apr
10-Apr	11-Apr	12-Apr	13-Apr	14-Apr	15-Apr	16-Apr
		Operational Phase Dolphin Monitoring	**Operational Phase Dolphin Monitoring**			
17-Apr	18-Apr	19-Apr	20-Apr	21-Apr	22-Apr	23-Apr
				Operational Phase Dolphin Monitoring		
24-Apr	25-Apr	26-Apr	27-Apr	28-Apr	29-Apr	30-Apr
	Operational Phase Dolphin Monitoring					

Agreement No. HMWSD 1/2021 (EP) Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area – Investigation
Operational Phase Dolphin Monitoring Survey Monitoring Schedule - May 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-May	02-May	03-May	04-May	05-May	06-May	07-May
		Operational Phase Dolphin Monitoring		**Operational Phase Dolphin Monitoring**		
08-May	09-May	10-May	11-May	12-May	13-May	14-May
15-May	16-May	17-May	18-May	19-May	20-May	21-May
		Operational Phase Dolphin Monitoring		**Operational Phase Dolphin Monitoring**		
22-May	23-May	24-May	25-May	26-May	27-May	28-May
29-May	30-May	31-May				

Appendix C

Operational Phase Dolphin Monitoring Survey

CONTRACT NO. HY/2012/08
Hong Kong-Zhuhai-Macao Bridge Tuen Mun – Chek Lap Kok Link (Northern Connection Sub-sea Tunnel Section)
Post-Construction Dolphin Monitoring

8th Quarterly Progress Report (March-May 2022)
submitted to Dragages – Bouygues Joint Venture & ERM Hong Kong Ltd.

Submitted by
Samuel K.Y. Hung, Ph.D.
Hong Kong Cetacean Research Project

7 June 2022

1. Introduction

1.1. As part of the Hong Kong-Zhuhai-Macao Bridge (HZMB), the Tuen Mun-Chek Lap Kok Link (TMCLKL) is a designated project under the Environmental Impact Assessment Ordinance (EIAO). The Environmental Impact Assessment (EIA) Report and Environmental Monitoring and Audit (EM&A) Manual (EIA Register No.: AEIAR-146/2009) for the project were approved by the Director of Environmental Protection in October 2009 and the Environmental Permit No. EP-354/2009 (EP) was issued in November 2009. The EP has been subject to several variations and the current one is EP No. EP-354/2009/D.

1.2. The TMCLKL was constructed under two works contracts namely Contract No. HY/2012/07 (Southern Connection Viaduct Section) and Contract No. HY/2012/08 (North Connection Sub-sea Tunnel Section). In accordance with the EP, the Contractors of Contract No. HY/2012/07 and Contract No. HY/2012/08 have separately employed their own Environmental Team (ET) and ET Leader to conduct construction phase monitoring of Chinese White Dolphin (CWD) in the North Lantau (NL) waters, which included the Northeast Lantau (NEL) and Northwest Lantau (NWL) survey areas, following the requirements specified in the EM&A Manual and the relevant contract specifications of the two contracts.

1.3. In accordance with Section 6.1 of the EM&A Manual and the EP, an ecological monitoring and audit programme is needed to monitor potential impacts through construction and operation activities of TMCLKL. The construction and post-construction (operational) EM&A objectives are to ensure that the ecological contract works and construction mitigation procedures recommended in the EIA are carried out as specified and are effective. Post-construction phase EM&A will comprise the audit of the measures as appropriate. In order for such monitoring to be effective, it needs to be divided into three phases: pre-disturbance (i.e. baseline phase), the entire period of disturbance (i.e. construction phase) and post-disturbance after the completion

of construction works (i.e. post-construction phase). Survey techniques must be held constant from phase to phase, and survey equipment and personnel should ideally be the same as well.

1.4. The main objective of the current assignment commissioned by the Highways Department is to conduct the post-construction monitoring of CWD in NL waters in compliance with the requirements stipulated in the EM&A Manual and the EP for the TMCLKL works. Such monitoring should be conducted for two years upon the completion of all marine-based construction activities for the TMCLKL according to the EM&A Manual, which were completed in May 2020. From June 2020 to August 2021, 15 months of post-construction dolphin monitoring had been carried out by the ET / ET Leader appointed under Contract No. HY/2012/08, while the remaining nine months of post-construction dolphin monitoring will be completed under this assignment, from September 2021 to May 2022.

1.5. In August 2021, the ERM Hong Kong (ERMHK) Limited has been appointed as the Consultant responsible for the nine months of post-construction monitoring of CWD in NL waters for the TMCLKL. Subsequently, the Hong Kong Cetacean Research Project (HKCRP) has been appointed by ERMHK to collaborate and undertake the dolphin monitoring tasks to conduct systematic line-transect vessel surveys.

1.6. The present quarterly progress report is submitted to the Contractor under the TMCLKL post-construction phase dolphin monitoring programme, which summarizes the results of survey findings during the period of March to May 2022.

2. Monitoring Methodology

2.1. Vessel-based Line-transect Survey

2.1.1. According to the requirement of the updated EM&A manual, dolphin monitoring programme should cover all transect lines in NEL and NWL survey areas (see Figure 1) twice per month throughout the entire construction and post-construction monitoring period. The co-ordinates of all transect lines are shown in Table 1.

Table 1 Co-ordinates of transect lines conducted by TMCLKL08 project

Line No.		Easting	Northing		Line No.		Easting	Northing
1	Start Point	804671	815456		13	Start Point	816506	819480
1	End Point	804671	831404		13	End Point	816506	824859
2	Start Point	805476	820800		14	Start Point	817537	820220
2	End Point	805476	826654		14	End Point	817537	824613
3	Start Point	806464	821150		15	Start Point	818568	820735
3	End Point	806464	822911		15	End Point	818568	824433

4	Start Point	807518	821500		16	Start Point	819532	821420
4	End Point	807518	829230		16	End Point	819532	824209
5	Start Point	808504	821850		17	Start Point	820451	822125
5	End Point	808504	828602		17	End Point	820451	823671
6	Start Point	809490	822150		18	Start Point	821504	822371
6	End Point	809490	825352		18	End Point	821504	823761
7	Start Point	810499	822000		19	Start Point	822513	823268
7	End Point	810499	824613		19	End Point	822513	824321
8	Start Point	811508	821123		20	Start Point	823477	823402
8	End Point	811508	824254		20	End Point	823477	824613
9	Start Point	812516	821303		21	Start Point	805476	827081
9	End Point	812516	824254		21	End Point	805476	830562
10	Start Point	813525	821176		22	Start Point	806464	824033
10	End Point	813525	824657		22	End Point	806464	829598
11	Start Point	814556	818853		23	Start Point	814559	821739
11	End Point	814556	820992		23	End Point	814559	824768
12	Start Point	815542	818807		24	Start Point	805476	815900
12	End Point	815542	824882		24	End Point	805476	819100

2.1.2. The TMCLKL08 survey team used standard line-transect methods (Buckland et al. 2001) to conduct the systematic vessel surveys, and followed the same technique of data collection that has been adopted over the last 22 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2020). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars. Both observers searched the sea ahead of the vessel, between 270^{o} and 90^{o} (in relation to the bow, which is defined as 0^{o}). One to two additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.

2.1.4. During on-effort survey periods, the survey team recorded effort data including time, positions (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (*Garmin eTrex Legend*).

2.1.5. Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.

2.1.6. When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin group to the transect line was later calculated from the initial sighting distance and angle.

2.1.7. Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines (as indicated in Figure 1) was labeled as "primary" survey effort, while the survey effort conducted along the connecting lines between parallel lines was labeled as "secondary" survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese white dolphins deduced from effort and sighting data collected along primary and secondary lines were similar in NEL and NWL survey areas. Therefore, both primary and secondary survey effort were presented as on-effort survey effort in this report.

2.2. Photo-identification Work

2.2.1. When a group of Chinese White Dolphins were sighted during the line-transect survey, the TMCLKL08 survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.

2.2.2. A professional digital camera (*Canon* EOS 7D model), equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.

2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995.

2.2.4. Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson 2000).

2.2.5. All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database.

2.3. Data Analysis

2.3.1. Distribution Analysis – The line-transect survey data was integrated with the Geographic Information System (GIS) in order to visualize and interpret different spatial and temporal patterns of dolphin distribution using sighting positions. Location data of dolphin groups were plotted on map layers of Hong Kong using a desktop GIS (ArcView© 3.1) to examine their distribution patterns in details. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, young calves and activities.

2.3.2. Encounter rate analysis – Encounter rates of Chinese white dolphins (number of on-effort sightings per 100 km of survey effort, and total number of dolphins sighted on-effort per 100 km of survey effort) were calculated in NEL and NWL survey areas in relation to the amount of survey effort conducted during each month of monitoring survey. Only data collect under Beaufort 3 or below condition would be used for the encounter rate analyses. Dolphin encounter rates were calculated in two ways for comparisons with the HZMB baseline monitoring results as well as to AFCD long-term marine mammal monitoring results.

Firstly, for the comparison with the HZMB baseline monitoring results, the encounter rates were calculated using primary survey effort alone. The average encounter rate of sightings (STG) and average encounter rate of dolphins (ANI) were deduced based on the encounter rates from six events during the present quarter (i.e. six sets of line-transect surveys in North Lantau), which was also compared with the one deduced from the six events during the baseline period (i.e. six sets of line-transect surveys in North Lantau).

Secondly, the encounter rates were calculated using both primary and secondary survey effort collected under Beaufort 3 or below condition as in AFCD long-term monitoring study. The encounter rate of sightings and dolphins were deduced by dividing the total number of on-effort sightings (STG) and total number of dolphins (ANI) by the amount of survey effort for the present quarterly period.

2.3.3. Quantitative grid analysis on habitat use – To conduct quantitative grid analysis of habitat use, positions of on-effort sightings of Chinese White Dolphins collected during the quarterly monitoring period were plotted onto 1-km^2 grids among NWL and NEL survey areas on GIS. Sighting densities (number of on-effort sightings per km^2) and dolphin densities (total number of dolphins from on-effort sightings per km^2) were then calculated for each 1 km by 1 km grid with the aid of GIS.

Sighting density grids and dolphin density grids were then further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid was calculated by examining the survey coverage on each line-transect survey to determine how many times the grid was surveyed during the study period. For example, when the survey boat traversed through a specific grid 50 times, 50 units of survey effort were counted for that grid. With the amount of survey effort calculated for each grid, the sighting density and dolphin density of each grid were then normalized (i.e. divided by the unit of survey effort).

The newly-derived unit for sighting density was termed SPSE, representing the number of on-effort **s**ightings **p**er 100 units of **s**urvey **e**ffort. In addition, the derived unit for actual dolphin density was termed DPSE, representing the number of **d**olphins **p**er 100 units of **s**urvey **e**ffort. Among the 1-km^2 grids that were partially covered by land, the percentage of sea area was calculated using GIS tools, and their SPSE and DPSE values were adjusted accordingly. The following formulae were used to estimate SPSE and DPSE in each 1-km^2 grid within the study area:

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

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

2.3.4. Behavioural analysis – When dolphins were sighted during vessel surveys, their behaviour was observed. Different activities were categorized (i.e. feeding, socializing, traveling, and milling/resting) and recorded on sighting datasheets. This data was then input into a separate database with sighting information, which can be used to determine the distribution of behavioural data with a desktop GIS. Distribution of sightings of dolphins engaged in different activities and behaviours would then be plotted on GIS and carefully examined to identify important areas for different activities of the dolphins.

2.3.5. Ranging pattern analysis – Location data of individual dolphins that occurred during the 3-month post-construction phase monitoring period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, was loaded as an extension with ArcView© 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD level.

3. Monitoring Results

3.1. Summary of survey effort and dolphin sightings

3.1.1. During the period of March to May 2022, six sets of systematic line-transect vessel surveys were conducted under the TMCLKL08 post-construction dolphin monitoring works to cover all transect lines in NWL and NEL survey areas twice per month.

3.1.2. From these TMCLKL08 surveys, a total of 838.31 km of survey effort was collected, with 100% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility). Among the two areas, 327.00 km and 511.31 km of survey effort were conducted in NEL and NWL survey areas respectively.

3.1.3. The total survey effort conducted on primary lines was 580.29 km, while the effort on secondary lines was 258.02 km. Survey effort conducted on both primary and secondary lines were considered to be on-effort survey data. A summary table of the survey effort is shown in Appendix I.

3.1.4. During the six sets of TMCLKL08 monitoring surveys conducted between March and May 2022, no Chinese White Dolphin was sighted at all, which was the second time with no sighting for the whole quarter since HZMB monitoring began in 2012 (the first time was in the quarter of June-August 2021).

3.2. Encounter rate

3.2.1. During the present quarterly period, the encounter rates of Chinese White Dolphins deduced from the survey effort and on-effort sighting data from the primary transect lines under favourable conditions (Beaufort 3 or below) for each set of the TMCLKL08 surveys in NEL and NWL are shown in Table 2. The average encounter rates deduced from the six sets of surveys were also compared with the ones deduced from the baseline monitoring period (September-November 2011) (Table 3).

Table 2. Dolphin encounter rates (sightings per 100 km of survey effort) during March-May 2022

SURVEY AREA	DOLPHIN MONITORING DATES	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)
		Primary Lines Only	Primary Lines Only
Northeast Lantau	Set 1 (8 & 11 Mar 2022)	0.00	0.00
	Set 2 (14 & 15 Mar 2022)	0.00	0.00
	Set 3 (12 & 13 Apr 2022)	0.00	0.00
	Set 4 (21 & 25 Apr 2022)	0.00	0.00
	Set 5 (3 & 5 May 2022)	0.00	0.00
	Set 6 (17 & 19 May 2022)	0.00	0.00
Northwest Lantau	Set 1 (8 & 11 Mar 2022)	0.00	0.00
	Set 2 (14 & 15 Mar 2022)	0.00	0.00
	Set 3 (12 & 13 Apr 2022)	0.00	0.00
	Set 4 (21 & 25 Apr 2022)	0.00	0.00
	Set 5 (3 & 5 May 2022)	0.00	0.00
	Set 6 (17 & 19 May 2022)	0.00	0.00

Table 3. Comparison of average dolphin encounter rates from the present post-construction monitoring period (March-May 2022) and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; ± denotes the standard deviation of the average encounter rates)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		**Encounter rate (ANI)** (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	March – May 2022	**September – November 2011**	**March – May 2022**	**September – November 2011**
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	0.0	9.85 ± 5.85	0.0	44.66 ± 29.85

3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter rates were also calculated for the present quarter using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL and NEL were all nil for this quarter with no dolphin being sighted.

3.3.3 In NEL, the average dolphin encounter rates (both STG and ANI) in the present quarterly post-construction monitoring period were both zero with no on-effort sighting being made, and such complete absence of dolphins in NEL have been consistently recorded during the same spring quarters throughout the HKLR03/TMCLKL08 dolphin monitoring in the past eight consecutive years (Table 4).

Table 4. Comparison of average dolphin encounter rates in Northeast Lantau survey area from the same spring quarters of HKLR03/TMCLKL08 impact and post-construction monitoring periods since 2013 and the baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; ± denotes the standard deviation of the average encounter rates)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	**Encounter rate (ANI)** (no. of dolphins from all on-effort sightings per 100 km of survey effort)
September-November 2011 (Baseline)	6.00 ± 5.05	22.19 ± 26.81
March-May 2013 (Impact)	0.42 ± 1.03	0.42 ± 1.03
March-May 2014 (Impact)	0.00	0.00
March-May 2015 (Impact)	0.00	0.00
March-May 2016 (Impact)	0.00	0.00
March-May 2017 (Impact)	0.00	0.00
March-May 2018 (Impact)	0.00	0.00
March-May 2019 (Impact)	0.00	0.00
March-May 2020 (Impact)	0.00	0.00
March-May 2021 (Post-Construction)	0.00	0.00
March-May 2022 (Post-Construction)	0.00	0.00

3.3.4. Furthermore, the average dolphin encounter rates (STG and ANI) in NWL during the present quarterly period were both nil with no sighting being made at all. Such complete absence of dolphins in North Lantau waters throughout the entire quarter was recorded for the second time since all HZMB dolphin monitoring began in 2012, indicating a dramatic decline in dolphin usage of this survey area since the baseline period in 2011.

3.3.5. When comparing among the past ten spring quarters in 2013-22, both quarterly counter rates in STG and ANI remained consistently low since 2015, and reached the lowest ever level in 2022 (Table 5). Such dramatic and continuous drop in dolphin occurrence in NWL since the spring period in 2015 raises serious concerns as there has been no sign of recovery in dolphin occurrence in North Lantau waters at all.

Table 5. Comparison of average dolphin encounter rates in Northwest Lantau survey area from the same spring quarters of HKLR03/TMCLKL08 impact and post-construction monitoring periods since 2013 and the baseline monitoring period (September November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; ± denotes the standard deviation of the average encounter rates)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	**Encounter rate (ANI)** (no. of dolphins from all on-effort sightings per 100 km of survey effort)
September-November 2011 (Baseline)	9.85 ± 5.85	44.66 ± 29.85
March-May 2013 (Impact)	7.75 ± 3.96	24.23 ± 18.05
March-May 2014 (Impact)	6.51 ± 3.34	19.14 ± 7.19
March-May 2015 (Impact)	0.47 ± 0.73	2.36 ± 4.07
March-May 2016 (Impact)	0.98 ± 1.10	4.78 ± 6.85
March-May 2017 (Impact)	0.93 ± 1.03	5.25 ± 9.53
March-May 2018 (Impact)	2.88 ± 4.81	11.12 ± 22.46
March-May 2019 (Impact)	1.13 ± 1.39	2.54 ± 3.00
March-May 2020 (Impact)	0.56 ± 0.86	0.56 ± 0.86
March-May 2021 (Post-Construction)	1.13 ± 1.37	3.44 ± 4.26
March-May 2022 (Post-Construction)	0.00	0.00

3.3.6. A two-way ANOVA with repeated measures and unequal sample size was conducted to examine whether there were any significant differences in the average encounter rates between the baseline and HKLR03/TMCLKL08 monitoring periods. The two variables that were examined included the two periods (baseline and impact/post-construction phases) and two locations (NEL and NWL).

3.3.8. For the comparison between the baseline period and the cumulative quarters of the HKLR03/TMCLKL08 monitoring period (i.e. the 35 quarters of the impact and post-construction phases being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were both 0.000000. Even if the alpha value is set at 0.00001, significant differences were still detected in both the average dolphin encounter rates of STG and ANI (i.e. between the cumulative periods and the locations).

3.3.9. As indicated in both dolphin distribution patterns and encounter rates, dolphin usage has been significantly and dramatically reduced in both NEL and NWL survey areas during the present quarterly period, and such low occurrence of dolphins has also been consistently documented throughout the HKLR03/TMCLKL08 monitoring period.

3.3.10. Even though all marine works associated with the HZMB construction have already been completed for two years, and the Brothers Marine Park has been established as a compensation measure for the permanent habitat loss in association with the HZMB reclamation works since late 2016, apparently there has still been no sign of recovery of

dolphin usage in North Lantau waters at all. On the contrary, such usage has continued to diminish to a near-absence level.

4. References

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Appendix I. TMCLKL08 Survey Effort Database (March-May 2022)

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
8-Mar-22	NW LANTAU	2	20.79	SPRING	STANDARD36826	TMCLKL	P
8-Mar-22	NW LANTAU	3	5.50	SPRING	STANDARD36826	TMCLKL	P
8-Mar-22	NW LANTAU	2	9.11	SPRING	STANDARD36826	TMCLKL	S
8-Mar-22	NE LANTAU	2	7.98	SPRING	STANDARD36826	TMCLKL	P
8-Mar-22	NE LANTAU	3	10.90	SPRING	STANDARD36826	TMCLKL	P
8-Mar-22	NE LANTAU	2	4.22	SPRING	STANDARD36826	TMCLKL	S
8-Mar-22	NE LANTAU	3	6.40	SPRING	STANDARD36826	TMCLKL	S
11-Mar-22	NW LANTAU	2	28.90	SPRING	STANDARD36826	TMCLKL	P
11-Mar-22	NW LANTAU	3	6.30	SPRING	STANDARD36826	TMCLKL	P
11-Mar-22	NW LANTAU	2	8.90	SPRING	STANDARD36826	TMCLKL	S
11-Mar-22	NW LANTAU	3	4.60	SPRING	STANDARD36826	TMCLKL	S
11-Mar-22	NE LANTAU	2	16.52	SPRING	STANDARD36826	TMCLKL	P
11-Mar-22	NE LANTAU	2	9.08	SPRING	STANDARD36826	TMCLKL	S
14-Mar-22	NW LANTAU	2	26.50	SPRING	STANDARD36826	TMCLKL	P
14-Mar-22	NW LANTAU	2	9.50	SPRING	STANDARD36826	TMCLKL	S
14-Mar-22	NE LANTAU	2	18.38	SPRING	STANDARD36826	TMCLKL	P
14-Mar-22	NE LANTAU	2	10.92	SPRING	STANDARD36826	TMCLKL	S
15-Mar-22	NW LANTAU	2	34.30	SPRING	STANDARD36826	TMCLKL	P
15-Mar-22	NW LANTAU	3	1.30	SPRING	STANDARD36826	TMCLKL	P
15-Mar-22	NW LANTAU	2	13.00	SPRING	STANDARD36826	TMCLKL	S
15-Mar-22	NE LANTAU	2	15.31	SPRING	STANDARD36826	TMCLKL	P
15-Mar-22	NE LANTAU	2	9.89	SPRING	STANDARD36826	TMCLKL	S
12-Apr-22	NW LANTAU	2	36.20	SPRING	STANDARD36826	TMCLKL	P
12-Apr-22	NW LANTAU	2	13.10	SPRING	STANDARD36826	TMCLKL	S
12-Apr-22	NE LANTAU	2	13.65	SPRING	STANDARD36826	TMCLKL	P
12-Apr-22	NE LANTAU	3	1.50	SPRING	STANDARD36826	TMCLKL	P
12-Apr-22	NE LANTAU	2	9.95	SPRING	STANDARD36826	TMCLKL	S
13-Apr-22	NW LANTAU	2	26.55	SPRING	STANDARD36826	TMCLKL	P
13-Apr-22	NW LANTAU	2	10.25	SPRING	STANDARD36826	TMCLKL	S
13-Apr-22	NE LANTAU	2	19.84	SPRING	STANDARD36826	TMCLKL	P
13-Apr-22	NE LANTAU	2	9.46	SPRING	STANDARD36826	TMCLKL	S
21-Apr-22	NW LANTAU	2	36.80	SPRING	STANDARD36826	TMCLKL	P
21-Apr-22	NW LANTAU	2	11.60	SPRING	STANDARD36826	TMCLKL	S
21-Apr-22	NE LANTAU	2	16.33	SPRING	STANDARD36826	TMCLKL	P
21-Apr-22	NE LANTAU	2	9.07	SPRING	STANDARD36826	TMCLKL	S
25-Apr-22	NW LANTAU	2	22.55	SPRING	STANDARD36826	TMCLKL	P
25-Apr-22	NW LANTAU	3	2.90	SPRING	STANDARD36826	TMCLKL	P
25-Apr-22	NW LANTAU	2	6.63	SPRING	STANDARD36826	TMCLKL	S
25-Apr-22	NW LANTAU	3	3.82	SPRING	STANDARD36826	TMCLKL	S
25-Apr-22	NE LANTAU	2	14.73	SPRING	STANDARD36826	TMCLKL	P
25-Apr-22	NE LANTAU	3	3.58	SPRING	STANDARD36826	TMCLKL	P
25-Apr-22	NE LANTAU	2	9.66	SPRING	STANDARD36826	TMCLKL	S
25-Apr-22	NE LANTAU	3	0.43	SPRING	STANDARD36826	TMCLKL	S
3-May-22	NW LANTAU	2	18.19	SPRING	STANDARD36826	TMCLKL	P
3-May-22	NW LANTAU	3	8.05	SPRING	STANDARD36826	TMCLKL	P
3-May-22	NW LANTAU	2	8.96	SPRING	STANDARD36826	TMCLKL	S
3-May-22	NW LANTAU	3	1.30	SPRING	STANDARD36826	TMCLKL	S
3-May-22	NE LANTAU	2	18.33	SPRING	STANDARD36826	TMCLKL	P
3-May-22	NE LANTAU	2	10.67	SPRING	STANDARD36826	TMCLKL	S
5-May-22	NW LANTAU	2	22.38	SPRING	STANDARD140232	TMCLKL	P
5-May-22	NW LANTAU	3	13.82	SPRING	STANDARD140232	TMCLKL	P

Appendix I. (cont'd)

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
5-May-22	NW LANTAU	2	8.60	SPRING	STANDARD140232	TMCLKL	S
5-May-22	NW LANTAU	3	5.10	SPRING	STANDARD140232	TMCLKL	S
5-May-22	NE LANTAU	2	6.01	SPRING	STANDARD140232	TMCLKL	P
5-May-22	NE LANTAU	3	9.43	SPRING	STANDARD140232	TMCLKL	P
5-May-22	NE LANTAU	2	7.06	SPRING	STANDARD140232	TMCLKL	S
5-May-22	NE LANTAU	3	2.70	SPRING	STANDARD140232	TMCLKL	S
17-May-22	NW LANTAU	2	20.06	SPRING	STANDARD138716	TMCLKL	P
17-May-22	NW LANTAU	3	6.73	SPRING	STANDARD138716	TMCLKL	P
17-May-22	NW LANTAU	2	7.30	SPRING	STANDARD138716	TMCLKL	S
17-May-22	NW LANTAU	3	2.51	SPRING	STANDARD138716	TMCLKL	S
17-May-22	NE LANTAU	2	15.98	SPRING	STANDARD138716	TMCLKL	P
17-May-22	NE LANTAU	3	2.78	SPRING	STANDARD138716	TMCLKL	P
17-May-22	NE LANTAU	2	10.09	SPRING	STANDARD138716	TMCLKL	S
17-May-22	NE LANTAU	3	1.05	SPRING	STANDARD138716	TMCLKL	S
19-May-22	NW LANTAU	1	5.80	SPRING	STANDARD138716	TMCLKL	P
19-May-22	NW LANTAU	2	26.30	SPRING	STANDARD138716	TMCLKL	P
19-May-22	NW LANTAU	3	3.21	SPRING	STANDARD138716	TMCLKL	P
19-May-22	NW LANTAU	2	13.90	SPRING	STANDARD138716	TMCLKL	S
19-May-22	NE LANTAU	2	14.41	SPRING	STANDARD138716	TMCLKL	P
19-May-22	NE LANTAU	3	1.50	SPRING	STANDARD138716	TMCLKL	P
19-May-22	NE LANTAU	2	8.08	SPRING	STANDARD138716	TMCLKL	S
19-May-22	NE LANTAU	3	1.11	SPRING	STANDARD138716	TMCLKL	S

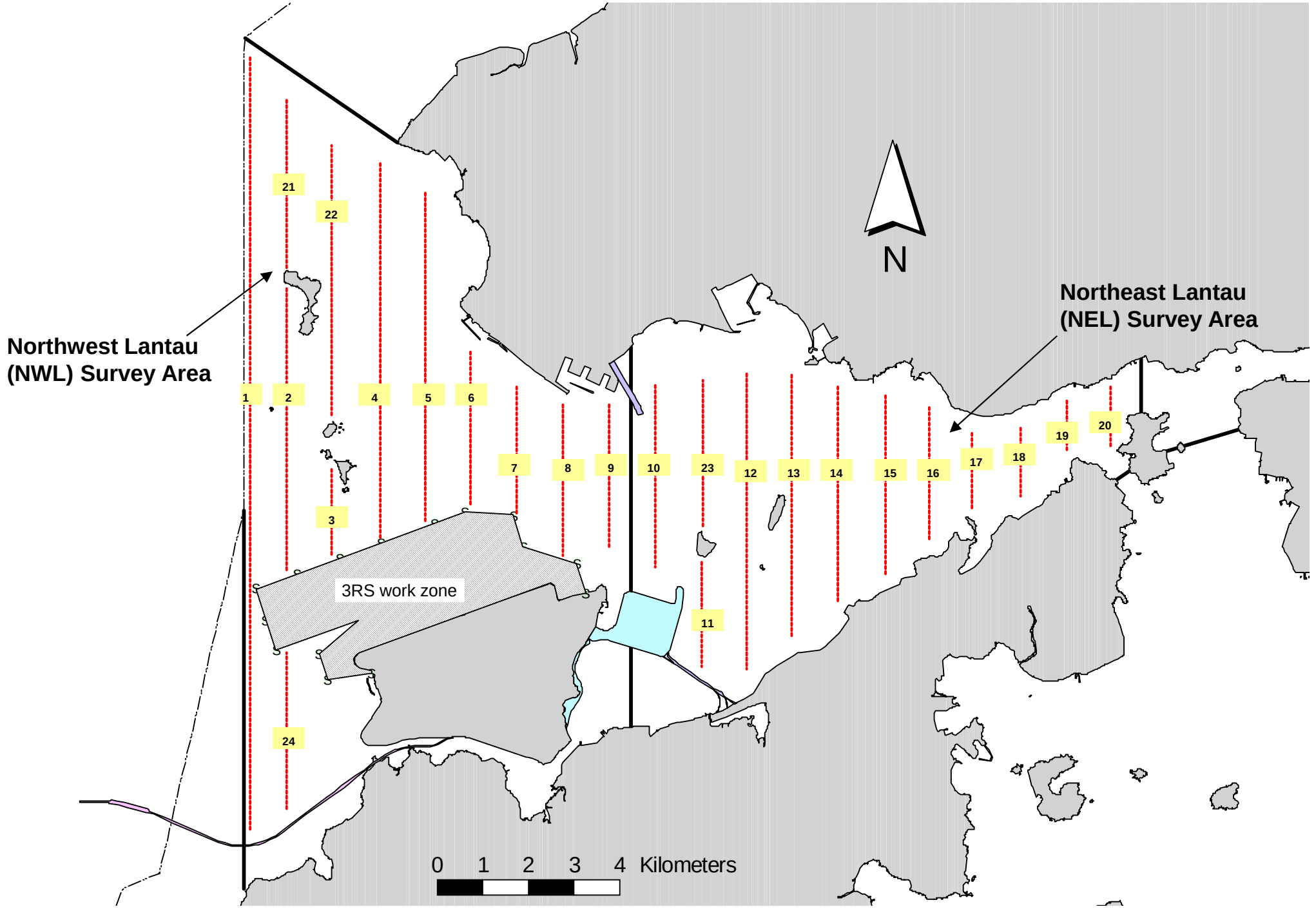

Figure 1. Transect Line Layout in Northwest and Northeast Lantau Survey Areas

Appendix D

Cumulative Statistics on Exceedances, Complaints, Notifications of Summons and Successful Prosecutions

Table D1 *Cumulative Statistics on Exceedances*

Monitoring Parameters	Action/Limit Level	Total No. recorded in this reporting quarter	Total No. recorded since Contract commencement
Post Construction (Operational) Dolphin Monitoring	Action	0	0
	Limit	1	3

Table D2 *Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions*

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Successful Prosecutions
This Reporting Period (March to May 2022)	0	0	0
Total No. received since Contract commencement	0	0	0

Email message

Environmental Resources Management

2509, 25/F One Harbourfront
18 Tak Fung Street
Hunghom, Kowloon
Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 3015 8052

To	Ramboll Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Agreement No. HMWSD 1/2021 (EP) Post-Construction Monitoring of Chinese White Dolphin (Line-transect Vessel Surveys) for Tuen Mun – Chek Lap Kok Link in Northeast and Northwest Lantau Survey Area - Investigation
Subject	Notification of Exceedance for Post Construction (Operational) Dolphin Monitoring
Date	7 June 2022

Dear Sir or Madam,

Please find attached the Notification of Exceedance (NOE) of the following Log no.:

0611663_March/May2022_dolphin_STG&ANI_NEL&NWL

A total of one limit level exceedance was recorded in the quarterly post construction (operational) dolphin monitoring data between March and May 2022.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

AGREEMENT NO. HMWSD 1/2021 (EP)
POST-CONSTRUCTION MONITORING OF CHINESE WHITE DOLPHIN (LINE-TRANSECT VESSEL SURVEYS) FOR TUEN MUN – CHEK LAP KOK LINK IN NORTHEAST AND NORTHWEST LANTAU SURVEY AREA - INVESTIGATION

Post Construction Dolphin Monitoring
Notification of Exceedance

Log No.	**0611663_ Mar/May2022_dolphin_STG&ANI_NEL&NWL** **[Total No. of Exceedances = 1 Limit Level Exceedance]**	
Date	March – May 2022 (monitored) 7 June 2022 (results received by ERM)	
Monitoring Area	Northeast Lantau (NEL) and Northwest Lantau (NWL)	
Parameter(s) with Exceedance(s)	Quarterly encounter rate of dolphin sightings (STG) Quarterly encounter rate of total number of dolphins (ANI)	
Action Levels	North Lantau Social cluster	NEL: STG < 4.2 & ANI < 15.5 or NWL: STG < 6.9 & ANI < 31.3
Limit Levels		NEL: STG < 2.4 & ANI < 8.9 and NWL: STG < 3.9 & ANI < 17.9
Recorded Levels	NEL	STG = 0 & ANI = 0
	NWL	STG = 0.55 & ANI = 1.09
	One Limit Level Exceedance was recorded in the quarterly post construction dolphin monitoring at NEL and NWL between March and May 2022.	
Statistical Analyses	Further to the review of the available and relevant dolphin monitoring data for TMCLKL project, statistical analyses were conducted as follows: • A two-way ANOVA with repeated measures and unequal sample size was conducted using Period (2 levels: baseline vs present post construction quarter, March and May 2022) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the average encounter rates between the baseline and present post construction monitoring quarter. By setting $\alpha = 0.01$ as the significance level in the statistical tests, significant differences in STG ($p = 0.0000$) and ANI ($p = 0.0000$) were detected between Periods. • A two-way ANOVA with repeated measures and unequal sample size was conducted using Cumulative Period (2 levels: the first 37 quarters of impact and post construction phases of HKLR03/TMCLKL08) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the average encounter rates between the baseline and cumulative quarters. By setting $\alpha = 0.00001$ as the significance level in the statistical tests, significant difference in STG ($p = 0.000000$) and in ANI ($p = 0.000000$) between Cumulative Period and Location were detected. *Note: Operational phase dolphin monitoring between June 2020 and August 2021 were conducted under Contract No. HY/2012/08 and operational phase dolphin monitoring between September 2021 and May 2022 were/will be conducted under Agreement No. HMWSD 1/2021 (EP).	

Works Undertaken (in the monitoring quarter)	No marine works was undertaken in the reporting period under Agreement No. HMWSD 1/2021 (EP). No marine works was undertaken in the reporting period under Contract No. HY/2012/08. Operational phase dolphin monitoring commenced in June 2020. Termination proposal for construction EM&A programme was approved by EPD on 19 March 2021. The construction phase EM&A programme of Contract No. HY/2012/08 has been terminated since 19 March 2021. No marine works was undertaken in the reporting period under Contract No. HY/2012/07. Termination proposal for construction EM&A programme of Contract No. HY/2012/07 was approved by EPD on 16 March 2020. The construction phase EM&A programme of Contract No. HY/2012/07 has been terminated since 16 March 2020.
Possible Reason for Action or Limit Level Exceedance(s)	The exceedance recorded in the quarterly post construction dolphin monitoring is unlikely to be due to TMCLKL project, in view of the following: • Marine works of TMCLKL project: No marine works was undertaken in the reporting period under Agreement No. HMWSD 1/2021 (EP). Marine works were completed and no marine vessels will be deployed under Contract No. HY/2012/08 as per confirmed by SOR on 17 April 2020. The Proposal for operational phase dolphin monitoring was approved by EPD on 19 May 2020. Operational phase dolphin monitoring commenced in June 2020. Termination proposal for construction EM&A programme was approved by EPD on 19 March 2021. The construction phase EM&A programme of the Contract has been terminated since 19 March 2021. No marine works was undertaken in the reporting period under Contract No. HY/2012/07. Termination proposal for construction EM&A programme of Contract No. HY/2012/07 was approved by EPD on 16 March 2020. The construction phase EM&A programme of Contract No. HY/2012/07 has been terminated since 16 March 2020. During this quarter of dolphin monitoring, no adverse impact on CWD due to the activities under TMCLKL project was observed. • Impact on water quality: Marine works were completed and no marine vessels will be deployed under TMCLKL project. The Proposal for operational phase water quality monitoring was approved by EPD on 19 May 2020. Operational phase water quality monitoring commenced in June 2020 and completed in May 2021 (monitoring conducted under Contract No. HY/2012/08). • Provision of Marine Park: The Government has designated the Brothers Islands as a marine park in December 2016, with the aim to help better conserve the Chinese White Dolphins, their habitats and enhance the marine and fisheries resources therein. In view of the above, no unacceptable impact on CWD or its habitat was associated with TMCLKL project in this quarter.
Actions Taken / To Be Taken	No marine works and vessels was undertaken/deployed in the reporting period. The ET will monitor for future trends in exceedances.
Remarks	The results of post construction dolphin monitoring are documented in the approved *Seventh* to *Ninth Monthly EM&A Reports*.