

Appendix B Chinese White Dolphin Monitoring Results

30 August 2019

By Fax (3767 5922) and By Post

ARUP
Level 5, Festival Walk
80 Tat Chee Avenue
Kowloon Tong, Kowloon

Attention: Mr. Michael Chan / Mr. Mark Ching

Dear Sirs,

**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/2011/09 HZMB Hong Kong Link Road - Section between HKSAR
Boundary and Scenic Hill
Dolphin Monthly Monitoring – Monthly Progress Report (July 2019)**

Reference is made to the submission of Dolphin Monthly Monitoring – Monthly Progress Report (July 2019) dated 21 August 2019 certified by the ET Leader (ET's ref.: MA12014/DCVJV/it190812_July19 dated 12 August 2019) and provided to us via e-mail on 21 August 2019.

We are pleased to inform you that we have no adverse comments on the captioned submission.

Thank you very much for your attention and please feel free to contact the undersigned should you require further information.

Yours sincerely,
For and on behalf of
Ramboll Hong Kong Limited



Ray Yan
Independent Environmental Checker
HZMB HKLR

C.C.

HyD	Mr. Cheng Pan	(By Fax: 3188 6614)
HyD	Mr. David Chan	(By Fax: 3188 6614)
ARUP	Mr. Eric Chan	(By Fax: 2268 3970)
Wellab	Dr. Priscilla Choy	(By Fax: 3107 1388)
DCVJV	Mr. C. S. Chu	(By Fax: 3121 6688)

Internal: DY, YH, HW, ENPO Site

Q:\Projects\HYDHZMBEEM00\02_Proj_Mgt\02_Corr\HYDHZMBEEM00_0_7646L.19

Our Ref: MA12014/DCVJV/it190812_July19

Dragages-China Harbour-VSL Joint Venture

Site Office: Tung Chung Waterfront Road,
adjacent to Tung Chung New Development Pier,
New Territories, Hong Kong

By Mail
12 August 2019

Attn.: Mr. W K Poon (Project Director)

Dear Sir,

Contract No. HY/2011/09

**Hong Kong Link Road – Section between HKSAR Boundary and Scenic Hill
- Dolphin Monthly Monitoring - Monthly Progress Report (July 2019)**

I refer to the Dolphin Monthly Monitoring - Monthly Progress Report (July 2019) dated 30 July 2019 for the captioned Contract prepared by Samuel Hung of Hong Kong Cetacean Research Project (Document Ref. No.: HKLR9/DCV/ENV/06649/A) according to updated EM&A Manual, Section 10.7.1.

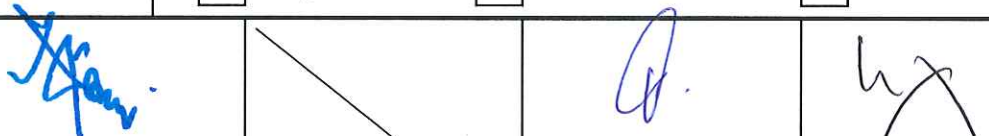
I hereby agree to certify the above document in accordance with the EP (No. EP-352/2009/D), Condition 1.9.

If you need any further information, please call me at 2151 2089 or 9161 7287.

Yours faithfully,
WELLAB Limited



Dr. Priscilla Choy
Environmental Team Leader

	CONTRACT NO. HY/2011/09 HONG KONG-ZHUHAI-MACAO BRIDGE HONG KONG LINK ROAD - SECTION BETWEEN HKSAR BOUNDARY AND SCENIC HILL	Contractor's Submission Form (CSF)
To: Mr. Michael CHAN (Supervising Officer's Representatives)		
Title of Submission:	Monthly Line-transect Survey Report (July 2019)	
Submission Number:	HKLR9 / CS / DCV / ENV / 06649 / 1	
Document No.:	HKLR9 / DCV / ENV / 06649 / A	
SOR Ref. No.	NA	
SOR Document No.	NA	
Specification Reference:	NA	
Location of Works:	NA	
Description of Contents:		 A42213
We enclose to submit the Chinese White Dolphin monthly line transect survey report (July 2019). The ET's certifying letter to this report was also attached. 		
Remarks: No. of copies : 1		
13 AUG 2019		
Submission Date:		
Purpose of Submission :	☐ For Approval ☐ For Information ☒ For Record	
Signature :		
Name :	CHU Chung Sing	Keith Hui
Position :	Environmental Officer	Safety Manager
Date :	2 Aug 2019	3/8/19
Originated by	Reviewed by	Reviewed by
Distribution:		Approved by
cc: Arup - Mr. Eric Chan (Supervising Officer)		



Contract No. HY/2011/09
Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road – Section
between HKSAR Boundary and Scenic Hill

Non – Technical Document

Document Ref. No.:

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Project Code					Issuer Code					Doc. Code					Sequential Number					Rev.

Document Title:

Monthly Line-transect Survey Report
(July 2019)

	PREPARED BY:	INTERNAL REVIEW:		INTERNAL APPROVAL
COMPANY	HK Cetacean Research Project	DCVJV	DCVJV	DCVJV
NAME	Samuel Hung	CHU Chung Sing	Keith Hui	WK POON
POSITION	Director	Environmental Officer	Safety Manager	Project Director
SIGNATURE				
DATE	July 2019	2 Aug 2019	3/8/19	5.8.2019



Contract No. HY/2011/09
Hong Kong-Zhuhai-Macao Bridge
Hong Kong Link Road –
Section between HKSAR Boundary and Scenic Hill

Revision Status

Rev.	Rev. Date	Sections	Amendment Source and/or Details
A	-	-	The First submission

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road –
Section between HKSAR Boundary and Scenic Hill Dolphin
Monthly Monitoring**

Monthly Progress Report (July 2019)

Submitted by

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

30 July 2019

1. Introduction

- 1.1. The Hong Kong Link Road (HKLR) serves to connect the Hong Kong-Zhuhai-Macao Bridge (HZMB) Main Bridge at the Hong Kong Special Administrative Region (HKSAR) Boundary and the HZMB Hong Kong Boundary Crossing Facilities (HKBCF) located at the northeastern waters of the Hong Kong International Airport.
- 1.2. According to the updated Environmental Monitoring and Audit (EM&A) Manual (for HKLR), monthly line-transect vessel surveys for Chinese White Dolphin should be conducted to cover the West Lantau survey area as in AFCD annual marine mammal monitoring programme.
- 1.3. Since November 2012, Hong Kong Cetacean Research Project (HKCRP) has been commissioned by Dragages – China Harbour – VSL JV to conduct this dolphin monitoring study in order to collect data on Chinese White Dolphins in West Lantau (WL) survey area, and to analyze the collected survey data to monitor distribution, encounter rate, abundance, activities and occurrence of dolphin calves. Photo-identification will also be collected from individual Chinese White Dolphins to examine their individual range patterns and core area use.
- 1.4. The present report summarizes the results of the survey findings during the monitoring month of July 2019.

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 WL survey area (see Figure 1) twice per month. The co-ordinates of all transect lines are shown in Table 1.

Table 1. Co-ordinates of transect lines in WL survey area

Line No.		Easting	Northing		Line No.		Easting	Northing
1	Start Point	803750	818500		7	Start Point	800200	810450
1	End Point	803750	815500		7	End Point	801400	810450
2	Start Point	803750	815500		8	Start Point	801300	809450
2	End Point	802940	815500		8	End Point	799750	809450
3	Start Point	802550	814500		9	Start Point	799400	808450
3	End Point	803700	814500		9	End Point	801430	808450
4	Start Point	803120	813600		10	Start Point	801500	807450
4	End Point	801640	813600		10	End Point	799600	807450
5	Start Point	801100	812450		11	Start Point	800300	806500
5	End Point	802900	812450		11	End Point	801750	806500
6	Start Point	802400	811500		12	Start Point	801760	805450
6	End Point	800660	811500		12	End Point	800700	805450

2.1.2. The 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 20 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2017). 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° and 90° (in relation to the bow, which is defined as 0°). 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, position (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.
- 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 being 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 survey areas around Lantau Island. Therefore, primary and secondary survey effort were both presented as on-effort survey effort in this report.

- 2.1.8. Encounter rates of Chinese White Dolphins (number of on-effort sightings per 100 km of survey effort) were calculated in WL survey area in relation to the amount of survey effort conducted during each month of monitoring survey. Only data collected under Beaufort 3 or below condition would be used for encounter rate analysis. Dolphin encounter rates were calculated using primary survey effort alone, as well as the combined survey effort from both primary and secondary lines.

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 Mark II* 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.

3. Monitoring Results

3.1. Vessel-based Line-transect Survey

- 3.1.1. During the monitoring month of July 2019, two complete sets of systematic line-transect vessel surveys were conducted on the 5th and 11th, to cover all transect lines in WL survey area twice. The survey routes of each survey day are presented in Figures 2-3.
- 3.1.2. From these surveys, a total of 64.67 km of survey effort was collected, with 88.8% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility) (Appendix I). The total survey effort conducted on primary lines (i.e. the horizontal lines perpendicular to the coastlines) was 42.69 km, while the effort on secondary lines (i.e. the lines connecting the primary lines) was 21.98 km.
- 3.1.3. During the monitoring surveys conducted in July 2019, six groups of 27 Chinese White Dolphins were sighted. Four of the six dolphin groups were sighted during on-effort search, while three of the four on-effort sightings were made on primary lines (Appendix II). None of these dolphin groups was associated with operating fishing vessel during the monitoring month.
- 3.1.4. Distribution of the dolphin sightings made during July's surveys is shown in Figure 4. These sightings were scattered between Tai O Peninsula and Fan Lau with no particular concentration (Figure 4). Furthermore, as in the previous two monitoring months, dolphins have completely avoided the northern portion of the WL survey area, with no sighting made near the HKLR09 alignment (Figure 4).
- 3.1.5. During the July's surveys, encounter rates of Chinese White Dolphins deduced from the survey effort and on-effort sighting data made under favourable conditions (Beaufort 3 or below) are shown in Tables 2 & 3.

Table 2. Dolphin encounter rates (sightings per 100 km of survey effort) per set during July's surveys in West Lantau (WL)

		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
West Lantau	Set 1: July 5 th	6.0	59.6
	Set 2: July 11 th	10.0	64.9

Table 3. Overall dolphin encounter rates (sightings per 100 km of survey effort) in July's surveys on primary lines only as well as both primary lines and secondary lines in West Lantau (WL)

	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	Both Primary and Secondary Lines	Primary Lines Only	Both Primary and Secondary Lines
West Lantau	8.1	7.0	62.5	43.5

- 3.1.6. The average group size of Chinese White Dolphins sighted during July's surveys was 4.5 individuals per group, which was slightly higher than the averages in previous months of HKLR09 monitoring surveys. Three of the six dolphin sightings were consisted of small groups of 1-2 animals per group, but there were also two medium-sized groups with 5-8 animals and one large group of 10 animals being sighted during this monitoring month (Appendix II).

3.2. Photo-identification Work

- 3.2.1. Sixteen different individual Chinese White Dolphins were identified 16 times during July's surveys (Appendices III and IV). All individuals were only re-sighted once during the monitoring month.
- 3.2.2. Notably, only one of these individuals (i.e. NL256) was accompanied by her young calf during her re-sighting in this month's monitoring surveys.

3.3. Conclusion

- 3.3.1. In this month of dolphin monitoring, marine construction activities have been completed under this contract, and as are result, no adverse impact on Chinese White Dolphins was observed.

4. References

- Buckland, S. T., Anderson, D. R., Burnham, K. P., Laake, J. L., Borchers, D. L., and Thomas, L. 2001. Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press, London.

- Hung, S. K. 2017. Monitoring of marine mammals in Hong Kong waters: final report (2016-17). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 162 pp.
- Jefferson, T. A. 2000. Population biology of the Indo-Pacific hump-backed dolphin in Hong Kong waters. Wildlife Monographs 144:1-65.

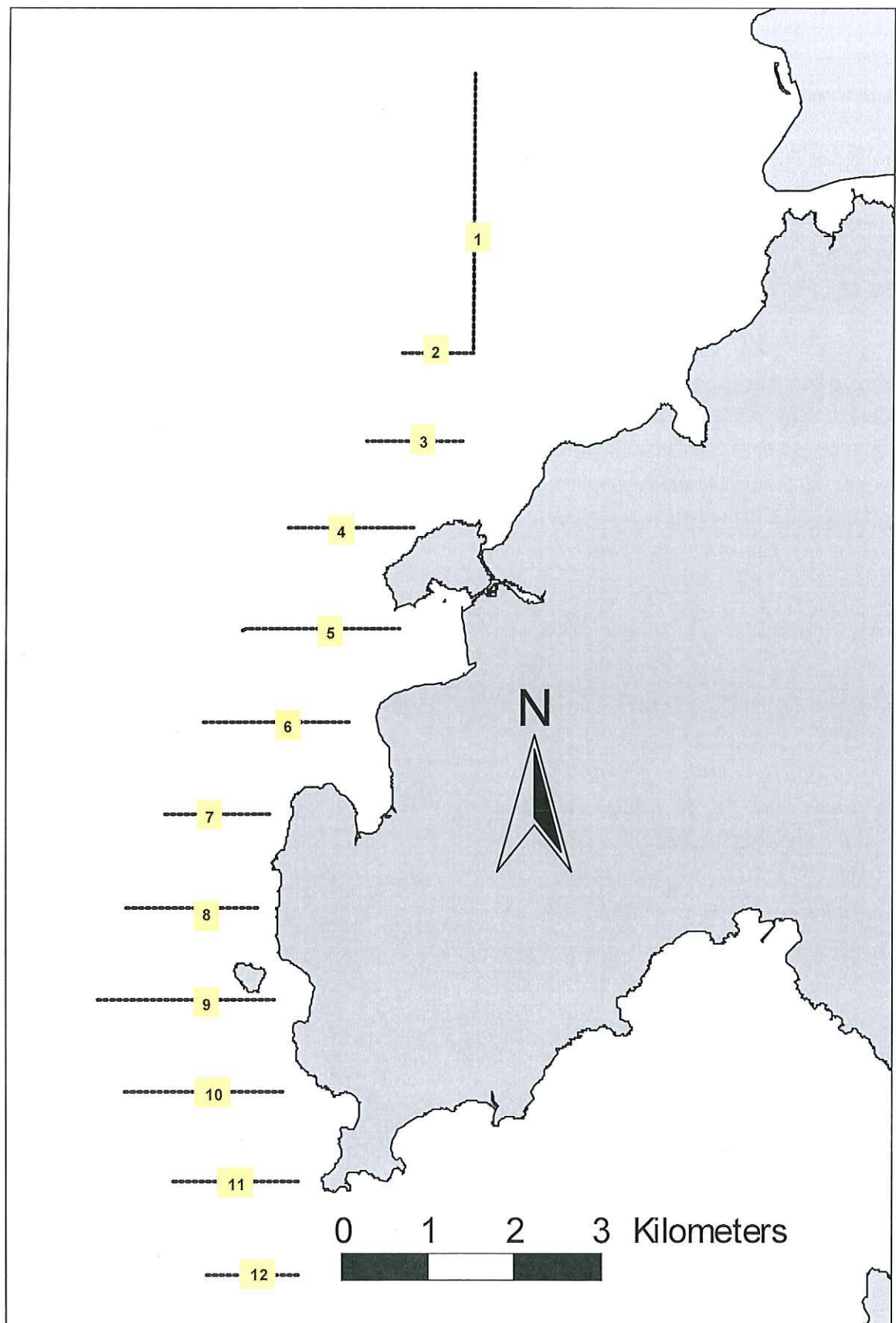


Figure 1. Transect Line Layout in West Lantau Survey Areas

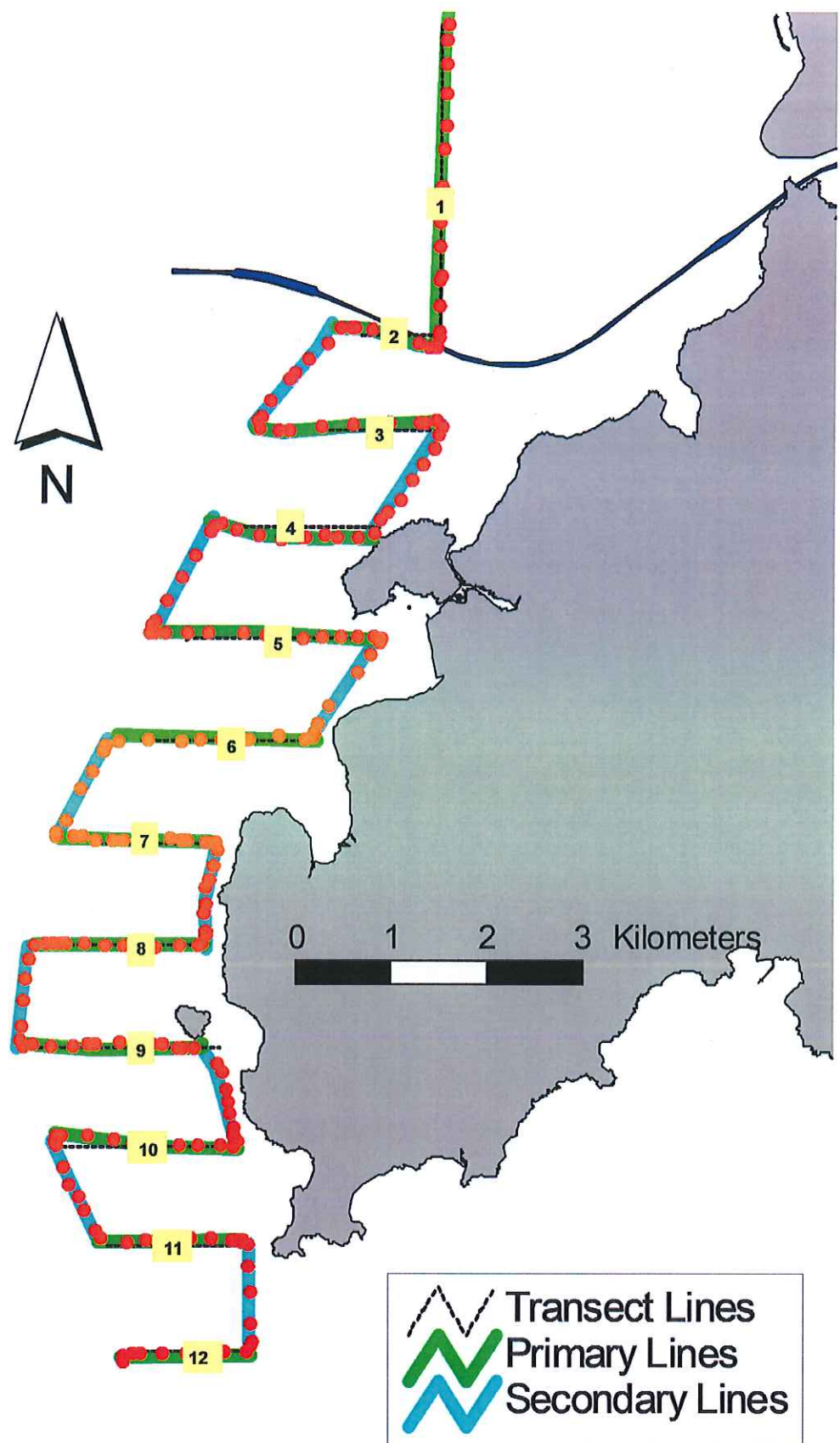


Figure 2. Survey Route on July 5th, 2019 (note: red dots represent the tracked positions of survey boat logged continuously by GPS throughout the course of the survey)

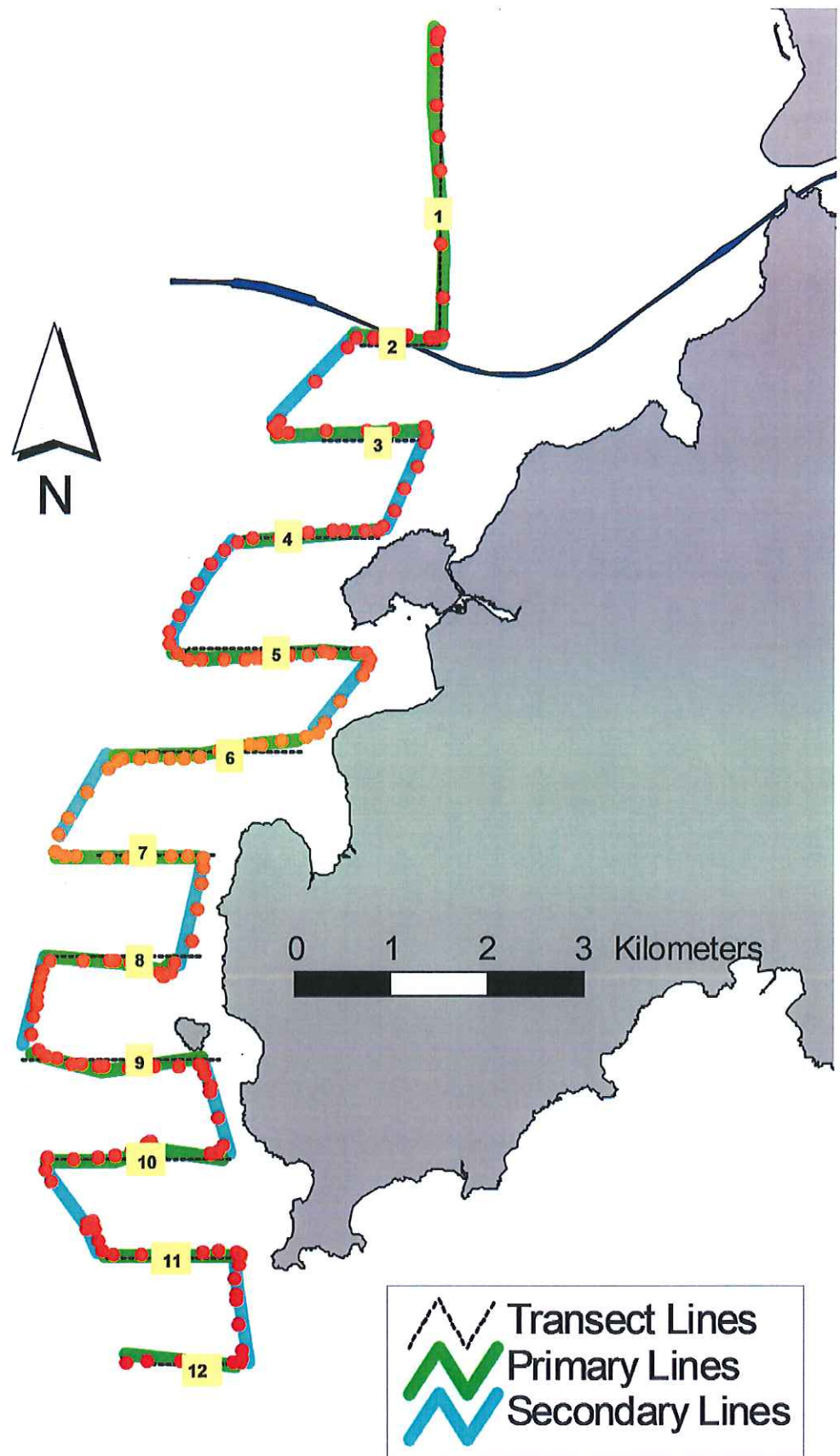


Figure 3. Survey Route on July 11th, 2019 (note: red dots represent the tracked positions of survey boat logged continuously by GPS throughout the course of the survey)

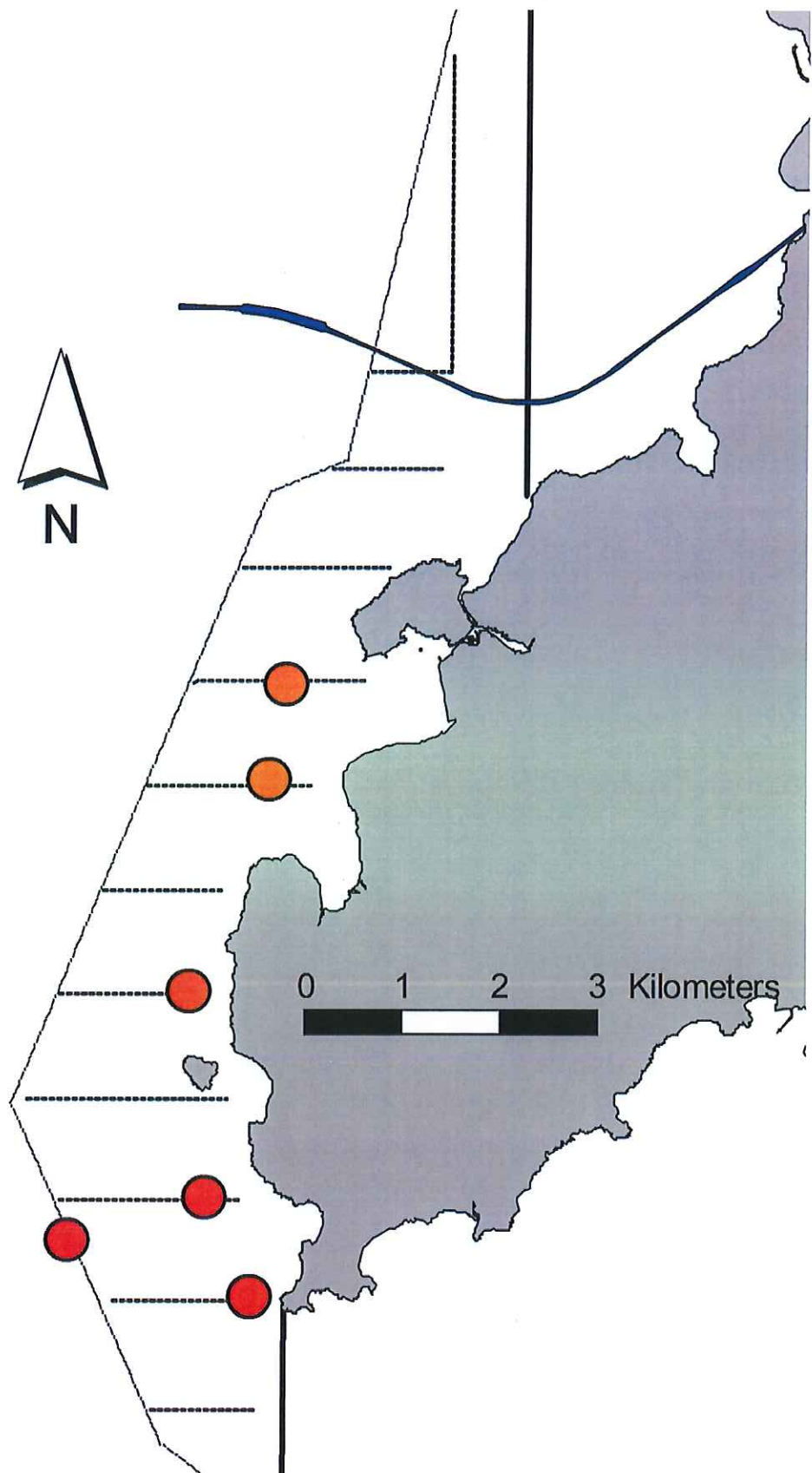


Figure 4. Distribution of Chinese White Dolphin Sightings during July 2019 HKLR09 Monitoring Surveys

Appendix I. HKLR09 Survey Effort Database (July 2019)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
5-Jul-19	W LANTAU	3	16.77	SUMMER	STANDARD36826	HKLR	P
5-Jul-19	W LANTAU	4	5.88	SUMMER	STANDARD36826	HKLR	P
5-Jul-19	W LANTAU	2	0.86	SUMMER	STANDARD36826	HKLR	S
5-Jul-19	W LANTAU	3	9.61	SUMMER	STANDARD36826	HKLR	S
5-Jul-19	W LANTAU	4	1.35	SUMMER	STANDARD36826	HKLR	S
11-Jul-19	W LANTAU	2	6.33	SUMMER	STANDARD36826	HKLR	P
11-Jul-19	W LANTAU	3	13.71	SUMMER	STANDARD36826	HKLR	P
11-Jul-19	W LANTAU	2	3.91	SUMMER	STANDARD36826	HKLR	S
11-Jul-19	W LANTAU	3	6.25	SUMMER	STANDARD36826	HKLR	S

Appendix II. HKLR09 Chinese White Dolphin Sighting Database (July 2019)

(Abberviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; ND = Not Determined; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Lines)

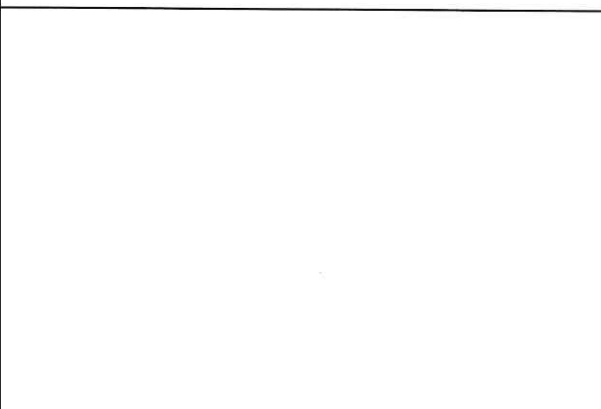
DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
5-Jul-19	1	1105	1	W LANTAU	3	ND	OFF	HKLR	806506	801694	SUMMER	NONE	
5-Jul-19	2	1230	10	W LANTAU	3	481	ON	HKLR	812430	802057	SUMMER	NONE	P
11-Jul-19	1	1119	1	W LANTAU	2	ND	OFF	HKLR	811500	801890	SUMMER	NONE	
11-Jul-19	2	1141	8	W LANTAU	3	418	ON	HKLR	809453	801061	SUMMER	NONE	P
11-Jul-19	3	1230	5	W LANTAU	2	94	ON	HKLR	807471	801221	SUMMER	NONE	P
11-Jul-19	4	1246	2	W LANTAU	3	224	ON	HKLR	807064	799808	SUMMER	NONE	S

Appendix III. Individual dolphins identified during HKLR09 monitoring surveys in July 2019

ID#	DATE	STG#	AREA
CH12	11/07/19	3	W LANTAU
CH112	05/07/19	2	W LANTAU
CH113	11/07/19	2	W LANTAU
NL206	05/07/19	2	W LANTAU
NL224	11/07/19	2	W LANTAU
NL249	11/07/19	2	W LANTAU
NL256	11/07/19	2	W LANTAU
NL259	11/07/19	2	W LANTAU
NL261	05/07/19	2	W LANTAU
NL269	11/07/19	2	W LANTAU
NL311	05/07/19	2	W LANTAU
NL328	05/07/19	2	W LANTAU
WL91	05/07/19	2	W LANTAU
WL213	05/07/19	2	W LANTAU
WL216	11/07/19	2	W LANTAU
WL298	05/07/19	2	W LANTAU



Appendix IV. Photographs of Identified Individual Dolphins in July 2019 (HKLR09)



Appendix IV (cont'd).