

Appendix J Land-based Theodolite Tracking Report

Contract No. EP/SP/66/12
Integrated Waste Management Facilities, Phase 1
Land-based Theodolite Tracking Report



Land-based Theodolite Tracking Report

Revision History

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CONTENTS

1. Introduction	4
2. Methodology	5
3. Results	6
4. Discussion	7
5. Conclusions	9
6. References	10
7. Figures and Tables.....	11

Annex I	Summary Data Extracted from Baseline Theodolite Monitoring, at Shek Kwu Chau, January – May 2018
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1. INTRODUCTION

- 1.1 The marine mammal monitoring programme for the IWMF focuses on finless porpoise (*Neophocaena phocaenoides*) as the Project Site has been identified as a hotspot for this species. The Chinese white dolphin (*Sousa chinensis*) rarely occurs in this area, however, all sightings of this species are also recorded and reported. Under the updated EM&A Manual for the Integrated Waste Management Facility (IWMF) [EP/SP/66/12], there is a requirement to conduct a theodolite tracking survey of marine mammals and vessel traffic around the IWMF Site, for a minimum of thirty (30) days. The monitoring must occur during the peak porpoise period (December to May) and, as much as possible, in good weather conditions, i.e., when adverse weather conditions are forecast, for example, heavy rain, fog or elevated sea states, theodolite surveys are to be postponed.
- 1.2 The aims of the monitoring are to
- verify that the impacts on marine mammals predicted in the Environmental Impact Assessment (EIA) are accurate,
 - compare the data obtained to the thirty (30) day baseline theodolite tracking report,
 - examine the effectiveness of the mitigation measures recommended in the EIA and the marine mammal monitoring programme should cover pre-construction phase, construction phase, and operation phase.
- 1.3 This report details the theodolite tracking survey conducted between 21 Feb – 10 May 2019 and is compared to the results available for the baseline theodolite tracking monitoring. Where relevant, data will also be compared to the AFCD long-term marine mammal monitoring programme reports. Significant differences shall be noted, if it is possible to do so from the data available.
- 1.4 The baseline theodolite monitoring was conducted during the pre-construction phase and the result was presented in Appendix I of Baseline Monitoring Report (Rev C). Therefore, this impact theodolite monitoring report during construction phase is presented in 17th Monthly EM&A report.

2. METHODOLOGY

- 2.1 Land-based Theodolite Tracking will be carried out for 30 days on site during the peak occurrence period of Finless Porpoise (December to May). The survey should cover pre-construction phase, construction and operation phases. Six hours of theodolite tracking should be conducted for each day of the baseline field survey in which the theodolite station should be set up at the south of SKC from an un-obstructed vantage point at a height above the monitoring area. Our monitoring team consists of one experienced theodolite operator and at least two field observers for assistance. To conduct theodolite tracking, our observers will search systematically for Finless Porpoise using the unaided eye and 7 x 50 handheld binoculars on each survey day throughout the study area. When an individual or group of porpoises is located, a theodolite tracking session will be initiated and focal follow methods will be used to track the porpoise(s). Behavioural state data (i.e. resting, milling, travelling, feeding and socializing) will also be recorded every 5 minutes for the focal individual or group. Positions of porpoises and boats will be measured using a digital theodolite connected to a laptop computer to provide information on the target's distance from shore, depth of water, distance from anthropogenic activities, and relative speeds and orientations; as well as measurements of leg (one point to other) speeds, re-orientations, distance made-good over time, and other movement related parameters.
- 2.2 The location of all working vessels and buoys were recorded with the theodolite at the beginning, the mid-point at the end of each survey day. All marine mammals were recorded, as were fast ferries, fishing vessels, transport boats and other vessels. The geographical position of each object, be it a vessel or a marine mammal, was determined using a digital theodolite which measured horizontal and vertical angles that were then be converted into x/y map coordinates. All theodolite data is stored in a database which is then post-processed using the software PYTHAGORAS© (G. Gailey, Texas A&M University).
- 2.3 Three observers were deployed at the theodolite tracking station and the area was continuously scanned using both naked eye and binoculars. When a marine mammal was observed, it was tracked throughout the entire observation period until lost from view. Porpoise groups were defined as any aggregation of one or more porpoise (including all age-classes) observed within 100m of each other, in apparent association and engaged in similar activities. Theodolite fixes were taken at the centre of the porpoise group every surface. In addition, information on time and activity patterns were noted for each point in time the porpoise or porpoise group was located. If a group was not sighted for five minutes, scanning was restarted. These protocols are presented in detail in Wursig (1991) and in other studies of marine mammals in Hong Kong, including the baseline monitoring for this Project. Data for dolphins were also collected if sighted during the theodolite survey period although porpoise were the priority species.

3. RESULTS

- 3.1 Theodolite surveys were conducted between 21/02/2019 and 10/05/2019, totalling thirty-four days of theodolite tracking and comprising 167 hours and 40 minutes of observation. On three days (22/3; 12/4; 30/4) poor weather conditions reduced the length of the survey day, therefore additional days of observation were included in the monitoring period. Observational effort was conducted between 10:00 and 16:30 (**Section 7: Table 1**). No Chinese white dolphin was observed and only one finless porpoise was recorded (**Section 7: Table 2**) The finless porpoise was located to the south west of SKC and outside the Project site boundary (**Section 7: Figure 2**). The finless porpoise encounter rate was calculated as 0.006 finless porpoise per hour, in all weather conditions.
- 3.2 A total of 2620 vessels of ten different types were observed and tracked within or in the proximity of the IW MF construction site. These comprised fishing boats (236), speed boats (29), container boats (155), government boats (22), high speed ferries (53), others (13) and IW MF-Related construction platforms (974), tug boats(240), transportation boats (363), construction boats (531 and approximately 8 buoys were present marking the site boundary¹ (**Section 7: Table 4**).

Note 1: These numbers represent the total number of vessels/platforms recorded daily, not individual platforms or vessels

4. DISCUSSION

- 4.1 Baseline theodolite tracking was conducted between 30/1/2018 and 14/05/2018 totalling 30 days of theodolite tracking and comprising 179 hours and 59 minutes, covering the period immediately prior to and during the first construction activities of the Project site. Ground investigation activities started on the 09/03/2018, after 11 days of site preparation activities free monitoring. As such, only 11 days of the 30 day monitoring period had no ground investigation activities occurring (**Annex: Table 1 and Table 2**). There was a total of 95 finless porpoise sightings during baseline monitoring surveys, concentrated close to the shore of SKC, mainly within the proposed construction works area (**Section 7: Figure 1**). The baseline monitoring phase records 65:51 observation hours with no construction traffic or activities present with a corresponding finless porpoise encounter rate of 1.34 porpoise per hour. The baseline monitoring phase records 114:08 hours of observations during which construction vessels and ground investigation survey activities were observed and a corresponding encounter rate of 0.06 finless porpoise per hour. The impact monitoring phase records 167:40 hours of observations and a corresponding encounter rate of 0.006 finless porpoise per hour.
- 4.2 The theodolite was positioned at southwest Shek Kwu Chau (SKC) (N 22° 11.47'; E 113° 59.33') which is the vantage point used previously for the baseline theodolite monitoring for this Project, (**Annex I: Figure 1**). Prior to construction at SKC, this point had a relatively unobstructed view of the Project site, however, the observable sea area is now occupied by the IWMF construction works. The works inevitably obstructed the view (**Section 7: Figure 3**), making it challenging to see all the areas that were available during baseline theodolite monitoring.
- 4.3 A comparison of the number of vessels and activities related to construction activities was also made, to both compare other anthropogenic activities in the area, and to cross check the two studies boat-fixing procedures. Of the vessels that would usually be expected to be in the area, i.e., fishing boats, speed boats, container boats, government boats research vessels and high speed ferries, there was little variation in the average number of vessels recorded per day in each vessel category². As expected, there was a considerable increase in construction related vessel activities between pre construction, initial construction (ground works) and full construction phases, i.e., construction vessels increased from 0, to 0.3 to 12.6 (average) per day during each phase (**Section 7: Table 5**).

Note 2: Except high speed ferries which only occurred close to the site on the first two days of monitoring

- 4.4 The baseline monitoring and the impact monitoring data captures periods of no construction, initiation of site preparation activities (i.e. placement of buoys, ground investigation survey) and full construction activities and shows a concomitant reduction in finless porpoise encounter rate. The baseline theodolite monitoring report records a marked decrease in porpoise sightings as initial site activities commenced and states that that the decrease is most likely due to the onset of construction activities, including but not limited to disturbance from stationary construction platforms, moving construction vessels, increased underwater noise from these vessels and marine construction works. The baseline theodolite monitoring report also considered seasonal variation on encounter rates as an explanation for the marked decline in porpoise sightings, however, conclude that the observed low encounter numbers were much lower than reported for previous years (AFCD 2016; AFCD 2017). The baseline theodolite monitoring report further predicts that increased construction activities will further reduce the finless porpoise encounter rate, and this has indeed been shown in the theodolite data recorded for impact monitoring.

- 4.5 It is noted that the visibility of the entire construction area, where the majority of baseline phase monitoring finless porpoise sightings were recorded, was obscured by the construction vessels themselves which may also reduce the area available for observation, when compared to the baseline theodolite monitoring.

5. CONCLUSIONS

- 5.1 The impacts of the Project on marine mammals as predicted in the EIA were that construction activities would cause individuals to move away from the area. The baseline theodolite monitoring report shows a significant decline in porpoise encounters during the initiation of site preparation activities (i.e. placement of buoys, ground investigation survey) of the Project. This report shows a significant decline in finless porpoise encounter rate at the Project site during impact monitoring. Therefore, this monitoring period data supports both EIA and baseline theodolite monitoring report conclusions that predict a correlation between increased construction site activities and a decrease in in finless porpoise occurrence. The impact on this significant decline on the finless porpoise population has not yet been assessed.

6. REFERENCES

- 6.1 Acuity 2018. Baseline Monitoring Report: Shore-based theodolite tracking on finless porpoises for the EM&A Programme of Integrated Waste Management Facilities Project (CONTRACT NO. EP/SP/66/12) pp 630
- 6.2 Agriculture, Fisheries and Conservation Department (AFCD) 2018. Annual Marine Mammal Monitoring Programme April 2017-March 2018) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/c_on_mar_chi_chi.html
- 6.3 Agriculture, Fisheries and Conservation Department (AFCD) 2017. Annual Marine Mammal Monitoring Programme April 2016-March 2017) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/c_on_mar_chi_chi.html
- 6.4 Agriculture, Fisheries and Conservation Department (AFCD) 2016. Annual Marine Mammal Monitoring Programme April 2015-March 2016) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

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- 6.5 EIA 2008. Engineering Investigation and Environmental Studies for Integrated Waste Management Facilities Phase 1 – Feasibility Study: ENVIRONMENTAL IMPACT ASSESSMENT REPORT

https://www.epd.gov.hk/eia/register/report/eiareport/eia_2012011/index.htm
- 6.6 Piwetz, S., Hung, S., Wang, J., Lundquist, D. and Würsig, B., 2012. Influence of vessel traffic on movements of Indo-Pacific humpback dolphins (*Sousa chinensis*) off Lantau Island, Hong Kong. *Aquatic Mammals*, 38(3), p.325.

7. FIGURES AND TABLES

Figure 1 Theodolite Tracking Station (N 22° 11.47'; E 113° 59.33'), Shek Kwu Chau, Hong Kong SAR



Figure 2 Finless Porpoise Sighting (01/03/2019) During Impact Monitoring at Shek Kwu Chau, Hong Kong SAR

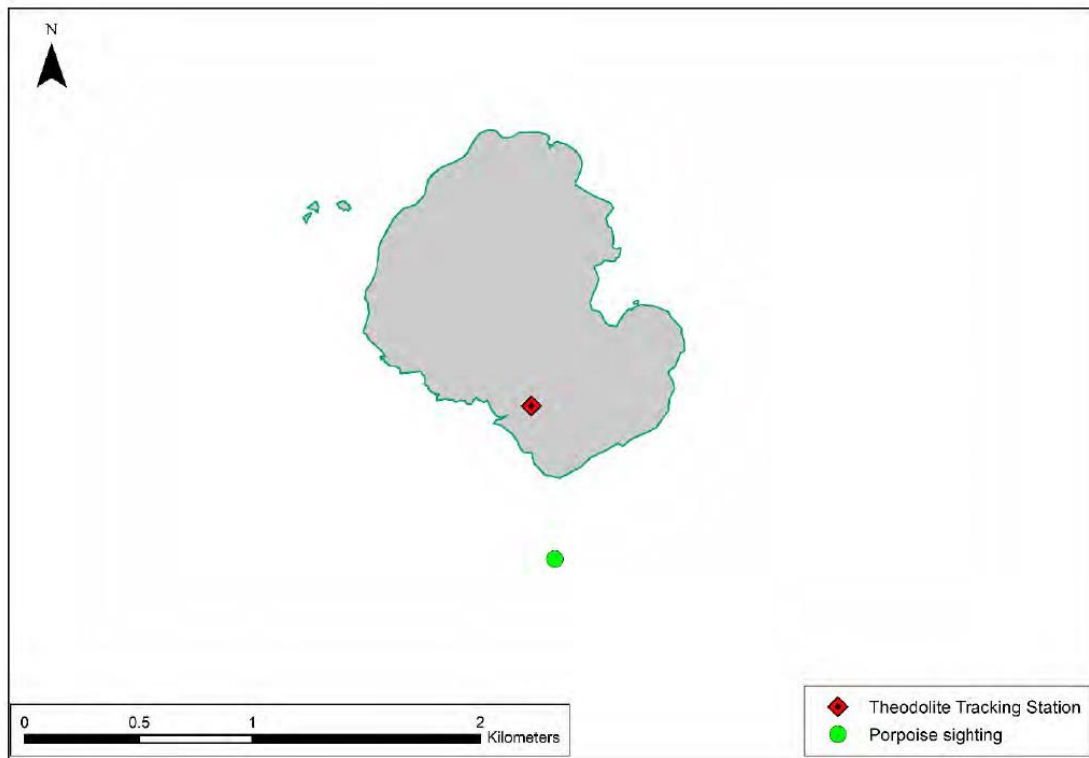


Figure 3 Images of the Project site in Shek Kwu Chau



Table 1 Summary Data from IWMF Impact Theodolite Tracking Monitoring at Shek Kwu Chau, Hong Kong SAR (February – May 2019)

Date	Start Time	End Time	Duration	Beaufort	Visibility	No. of FP Groups	Total No. of Fixes	No. of Fix (FP)	No. of Fix (fishing boat)	No. of Fix (HSF)	No. of Fix (others)
21/02/2019	10:26:49	15:09:11	4:42	1 - 2	5 KM	0	104	0	6	31	67
22/02/2019	10:40:29	15:45:36	5:05	1 - 2	5 KM	0	128	0	11	20	97
28/02/2019	10:27:02	16:19:44	5:52	1	5 KM	0	95	0	10	0	85
01/03/2019	10:31:54	15:31:12	4:59	1	5 KM	1	99	1	8	0	90
04/03/2019	10:35:30	15:31:05	4:55	1 - 3	5 KM	0	94	0	2	0	92
05/03/2019	10:30:27	15:32:02	5:01	2	5 KM	0	102	0	7	0	95
12/03/2019	10:32:12	15:31:19	4:59	2 - 3	5 KM	0	106	0	10	0	96
13/03/2019	10:15:46	15:31:55	5:16	2	5 KM	0	115	0	14	0	101
15/03/2019	10:15:37	15:32:56	5:17	2	5 KM	0	107	0	10	0	97
20/03/2019	10:18:15	15:32:06	5:13	2	3 - 5 KM	0	94	0	5	0	89
21/03/2019	10:19:02	15:31:01	5:12	2	5 KM	0	95	0	16	0	79
22/03/2019	10:20:30	11:50:47	1:30	2	3 KM	0	39	0	0	0	39
26/03/2019	10:12:24	15:30:14	5:17	2 - 3	5 KM	0	86	0	0	0	86
27/03/2019	10:20:00	15:30:15	5:10	2	5 KM	0	95	0	8	0	87
29/03/2019	10:13:44	15:40:49	5:27	2	5 KM	0	90	0	12	0	78
01/04/2019	10:13:01	15:30:11	5:17	3	5 KM	0	83	0	10	0	73
03/04/2019	10:24:28	15:30:04	5:05	2 - 3	5 KM	0	107	0	8	0	99
04/04/2019	10:36:49	15:30:03	4:53	2	5 KM	0	97	0	3	0	94
08/04/2019	10:22:44	15:29:41	5:06	1 - 2	5 KM	0	83	0	5	0	78
09/04/2019	10:12:14	15:30:07	5:17	2	5 KM	0	93	0	6	0	87
10/04/2019	10:19:15	15:30:06	5:10	2	1 - 5 KM	0	101	0	7	0	94
11/04/2019	10:13:04	15:45:30	5:32	2	5 KM	0	97	0	6	0	91
12/04/2019	10:17:28	12:36:53	2:19	3	5 KM	0	28	0	0	0	28
15/04/2019	10:09:50	15:30:03	5:20	3	5 KM	0	78	0	4	0	74
18/04/2019	10:26:36	16:04:55	5:38	1 - 3	5 KM	0	77	0	3	0	74
24/04/2019	10:08:25	15:00:14	4:51	2	5 KM	0	89	0	11	0	78
25/04/2019	10:38:19	15:30:03	4:51	2	5 KM	0	80	0	9	0	71
26/04/2019	10:27:11	16:05:40	5:38	1	5 KM	0	75	0	9	0	66
29/04/2019	10:12:53	15:30:06	5:17	1 - 2	5 KM	0	78	0	5	2	71
30/04/2019	10:11:01	12:46:14	2:35	2 - 3	1 - 5 KM	0	35	0	4	0	31
07/05/2019	10:22:36	15:30:02	5:07	3	5 KM	0	86	0	10	0	76
08/05/2019	10:15:10	15:24:20	5:09	3 - 4	5 KM	0	43	0	3	0	40
09/05/2019	10:13:54	15:31:08	5:17	1 - 2	5 KM	0	76	0	7	0	69
10/05/2019	10:20:54	15:30:32	5:09	1 - 2	5 KM	0	87	0	7	0	80

Table 2 Finless Porpoise Sightings during Impact Monitoring at Shek Kwu Chau, Hong Kong SAR

Date	Time	Weather	Beaufort Sea State	Visibility	Fix Type	Group Number	Group Size	Behaviour	Horizontal	Vertical	Latitude	Longitude
01/03/2019	12:45:25	Fair	1	Good > 5KM	Finless Porpoise	1	1	Traveling	170.0541	267.3245	N 22° 11.1	113° 59.4

Table 3 Comparison of Monitoring Periods, Construction Status, Vessels and Finless Porpoise Fixes between Baseline and Impact Monitoring

Year	Monitoring Periods	Construction Status	Duration	No. of FP groups	Encounter Rate FP	Total No. of Fixes	No. of Fix (FP)	No. of Fix (fishing boat)	No. of Fix (HSF)	No. of Fix (others)
2018	Baseline	No construction	65 hrs 51 mins	88	1.34	2194	1385	482	4	307
		Site preparation	114 hrs 8 mins	7	0.06	2563	59	385	6	2085
2019	Impact	Construction	167 hrs 40 mins	1	0.006	2942	1	236	53	2652

Table 4 Porpoise, Vessel and Buoy Occurrence recorded during the IWMF Impact Monitoring Study, 2019

Date	Finless Porpoise	Fishing Boat	Speed Boat	Container Boat	Government Boat	Research Vessel	High Speed Ferry	Boat - Others			IWMF-Related	IWMF-Related	IWMF-Related	IWMF-Related	IWMF-Related
											Construction Platform	Related Tug Boat	Transportation Boat	Construction Boat	Related Bouy
2/21/2019	0	6	6	3	3	0	31	2		16	10	14	6	7	
2/22/2019	0	11	3	3	1	1	20	4		39	6	21	8	11	
2/28/2019	0	10	1	1	0	0	0	0		18	9	17	30	9	
3/1/2019	1	8	0	9	1	0	0	2		17	7	14	29	11	
3/4/2019	0	2	0	3	2	0	0	0		41	12	15	9	10	
3/5/2019	0	7	0	5	2	0	0	0		39	9	9	22	9	
3/12/2019	0	10	4	9	0	0	0	1		41	14	10	7	10	
3/13/2019	0	14	2	8	1	0	0	2		44	18	12	5	9	
3/15/2019	0	10	0	7	1	0	0	0		39	13	17	10	10	
3/20/2019	0	5	0	6	1	0	0	0		42	4	9	16	11	
3/21/2019	0	16	1	2	1	1	0	1		39	7	8	9	10	
3/22/2019	0	0	0	0	0	0	0	0		14	4	5	6	10	
3/26/2019	0	0	0	1	1	0	0	0		43	11	8	12	10	
3/27/2019	0	8	1	5	0	0	0	0		44	6	13	9	9	
3/29/2019	0	12	0	7	0	0	0	0		9	7	8	39	8	
4/1/2019	0	10	0	6	0	0	0	0		27	5	8	20	7	
4/3/2019	0	8	1	6	0	0	0	1		41	8	13	19	10	
4/4/2019	0	3	3	7	0	0	0	0		40	8	12	14	10	
4/8/2019	0	5	1	4	1	0	0	0		34	6	10	13	9	
4/9/2019	0	6	0	11	1	0	0	0		34	6	10	14	11	
4/10/2019	0	7	1	8	3	0	0	0		38	5	19	9	11	
4/11/2019	0	6	1	4	0	0	0	0		13	11	14	38	10	
4/12/2019	0	0	0	0	0	0	0	0		2	1	4	13	8	
4/15/2019	0	4	0	3	0	0	0	0		36	7	10	9	9	
4/18/2019	0	3	0	5	2	0	0	0		20	3	8	26	10	
4/24/2019	0	11	0	7	0	0	0	0		23	3	9	25	11	
4/25/2019	0	9	0	5	0	0	0	0		30	3	14	9	10	
4/26/2019	0	9	0	3	0	1	0	0		20	8	7	19	8	
4/29/2019	0	5	1	4	0	1	2	0		30	5	11	9	10	
4/30/2019	0	4	1	1	0	0	0	0		10	3	4	3	9	
5/7/2019	0	10	0	5	0	0	0	0		39	3	6	12	11	
5/8/2019	0	3	0	1	0	0	0	0		14	4	6	8	7	
5/9/2019	0	7	2	4	0	0	0	0		23	7	9	17	7	
5/10/2019	0	7	0	2	1	0	0	0		15	7	9	37	9	

Table 5 A Comparison of Vessel Classes Recorded During Baseline Monitoring and Impact Studies

Year	Monitoring Period	Construction Status	Fishing Boat	Speed Boat	Container Boat	Government Boat	Research Vessel	High Speed Ferry	IWMF related				
									Construction Platform	Tug Boat	Transportation Boat	Construction Boat	Buoy
2018	Baseline	No construction	4.7	1.9	3.5	0.7	0.4	0.2	0	0	0	0	0
		Site preparation	4.6	1.7	7.9	0.7	0.2	0.1	1.9	1.5	2.5	0.3	10
2019	Impact	Construction	5.6	0.6	3.9	0.4	0.1	0.1	23.6	5.5	8.0	12.6	8

Annex I Summary Data Extracted from Baseline Theodolite Monitoring, at Shek Kwu Chau, January – May 2018

Table 1. Summary Table for Shore-based Theodolite Tracking at Shek Kwu Chau Station during IWMF Baseline Monitoring Period (January-May 2018)

Date	Start Time	End Time	Duration	Beaufort	Visibility	No. of FP Groups	Total No. of Fixes	No. of fix (FP)	No. of fix (fishing boat)	No. of fix (HSF)	No. of fix (others)
30/01/18	9:13	15:00	5:47	2	2	17	261	229	0	0	31
02/02/18	10:17	16:00	5:43	2	2.5	11	216	113	58	4	40
06/02/18	9:20	15:24	6:04	2-5	1.5	8	199	102	62	0	33
07/02/18	9:07	15:22	6:15	2-3	2	7	137	73	46	0	16
13/02/18	9:39	15:39	6:00	2-4	2.5	1	101	14	70	0	15
14/02/18	9:31	15:31	6:00	2-3	2	4	124	18	94	0	11
21/02/18	9:44	15:44	6:00	2-3	2.5	11	207	152	29	0	25
23/02/18	9:44	15:48	6:04	2	1	9	248	219	10	0	18
27/02/18	9:41	15:41	6:00	2	1.5	3	167	33	95	0	37
28/02/18	9:44	15:44	6:00	2	2.5	7	261	167	14	0	79
01/03/18	9:50	15:48	5:58	1-2	3-4	10	273	265	4	0	2
09/03/18	9:38	15:40	6:02	2-4	1.5	1	102	8	8	0	84
13/03/18	9:32	15:34	6:02	2	2.5	1	201	7	45	0	134
14/03/18	9:33	15:33	6:00	2	2	2	178	32	20	0	124
15/03/18	9:33	15:33	6:00	1-2	3	1	134	3	27	0	89
21/03/18	9:30	15:30	6:00	2	1.5	0	162	0	45	0	116
22/03/18	9:18	15:18	6:00	2-3	2	0	173	0	47	0	125
28/03/18	9:39	15:39	6:00	2-4	2.5	0	156	0	43	0	113
29/03/18	9:28	15:29	6:01	2-3	2.5	0	145	0	31	0	113
11/04/18	9:43	15:43	6:00	2	2	0	117	0	6	0	109
13/04/18	9:16	15:16	6:00	2	2	1	128	1	21	3	101
18/04/18	9:32	15:32	6:00	2-3	2.5	0	104	0	0	0	101
20/04/18	9:46	15:46	6:00	3	2.5	0	117	0	10	0	104
25/04/18	9:48	15:46	5:58	2-3	3	0	98	0	3	0	93
27/04/18	9:29	15:30	6:01	2	2	0	125	0	14	0	109
30/04/18	9:42	15:44	6:02	2	2	0	87	0	6	0	79
02/05/18	9:27	15:29	6:02	1-2	1.5	0	133	0	16	0	114
03/05/18	9:44	15:44	6:00	2-3	2	0	120	0	0	0	117
11/05/18	9:43	15:43	6:00	3	2.5	0	169	0	24	0	144
14/05/18	9:31	15:31	6:00	2-3	1.5	1	114	8	19	3	83

Table 2. Number of porpoise groups and different types of vessels tracked during IWMF Baseline Monitoring Period

Date	FP Group	Fishing Boat	Speed Boat	Container Boat	Govt Boat	Research Vessel	Hi-speed Ferry	IWMF-Related				
								Construction Platform	Tug Boat	Transportation Boat	Construction Boat	Buoy
30/01/18	17		2	7	3							
02/02/18	11	4	7	6	1		2					
06/02/18	8	4	1	7	1	1						
07/02/18	7	7	1	3		1						
13/02/18	1	4	2	2	1							
14/02/18	4	5	1	1	1							
21/02/18	11	8	1	4	1	1						
23/02/18	9	5	1	3	1							
27/02/18	3	9	2	8								
28/02/18	7	4	4	4	2	1						
01/03/18	10	2	1									
09/03/18	1	3	1	9				1	3			10
13/03/18	1	12	1	2	1	1		2	2	7		10
14/03/18	2	6	2	7	1			2	1	1		17
15/03/18	1	9	8	4	2			2	1	4		10
21/03/18	0	9	1	8	1			2	1	3		10
22/03/18	0	7	1	7				2	3	1		10
28/03/18	0	4	1	7	2			2	2	1		10
29/03/18	0	8		2				2				10
11/04/18	0	2	6	13				2	1			10
13/04/18	1	3	1	7	1		1	2	2	3		10
18/04/18	0		1	8	1			2	2	4	1	10
20/04/18	0	3	1	8				2	1	2		10
25/04/18	0	1	1	8	1			2	1	3	2	10
27/04/18	0	2	1	11	2			2	1	3		10
30/04/18	0	2	2	9		1		2	1	2	2	10
02/05/18	0	6	1	10		1		2	1	6		10
03/05/18	0		1	11				2	2	2		10
11/05/18	0	6	1	10				2	2	3		10
14/05/18	1	5	2	9	1		1	2	1	2		10

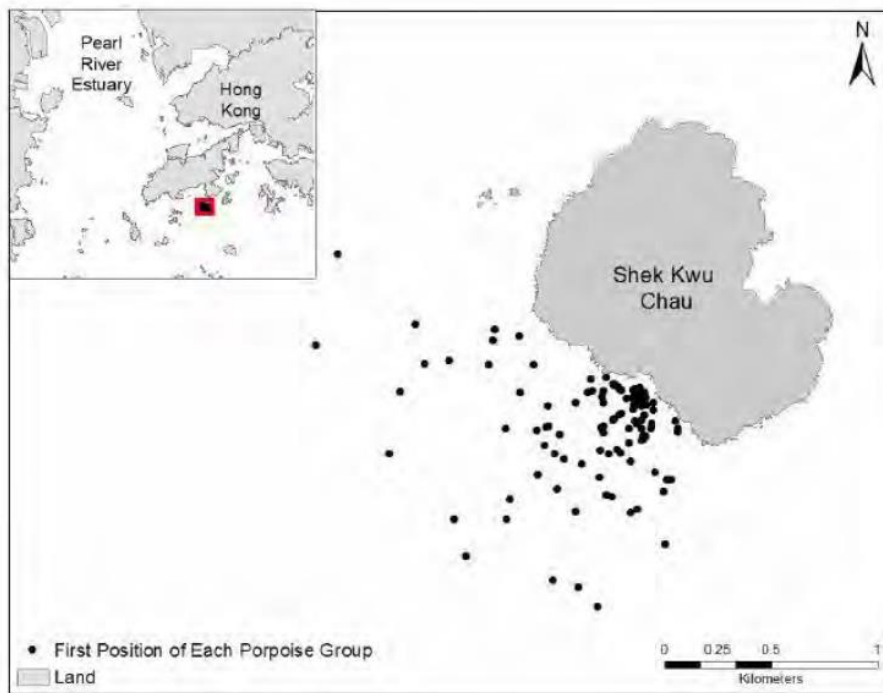


Figure 1. Plots of first sightings of all porpoise groups (prior to filtering out standardised segments) obtained from land-based station at Shek Kwu Chau during baseline monitoring theodolite tracking surveys in 2018.