

Appendix B Chinese White Dolphin Monitoring Results

Ref.: HYDZHMBEEM00_0_7691L.19

30 September 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 (August 2019)**

Reference is made to the submission of Dolphin Monthly Monitoring – Monthly Progress Report (August 2019) dated 1 September 2019 certified by the ET Leader (ET's ref.: MA12014/DCVJV/it190916_Aug19 dated 16 September 2019) and provided to us via e-mail on 19 September 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

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Our Ref: MA12014/DCVJV/it190916_Aug19

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
16 September 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 (August 2019)

I refer to the revised Dolphin Monthly Monitoring - Monthly Progress Report (August 2019) dated 1 September 2019 for the captioned Contract prepared by Samuel Hung of Hong Kong Cetacean Research Project (Document Ref. No.: HKLR9/DCV/ENV/06654/A) according to updated EM&A Manual, Section 10.7.1.


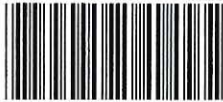


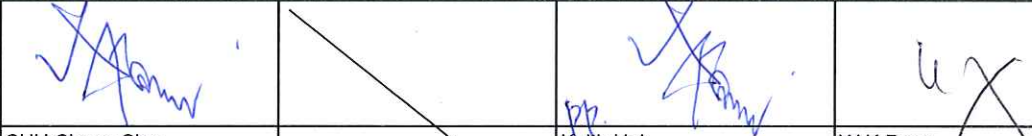
I hereby agree to certify the above document in accordance with the EP (No. EP-352/2009/D), Condition 1.9.

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 (August 2019) | |
| Submission Number: | HKLR9 / CS / DCV / ENV / 06654 / 1 | |
| Document No.: | HKLR9 / DCV / ENV / 06654 / A | |
| SOR Ref. No. | NA | |
| SOR Document No. | NA | |
| Specification Reference: | NA | |
| Location of Works: | NA | |
| Description of Contents: | |  A42369 |
| <p>We enclose to submit the Chinese White Dolphin monthly line transect survey report (August 2019). The ET's certifying letter to this report was also attached.</p> <div style="text-align: right; margin-top: 100px;">  </div> | | |
| Remarks: No. of copies : 1 <div style="text-align: center; margin-top: 10px;">  </div> | | |
| Submission Date: | | |
| Purpose of Submission : | <input type="checkbox"/> For Approval <input type="checkbox"/> For Information <input checked="" type="checkbox"/> For Record | |
| Signature : |  | |
| Name : | CHU Chung Sing Keith Hui W K Poon | |
| Position : | Environmental Officer Safety Manager Project Director | |
| Date : | 17.9.2019 17.9.2019 18.9.2019 | |
| | Originated by | Reviewed by |
| Distribution: | | |
| 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

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

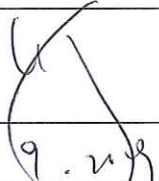
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Document Ref. No.:

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| Project Code | | | | | Issuer Code | | | | | Doc. Code | | | | | Sequential Number | | | | | Rev. |

Document Title:

Monthly Line-transect Survey Report
(August 2019)

| | PREPARED BY: | INTERNAL REVIEW: | INTERNAL APPROVAL |
|-----------|---|---|---|
| COMPANY | HK Cetacean Research Project | DCVJV | DCVJV |
| NAME | Samuel HUNG | CHU Chung Sing | WK POON |
| POSITION | Director | Environmental Officer | Project Director |
| SIGNATURE |  |  |  |
| DATE | September 2019 | 17.9.2019 | 18.9.2019 |



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 (August 2019)

Submitted by

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

1 September 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 August 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 August 2019, two complete sets of systematic line-transect vessel surveys were conducted on the 12th and 28th, 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 64.66 km of survey effort was collected, with 100% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility) (Appendix I). The total survey effort conducted on primary lines (i.e. the horizontal lines perpendicular to the coastlines) was 44.22 km, while the effort on secondary lines (i.e. the lines connecting the primary lines) was 20.44 km.
- 3.1.3. During the monitoring surveys conducted in August 2019, eight groups of 26 Chinese White Dolphins were sighted. All eight dolphin groups were sighted during on-effort search, while six of these 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 August's surveys is shown in Figure 4. These sightings were scattered between Tai O Peninsula and Fan Lau with slightly higher concentration near Tai O (Figure 4). Furthermore, as in the previous three monitoring months, dolphins have completely avoided the northern portion of the WL survey area, with no sighting made near the HKLR09 alignment at all (Figure 4).
- 3.1.5. During the August'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 August'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: August 12 th | 0.0 | 0.0 |
| | Set 2: August 28 th | 27.0 | 94.6 |

Table 3. Overall dolphin encounter rates (sightings per 100 km of survey effort) in August'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 | 13.6 | 12.4 | 47.5 | 40.2 |

- 3.1.6. The average group size of Chinese White Dolphins sighted during August's surveys was 3.3 individuals per group, which was similar to the averages in previous months of HKLR09 monitoring surveys. Five of the eight dolphin sightings were consisted of small groups of 1-3 animals per group, but there were also three medium-sized groups with 4-7 animals being sighted during this monitoring month (Appendix II).

3.2. Photo-identification Work

- 3.2.1. Fifteen different individual Chinese White Dolphins were identified 16 times during the August's surveys (Appendices III and IV). Almost all individuals were only re-sighted once during the monitoring month, with the exception of one individual (WL268) being re-sighted twice (Appendix III).
- 3.2.2. Notably, none of these individuals was accompanied with any young calf during their re-sightings 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.

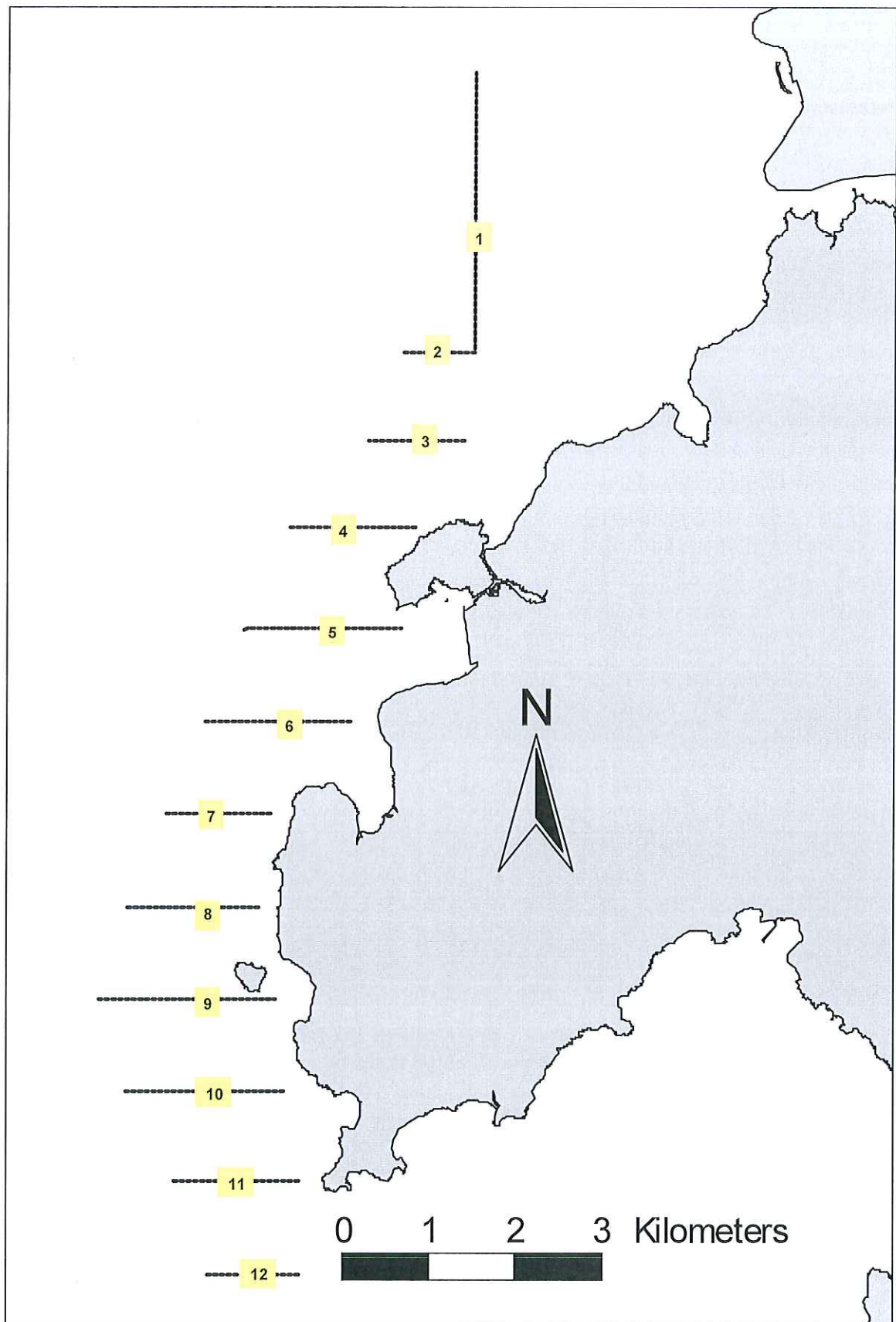


Figure 1. Transect Line Layout in West Lantau Survey Areas

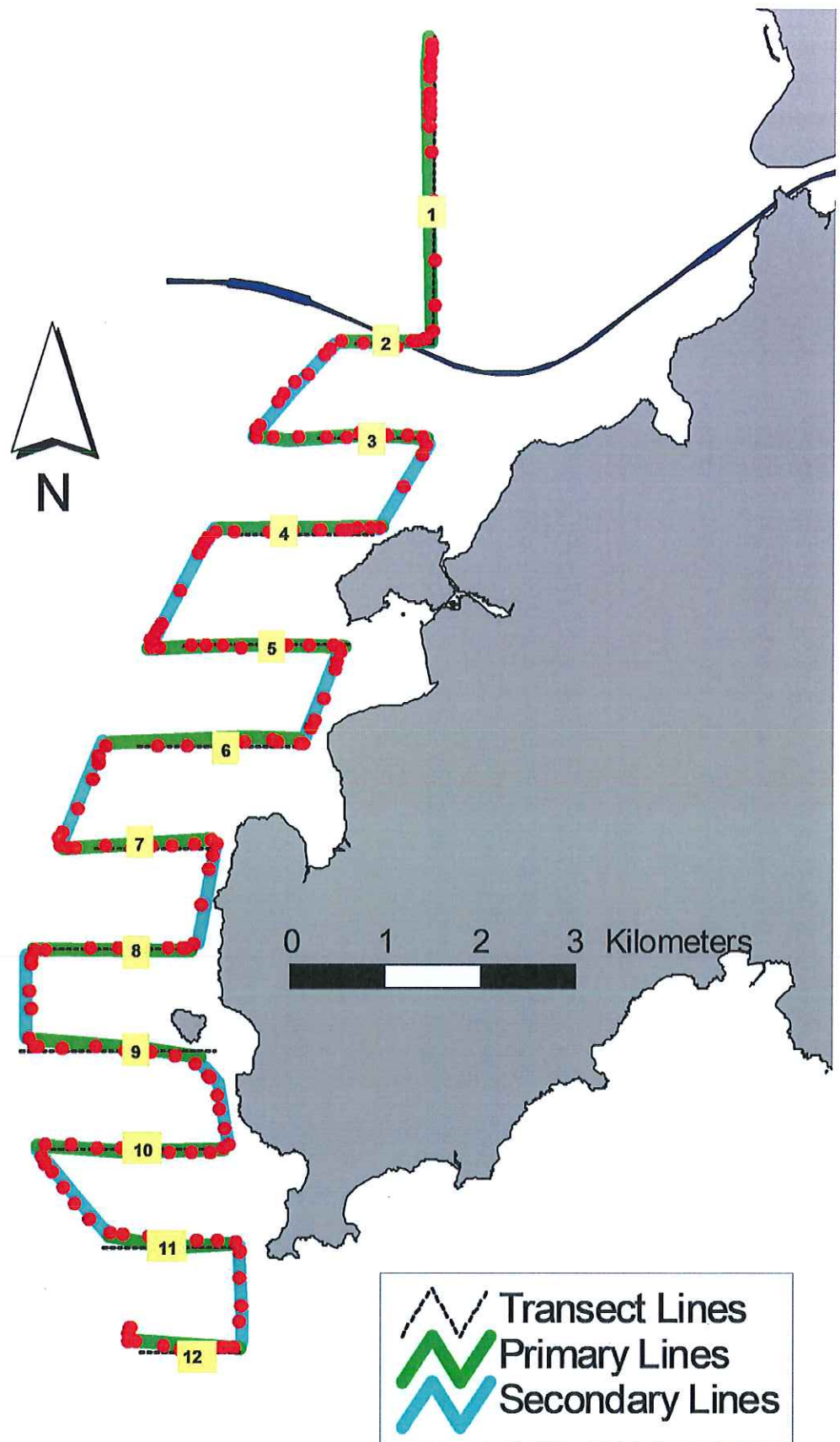


Figure 2. Survey Route on August 12th, 2019 (note: red dots represent the tracked positions of survey boat logged continuously by GPS throughout the course of the survey)

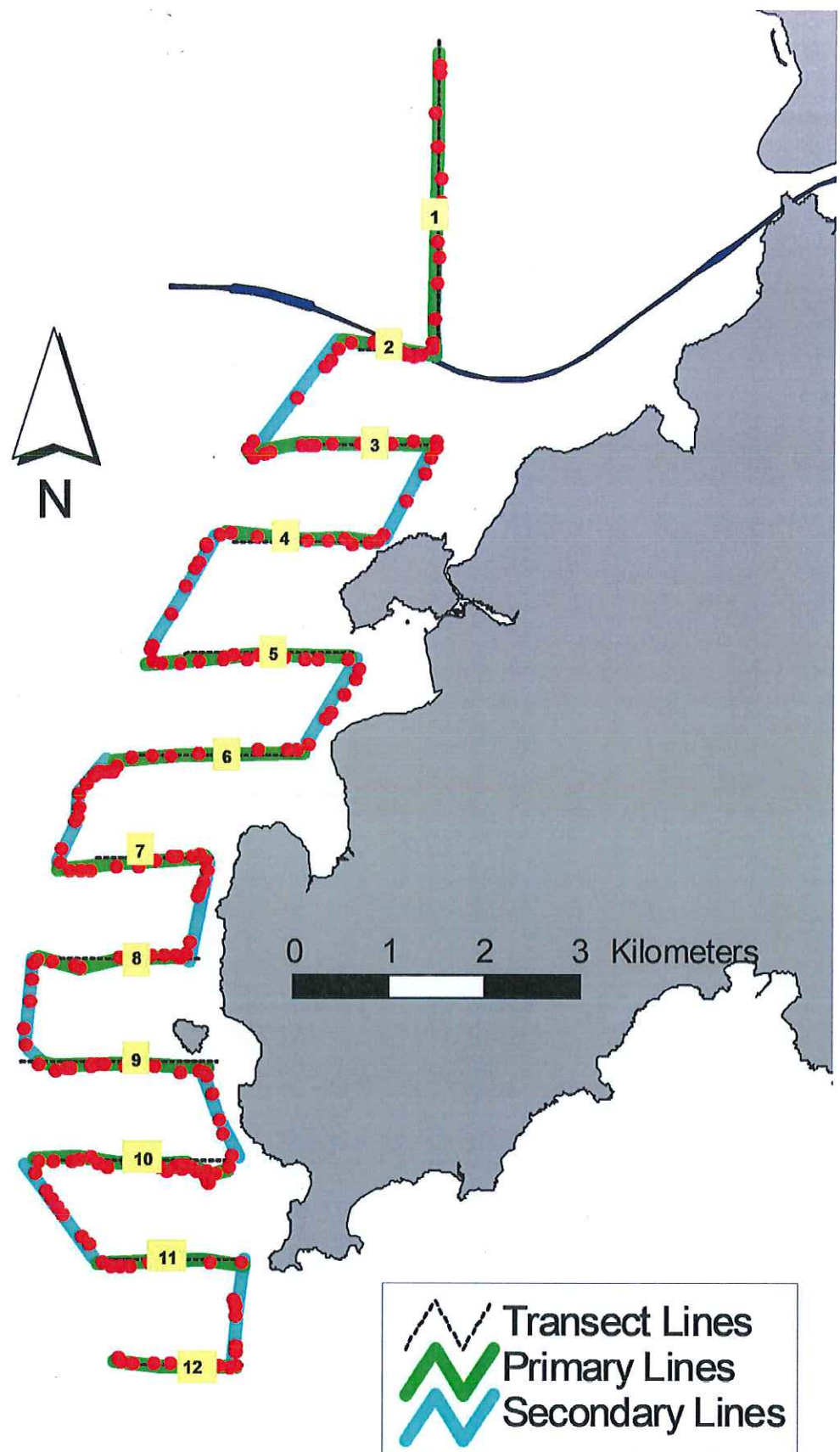


Figure 3. Survey Route on August 28th, 2019 (note: red dots represent the tracked positions of survey boat logged continuously by GPS throughout the course of the survey)

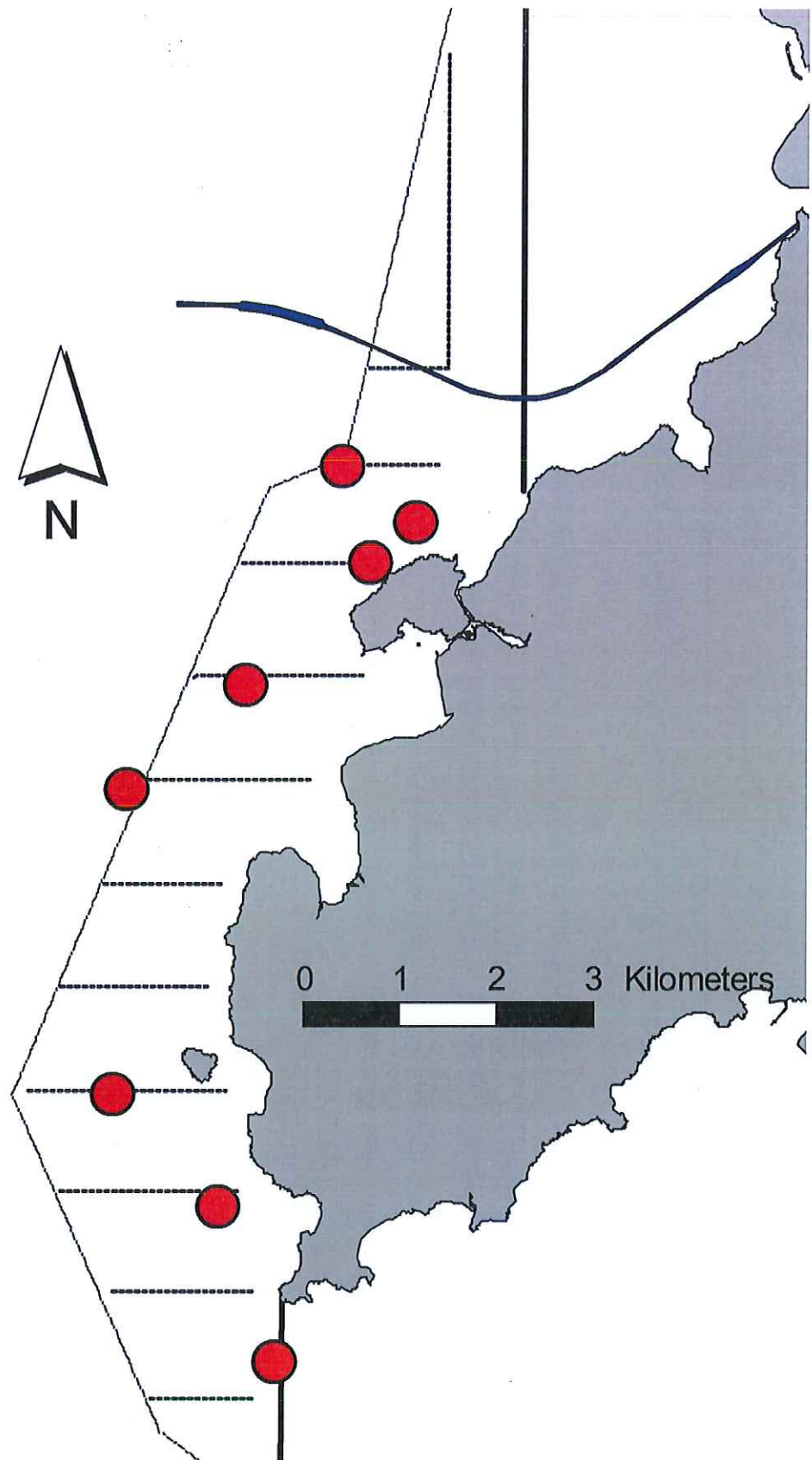


Figure 4. Distribution of Chinese White Dolphin Sightings during August 2019 HKLR09 Monitoring Surveys

Appendix I. HKLR09 Survey Effort Database (August 2019)

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

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | TYPE | P/S |
|-----------|----------|------|--------|--------|---------------|------|-----|
| 12-Aug-19 | W LANTAU | 2 | 2.39 | SUMMER | STANDARD36826 | HKLR | P |
| 12-Aug-19 | W LANTAU | 3 | 19.63 | SUMMER | STANDARD36826 | HKLR | P |
| 12-Aug-19 | W LANTAU | 2 | 2.71 | SUMMER | STANDARD36826 | HKLR | S |
| 12-Aug-19 | W LANTAU | 3 | 7.20 | SUMMER | STANDARD36826 | HKLR | S |
| 28-Aug-19 | W LANTAU | 2 | 18.62 | SUMMER | STANDARD36826 | HKLR | P |
| 28-Aug-19 | W LANTAU | 3 | 3.58 | SUMMER | STANDARD36826 | HKLR | P |
| 28-Aug-19 | W LANTAU | 2 | 8.85 | SUMMER | STANDARD36826 | HKLR | S |
| 28-Aug-19 | W LANTAU | 3 | 1.68 | SUMMER | STANDARD36826 | HKLR | S |

Appendix II. HKLR09 Chinese White Dolphin Sighting Database (August 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)

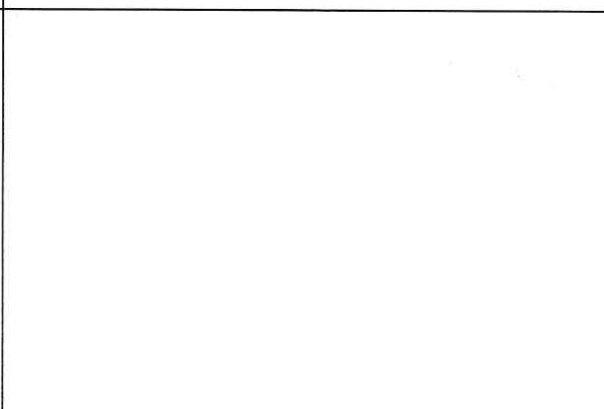
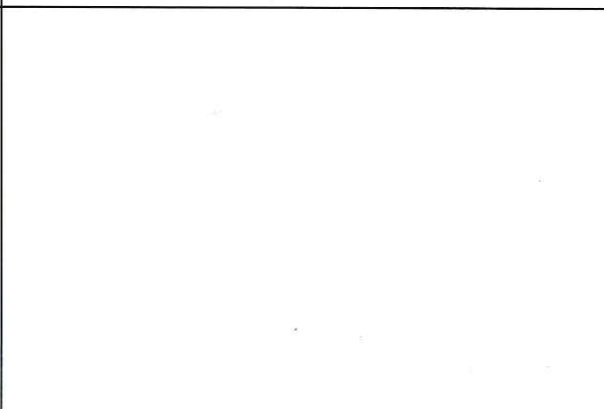
| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | TYPE | NORTHING | EASTING | SEASON | BOAT ASSOC. | P/S |
|-----------|-------|------|--------|----------|------|-----|--------|------|----------|---------|--------|-------------|-----|
| 12-Aug-19 | 1 | 1048 | 4 | W LANTAU | 3 | 90 | ON | HKLR | 813955 | 803401 | SUMMER | NONE | S |
| 28-Aug-19 | 1 | 1041 | 1 | W LANTAU | 2 | 163 | ON | HKLR | 814488 | 802639 | SUMMER | NONE | P |
| 28-Aug-19 | 2 | 1101 | 2 | W LANTAU | 2 | 293 | ON | HKLR | 813568 | 802936 | SUMMER | NONE | P |
| 28-Aug-19 | 3 | 1126 | 7 | W LANTAU | 2 | 95 | ON | HKLR | 812364 | 801655 | SUMMER | NONE | P |
| 28-Aug-19 | 4 | 1200 | 1 | W LANTAU | 3 | 200 | ON | HKLR | 811359 | 800426 | SUMMER | NONE | P |
| 28-Aug-19 | 5 | 1233 | 7 | W LANTAU | 2 | 124 | ON | HKLR | 808392 | 800275 | SUMMER | NONE | P |
| 28-Aug-19 | 6 | 1255 | 3 | W LANTAU | 2 | 26 | ON | HKLR | 807293 | 801376 | SUMMER | NONE | P |
| 28-Aug-19 | 7 | 1321 | 1 | W LANTAU | 2 | 37 | ON | HKLR | 805797 | 801960 | SUMMER | NONE | S |

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

| ID# | DATE | STG# | AREA |
|-------|----------|------|----------|
| NL33 | 28/08/19 | 6 | W LANTAU |
| NL123 | 28/08/19 | 2 | W LANTAU |
| NL259 | 28/08/19 | 2 | W LANTAU |
| NL311 | 12/08/19 | 1 | W LANTAU |
| SL42 | 28/08/19 | 3 | W LANTAU |
| WL61 | 28/08/19 | 7 | W LANTAU |
| WL72 | 28/08/19 | 5 | W LANTAU |
| WL91 | 28/08/19 | 3 | W LANTAU |
| WL124 | 12/08/19 | 1 | W LANTAU |
| WL145 | 28/08/19 | 6 | W LANTAU |
| WL179 | 28/08/19 | 3 | W LANTAU |
| WL216 | 12/08/19 | 1 | W LANTAU |
| WL227 | 28/08/19 | 3 | W LANTAU |
| WL233 | 28/08/19 | 5 | W LANTAU |
| WL268 | 28/08/19 | 1 | W LANTAU |
| | 28/08/19 | 3 | W LANTAU |



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



Appendix IV (cont'd).