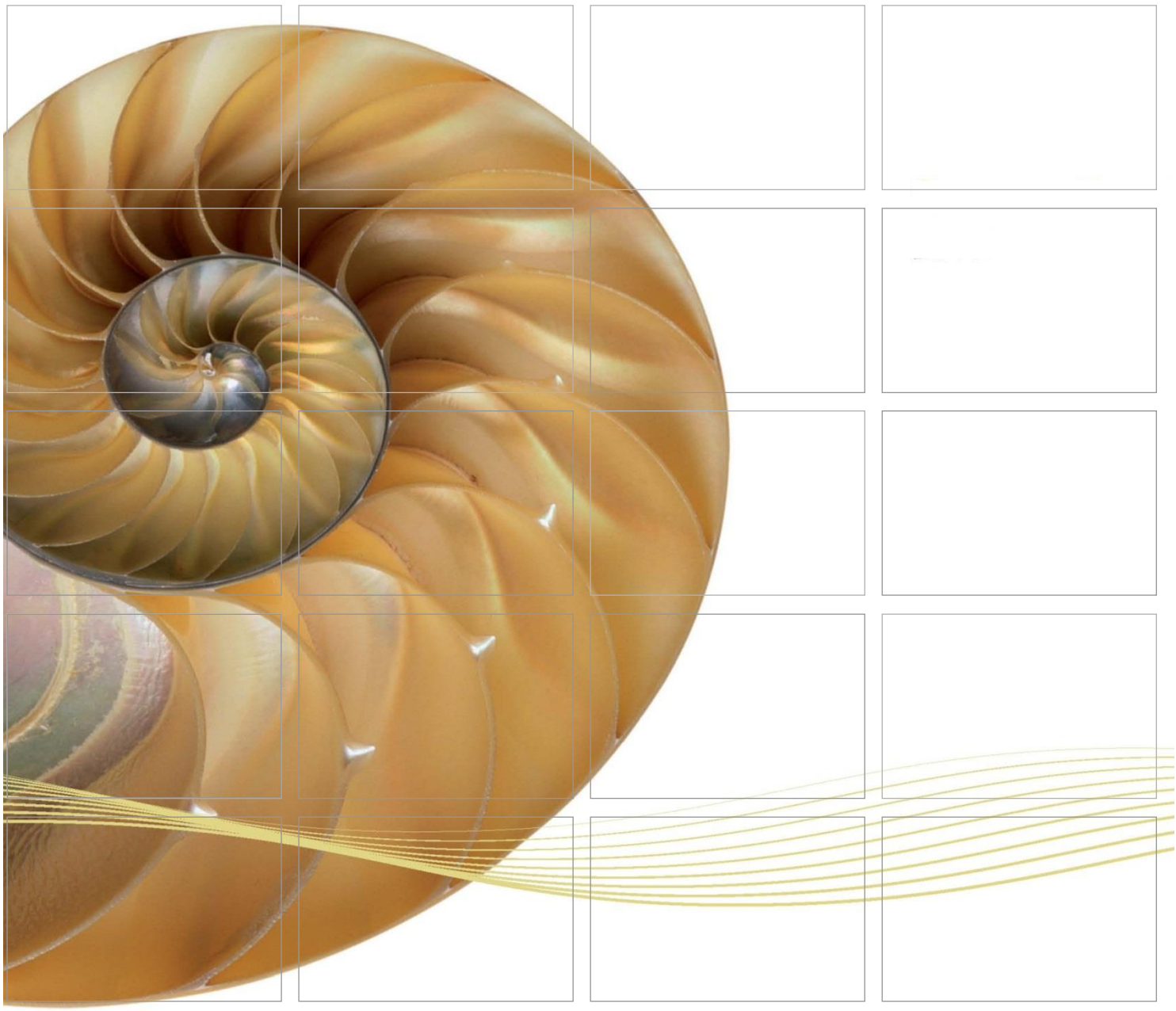
Report



Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

Thirty-first Quarterly Environmental Monitoring & Audit (EM&A) Report

26 October 2021

Environmental Resources Management
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Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

Thirty-first Quarterly Environmental Monitoring & Audit (EM&A) Report

Document Code: 0212330_31st Quarterly EM&A_20211026doc

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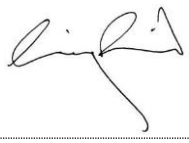
Client:	Project No:
DBJV	0212330
Summary:	Date: 26 October 2021
This document presents the Thirty-first Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section.	Approved by:  *Mr Craig Reid* *Partner*
	Certified by:  *Dr Jasmine Ng* *ET Leader*

	31st Quarterly EM&A Report	VAR	JN	CAR	26/10/21
Revision	Description	By	Checked	Approved	Date

Distribution

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OHSAS 18001:2007 Certificate No. OHS 515956

ISO 9001 : 2008 Certificate No. FS 32515

Ref.: HYDHZMBEEM00_0_8623L.21

22 December 2021

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. Roger Man

Dear Mr. Man,

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

Contract No. HY/2012/08
TM-CLKL – Northern Connection Sub-sea Tunnel Section
31st Quarterly EM&A Summary Report for June 2021 to August 2021

Reference is made to the ET's submission of 31st Quarterly EM&A Summary Report for June 2021 to August 2021 (ET's ref.: "*0212330_31st Quarterly EM&A_20211026.doc*" dated 26 October 2021) 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. Patrick Ng	(By Fax: 3188 6614)
HyD	Mr. Alan Ip	(By Fax: 3188 6614)
AECOM	Mr. Conrad Ng	(By Fax: 3922 9797)
ERM	Dr. Jasmine Ng	(By Fax: 2723 5660)
DBJV	Mr. Bryan Lee	(By Fax: 2293 7499)

Internal: DY, YH, ENPO Site

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Ramboll Hong Kong Limited 英環香港有限公司
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Under *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of the Tuen Mun – Chek Lap Kok Link Project (TM-CLK Link Project) while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) in accordance with *Environmental Permit No. EP-354/2009/A*. Ramboll Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO). 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.

The construction phase of the Contract commenced on 1 November 2013 and will tentatively be completed in 2021. The impact monitoring of the EM&A programme, including air quality, water quality, marine ecological monitoring and environmental site inspections, were commenced on 1 November 2013.

This is the Thirty-first Quarterly EM&A report presenting the EM&A works carried out during the period from 1 June to 31 August 2021 for the *Contract No. HY/2012/08 Northern Connection Sub-sea Tunnel Section* (the "Contract") in accordance with the Updated EM&A Manual of the TM-CLK Link Project. As informed by the Contractor, there was no major activities in the reporting quarter.

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.

In order to fulfil the EP's and EM&A Manual's requirements for TM-CLKL Project, Agreement No. HMWSD 1/2021 (EP) will take 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

Implementation of Marine Mammal Exclusion Zone

No marine works were undertaken since 30 December 2019, therefore, daily 250 m marine mammal exclusion zone monitoring was not undertaken since 30 December 2019.

Summary of Breaches of Action/Limit Levels

Breaches of Action and Limit Levels for Air Quality

No Action and Limit Level exceedance was recorded.

Dolphin Monitoring

One (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between June and August 2021.

Environmental Complaints, Non-compliance & Summons

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.

Reporting Change

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

Upcoming Works for the Next Reporting Period

As informed by the Contractor, there was no major activities undertaken in the coming quarterly period.

Future Key Issues

As informed by the Contractor, there was no major activities undertaken in the coming quarterly period. Potential environmental impacts in the coming quarterly period are not expected.

1 INTRODUCTION

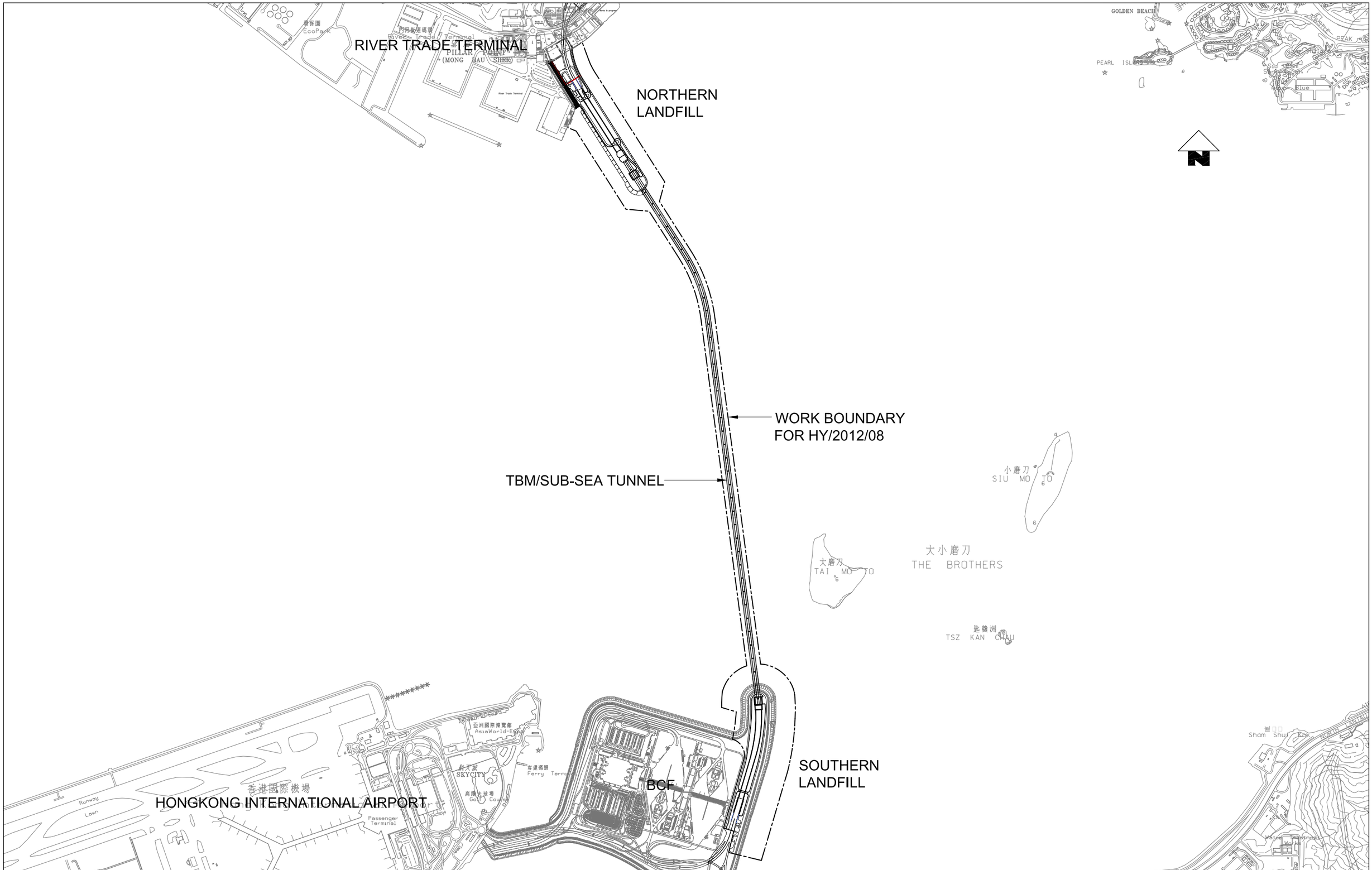
1.1 BACKGROUND

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 *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of TM-CLKL while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) in accordance with Environmental Permit No. EP-354/2009/A. Ramboll Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO).

Layout of the Contract components is presented in *Figure 1.1*.



Rev.	Description	Date	Checked
A	FIRST ISSUE	11SEP13	PKV

Designed By: PKV
Drawn By: DAI
Approved By: SPo PP
Date: 11SEP2013

Main Contractor: Dragages - Bouygues Joint Venture 實嘉 - 布依格聯營

Client: 路政署 HIGHWAYS DEPARTMENT

Contractor's Designer: ARUP Ove Arup & Partners Hong Kong Limited

Project: Contract No. HY/2012/08
Tuen Mun - Chek Lap Kok Link -
Northern Connection Sub-Sea Tunnel Section

Drawing Title: **Figure 1.1**

Drawing no.: TMCLKL8-DBJ-GEN-DWG-00174
Scale: 1:25000 @ A3
CADD Ref.: TMCLKL8-DBJ-GEN-DWG-00174-DFT-A
Issue Status: DFT (DRAFT)
Revision: A

The construction phase of the Contract commenced on 1 November 2013 and will tentatively be completed in 2021. The impact monitoring phase of the EM&A programme, including air quality, water quality, marine ecological monitoring and environmental site inspections, were commenced on 1 November 2013.

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.

In order to fulfil the EP's and EM&A Manual's requirements for TM-CLKL Project, Agreement No. HMWSD 1/2021 (EP) will take 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 Thirty-first Quarterly EM&A Report under the *Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section*. This report presents a summary of the environmental monitoring and audit works from 1 June to 31 August 2021.

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	Engr 24/SD	Ken T.M. Cheng	2762 4062	3188 6614
SOR (AECOM Asia Company Limited)	Chief Resident Engineer	Roger Man	2293 6388	2293 6300
ENPO / IEC (Ramboll Hong Kong Ltd.)	ENPO Leader	Y.H. Hui	3465 2850	3465 2899
	IEC	Brian Tam	9700 6767	3465 2899
Contractor (Dragages – Bouygues Joint Venture)	Quality and Environmental Manager	Erwin Regalado	2507 1732	2293 7499
	24-hour hotline		2293 7330	
ET (ERM-HK)	ET Leader	Jasmine Ng	2271 3311	2723 5660

1.4 SUMMARY OF CONSTRUCTION WORKS

The construction phase of this Contract was commenced on 1 November 2013. The construction programme is shown in *Appendix B*.

As per DBJV's information, there was no major activities undertaken in the reporting period.

The Environmental Sensitive Receivers in the vicinity of the Contract are shown in *Figure 1.2*.

The implementation schedule of environmental mitigation measures is presented in *Appendix C*.

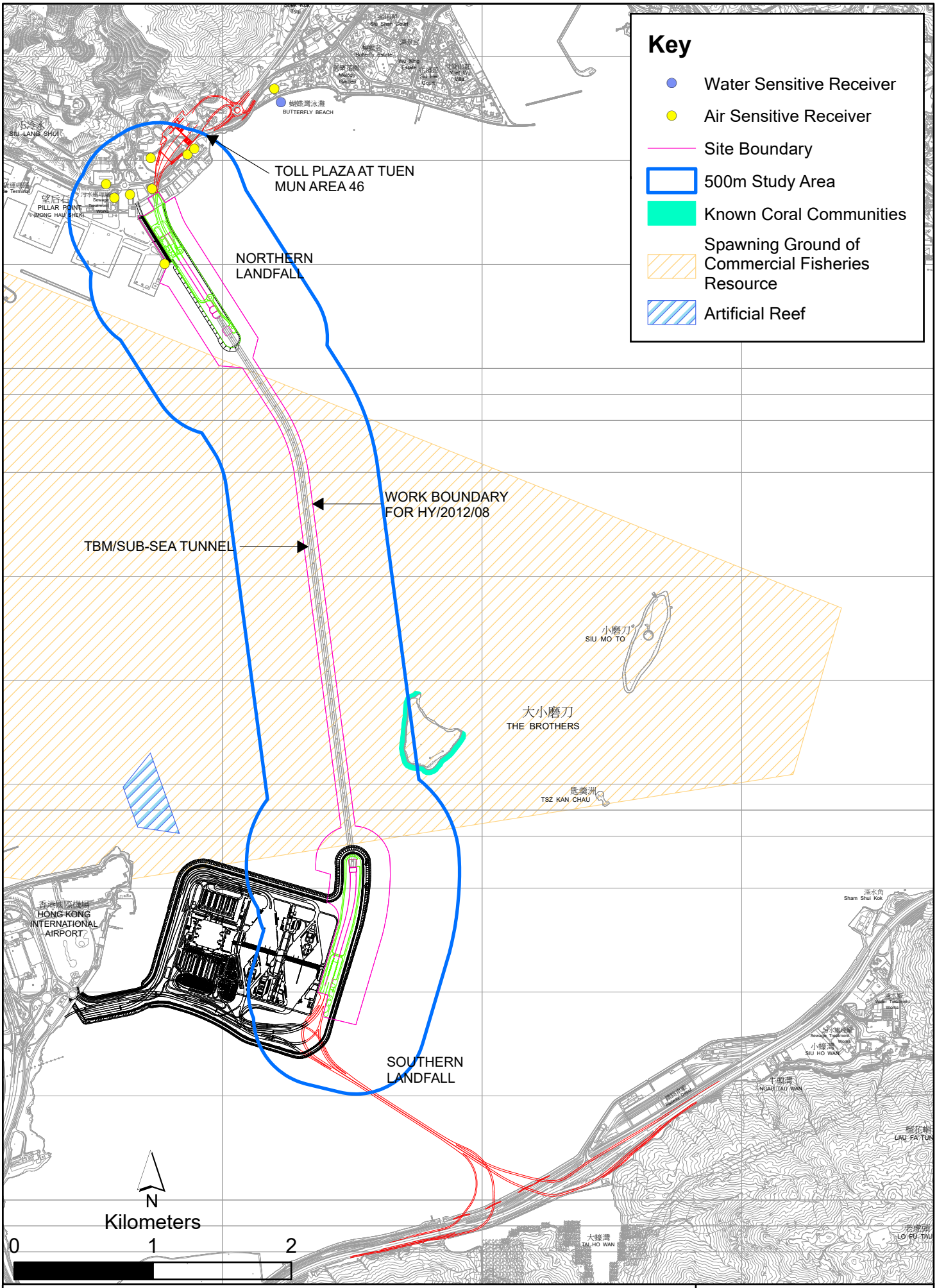


Figure 1.2 Environmental Sensitive Receivers in the vicinity of Contract No. HY/2012/08 Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-Sea Tunnel Section

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Date: 15/4/2014

Environmental Resources Management

2 EM&A RESULTS

The EM&A programme required environmental monitoring for air quality, water quality and marine ecology as well as environmental site inspections for air quality, noise, water quality, waste management, marine ecology and landscape and visual impacts. The EM&A requirements and related findings for each component are summarized in the following sections

2.1 AIR QUALITY

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.

2.2 WATER QUALITY MONITORING

According to the Updated EM&A Manual, a operational phase water quality monitoring shall be performed monthly during the first year of Project operation at all designated monitoring stations including control stations. The operation phase water quality monitoring shall be ceased after the first year of operation of the Project subject to the first year review. Operational phase water quality monitoring commenced in June 2020 and completed in May 2021.

2.3 DOLPHIN MONITORING

2.3.1 *Monitoring Requirements*

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

2.3.2 *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

2.3.3 *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.

2.3.4 *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

Line No.		Easting	Northing	Line No.		Easting	Northing
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*

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.

2.3.5 *Monitoring Schedule for the Reporting Period*

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

2.3.6 *Results & Observations*

A total of 847.63 km of survey effort was conducted, with 99.6% 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, 333.38 km and 514.25 km of survey effort were conducted from NEL and NWL survey areas, respectively. The total survey effort conducted on primary and secondary lines were 598.50 km and 249.13 km, respectively. The survey efforts are summarized in *Appendix E*.

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 (17 & 24 Jun	0.00	0.00

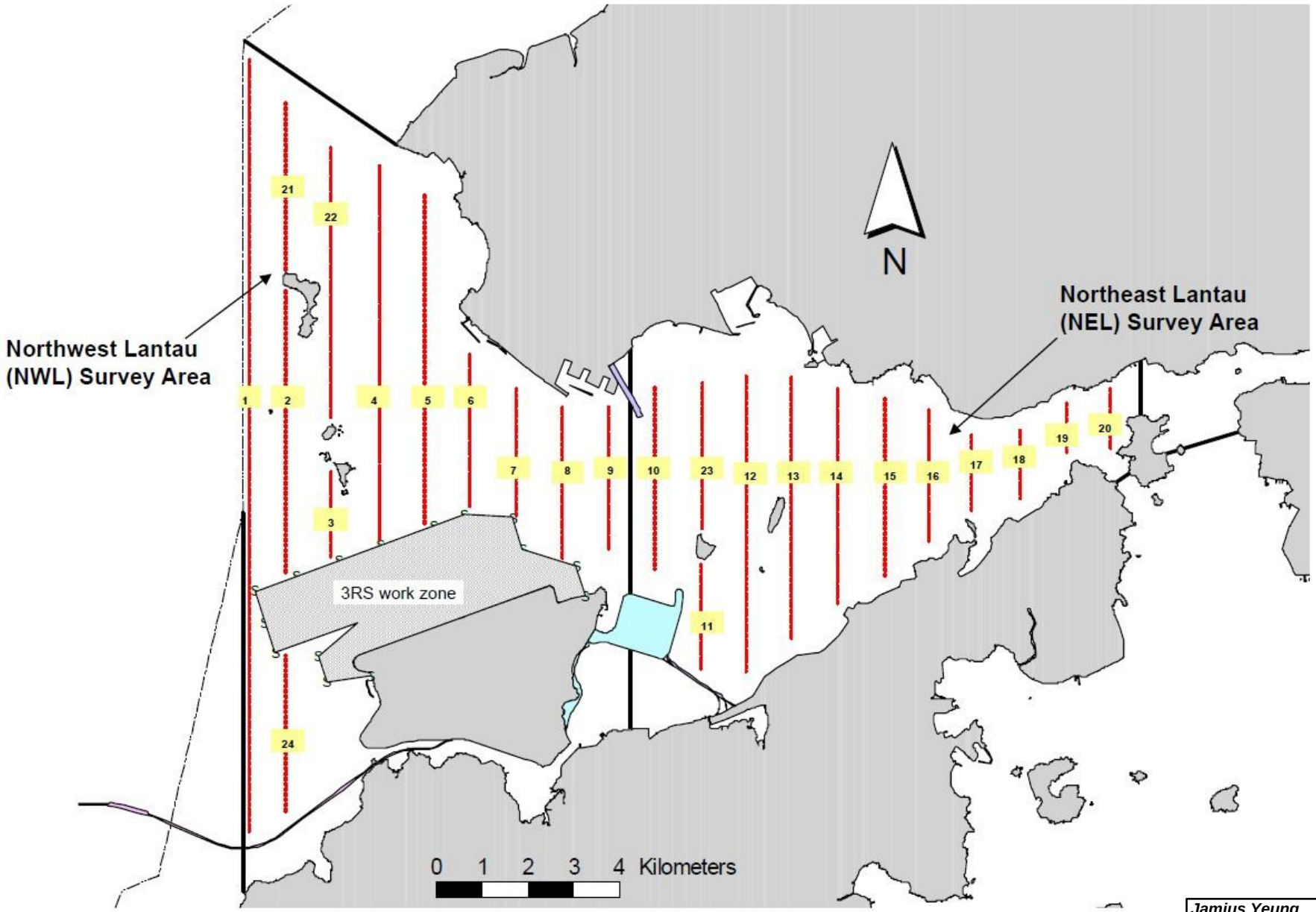

Figure 2.1

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

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Date: 29/11/2013

Jamius.Yeung
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Figure 2.2

Environmental Resources Management

ERM

	2021)		
	Set 2 (28 & 29 Jun 2021)	0.00	0.00
	Set 3 (13 & 21 Jul 2021)	0.00	0.00
	Set 4 (27 & 29 Jul 2021)	0.00	0.00
	Set 5 (3 & 5 Aug 2021)	0.00	0.00
	Set 6 (9 & 24 Aug 2021)	0.00	0.00
NWL	Set 1 (17 & 24 Jun 2021)	0.00	0.00
	Set 2 (28 & 29 Jun 2021)	0.00	0.00
	Set 3 (13 & 21 Jul 2021)	0.00	0.00
	Set 4 (27 & 29 Jul 2021)	0.00	0.00
	Set 5 (3 & 5 Aug 2021)	0.00	0.00
	Set 6 (9 & 24 Aug 2021)	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)**	
	June – August 2021	**September – November 2011**	**June – August 2021**	**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 June to August 2021.

2.3.7 Implementation of Marine Mammal Exclusion Zone

No marine works were undertaken since 30 December 2019, therefore, daily 250 m marine mammal exclusion zone monitoring was not undertaken since 30 December 2019.

2.4 EM&A SITE INSPECTION

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.

2.5 WASTE MANAGEMENT STATUS

The Contractor had submitted application form for registration as chemical waste producer under the Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting.

Wastes generated during this reporting period include mainly construction wastes (inert and non-inert). Reference has been made to the waste flow table prepared by the Contractor (*Appendix G*). The quantities of different types of wastes are summarized in *Table 2.5*.

Table 2.5 Quantities of Different Waste Generated in the Reporting Period

Month/Year	Inert Construction Waste [a] (tonnes)	Inert Construction Waste Re-used (tonnes)	Non-inert Construction Waste [b] (tonnes)	Recyclable Materials [c] (kg)	Chemical Wastes (kg)	Marine Sediment (m^3)		
						Category L	Category M (M_p & M_f)	Mixed (L+M)
June 2021	31	0	33	0	0	0	0	0
July 2021	39	0	9	0	0	0	0	0
August 2021	17	0	7	0	0	0	0	0

Notes:

(a) Inert construction wastes include hard rock and large broken concrete, and materials disposed as public fill.

(b) Non-inert construction wastes include general refuse disposed at landfill.

(c) Recyclable materials include metals, paper, cardboard, plastics, timber and others.

The Contractor was advised to properly maintain on site C&D materials and waste collection, sorting and recording system, dispose of C&D materials and wastes at designated ground and maximize reuse/ recycle of C&D materials and wastes. The Contractor was also reminded to properly maintain the site tidiness and dispose of the wastes accumulated on site regularly and properly.

For chemical waste containers, the Contractor was reminded to treat properly and store temporarily in designated chemical waste storage area on site in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.

2.6 ENVIRONMENTAL LICENSES AND PERMITS

The status of environmental licensing and permit is summarized in *Table 2.6* below.

Table 2.6 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
Construction Dust Notification	435068	27 June 2018	Throughout the Contract	DBJV	Northern Landfall
Construction Dust Notification	435505	12 July 2018	Throughout the Contract	DBJV	Southern Landfall
Chemical Waste Registration	5213-422-D2516-02	18 January 2017	Throughout the Contract	DBJV	Northern Landfall
Chemical Waste Registration	5213-951-D2591-01	25 May 2016	Throughout the Contract	DBJV	Southern Landfall
Construction Waste Disposal Account	7018108	28 August 2013	Throughout the Contract	DBJV	Waste disposal in Contract No. HY/2012/08
Waste Water Discharge License	WT00031435-2018	2 August 2018	31 August 2023	DBJV	Southern Landfall
Waste Water Discharge License	WT00034060-2019	25 July 2019	30 June 2024	DBJV	Northern Landfall (4 Discharge Point)

Notes:
HyD = Highways Department
DBJV = Dragages – Bouygues Joint Venture
VEP = Variation of Environmental Permit

2.7 *IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES*

A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in *Appendix C*. The necessary mitigation measures relevant to this Contract were implemented properly.

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

No Action and Limit Level exceedance of was recorded.

One (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between June and August 2021.

Cumulative statistics are provided in *Appendix F*.

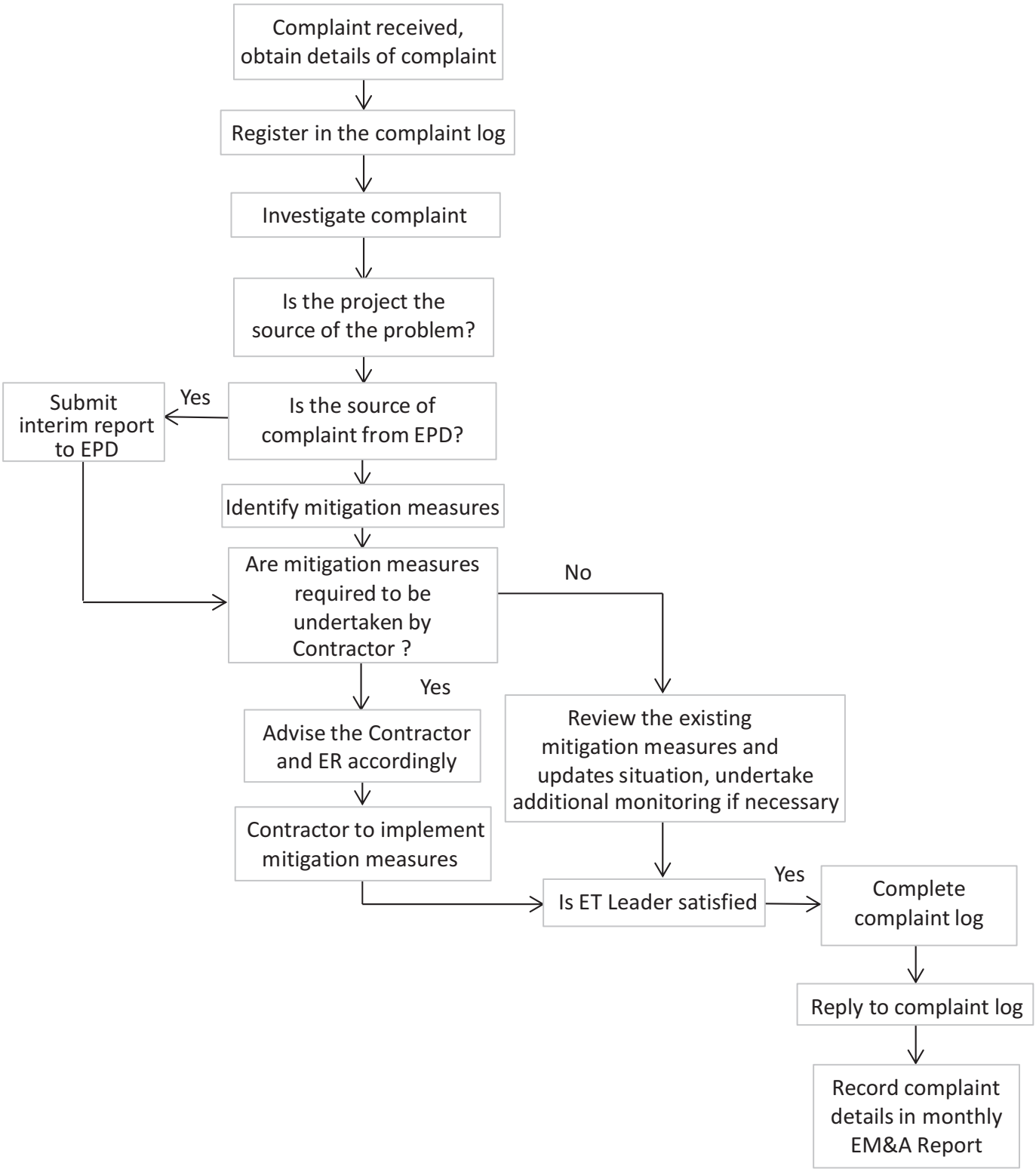
2.9 *SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS*

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 F*.



Environmental Complaint Handling Procedure

Figure 2.2

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DATE: 06/12/2013

Environmental Resources Management

ERM

3 FUTURE KEY ISSUES

3.1 CONSTRUCTION ACTIVITIES FOR THE COMING QUARTER

As informed by the Contractor, there was no major activities undertaken in the coming quarterly period.

3.2 KEY ISSUES FOR THE COMING QUARTER

As informed by the Contractor, there was no major activities undertaken in the coming quarterly period. Potential environmental impacts in the coming quarterly period are not expected.

3.3 MONITORING SCHEDULE FOR THE COMING QUARTER

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

4 CONCLUSIONS

This Thirty-first Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 June to 31 August 2021, in accordance with the Updated EM&A Manual and the requirements of *EP-354/2009/D*.

Post construction (operational) phase dolphin monitoring was carried out in the reporting period.

No Chinese White Dolphins sightings was recorded during the six sets of surveys in this reporting quarter. One limit level exceedance was observed for the quarterly dolphin monitoring data between June to August 2021.

No non-compliance event was recorded during the reporting period.

No environmental complaint was received in this reporting period.

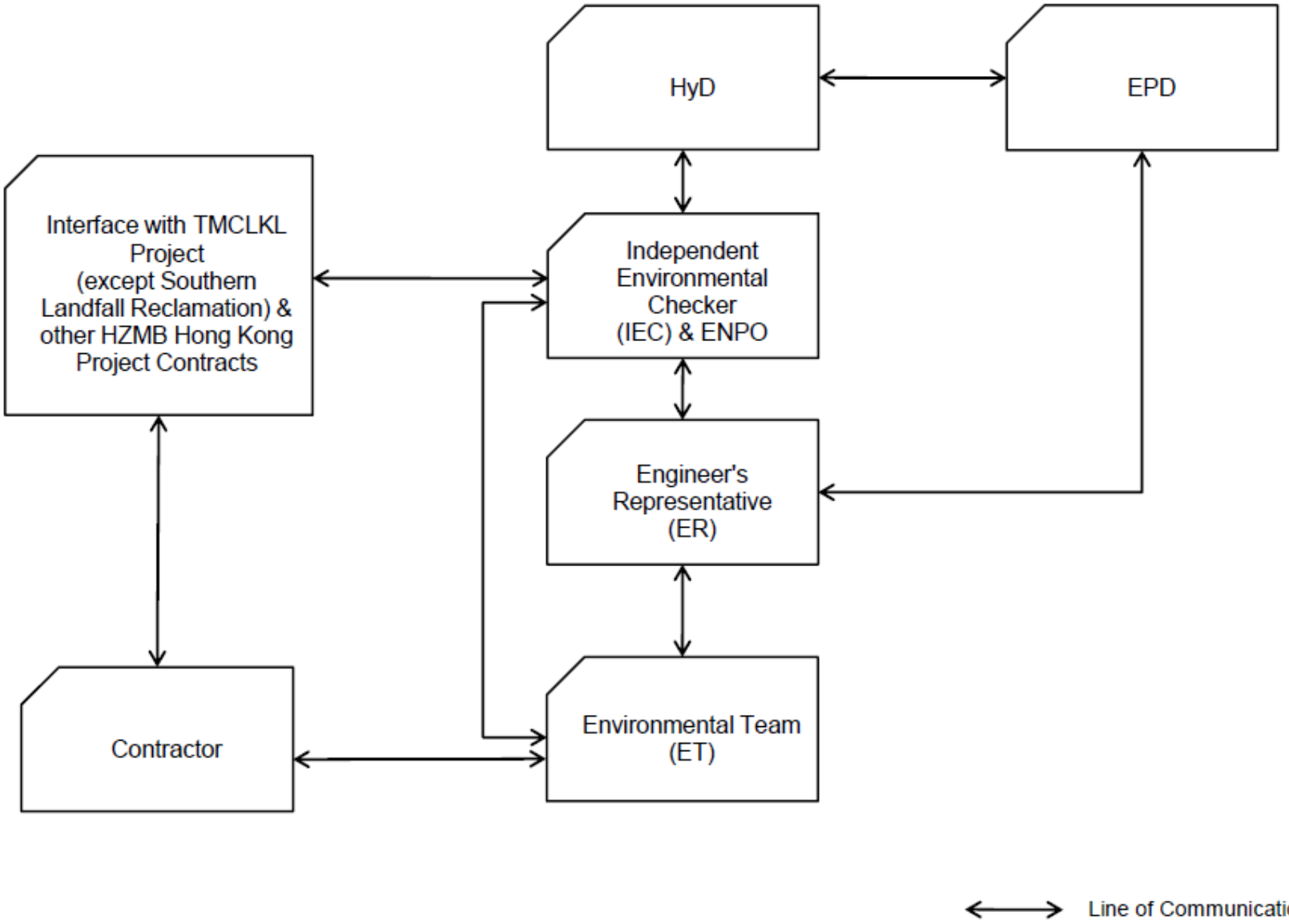
No environmental summons was received in this reporting period.

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.

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

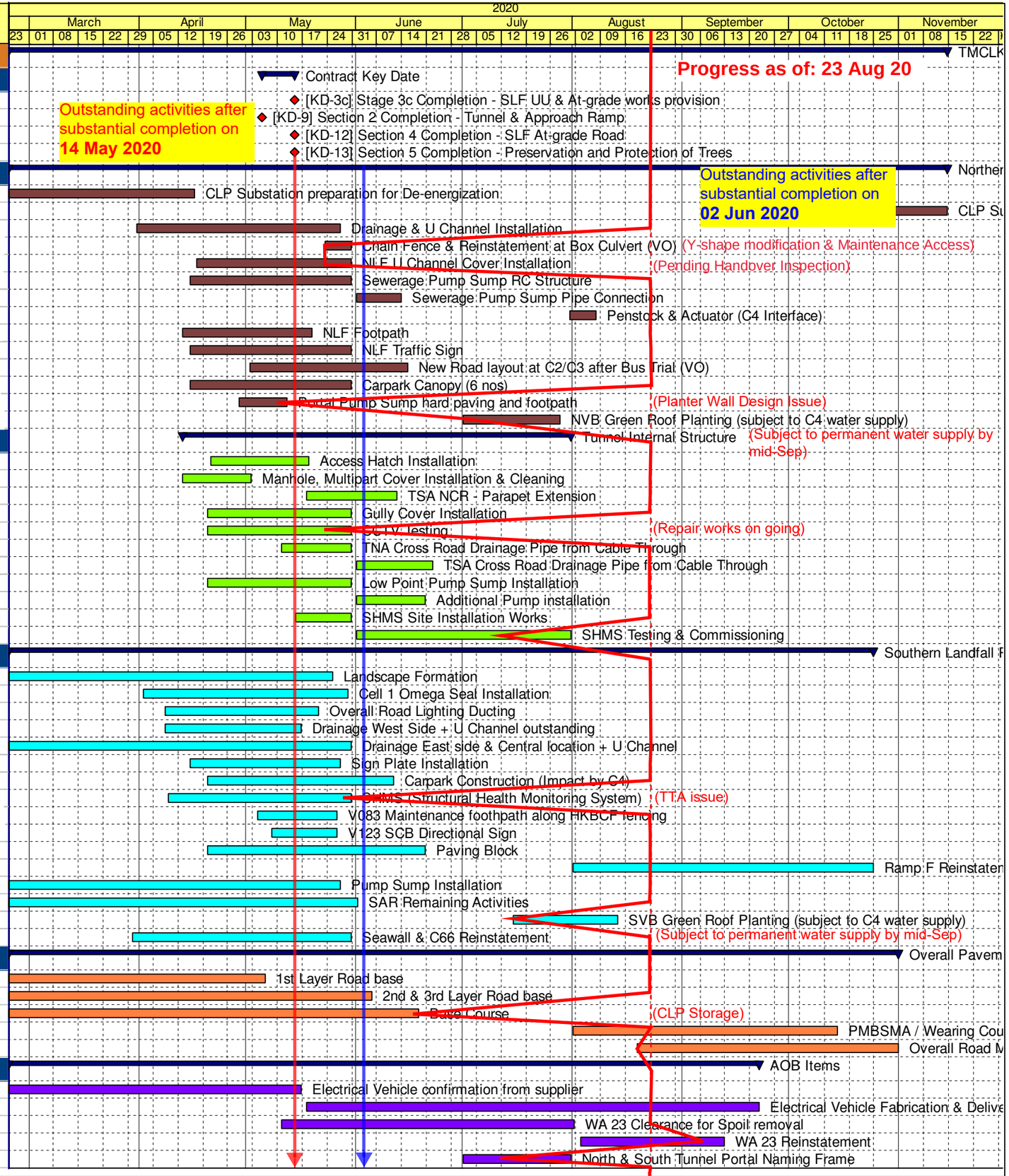
Environmental Resources Management

ERM

Appendix B

Construction Programme

#	Activity Name	Orig Dur	Start	Finish	Target Finish Date
1	**TMCLKL Northen Connection Sub-sea Tunnel Section**	217	24-Feb-20	14-Nov-20	
2	**Contract Key Date**	8	05-May-20	14-May-20	
3	[KD-3c] Stage 3c Completion - SLF UU & At-grade works provision	0		14-May-20	
4	[KD-9] Section 2 Completion - Tunnel & Approach Ramp	0		05-May-20	
5	[KD-12] Section 4 Completion - SLF At-grade Road	0		14-May-20	
6	[KD-13] Section 5 Completion - Preservation and Protection of Trees	0		14-May-20	
7	**Northern Landfall Remaining Works**	228	24-Feb-20	14-Nov-20	
8	CLP Substation preparation for De-energization	46	24-Feb-20	16-Apr-20	
9	CLP Substation - Dismantling, Removal & Reinstatement	39	01-Oct-20	14-Nov-20	
10	Drainage & U Channel Installation	50	31-Mar-20	27-May-20	
11	Chain Fence & Reinstatement at Box Culvert (VO)	7	23-May-20	30-May-20	30-Sep-20
12	NLF U Channel Cover Installation	38	17-Apr-20	30-May-20	15-Sep-20
13	Sewerage Pump Sump RC Structure	40	15-Apr-20	30-May-20	
14	Sewerage Pump Sump Pipe Connection	12	01-Jun-20	13-Jun-20	
15	Penstock & Actuator (C4 Interface)	7	31-Jul-20	07-Aug-20	
16	NLF Footpath	32	13-Apr-20	19-May-20	
17	NLF Traffic Sign	40	15-Apr-20	30-May-20	15-Aug-20
18	New Road layout at C2/C3 after Bus Trial (VO)	38	02-May-20	15-Jun-20	
19	Carpark Canopy (6 nos)	40	15-Apr-20	30-May-20	
20	Portal Pump Sump hard paving and footpath	12	29-Apr-20	12-May-20	05-Sep-20
21	NVB Green Roof Planting (subject to C4 water supply)	24	01-Jul-20	28-Jul-20	30-Sep-20
22	**Tunnel Internal Structure**	95	13-Apr-20	31-Jul-20	
23	Access Hatch Installation	24	21-Apr-20	18-May-20	
24	Manhole, Multipart Cover Installation & Cleaning	18	13-Apr-20	02-May-20	
25	TSA NCR - Parapet Extension	23	18-May-20	12-Jun-20	7-Aug-20
26	Gully Cover Installation	36	20-Apr-20	30-May-20	
27	CCTV Testing	36	20-Apr-20	30-May-20	15-Aug-20
28	TNA Cross Road Drainage Pipe from Cable Through	18	11-May-20	30-May-20	8-Jul-20
29	TSA Cross Road Drainage Pipe from Cable Through	19	01-Jun-20	22-Jun-20	4-Jul-20
30	Low Point Pump Sump Installation	36	20-Apr-20	30-May-20	15-Aug-20
31	Additional Pump installation	18	01-Jun-20	20-Jun-20	15-Aug-20
32	SHMS Site Installation Works	14	15-May-20	30-May-20	15-Aug-20
33	SHMS Testing & Commissioning	53	01-Jun-20	31-Jul-20	15-Oct-20
34	**Southern Landfall Remaining Works**	210	24-Feb-20	24-Oct-20	
35	Landscape Formation	79	24-Feb-20	25-May-20	
36	Cell 1 Omega Seal Installation	50	02-Apr-20	29-May-20	
37	Overall Road Lighting Ducting	38	08-Apr-20	21-May-20	
38	Drainage West Side + U Channel outstanding	34	08-Apr-20	16-May-20	
39	Drainage East side & Central location + U Channel	84	24-Feb-20	30-May-20	
40	Sign Plate Installation	37	15-Apr-20	27-May-20	
41	Carpark Construction (Impact by C4)	46	20-Apr-20	11-Jun-20	
42	SHMS (Structural Health Monitoring System)	45	09-Apr-20	30-May-20	26-Aug-20
43	V083 Maintenance foothpath along HKBCF fencing	20	04-May-20	26-May-20	
44	V123 SCB Directional Sign	16	08-May-20	26-May-20	
45	Paving Block	54	20-Apr-20	20-Jun-20	
46	Ramp F Reinstatement	73	01-Aug-20	24-Oct-20	
47	Pump Sump Installation	81	24-Feb-20	27-May-20	
48	SAR Remaining Activities	85	24-Feb-20	01-Jun-20	
49	SVB Green Roof Planting (subject to C4 water supply)	26	15-Jul-20	13-Aug-20	15-Sep-20
50	Seawall & C66 Reinstatement	54	30-Mar-20	30-May-20	
51	**Overall Pavement Works**	216	24-Feb-20	31-Oct-20	
52	1st Layer Road base	63	24-Feb-20	06-May-20	
53	2nd & 3rd Layer Road base	89	24-Feb-20	05-Jun-20	
54	Base Course	100	24-Feb-20	18-Jun-20	
55	PMBSMA / Wearing Course	64	01-Aug-20	14-Oct-20	
56	Overall Road Marking	64	19-Aug-20	31-Oct-20	
57	**AOB Items**	182	24-Feb-20	22-Sep-20	
58	Electrical Vehicle confirmation from supplier	72	24-Feb-20	16-May-20	
59	Electrical Vehicle Fabrication & Delivery	110	18-May-20	22-Sep-20	
60	WA 23 Clearance for Spoil removal	72	11-May-20	01-Aug-20	
61	WA 23 Reinstatement	36	03-Aug-20	12-Sep-20	
62	North & South Tunnel Portal Naming Frame	27	01-Jul-20	31-Jul-20	5 Sep-20



Page 1 of 1

Data Date: 24-Feb-20

Milestone | Pavement | Northern Landfall | AOB | Internal Structure | Summary | Southern Landfall

TMCLK Northern Connection Sub-sea Tunnel Section

Programme of Remaining Works

Forecast as of: 24 February 2020

Dragages HongKong 香港寶嘉 — A member of the Bouygues Construction group

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Date	Revision	Checked	Approved
09-May-20	For Monitoring	SPa	DLo

Appendix C

Environmental Mitigation and Enhancement Measure Implementation Schedules

Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
Air Quality									
4.8.1	3.8	An effective watering programme of twice daily watering with complete coverage, is estimated to reduce by 50%. This is recommended for all areas in order to reduce dust levels to a minimum;	All areas / throughout construction period	Contractor	TMEIA Avoid smoke impacts and disturbance		Y		N/A
4.8.1	3.8	Watering of the construction sites in Lantau for 8 times/day and in Tuen Mun for 12 times/day to reduce dust emissions by 87.5% and 91.7% respectively and shall be undertaken.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A
4.8.1	3.8	The Contractor shall, to the satisfaction of the Engineer, install effective dust suppression measures and take such other measures as may be necessary to ensure that at the Site boundary and any nearby sensitive receiver, dust levels are kept to acceptable levels.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A
4.8.1	3.8	The Contractor shall not burn debris or other materials on the works areas.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A
4.8. 1	3.8	In hot, dry or windy weather, the watering programme shall maintain all exposed road surfaces and dust sources wet.	All unpaved haul roads / throughout construction period in hot, dry or windy weather	Contractor	TMEIA Avoid smoke impacts and disturbance		Y		N/A
4.8.1	3.8	Where breaking of oversize rock/concrete is required, watering shall be implemented to control dust. Water spray shall be used during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A
4.8. 1	3.8	Open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A
4.8.1	3.8	During transportation by truck, materials shall not be loaded to a level higher than the side and tail boards, and shall be dampened or covered before transport.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
4.8.1	3.8	Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A
4.8.1	3.8	No earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site.	All site exits / throughout construction period	Contractor	TMEIA Avoid dust		Y		N/A
4.8.1	3.8	Areas of exposed soil shall be minimised to areas in which works have been completed shall be restored as soon as is practicable.	All exposed surfaces / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A
4.8.1	3.8	All stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy condition.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		N/A
4.11	Section 3	EM&A in the form of 1 hour and 24 hour dust monitoring and site audit.	All representative existing ASRs / throughout construction period	Contractor	EM&A Manual		Y		N/A
WATER QUALITY									
Marine Works (Sequence A)									
6.1 Figure 6.2a Appendix D6a	Annex A	Construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. The protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2a and detailed in Appendix D6a. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation;	All areas/ prior to dredging and backfilling works	Contractor	TM-EIAO		Y		N/A
6.1	-	a maximum of 50% public fill to be used for all seawall filling below +2.5mPD for TM-CLKL southern and northern landfalls.	TM-CLKL seawall filling	Contractor	TM-EIAO		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
6.1	-	a maximum of 30% public fill to be used for reclamation filling below +2.5mPD for TM-CLKL southern landfall	TM-CLKL southern landfall reclamation filling	Contractor	TM-EIAO		Y		N/A
6.1	-	a maximum of 100% public fill to be used for reclamation filling below +2.5mPD for TM-CLKL northern landfall	TM-CLKL northern landfall reclamation filling	Contractor	TM-EIAO		Y		N/A
6.1	-	Use of cage type silt curtains round allgrab dredgers during the HKBCF, HKLR and TM-CLKL southern reclamation works.	All areas dredging works	Contractor	TM-EIAO		Y		N/A
	Figure 1.1 of Annex C	A layer of floating type silt curtain will be applied when dredging and reclamation works are being undertaken at Portion N-a as shown in Figure 1.1 of Annex C of the EM&A Manual.	All areas/ through out marine works	Contractor	TM-EIAO		Y		N/A
6.1	-	Trailer suction hopper dredgers shall not allow mud to overflow.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	The use of Lean Material Overboard (LMOB) systems shall be prohibited.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1 Figure 6.2b Appendix D6b	Annex A	For other parts of the reclamation works construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. It should be noted that the protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2b and detailed in Appendices D6b. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation; - Reclamation filling for Portion D of HKBCF; Reclamation filling for FSD berth of HKBCF; and - Reclamation dredging and filling for Portion 1 of HKLR;	TM-CLKL northern landfall, Portion D of HKBCF and HKLR	Contractor	TM-EIAO		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
6.1	-	The filling material for the other parts of the works are the same as Sequence A;	All other areas/backfilling works	Contractor	TM-EIAO		Y		N/A
6.1	5.7	Cage type silt curtain (with steel enclosure) shall be used for grab dredgers working in the site of HKBCF and TM- CLKL southern reclamation. Cage type silt curtains will be applied round all grab dredgers at other works area.	HKBCF, HKLR and TM-CLKL grab dredging	Contractor	TM-EIAO		Y		N/A
6.1	Annex A	A layer of floating type silt curtain will be applied around all works as defined in Appendix D6b.	All areas/ through out marine works	Contractor	TM-EIAO		Y		N/A
6.1	-	TM-CLKL northern landfall: - Reclamation filling shall not proceed until at least 200m section of leading seawall at both the east and west sides of the reclamation are formed above +2.5 mPD, except for 100m gaps for marine access;	All areas/ through out marine works	Contractor	TM-EIAO		Y		N/A
General Marine Works									
6.1	-	Use of TBM for the construction of the submarine tunnel.	Tunnel works / Construction phase	Contractor	TM-EIAO		Y		N/A
6.1	-	Export dredged spoils from NWWCZ.	All areas as much as possible / dredging activities	Contractor	DASO Permit conditions		Y		N/A
6.1	-	Where public fill is proposed for filling below +2.5mPD, the fine content in the public fill will be controlled to 25%	All areas/ backfilling works	Contractor	TM-EIAO		Y		N/A
6.1	-	Where sand fill is proposed for filling below +2.5mPD, the fine content in the sand fill will be controlled to 5%.	All areas/ backfilling works	Contractor	TM-EIAO		Y		N/A
6.1	-	Mechanical grabs shall be designed and maintained to avoid spillage and should seal tightly while being lifted.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
6.1	-	Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action;	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	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.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	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.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	5.2	Silt curtain shall have proved effectiveness from the producer and shall be fully maintained throughout the works by the contractor.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
6.1	-	The daily maximum production rates shall not exceed those assumed in the water quality assessment.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	The dredging and filling works shall be scheduled to spread the works evenly over a working day.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
Land Works									
6.1	-	Wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Sewage effluent and discharges from on- site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Temporary access roads should be surfaced with crushed stone or gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
6.1	5.8	Manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	All vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for off site disposal.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	The Contractor shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance.	All areas/ throughout construction period	Contractor	TM-EIAO Waste Disposal Ordinance		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
6.1	-	All fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	Roadside gullies to trap silt and grit shall be provided prior to discharging the stormwater into the marine environment. The sumps will be maintained and cleaned at regular intervals.	Roadside/design and operation	Design Consultant/ Contractor	TM-EIAO	Y		Y	N/A
6.1	Section 5	All construction works shall be subject to routine audit to ensure implementation of all EIA recommendations and good working practice.	All areas/ throughout construction period	Contractor	EM&A Manual		Y		N/A
Water Quality Monitoring									
6.1	Section 5	Water quality monitoring shall be undertaken for suspended solids, turbidity, and dissolved oxygen. Nutrients and metal parameters shall also be measured for Mf sediment operations (only HKBCF and HKLR required handling of Mf sediment) during baseline, backfilling and post construction period. One year operation phase water quality monitoring at designated stations.	Designated monitoring stations as defined in EM&A Manual, Section 5/ Before, through-out marine construction period, post construction and monthly operational phase water quality monitoring for a year.	Contractor	EM&A Manual		Y	Y	Operational phase water quality monitoring commenced in June 2020 and completed in May 2021.
ECOLOGY									
8.14	6.3	Specification for and implement pre, during and post construction dolphin abundance monitoring.	All Areas/Detailed Design/ during construction works/post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y	✓
8.14	6.3,6.5	Specification and implementation of 250m dolphin exclusion zone.	All dredging and reclamation areas/Detailed Design/during all reclamation and dredging works	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
8.15	6.3, 6.5	Specification and deployment of an artificial reef of an area of 3,600m2 in an area where fishing activities are prohibited.	Area of prohibited fishing activities/Detailed Design/towards end of construction period	TM-CLKL/ HKBCF Design Consultant/TM-CLKL/ HKBCF Contractor	TMEIA	Y		Y	N/A. To be implemented by AFCD.
8.14	6.3, 6.5	Specification and implementation of marine vessel control specifications	All areas/Detailed Design/during construction works	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
8.14	6.3, 6.5	Design and implementation of acoustic decoupling methods for dredging and reclamation works	All areas/ Detailed Design/during dredging and reclamation works	Design Consultant/ Contractor	TMEIA	Y	Y		N/A

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
8.15	6.3, 6.4	Pre-construction phase survey and coral translocation	Detailed Design/Prior to construction	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
8.15	6.5	Audit coral translocation success	Post translocation	Contractor	TMEIA		Y		N/A
7.13	6.5	The loss of habitat shall be supplemented by enhancement planting in accordance with the landscape mitigation schedule.	All areas / As soon as accessible	Contractor	TMEIA		Y		N/A
7.13	6.5	Spoil heaps shall be covered at all times.	All areas / Throughout construction period	Contractor	TMEIA		Y		N/A
7.13	6.5	Avoid damage and disturbance to the remaining and surrounding natural habitat	All areas / Throughout construction period	Contractor	TMEIA		Y		N/A
7.13	6.5	Placement of equipment in designated areas within the existing disturbed land	All areas / Throughout construction period	Contractor	TMEIA		Y		N/A
7.13	6.5	Disturbed areas to be reinstated immediately after completion of the works.	All areas / Throughout construction period	Contractor	TMEIA		Y		N/A
7.13	6.5	Construction activities should be restricted to the proposed works boundary.	All areas / Throughout construction period	Contractor	TMEIA		Y		N/A
LANDSCAPE AND VISUAL									
10.9	7.6	The colour and shape of the toll control buildings, ventilation building and administration building shall adopt a design which could blend it into the vicinity elements, and the details will be developed in detailed design stage (DM2)	All areas/detailed design	Design Consultant	TMEIA	Y			N/A
10.9	7.6	Aesthetic design of the viaduct, retaining wall and other structures will be developed under ACABAS submission (DM5)	All areas/detailed design	Design Consultant	TMEIA	Y			N/A
10.9	7.6	Screening of construction works by hoardings around works area in visually unobtrusive colours, to screen works (CM5)	All areas/detailed design/ during construction/post construction	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
10.9	7.6	Control night-time lighting and glare by hooding all lights (CM6)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
10.9	7.6	Ensure no run-off into water body adjacent to the Project Area (CM7)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (CM8)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
10.9	7.6	Aesthetically pleasing design (visually unobtrusive and non-reflective) as regard to the form, material and finishes shall be incorporated to all buildings, engineering structures and associated infrastructure facilities (OM5)	All areas/detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	N/A
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (OM6)	All areas/detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	N/A
WASTE									
12.6		The Contractor shall identify a coordinator for the management of waste.	Contract mobilisation	Contractor	TMEIA		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6		The Contractor shall prepare and implement a Waste Management Plan which specifies procedures such as a ticketing system, to facilitate tracking of loads and to ensure that illegal disposal of wastes does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. A recording system for the amount of waste generated, recycled and disposed (locations) should be established.	Contract mobilisation	Contractor	TMEIA, Works Branch Technical Circular No. 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6		The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	Contract mobilisation	Contractor	TMEIA, Land (Miscellaneous Provisions) Ordinance (Cap 28); Waste Disposal Ordinance (Cap 354); Dumping at Sea Ordinance (Cap 466); Water Pollution Control Ordinance.		Y		N/A
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedures including waste reduction, reuse and recycling.	Contract Mobilisation	Contractor	TMEIA		Y		N/A
12.6	8.1	The extent of cutting operation should be optimised where possible. Earth retaining structures and bored pile walls should be proposed to minimise the extent of cutting.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	The surplus surcharge should be transferred to a fill bank	Reclamation areas / after surcharge works	Contractor	TMEIA		Y		N/A
12.6	8.1	Rock armour from the existing seawall should be reused on the new sloping seawall as far as possible	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	The site and surroundings shall be kept tidy and litter free.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	No waste shall be burnt on site.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Provisions to be made in contract documents to allow and promote the use of recycled aggregates where appropriate.	Detailed Design	Design Consultant	TMEIA	Y			N/A
12.6	8.1	The Contractor shall be prohibited from disposing of C&D materials at any sensitive locations. The Contractor should propose the final disposal sites in the EMP and WMP for approval before implementation.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Stockpiled material shall be covered by tarpaulin and /or watered as appropriate to prevent windblown dust/ surface run off.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage and dust generation.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Wheel washing facilities shall be used by all trucks leaving the site to prevent transfer of mud onto public roads.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6	8.1	Dredged marine mud shall be disposed of in a gazetted marine disposal ground under the requirements of the Dumping at Seas Ordinance.	Reclamation areas / throughout dredging works	Contractor	TMEIA		Y		N/A
12.6	8.1	Standard formwork or pre-fabrication should be used as far as practicable so as to minimise the C&D materials arising. The use of more durable formwork/plastic facing for construction works should be considered. The use of wooden hoardings should be avoided and metal hoarding should be used to facilitate recycling. Purchasing of construction materials should avoid over-ordering and wastage.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	The Contractor should recycle as many C&D materials (this is a waste section) as possible on-site. The public fill and C&D waste should be segregated and stored in separate containers or skips to facilitate the reuse or recycling of materials and proper disposal. Where practicable, the concrete and masonry should be crushed and used as fill materials. Steel reinforcement bar should be collected for use by scrap steel mills. Different areas of the sites should be considered for segregation and storage activities.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	All falsework will be steel instead of wood.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Chemical waste producers should register with the EPD. Chemical waste should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as follows: *f* suitable for the substance to be held, resistant to corrosion, maintained in good conditions and securely closed; *f* Having a capacity of <450L unless the specifications have been approved by the EPD; and w Chinese according to the instructions prescribed in Schedule 2 of the Regulations. *f* Clearly labelled and used solely for the storage of chemical wastes; *f* Enclosed with at least 3 sides; *f* Impermeable floor and bund with capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in the area, whichever is greatest; *f* Adequate ventilation;	All areas / throughout construction period	Contractor	TMEIA		Y		N/A

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
		f Sufficiently covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and *f* Incompatible materials are adequately separated.							
12.6	8.1	Waste oils, chemicals or solvents shall not be disposed of to drain,	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Adequate numbers of portable toilets should be provided for on-site workers. Portable toilets should be maintained in reasonable states, which will not deter the workers from utilising them.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Night soil should be regularly collected by licensed collectors.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	General refuse arising on-site should be stored in enclosed bins or compaction units separately from C&D and chemical wastes. Sufficient dustbins shall be provided for storage of waste as required under the Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station. Burning of refuse on construction sites is prohibited.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	All waste containers shall be in a secure area on hardstanding;	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	Office wastes can be reduced by recycling of paper if such volume is sufficiently large to warrant collection. Participation in a local collection scheme by the Contractor should be advocated. Waste separation facilities for paper, aluminium cans, plastic bottles, etc should be provided on-site.	Site Offices/ throughout construction period	Contractor	TMEIA		Y		N/A
12.6	Section 8	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken.	All areas / throughout construction period	Contractor	EM&A Manual		Y		N/A
CULTURAL HERITAGE									
11.8	Section 9	EM&A in the form of audit of the mitigation measures	All areas / throughout construction period	Highways Department	EIAO-TM		Y		N/A

*** Remarks:**

✓ Compliance of Mitigation Measures

<> Compliance of Mitigation but need improvement

x Non-compliance of Mitigation Measures

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Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	

▲ Non-compliance of Mitigation Measures but rectified by Contractor
∆ Deficiency of Mitigation Measures but rectified by Contractor
N/A Not Applicable in Reporting Period

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Appendix D

EM&A Monitoring Schedules

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Operational Phase Dolphin Monitoring Survey Monitoring Schedule - June 2021

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

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Operational Phase Dolphin Monitoring Survey Monitoring Schedule - July 2021

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

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Operational Phase Dolphin Monitoring Survey Monitoring Schedule - August 2021

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

Appendix E

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

5th Quarterly Progress Report (June-August 2021)
submitted to Dragages – Bouygues Joint Venture & ERM Hong Kong Ltd.

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

1 September 2021

1. Introduction

1.1. As part of the Hong Kong-Zhuhai-Macao Bridge, the Tuen Mun-Chek Lap Kok Link (TM-CLKL) Northern Connection Sub-sea Tunnel Section (Contract no. HY/2012/08) comprises the sub-sea TBM tunnels (two tubes with cross passages) across the Urmston Road to connect Tuen Area 40 and Hong Kong Boundary Crossing Facilities (HKBCF) of approximately 4 km in length with dual 2-lane carriageway, the tunnels at both the southern landfall and the northern landfall for construction of approach roads to the sub-sea TBM tunnels of approximately 1.5 km in length, as well as the northern landfall reclamation of approximately 16.5 hectares and about 20.km long seawalls. Dragages – Bouygues Joint Venture (hereinafter called the "Contractor") was awarded as the main contractor for the Northern Connection Sub-sea Tunnel Section, and ERM Hong Kong Limited would serve as the Environmental Team to implement the Environmental Monitoring and Audit (EM&A) programme.

1.2. According to the updated EM&A Manual (for TMCLKL), monthly line-transect vessel surveys for Chinese White Dolphin should be conducted to cover the Northwest (NWL) and Northeast Lantau (NEL) survey areas as in AFCD annual marine mammal monitoring programme. Between 2013 and 2019, as such surveys have already been undertaken by the HKLR03 and HKBCF projects in the survey same areas of NEL and NWL, a combined monitoring approach was recommended by the Highways Department, that the TM-CLKL EM&A project can utilize the monitoring data collected by HKLR03 or HKBCF project to avoid any redundancy in monitoring effort. Such exemption for the dolphin monitoring has ended in September 2019 as the dolphin monitoring works carried out by HKLR03 and HKBCF contract have been completed. Starting in October 2019, TMCLKL08 contract takes over the dolphin monitoring works by conducting the regular vessel-based line-transect surveys during the construction phase. And as the construction works for the TMCLKL08 contract has also been completed in May 2020, the post-construction dolphin monitoring works have subsequently commenced in June 2020.

1.3. Since November 2013, the Director of Hong Kong Cetacean Research Project (HKCRP), Dr. Samuel Hung, has been appointed by ERM Hong Kong Limited as the dolphin specialist for the TMCLKL Northern Connection Sub-sea Tunnel Section EM&A project. He is responsible for the dolphin monitoring study, including the data collection on Chinese White Dolphins during the construction phase (i.e. impact period) as well as the post-construction phase of the TMCLKL project in Northwest Lantau (NWL) and Northeast Lantau (NEL) survey areas. During both phases, the dolphin specialist is responsible to utilize the collected monitoring data in order to examine any potential impacts on the dolphins during and after the TMCLKL construction works.

1.4. This report is the fifth quarterly progress report under the TM-CLKL post-construction phase dolphin monitoring programme submitted to the Contractor, which summarizes the results of the survey findings during the period of June to August 2021.

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 TMCLKL 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 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) x 100) / SA%
DPSE = ((D / E) x 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 impact 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 June to August 2021, six sets of systematic line-transect vessel surveys were conducted under the TMCLKL post-construction dolphin monitoring works to cover all transect lines in NWL and NEL survey areas twice per month.

3.1.2. From these surveys, a total of 847.63 km of survey effort was collected, with 99.6% 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, 333.38 km and 514.25 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 598.50 km, while the effort on secondary lines was 249.13 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 monitoring surveys from June to August 2021, no Chinese White Dolphin was sighted at all, for the first time since HZMB monitoring began in 2012.

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 TMCLKL 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 June-August 2021

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 (17 & 24 Jun 2021)	0.00	0.00
	Set 2 (28 & 29 Jun 2021)	0.00	0.00
	Set 3 (13 & 21 Jul 2021)	0.00	0.00
	Set 4 (27 & 29 Jul 2021)	0.00	0.00
	Set 5 (3 & 5 Aug 2021)	0.00	0.00
	Set 6 (9 & 24 Aug 2021)	0.00	0.00
Northwest Lantau	Set 1 (17 & 24 Jun 2021)	0.00	0.00
	Set 2 (28 & 29 Jun 2021)	0.00	0.00
	Set 3 (13 & 21 Jul 2021)	0.00	0.00
	Set 4 (27 & 29 Jul 2021)	0.00	0.00
	Set 5 (3 & 5 Aug 2021)	0.00	0.00
	Set 6 (9 & 24 Aug 2021)	0.00	0.00

Table 3. Comparison of average dolphin encounter rates from the present post-construction monitoring period (June-August 2021) 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)	
	June – August 2021	September – November 2011	June – August 2021	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 extremely low occurrence of dolphins in NEL have been consistently recorded during the same summer quarters throughout the HKLR03/TMCLKL 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 summer quarters of HKLR03/TMCLKL impact and post-construction monitoring periods since 2012 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
June-August 2013 (Impact)	0.88 ± 1.36	3.91 ± 8.36
June-August 2014 (Impact)	0.42 ± 1.04	1.69 ± 4.15
June-August 2015 (Impact)	0.44 ± 1.08	0.44 ± 1.08
June-August 2016 (Impact)	0.00	0.00
June-August 2017 (Impact)	0.00	0.00
June-August 2018 (Impact)	0.00	0.00
June-August 2019 (Impact)	0.00	0.00
June-August 2020 (Post-Construction)	0.00	0.00
June-August 2021 (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 first 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 (Table 5).

3.3.5. When comparing to the past eight summer quarters in 2013-20, the quarterly encounter rates in 2021 continued to plummet to the lowest level ever among all summer quarters during the HKLR03/TMCLKL monitoring period (Table 5). Such dramatic drop in dolphin occurrence in NWL raises serious concerns, and the temporal trend should be closely monitored in the upcoming monitoring quarters while all construction activities of HZMB works has already been completed.

Table 5. Comparison of average dolphin encounter rates in Northwest Lantau survey area from the same summer quarters of HKLR03/TMCLKL impact and post-construction monitoring periods since 2012 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
June-August 2013 (Impact)	6.56 ± 3.68	27.00 ± 18.71
June-August 2014 (Impact)	4.74 ± 3.84	17.52 ± 15.12
June-August 2015 (Impact)	2.53 ± 3.20	9.21 ± 11.57
June-August 2016 (Impact)	1.72 ± 2.17	7.48 ± 10.98
June-August 2017 (Impact)	2.20 ± 2.88	6.58 ± 8.12
June-August 2018 (Impact)	1.16 ± 1.39	2.87 ± 3.32
June-August 2019 (Impact)	0.62 ± 1.52	1.55 ± 3.80
June-August 2020 (Post-Construction)	0.57 ± 0.89	0.57 ± 0.89
June-August 2021 (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/TMCLKL monitoring periods. The two variables that were examined included the two periods (baseline and impact phases) and two locations (NEL and NWL).

3.3.7. For the comparison between the baseline period and the cumulative quarters of the HKLR03/TMCLKL monitoring period (i.e. the first 32 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/TMCLKL monitoring period.

3.3.10. Even though all marine works associated with the HZMB construction have already been completed, 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 been no sign of recovery of dolphin usage in North Lantau waters at all, while such usage has continued to diminish to the lowest ever level.

4. References

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- Hung, S. K. 2020. Monitoring of marine mammals in Hong Kong waters – data collection: final report (2019-20). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 138 pp.

- Jefferson, T. A. 2000. Population biology of the Indo-Pacific hump-backed dolphin in Hong Kong waters. Wildlife Monographs 144:1-65.

Appendix I. TMCLKL08 Survey Effort Database (June-August 2021)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
17-Jun-21	NW LANTAU	2	10.99	SUMMER	STANDARD138716	TMCLKL	P
17-Jun-21	NW LANTAU	3	24.81	SUMMER	STANDARD138716	TMCLKL	P
17-Jun-21	NW LANTAU	3	13.60	SUMMER	STANDARD138716	TMCLKL	S
17-Jun-21	NE LANTAU	2	10.21	SUMMER	STANDARD138716	TMCLKL	P
17-Jun-21	NE LANTAU	3	4.40	SUMMER	STANDARD138716	TMCLKL	P
17-Jun-21	NE LANTAU	2	11.29	SUMMER	STANDARD138716	TMCLKL	S
24-Jun-21	NW LANTAU	1	4.00	SUMMER	STANDARD138716	TMCLKL	P
24-Jun-21	NW LANTAU	2	22.55	SUMMER	STANDARD138716	TMCLKL	P
24-Jun-21	NW LANTAU	1	0.70	SUMMER	STANDARD138716	TMCLKL	S
24-Jun-21	NW LANTAU	2	8.35	SUMMER	STANDARD138716	TMCLKL	S
24-Jun-21	NE LANTAU	1	6.20	SUMMER	STANDARD138716	TMCLKL	P
24-Jun-21	NE LANTAU	2	10.36	SUMMER	STANDARD138716	TMCLKL	P
24-Jun-21	NE LANTAU	3	2.70	SUMMER	STANDARD138716	TMCLKL	P
24-Jun-21	NE LANTAU	1	4.20	SUMMER	STANDARD138716	TMCLKL	S
24-Jun-21	NE LANTAU	2	6.24	SUMMER	STANDARD138716	TMCLKL	S
28-Jun-21	NW LANTAU	2	30.81	SUMMER	STANDARD138716	TMCLKL	P
28-Jun-21	NW LANTAU	3	4.10	SUMMER	STANDARD138716	TMCLKL	P
28-Jun-21	NW LANTAU	2	14.19	SUMMER	STANDARD138716	TMCLKL	S
28-Jun-21	NE LANTAU	2	11.99	SUMMER	STANDARD138716	TMCLKL	P
28-Jun-21	NE LANTAU	3	3.60	SUMMER	STANDARD138716	TMCLKL	P
28-Jun-21	NE LANTAU	2	8.91	SUMMER	STANDARD138716	TMCLKL	S
28-Jun-21	NE LANTAU	3	1.30	SUMMER	STANDARD138716	TMCLKL	S
29-Jun-21	NW LANTAU	2	1.77	SUMMER	STANDARD36826	TMCLKL	P
29-Jun-21	NW LANTAU	3	21.57	SUMMER	STANDARD36826	TMCLKL	P
29-Jun-21	NW LANTAU	4	2.32	SUMMER	STANDARD36826	TMCLKL	P
29-Jun-21	NW LANTAU	3	9.09	SUMMER	STANDARD36826	TMCLKL	S
29-Jun-21	NW LANTAU	4	1.30	SUMMER	STANDARD36826	TMCLKL	S
29-Jun-21	NE LANTAU	2	17.57	SUMMER	STANDARD36826	TMCLKL	P
29-Jun-21	NE LANTAU	3	1.85	SUMMER	STANDARD36826	TMCLKL	P
29-Jun-21	NE LANTAU	2	10.58	SUMMER	STANDARD36826	TMCLKL	S
13-Jul-21	NW LANTAU	1	3.60	SUMMER	STANDARD36826	TMCLKL	P
13-Jul-21	NW LANTAU	2	32.90	SUMMER	STANDARD36826	TMCLKL	P
13-Jul-21	NW LANTAU	2	13.50	SUMMER	STANDARD36826	TMCLKL	S
13-Jul-21	NE LANTAU	1	3.80	SUMMER	STANDARD36826	TMCLKL	P
13-Jul-21	NE LANTAU	2	13.70	SUMMER	STANDARD36826	TMCLKL	P
13-Jul-21	NE LANTAU	2	8.80	SUMMER	STANDARD36826	TMCLKL	S
21-Jul-21	NW LANTAU	2	20.30	SUMMER	STANDARD138716	TMCLKL	P
21-Jul-21	NW LANTAU	3	5.40	SUMMER	STANDARD138716	TMCLKL	P
21-Jul-21	NW LANTAU	2	10.60	SUMMER	STANDARD138716	TMCLKL	S
21-Jul-21	NE LANTAU	2	11.47	SUMMER	STANDARD138716	TMCLKL	P
21-Jul-21	NE LANTAU	3	8.19	SUMMER	STANDARD138716	TMCLKL	P
21-Jul-21	NE LANTAU	2	10.04	SUMMER	STANDARD138716	TMCLKL	S
27-Jul-21	NW LANTAU	1	32.40	SUMMER	STANDARD36826	TMCLKL	P
27-Jul-21	NW LANTAU	2	5.50	SUMMER	STANDARD36826	TMCLKL	P
27-Jul-21	NW LANTAU	1	11.10	SUMMER	STANDARD36826	TMCLKL	S
27-Jul-21	NW LANTAU	2	2.20	SUMMER	STANDARD36826	TMCLKL	S
27-Jul-21	NE LANTAU	1	10.70	SUMMER	STANDARD36826	TMCLKL	P
27-Jul-21	NE LANTAU	2	6.57	SUMMER	STANDARD36826	TMCLKL	P
27-Jul-21	NE LANTAU	1	4.02	SUMMER	STANDARD36826	TMCLKL	S
27-Jul-21	NE LANTAU	2	5.41	SUMMER	STANDARD36826	TMCLKL	S

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
29-Jul-21	NW LANTAU	1	10.90	SUMMER	STANDARD138716	TMCLKL	P
29-Jul-21	NW LANTAU	2	17.54	SUMMER	STANDARD138716	TMCLKL	P
29-Jul-21	NW LANTAU	1	2.10	SUMMER	STANDARD138716	TMCLKL	S
29-Jul-21	NW LANTAU	2	6.56	SUMMER	STANDARD138716	TMCLKL	S
29-Jul-21	NE LANTAU	1	5.11	SUMMER	STANDARD138716	TMCLKL	P
29-Jul-21	NE LANTAU	2	11.45	SUMMER	STANDARD138716	TMCLKL	P
29-Jul-21	NE LANTAU	3	2.83	SUMMER	STANDARD138716	TMCLKL	P
29-Jul-21	NE LANTAU	1	4.00	SUMMER	STANDARD138716	TMCLKL	S
29-Jul-21	NE LANTAU	2	4.72	SUMMER	STANDARD138716	TMCLKL	S
29-Jul-21	NE LANTAU	3	1.27	SUMMER	STANDARD138716	TMCLKL	S
3-Aug-21	NW LANTAU	1	1.10	SUMMER	STANDARD36826	TMCLKL	P
3-Aug-21	NW LANTAU	2	13.28	SUMMER	STANDARD36826	TMCLKL	P
3-Aug-21	NW LANTAU	3	23.12	SUMMER	STANDARD36826	TMCLKL	P
3-Aug-21	NW LANTAU	2	9.30	SUMMER	STANDARD36826	TMCLKL	S
3-Aug-21	NW LANTAU	3	2.60	SUMMER	STANDARD36826	TMCLKL	S
3-Aug-21	NE LANTAU	1	1.20	SUMMER	STANDARD36826	TMCLKL	P
3-Aug-21	NE LANTAU	2	13.39	SUMMER	STANDARD36826	TMCLKL	P
3-Aug-21	NE LANTAU	3	2.60	SUMMER	STANDARD36826	TMCLKL	P
3-Aug-21	NE LANTAU	1	1.40	SUMMER	STANDARD36826	TMCLKL	S
3-Aug-21	NE LANTAU	2	7.31	SUMMER	STANDARD36826	TMCLKL	S
5-Aug-21	NW LANTAU	2	2.90	SUMMER	STANDARD138716	TMCLKL	P
5-Aug-21	NW LANTAU	3	27.11	SUMMER	STANDARD138716	TMCLKL	P
5-Aug-21	NW LANTAU	2	1.20	SUMMER	STANDARD138716	TMCLKL	S
5-Aug-21	NW LANTAU	3	4.09	SUMMER	STANDARD138716	TMCLKL	S
5-Aug-21	NE LANTAU	2	7.89	SUMMER	STANDARD138716	TMCLKL	P
5-Aug-21	NE LANTAU	3	10.89	SUMMER	STANDARD138716	TMCLKL	P
5-Aug-21	NE LANTAU	2	2.10	SUMMER	STANDARD138716	TMCLKL	S
5-Aug-21	NE LANTAU	3	8.42	SUMMER	STANDARD138716	TMCLKL	S
9-Aug-21	NW LANTAU	2	16.60	SUMMER	STANDARD138716	TMCLKL	P
9-Aug-21	NW LANTAU	3	18.90	SUMMER	STANDARD138716	TMCLKL	P
9-Aug-21	NW LANTAU	1	2.20	SUMMER	STANDARD138716	TMCLKL	S
9-Aug-21	NW LANTAU	2	6.30	SUMMER	STANDARD138716	TMCLKL	S
9-Aug-21	NW LANTAU	3	3.90	SUMMER	STANDARD138716	TMCLKL	S
9-Aug-21	NE LANTAU	2	17.30	SUMMER	STANDARD138716	TMCLKL	P
9-Aug-21	NE LANTAU	2	6.30	SUMMER	STANDARD138716	TMCLKL	S
9-Aug-21	NE LANTAU	3	1.30	SUMMER	STANDARD138716	TMCLKL	S
24-Aug-21	NW LANTAU	2	28.93	SUMMER	STANDARD36826	TMCLKL	P
24-Aug-21	NW LANTAU	2	7.97	SUMMER	STANDARD36826	TMCLKL	S
24-Aug-21	NE LANTAU	1	5.95	SUMMER	STANDARD36826	TMCLKL	P
24-Aug-21	NE LANTAU	2	10.48	SUMMER	STANDARD36826	TMCLKL	P
24-Aug-21	NE LANTAU	3	2.70	SUMMER	STANDARD36826	TMCLKL	P
24-Aug-21	NE LANTAU	1	3.27	SUMMER	STANDARD36826	TMCLKL	S
24-Aug-21	NE LANTAU	2	7.10	SUMMER	STANDARD36826	TMCLKL	S
24-Aug-21	NE LANTAU	3	0.30	SUMMER	STANDARD36826	TMCLKL	S

Appendix F

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

Table F1 *Cumulative Statistics on Exceedances*

Monitoring Parameters	Action/Limit Level	Total No. recorded in this reporting quarter	Total No. recorded since Contract commencement
1-Hr TSP	Action	0	122
	Limit	0	15
24-Hr TSP	Action	0	12
	Limit	0	4
Water Quality	Action	0	167
	Limit	0	19
Impact Dolphin Monitoring	Action	0	11
	Limit	0	19
Post Construction (Operational) Dolphin Monitoring	Action	0	0
	Limit	1	5

Table F2 *Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions*

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Successful Prosecutions
This Reporting Period (June to August 2021)	0	0	0
Total No. received since Contract commencement	17	1	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	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Post Construction (Operational) Dolphin Monitoring
Date	8 September 2021

ERM

Dear Sir or Madam,

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

0212330_June/August2021_dolphin_STG&ANI_NEL&NWL

A total of one limit level exceedance was recorded in the quarterly post construction (operational) dolphin monitoring data between June and August 2021.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08
TUEN MUN – CHEK LAP KOK LINK – NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Post Construction Dolphin Monitoring
Notification of Exceedance

Log No.	**0212330_ Jun/Aug2021_dolphin_STG&ANI_NEL&NWL** **[Total No. of Exceedances = 1 Limit Level Exceedance]**	
Date	June – August 2021 (monitored) 1 September 2021 (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 June and August 2021.	
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, June and August 2021) 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 35 quarters of impact and post construction phases) 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: The commencement date under *Contract No. HY/2012/08* is 1 November 2013 and the Proposal for operational phase dolphin monitoring was approved by EPD on 19 May 2020. Operational phase dolphin monitoring commenced in June 2020.	

Works Undertaken (in the monitoring quarter)	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 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.
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: 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. • 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 *Ninety-Second* to *Ninety-Fourth Monthly EM&A Reports*.

Appendix G

Waste Flow Table

Monthly Summary Waste Flow Table

Name of Department: HyD **Contract No. / Works Order No.: HY/2012/08**

Monthly Summary Waste Flow Table for August 2021 [to be submitted not later than the 15th day of each month following reporting month]

(All quantities shall be rounded off to 3 decimal places.)

Month	Monthly Break-down of Inert Construction & Demolition Materials (i.e. Public Fill Materials)				
	(a)=(b)+(c)+(d)+(e) Total Quantity Generated	(b) Hard Rock and Large Broken Concrete	(c) Reused in the Contract	(d) Reused in other Projects	(e) Disposed of as Public Fill
	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)
Sub-total	3205.825	0.000	336.902	889.467	1979.479
Jan-2021	1.031	0.000	0.000	0.000	1.031
Feb-2021	0.210	0.000	0.000	0.000	0.210
Mar-2021	0.409	0.000	0.000	0.000	0.409
Apr-2021	0.008	0.000	0.000	0.000	0.008
May-2021	0.000	0.000	0.000	0.000	0.000
Jun-2021	0.031	0.000	0.000	0.000	0.031
Half Year Sub-total	1.689	0.000	0.000	0.000	1.689
Jul-2021	0.039	0.000	0.000	0.000	0.039
Aug-2021	0.017	0.000	0.000	0.000	0.017
Sep-2021					
Oct-2021					
Nov-2021					
Dec-2021					
Project Total Quantities	3207.57	0.000	336.902	889.467	1981.224

Month	**Actual Quantities of <u>Non-inert</u> Construction Waste Generated Monthly**								
	Metals		Paper/ cardboard packaging		Plastics (see Note 3)		Chemical Waste		Others, e.g. General Refuse disposed at Landfill
	(in '000kg)		(in '000kg)		(in '000kg)		(in '000kg)		(in '000ton)
	generated	recycled	generated	recycled	generated	recycled	generated	Disposed	generated
Sub-total	9919.11	9919.11	18.28	18.28	16.84	16.84	93.807	93.807	28.243
Jan-2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.071
Feb-2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.011
Mar-2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.034
Apr-2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.068
May-2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.028
Jun-2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.033
Half Year Sub-total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.245
Jul-2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.009
Aug-2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.007
Sep-2021									
Oct-2021									
Nov-2021									
Dec-2021									
Project Total Quantities	9919.11	9919.11	18.28	18.28	16.84	16.84	93.807	93.807	28.504

Forecast of Total Quantities of Construction and Demolition Materials to be Generated from the Contract*				
Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed of as Public Fill
(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)
3200.000	0.000	350.000	1000.000	2000.000

Forecast of Total Quantities of Construction and Demolition Materials to be Generated from the Contract*				
Metals	Paper/ cardboard packaging	Plastics (see Note 3)	Chemical Waste	General Refuse disposed of at Landfill
(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000 ton)
10000.00	20.00	18.00	120.00	30.000

Notes:
(1) The performance targets are given in the **ER Appendix 8J Clause 14** and the EM & A Manual(s).
(2) The waste flow table shall also include C&D materials to be imported for use at the Site.
(3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.
(4) The Contractor shall also submit the latest forecast of the total amount of C&D materials expected to be generated from the Works, together with a breakdown of the nature where the amount of C&D materials expected to be generated from the Works is equal to or exceeding 50,000 m^3. (**ER Part 8 Clause 8.8.5 (d) (ii)** refers).