

Annex 10C

## Fisheries – Survey Results

## 10C.1 SURVEY RESULTS

### 10C.1.1 INTRODUCTION

This *Annex* presents the results of the adult fish production survey, ichthyoplankton and fish post-larvae survey, and vessel survey conducted to characterize the existing conditions of fisheries resources at selected locations within the Assessment Area. The methodology for the surveys is described in detail in *Annex 10B*.

### 10C.1.2 SURVEY SCHEDULE

In accordance with the agreed methodology, fisheries surveys were carried out from October 2016 to July 2017 and the survey schedule is summarized in *Table 10C.1.1*.

All surveys were conducted during daytime at each of the selected locations. During the course of the survey, sea conditions were mild to moderate and weather conditions were fine in general.

*Table 10C.1.1 Marine Fisheries Baseline Surveys*

Survey	Frequency	Date	
		Wet Season	Dry Season
Adult fish production survey	Monthly over a duration of 9 months, from October 2016 to June 2017 (inclusive)	20, 24 & 28 Oct 2016 3, 5 & 6 Apr 2017 17, 18 & 19 May 2017 15, 19 & 20 Jun 2017	16, 17 & 21 Nov 2016 12, 13 & 14 Dec 2016 4, 5 & 6 Jan 2017 8, 10 & 13 Feb 2017 8, 9 & 10 Mar 2017
Ichthyoplankton and Fish Post-larvae Survey	Monthly over a duration of 9 months, from November 2016 to July 2017 (inclusive)	19, 20 & 21 Apr 2017 24, 25 & 26 May 2017 21, 22 & 23 Jun 2017 18, 19, & 20 Jul 2017	18, 22 & 23 Nov 2016 19, 21 & 23 Dec 2016 16, 17 & 18 Jan 2017 20, 21 & 22 Feb 2017 20, 21 & 22 Mar 2017
Vessel Survey	Monthly over a duration of 9 months, from October 2016 to June 2017 (inclusive)	20, 24 & 28 Oct 2016 3, 5 & 6 Apr 2017 17, 18 & 19 May 2017 15, 19 & 20 Jun 2017	16, 17 & 21 Nov 2016 12, 13 & 14 Dec 2016 4, 5 & 6 Jan 2017 8, 10 & 13 Feb 2017 8, 9 & 10 Mar 2017

## 10C.2.1

## OVERVIEW

A total of about 78.58 kg (1,197 individuals) of fish were recorded from the 12 survey locations from the gill-netting and hand-lining surveys during the survey period from October 2016 to June 2017, with a total of 76 species from 35 families recorded. Other than fish species, a total of about 19.55 kg (740 individuals) of crustaceans were recorded from the surveys, with a total of 42 species from 12 families recorded. The full list of species recorded during the surveys is presented in *Annex 10D*.

The top dominant species of the Assessment Area consisted of fish with low commercial value (e.g. the croaker *Johnius belangerii*) and some fish and crustaceans of medium to high commercial value (e.g. flatheads, groupers, mantis shrimps, prawns and crabs). Details of fisheries resources in the survey locations are summarized in *Table 10C.2.1*. Overall, the highest total biomass of fisheries resources was recorded in Site 3 (Tai O), as contributed by a high biomass of the croaker *Johnius belangerii*, whereas the total abundance was the highest in Sites 5 and 6 (Fan Lau Kok and South of Soko Islands), mainly contributed by a high abundance of the croaker *Johnius belangerii* and the crab *Charybdis* spp.. Total species richness was also the highest in Sites 5 and 6, due to the richness of crustaceans in these two survey locations. Compared with other survey locations of the Assessment Area, Site 8 (LNG Terminal) showed relatively low biomass and species richness of fisheries resources with moderate abundance. The location with the lowest total biomass, abundance and species richness of fisheries resources is Site 4 (Peaked Hill).

*Table 10C.2.1 Fisheries Resources (Including Fish and Crustaceans) of the Assessment Area*

Survey Location	Total Biomass (kg)	Total Abundance (No. of Individuals)	Total Species Richness
1 (Deep Bay)	7.33	122	28
2 (Sha Chau & Lung Kwu Chau)	6.61	116	23
3 (Tai O)	15.50	235	31
4 (Peaked Hill)	2.83	77	20
5 (Fan Lau Kok)	9.04	278	44
6 (South of Soko Islands)	8.30	269	40
7 (Tau Lo Chau East)	11.40	221	35
8 (LNG Terminal)	5.37	122	27
9 (Shek Kwu Chau South)	10.21	119	30
10 (Cheung Chau South)	7.30	134	28
11 (Cheung Chau Southeast)	5.40	104	37
12 (West Lamma)	8.84	140	30
Overall	98.12	1937	120

Survey duration: nine months

## 10C.2.2 SPECIES COMPOSITION

The dominant fish species recorded in the survey, in terms of both biomass and abundance, was the croaker *Johnius belangerii* which is of low commercial value according to the Fish Marketing Organisation (FMO) <sup>(1)</sup> and other published references <sup>(2)</sup>. The dominant crustacean species recorded in the survey, in terms of both biomass and abundance, was the crab *Charybdis (Charybdis) affinis* which has been identified as of no commercial value <sup>(3)</sup>. The top ten species recorded from the surveys are summarised in **Table 10C.2.2**. At Site 8 (LNG Terminal), the dominant species included croakers *Johnius* spp., which are species with low commercial value.

**Table 10C.2.2 Top Ten Dominant Species Recorded from the Adult Fish Production Survey**

Family	Species	Commercial Value <sup>(1)(2)</sup>	Biomass (g)	% of Total Biomass (Rank)	Abundance (No. of Individuals)	% of Total Abundance (Rank)
Sciaenidae	<i>Johnius belangerii</i>	L	25852.10	26% (1)	456	24% (1)
Carcharhinidae	<i>Scoliodon laticaudus</i>	L	10517.10	11% (2)	42	2% (-)
Sciaenidae	<i>Johnius trewavasae</i>	L	3828.30	4% (3)	77	4% (5)
Portunidae	<i>Charybdis (Charybdis) affinis</i>	-	3394.30	3% (4)	142	7% (2)
Terapontidae	<i>Terapon jarbua</i>	M	3204.10	3% (5)	67	3% (6)
Platycephalidae	<i>Platycephalus indicus</i>	H	3114.10	3% (6)	21	1% (-)
Serranidae	<i>Epinephelus awoara</i>	H	2869.90	3% (7)	46	2% (9)
Tetraodontidae	<i>Lagocephalus wheeleri</i>	-	2414.50	2% (8)	16	1% (-)
Portunidae	<i>Portunus (Portunus) sanguinolentus</i>	H	2079.60	2% (9)	28	1% (-)
Squillidae	<i>Oratosquilla oratoria</i>	H	2040.70	2% (10)	87	4% (4)
Gobiidae	<i>Myersina filifer</i>	L	1469.10	1% (-)	104	5% (3)
Portunidae	<i>Charybdis (Charybdis) variegata</i>	L	221.50	0% (-)	59	3% (7)
Squillidae	<i>Oratosquillina interrupta</i>	H	1032.00	1% (-)	48	2% (8)
Squillidae	<i>Harpiosquilla harpax</i>	H	1857.00	2% (-)	44	2% (10)

Notes:

- (1) For fish species: H= High (> 65 HK\$/kg); M = Medium (55 - 65 HK\$/kg); L = Low (< 55 HK\$/kg); - = not commercially important species or no commercial value is evaluated
- (2) For crustacean species, commercial values made reference to approved EIA report

## 10C.2.3 COMMERCIAL VALUE

According to the Annual Report 2015/2016 of FMO, the average wholesale prices of fresh marine fish ranged between 54.01 - 63.98 HK\$/kg with an average price of 59.67 HK\$/kg. Therefore, the commercial value of adult fish resources recorded in the surveys was estimated based on FMO's wholesale price of fresh marine fish and ranked into three classes: High

- (1) Fish Marketing Organization (FMO). Available at <https://www.fmo.org.hk/uploads/AR2015-2016.pdf>
- (2) Mott MacDonald (2014) Expansion of Hong Kong International Airport into a Three-Runway System: EIA Study (EIA Report Registered No. AEIAR-185/2014)
- (3) Mott MacDonald (2014) Expansion of Hong Kong International Airport into a Three-Runway System: EIA Study (EIA Report Registered No. AEIAR-185/2014)

value (> 65 HK\$/kg); Medium value (55 – 65 HK\$/kg); and Low value (< 55 HK\$/kg). For species which do not have prices provided by the FMO, their commercial value were estimated with reference to previous EIA reports, Fishbase <sup>(1)</sup> and price of similar species. It should be noted that there are no published wholesale prices of crustaceans available for assessment of commercial value. Most edible species of mantis shrimps (e.g. *Oratosquilla* sp., *Harpisquilla harpax*, *Miyakella nepa*), prawns (e.g. Penaeidae spp.) and crabs (e.g. *Portunus* spp.) are generally regarded as having high commercial value <sup>(2)</sup>.

Seventy of the 76 fish species recorded in the survey are classified as commercial fish species (*Annex 10F*). Of the commercial fish species, species with low commercial value accounted for about 71% of total biomass and 77% of total abundance. For crustaceans, only 17 of the 42 species recorded in the survey are considered as commercial species, though the commercial species recorded are generally considered as of high value. Overall, the top dominant species consisted of fish with low commercial value and some fish and crustaceans of medium to high commercial value (*Table 10C.2.2*).

#### 10C.2.4 SPATIAL AND SEASONAL VARIATION

The mean biomass of fisheries resources (including fish and crustaceans) was slightly higher in the wet season than the dry season, while the mean abundance of fisheries resources was much higher in the wet season than the dry season (*Table 10C.2.3*). This was attributed by the difference in crustacean biomass and abundance between seasons. In both seasons, the croaker *Johnius belangerii* was the most dominant fish species. Commercially important crustaceans (including mantis shrimps, prawns and the crabs *Portunus* spp.) were more abundant in the wet season than the dry season.

The mean species richness, diversity (*H'*) and evenness (*J'*) of fisheries resources in the wet and dry seasons are presented in *Table 10C.2.3*. The mean species richness and diversity of the Assessment Area are considered to be low, with some unevenness in species distribution, i.e. some assemblages were dominated by several species only. The mean species richness and diversity of the Assessment Area was higher in the wet season than the dry season.

A higher mean abundance of fisheries resources was recorded in the wet season than the dry season in all survey locations. Across the survey locations, mean biomass was also in general higher in the wet season than the dry season, except in Sites 3 (Tai O), 6 (South of Soko Islands), 8 (LNG Terminal) and 9 (Shek Kwu Chau South) (*Table 10C.2.3*). At Sites 3 and 6, the higher biomass of fisheries resources in the dry season was contributed by the biomass of the croaker *Johnius belangerii*, whereas at Site 9 the higher biomass of fisheries resources in the dry season was mainly due to the biomass of the puffer fish (*Lagocephalus wheeleri* and *Takifugu oblongus*) and the flathead *Platycephalus indicus*. At Site 8 (LNG Terminal), mean biomass and abundance of fisheries resources were low

(1) Froese R, Pauly D (Eds) (2017) FishBase. Available at <http://www.fishbase.org/>, version (10/2017)

(2) Mott MacDonald (2014) Expansion of Hong Kong International Airport into a Three-Runway System: EIA Study (EIA Report Registered No. AEIAR-185/2014)

but comparable between seasons, and species richness, diversity and evenness were somewhat similar between seasons.

Among the 12 survey locations of the Assessment Area, Site 8 (LNG Terminal) consistently showed relatively low mean biomass and mean abundance of fisheries resources in both seasons, with low mean species richness, diversity and evenness.

**Table 10C.2.3 Fisheries Resources (Including Fish and Crustaceans) of the Assessment Area in the Wet Season and Dry Season**

Survey Location	Mean Biomass (kg)		Mean Abundance (No. of Individuals)		Mean Species Richness		Mean Species Diversity (Shannon-Weiner $H'$ )		Mean Species Evenness (Pielou's $J'$ )	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
1 (Deep Bay)	0.97	0.69	20.00	8.40	7.5	3.8	1.34	0.70	0.83	0.86
2 (Sha Chau & Lung Kwu Chau)	0.97	0.55	19.00	8.00	6.3	5.2	1.19	1.03	0.75	0.96
3 (Tai O)	1.63	1.80	26.75	25.60	8.5	5.8	1.03	0.57	0.62	0.53
4 (Peaked Hill)	0.38	0.26	11.25	6.40	5.3	3.8	0.87	0.13	0.98	0.92
5 (Fan Lau Kok)	1.44	0.66	53.50	12.80	13.3	6.4	1.21	1.08	0.79	0.86
6 (South of Soko Islands)	0.90	0.94	41.50	20.60	11.0	6.8	0.72	0.61	0.70	0.66
7 (Tau Lo Chau East)	1.34	1.21	31.75	18.80	9.5	7.2	0.80	0.76	0.73	0.75
8 (LNG Terminal)	0.52	0.66	16.50	11.20	8.0	5.2	1.08	0.77	0.83	0.87
9 (Shek Kwu Chau South)	1.13	1.14	17.25	10.00	7.0	5.0	1.37	1.33	0.80	0.90
10 (Cheung Chau South)	1.01	0.66	20.25	10.60	9.0	4.2	0.72	0.30	0.93	0.56
11 (Cheung Chau Southeast)	0.84	0.41	16.75	7.40	8.5	4.8	1.38	0.91	0.86	0.88
12 (West Lamma)	1.31	0.72	21.75	10.60	8.0	4.0	1.24	0.79	0.74	0.82
Overall	1.04	0.81	24.69	12.53	8.5	5.2	1.08	0.75	0.80	0.81

Wet Season: Oct, Apr, May, Jun

Dry Season: Nov, Dec, Jan, Feb, Mar

## 10C.3.1

## OVERVIEW

A total of 60 fish egg species from 24 families, 123 fish larvae species from 39 families, and 67 fish post-larvae species from 26 families were recorded from the 12 survey locations from the ichthyoplankton and fish post-larvae surveys during the survey period from November 2016 to July 2017. The full list of species recorded during the surveys is presented in *Annex 10E*.

Details of ichthyoplankton and fish post-larvae resources in the survey locations are summarised in *Table 10C.3.1*. In terms of fish eggs, whilst the total family richness was somewhat similar across sites, the total species richness was the highest in Sites 4 (Peaked Hill) and 9 (Shek Kwu Chau South). Total family richness of fish larvae varied across sites, and the highest total species richness was recorded in Site 6 (South of Soko Islands). The total family richness and species richness of fish post-larvae were the highest in Sites 1 (Deep Bay) and 2 (Sha Chau and Lung Kwu Chau). The survey results suggested that ichthyoplankton and fish post-larvae resources did not seem to exhibit a consistent pattern of diversity across sites.

The level of ichthyoplankton and fish post-larvae resources of the Assessment Area was low in general (mean of 3.6 – 34.6 eggs m<sup>-3</sup>, 0.14 – 2.11 larvae m<sup>-3</sup> and 0.004 – 0.04 post-larvae m<sup>-3</sup>). Higher mean densities of fish eggs, fish larvae and fish post-larvae were consistently recorded in Site 2 (Sha Chau and Lung Kwu Chau) than other sites. The mean densities of fish eggs and fish larvae at Site 2 were contributed by high densities of specimens from glassfishes (family Ambassidae), whereas gobies (family Gobiidae) accounted for the high mean densities of fish post-larvae at Site 2. It is noted that the mean density of fish larvae at Site 1 (Deep Bay) was much higher than other sites, which was contributed by high densities of glass perchlet *Ambassis* sp., gobies Gobiidae spp. and sardine *Sardinella zunasi*. Compared with other survey locations of the Assessment Area, Site 8 (LNG Terminal) showed low mean densities of fish larvae and fish post-larvae, and the lowest mean density of fish eggs and the lowest total species richness in fish post-larvae (*Table 10C.3.1*).



**Table 10C.3.1 Ichthyoplankton and Fish Post-larvae Resources of the Assessment Area**

Survey Location	Fish Eggs			Fish Larvae			Fish Post-larvae		
	Total Family Richness	Total Species Richness	Mean Density (/1000 m <sup>3</sup> )	Total Family Richness	Total Species Richness	Mean Density (/1000 m <sup>3</sup> )	Total Family Richness	Total Species Richness	Mean Density (/1000 m <sup>3</sup> )
1 (Deep Bay)	17	31	27311.42	22	55	2106.07	12	19	7.52
2 (Sha Chau & Lung Kwu Chau)	17	36	34612.98	18	42	785.18	13	18	41.01
3 (Tai O)	19	35	19833.42	25	55	402.92	9	16	11.70
4 (Peaked Hill)	18	38	12271.11	18	41	217.67	5	6	4.57
5 (Fan Lau Kok)	19	35	3921.74	19	42	175.78	6	7	4.04
6 (South of Soko Islands)	16	30	3823.40	28	59	343.37	7	8	5.73
7 (Tau Lo Chau East)	18	29	9887.56	26	43	230.04	8	9	7.90
8 (LNG Terminal)	19	31	3581.84	22	47	164.30	4	5	5.22
9 (Shek Kwu Chau South)	18	38	7753.18	21	39	147.27	11	16	9.50
10 (Cheung Chau South)	16	32	6240.77	26	45	196.32	11	12	16.13
11 (Cheung Chau Southeast)	17	31	22697.13	29	54	400.74	9	13	8.04
12 (West Lamma)	18	35	15687.99	24	44	140.49	12	15	14.03
Overall	26	60	13968.55	39	123	442.51	26	67	11.28

Survey duration: nine months

## 10C.3.2

## SPECIES COMPOSITION

The top ten species recorded from the ichthyoplankton and fish post-larvae surveys are summarised in *Table 10C.3.2* to *10C.3.4*. The dominant species of fish eggs and fish larvae recorded was the glass perchlet (family Ambassidae) which is of low commercial value <sup>(1)</sup>. Whilst the top ten dominant species of fish eggs included some species with medium to high commercial values, including pony fishes (family Leiognathidae), sole (family Soleidae), sweetlips (family Haemulidae) and sillago (family Sillaginidae), the top ten dominant species of fish larvae were mostly of low commercial value. Fish post-larvae of the Assessment Area were also dominated by species of low commercial value such as scads (family Carangidae), dragonets (family Callionymidae), gobies (family Gobiidae), anchovies (family Engraulidae) and rabbitfish (family Siganidae).

At Site 8 (LNG Terminal), the dominant species of fish eggs and fish larvae was croakers (family Sciaenidae), and the five species of fish post-larvae recorded there (from families Ambassidae, Gobiidae, Carangidae and Callionymidae) are of low commercial value.

*Table 10C.3.2 Top Ten Dominant Species of Fish Eggs Recorded from the Ichthyoplankton Survey*

Rank	Family	Species	Commercial Value <sup>(1)</sup>	Mean Density (/1000 m <sup>3</sup> )	% of Total Density
1	Ambassidae	Ambassidae sp.	L	3030.04	22%
2	Leiognathidae	<i>Nuchequula nuchalis</i>	M	2154.44	15%
3	Leiognathidae	<i>Nuchequula mannusella</i>	M	2071.84	15%
4	Sciaenidae	<i>Johnius belangerii</i>	L	1486.03	11%
5	Engraulidae	<i>Encrasicholina punctifer</i>	L	1033.64	7%
6	Clupeidae	<i>Sardinella zunasi</i>	L	920.82	7%
7	Sillaginidae	<i>Sillago sihama</i>	H	415.29	3%
8	Haemulidae	<i>Plectorhinchus pictus</i>	H	376.72	3%
9	Leiognathidae	Leiognathidae sp.	M	355.09	3%
10	Soleidae	<i>Solea ovata</i>	M	269.26	2%

Notes:

(1) For fish species: H= High (> 65 HK\$/kg); M = Medium (55 - 65 HK\$/kg); L = Low (< 55 HK\$/kg); - = not commercially important species or no commercial value is evaluated

*Table 10C.3.3 Top Ten Dominant Species of Fish Larvae Recorded from the Ichthyoplankton Survey*

Rank	Family	Species	Commercial Value <sup>(1)</sup>	Mean Density (/1000 m <sup>3</sup> )	% of Total Density
1	Ambassidae	<i>Ambassis</i> sp.	L	71.07	16%
2	Clupeidae	<i>Sardinella zunasi</i>	L	61.20	14%
3	Gobiidae	Gobiidae sp.1	L	50.06	11%

(1) Mott MacDonald (2014) Expansion of Hong Kong International Airport into a Three-Runway System: EIA Study (EIA Report Registered No. AEIAR-185/2014)

Rank	Family	Species	Commercial Value <sup>(1)</sup>	Mean Density (/1000 m <sup>3</sup> )	% of Total Density
4	Gobiidae	Gobiidae sp.3	L	27.68	6%
5	Clupeidae	<i>Sardinella gibbosa</i>	L	25.77	6%
6	Scorpaenidae	<i>Sebastiscus marmoratus</i>	H	21.41	5%
7	Carangidae	<i>Alepes kleinii</i>	L	20.47	5%
8	Sciaenidae	Sciaenidae sp.	L	20.41	5%
9	Engraulidae	<i>Engraulis japonicus</i>	L	18.82	4%
10	Blenniidae	<i>Omobranchus punctatus</i>	L	17.16	4%

Notes:

(1) For fish species: H= High (> 65 HK\$/kg); M = Medium (55 - 65 HK\$/kg); L = Low (< 55 HK\$/kg); - = not commercially important species or no commercial value is evaluated

**Table 10C.3.4 Top Ten Dominant Species of Fish Post-larvae Recorded from the Fish Post-larvae Survey**

Rank	Family	Species	Commercial Value <sup>(1)</sup>	Mean Density (/1000 m <sup>3</sup> )	% of Total Density
1	Carangidae	<i>Alepes kleinii</i>	L	1.47	13%
2	Callionymidae	Callionymidae sp.1	L	1.01	9%
3	Carangidae	<i>Decapterus maruadsi</i>	L	0.74	7%
4	Gobiidae	Gobiidae sp.7	L	0.71	6%
5	Engraulidae	Engraulidae sp.	L	0.64	6%
6	Gobiidae	Gobiidae sp.3	L	0.48	4%
7	Callionymidae	<i>Callionymus curvicornis</i>	L	0.43	4%
8	Sciaenidae	<i>Pennahia argentata</i>	M	0.42	4%
9	Soleidae	<i>Solea ovata</i>	M	0.35	3%
10	Siganidae	<i>Siganus canaliculatus</i>	L	0.32	3%

Notes:

(1) For fish species: H= High (> 65 HK\$/kg); M = Medium (55 - 65 HK\$/kg); L = Low (< 55 HK\$/kg); - = not commercially important species or no commercial value is evaluated

### 10C.3.3 SPATIAL AND SEASONAL VARIATION

Ichthyoplankton and fish post-larvae resources were patchily distributed across the survey locations, and their densities varied significantly over the 9-month survey period. The mean fish egg, fish larvae and fish post-larvae densities in the survey locations in different months are summarised in *Table 10C.3.5* to *Table 10C.3.7*.

At the survey locations in western waters (Sites 1 to 5) and Site 7 (Tau Lo Chau East), the mean fish egg densities were the highest in April (i.e. onset of the wet season) and dominated by species from the families Ambassidae, Leiognathidae and Engraulidae. The survey locations in southwestern waters (Sites 6, 8 and 9) also recorded the highest mean fish egg densities from the family Sciaenidae at the onset of the wet season in May, whereas the survey locations in southern waters (Sites 10 to 12) recorded the highest mean fish egg densities from the family Leiognathidae in July (*Table 10C.3.5*). Almost all survey locations supported the lowest mean fish egg densities in January, with some survey locations in western waters (Sites 1 to 4) also supporting very low

fish egg densities in July. During the flux of fish eggs at the onset of the wet season (April and May), the mean fish egg densities were much higher at Sites 1 (Deep Bay) and 2 (Sha Chau and Lung Kwu Chau) than the other sites, whereas during the other peak period in July, the mean fish egg densities were much higher at Site 11 (Cheung Chau Southeast) than the other sites. Mean fish egg density ranged from the lowest of 0 eggs m<sup>-3</sup>, in Sites 1 (Deep Bay) and 4 (Peaked Hill) in July, to the highest of 259 eggs m<sup>-3</sup> in Site 2 (Sha Chau and Lung Kwu Chau) in April.

For fish larvae, the highest mean densities were recorded in May consistently at all survey locations, with the exception of Site 12 (West Lamma) where the highest mean density was recorded in April (*Table 10C.3.6*). The spatial pattern seems to be similar to that of fish egg density, in which the mean fish larvae densities were much higher at Sites 1 (Deep Bay) and 2 (Sha Chau and Lung Kwu Chau) than the other sites, except January and March. Mean fish larvae density ranged from the lowest of 0.003 larvae m<sup>-3</sup>, in Sites 3 (Tai O) and 8 (LNG Terminal) in February and January respectively, to the highest of 15.5 larvae m<sup>-3</sup> in Site 1 (Deep Bay) in May.

For most survey locations, the highest mean fish post-larvae densities were also recorded at the onset of the wet season in April/ May (*Table 10C.3.7*). For Sites 3 (Tai O), 4 (Peaked Hill) and 5 (Fan Lau Kok), mean fish post-larvae densities were the highest in the dry season (Nov to Jan), though the densities in these months were very low (0.02 – 0.05 post-larvae m<sup>-3</sup>). Mean fish post-larvae density ranged from the lowest of 0 post-larvae m<sup>-3</sup> in many sites across all months except July, to the highest of 0.3 post-larvae m<sup>-3</sup> in Site 2 (Sha Chau and Lung Kwu Chau) in May.

Among the 12 survey locations of the Assessment Area, Site 8 (LNG Terminal) in general showed relatively low mean fish egg, fish larvae and fish post-larvae densities over the survey period.

**Table 10C.3.5 Mean Fish Eggs Density (/1000m<sup>3</sup>) Recorded from the Ichthyoplankton Survey over the Survey Period from Nov 2016 to Jul 2017**

Survey Location	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1 (Deep Bay)	514.21	2779.76	29.42	8366.14	9991.00	209693.72	14397.06	31.47	0.00
2 (Sha Chau & Lung Kwu Chau)	2682.37	3107.99	67.45	9547.66	23968.05	259630.76	12078.90	14.55	419.04
3 (Tai O)	1041.05	5608.03	26.18	3186.12	48664.79	109429.11	10368.40	171.20	5.94
4 (Peaked Hill)	1692.62	1192.97	50.99	2117.68	5288.84	93038.07	7037.20	21.63	0.00
5 (Fan Lau Kok)	996.38	738.64	6.68	1427.95	3641.66	13936.34	13253.91	19.43	1274.67
6 (South of Soko Islands)	859.39	1007.12	5.78	2044.58	819.88	2103.39	16718.26	855.11	9997.08
7 (Tau Lo Chau East)	1311.69	182.97	73.20	26.13	602.06	65507.82	12135.86	3896.75	5251.56
8 (LNG Terminal)	282.41	1527.27	11.28	23.69	8842.49	2846.78	15193.59	674.57	2834.46
9 (Shek Kwu Chau South)	2845.03	1533.21	195.26	2017.61	1843.02	18232.02	24167.88	420.87	18523.71
10 (Cheung Chau South)	968.70	897.45	216.33	9333.70	1329.51	6521.05	10335.25	1043.94	25521.04
11 (Cheung Chau Southeast)	1661.91	821.40	62.31	2168.96	1947.79	27974.41	43637.50	22114.04	103885.86
12 (West Lamma)	3209.25	256.51	30.41	1174.79	1359.36	20772.75	30152.84	3898.72	80337.30
Overall	1505.42	1637.78	64.61	3452.92	9024.87	69140.52	17456.39	2763.52	20670.89

**Table 10C.3.6 Mean Fish Larvae Density (/1000m<sup>3</sup>) Recorded from the Ichthyoplankton Survey over the Survey Period from Nov 2016 to Jul 2017**

Survey Location	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1 (Deep Bay)	157.97	968.94	81.18	511.66	52.20	999.47	15539.56	77.37	566.30
2 (Sha Chau & Lung Kwu Chau)	747.84	174.90	67.23	46.33	14.41	205.28	5416.51	17.17	376.91
3 (Tai O)	439.68	310.38	89.82	2.70	15.02	66.15	2274.57	9.68	418.31
4 (Peaked Hill)	106.31	259.98	69.88	6.18	4.13	84.44	1161.32	7.04	259.73
5 (Fan Lau Kok)	44.08	350.01	73.57	206.79	5.39	26.68	675.86	11.10	188.57
6 (South of Soko Islands)	18.90	381.73	11.23	19.24	40.69	102.41	1981.91	1.31	532.88
7 (Tau Lo Chau East)	26.91	79.91	3.08	4.27	13.13	236.68	1645.70	14.50	46.19
8 (LNG Terminal)	29.50	66.29	2.73	10.28	16.42	231.07	1045.87	13.41	63.09
9 (Shek Kwu Chau South)	27.47	23.65	12.21	13.80	47.58	105.94	1024.91	5.96	63.91
10 (Cheung Chau South)	41.14	24.53	313.40	14.43	87.34	262.91	992.92	4.44	25.73
11 (Cheung Chau Southeast)	24.98	126.11	119.00	33.95	48.61	497.82	2655.42	5.59	95.19
12 (West Lamma)	9.02	42.15	57.03	139.46	32.01	812.39	116.70	3.76	51.86
Overall	139.48	234.05	75.03	84.09	31.41	302.60	2877.60	14.28	224.06

**Table 10C.3.7 Mean Fish Post-larvae Density (/1000m<sup>3</sup>) Recorded from the Fish Post-larvae Survey over the Survey Period from Nov 2016 to Jul 2017**

Survey Location	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1 (Deep Bay)	6.98	5.63	8.47	3.63	1.35	24.21	0.00	5.73	11.68
2 (Sha Chau & Lung Kwu Chau)	10.24	6.02	46.16	0.00	0.00	9.89	275.84	4.29	16.69
3 (Tai O)	48.64	0.00	15.35	0.00	2.51	0.00	26.45	8.06	4.25
4 (Peaked Hill)	2.92	8.49	24.10	0.00	0.00	0.00	0.00	4.23	1.43
5 (Fan Lau Kok)	0.00	20.44	0.00	0.00	0.00	4.45	7.23	1.23	2.99
6 (South of Soko Islands)	0.00	0.00	0.00	3.28	1.49	27.93	11.26	0.00	7.58
7 (Tau Lo Chau East)	2.45	0.00	1.54	4.27	0.00	47.34	12.19	0.00	3.30
8 (LNG Terminal)	0.00	7.37	0.00	1.12	0.00	0.00	24.04	7.45	7.01
9 (Shek Kwu Chau South)	3.87	5.07	23.36	0.00	0.00	24.93	24.85	0.00	3.45
10 (Cheung Chau South)	4.98	0.00	11.14	0.00	2.65	83.36	39.45	1.48	2.14
11 (Cheung Chau Southeast)	0.00	0.00	17.00	5.10	1.39	18.90	14.12	0.00	15.86
12 (West Lamma)	0.00	18.07	8.72	8.29	1.30	21.14	59.31	0.00	9.43
Overall	6.67	5.92	12.99	2.14	0.89	21.85	41.23	2.71	7.15

A total of 99 vessels with fishing activities were recorded during the adult fish production surveys between October 2016 and June 2017. The locations of fishing vessels sighted during the surveys are presented in *Figures 10C.2 to 10C.5* <sup>(1)</sup>. The level of fishing activities recorded during the survey was considered to be quite low, with an average of about 3-4 vessels encountered per day. There were more fishing activities recorded in the dry season (60 vessels) than the wet season (39 vessels).

In the wet season, fishing activities were mostly recorded near Site 1 (Deep Bay) and in southern Lantau (around Sites 9 to 12). Fishing by hand-lining, gill-netting and cage trapping were observed, with a majority of fishing undertaken by hand-lining and gill-netting using P4/7 vessels (also referred to as sampan). Hand-lining by P4/7 vessels which represented recreational fishing activities accounted for over half of the fishing activities observed.

In the dry season, fishing activities were mostly recorded near Site 4 (Peaked Hill) and south of Shek Kwu Chau and Cheung Chau. Fishing by hand-lining, gill-netting, cage-trapping, long-lining and purse-seining were observed, with over half of the activities undertaken by hand-lining and gill-netting using P4/7 vessels. Commercial fishing activities by gill-netting, cage-trapping, long-lining and purse-seining together predominated over recreational fishing activities by hand-lining using P4/7. Some suspected illegal trawling activities were observed in the HKSAR waters off Fan Lau Kok and south of Shek Kwu Chau.

(1) The license number of most vessels observed was not clearly marked, and the vessels were usually distant from the observation point, thus the license number of the observed vessels was not recorded.

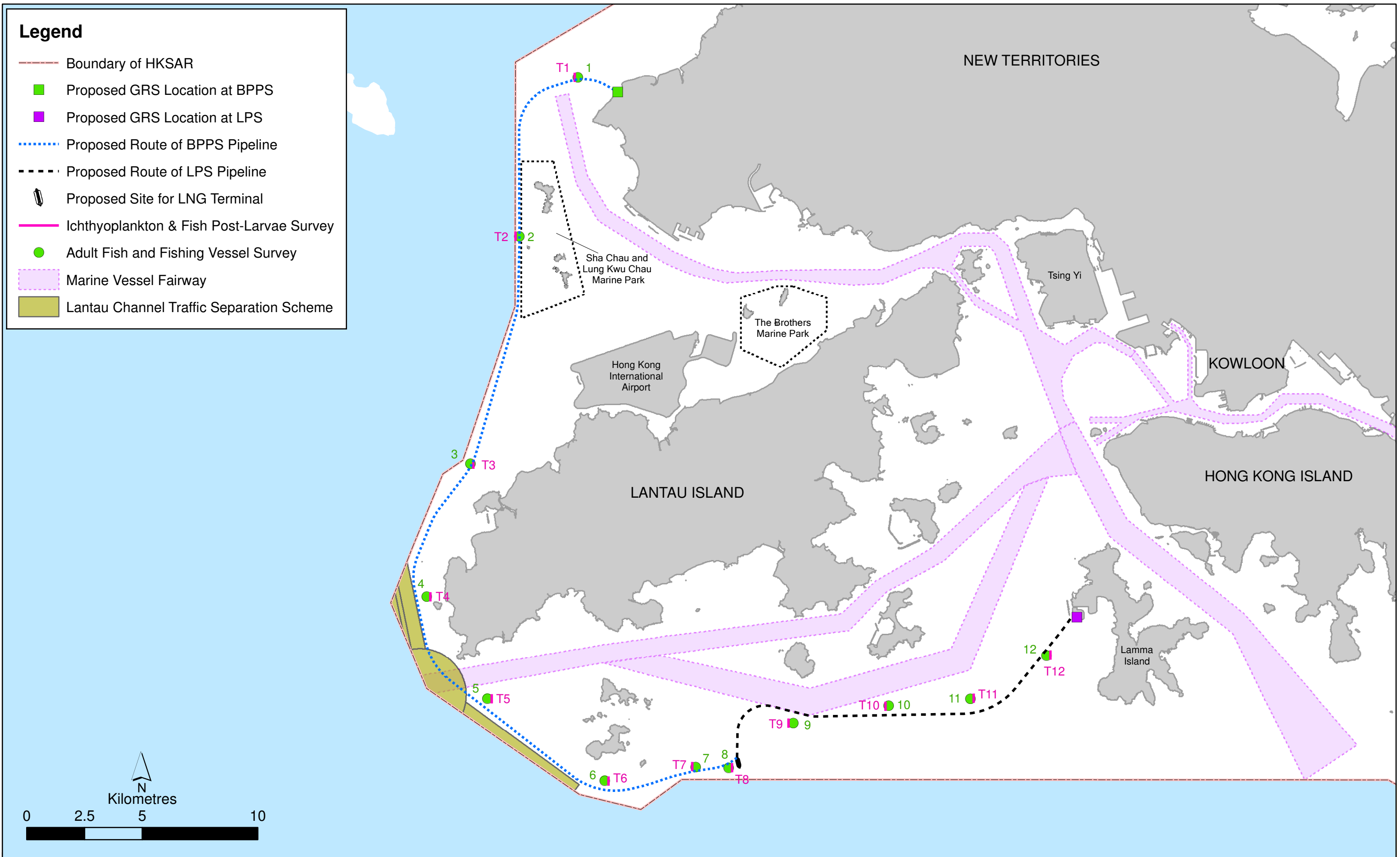


Figure 10C.1

Proposed Locations for Fisheries Surveys



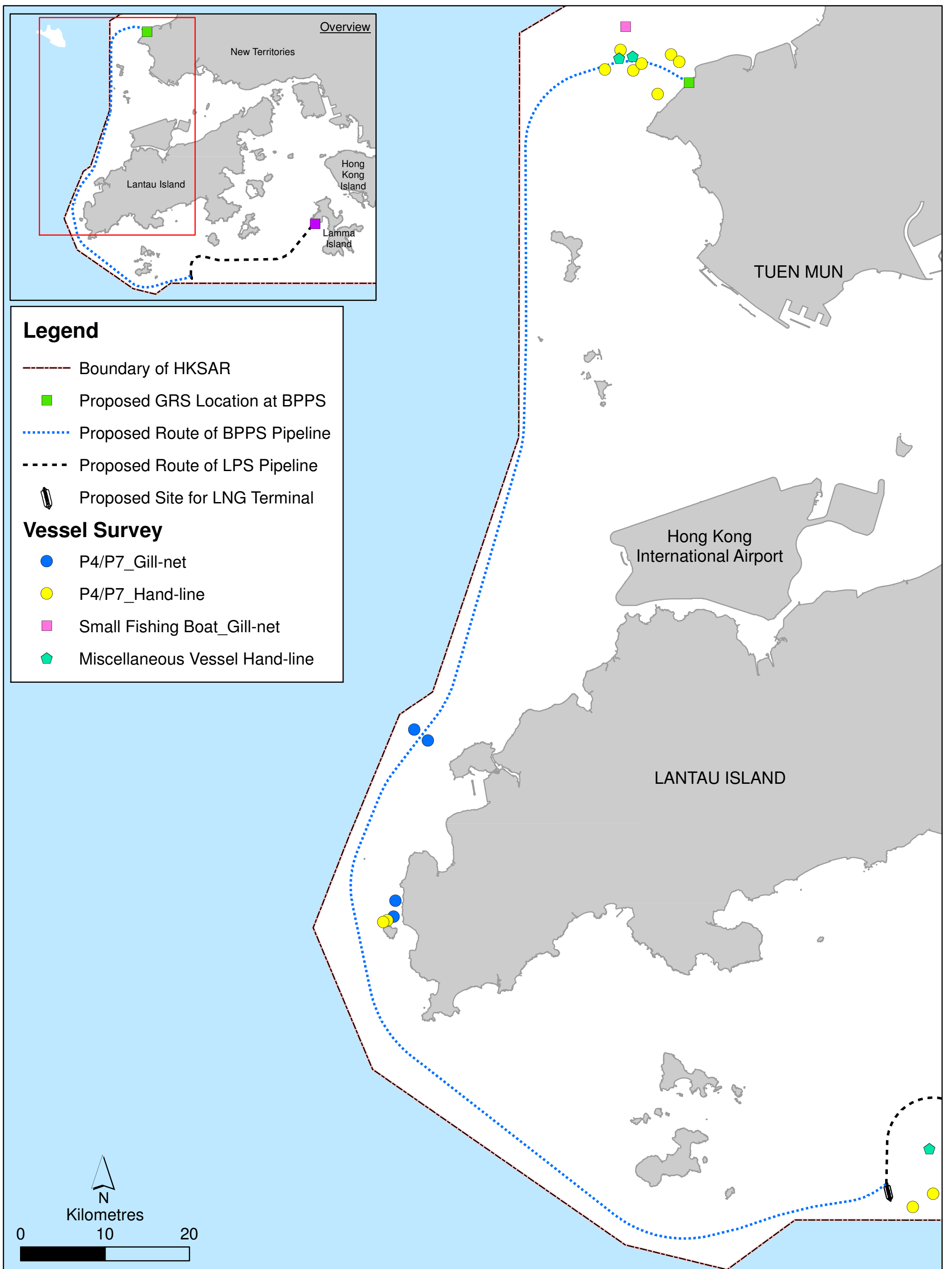


Figure 10C.2

Results of Vessel Survey in Wet Season

File: T:\GIS\CONTRACT\0359722\Mxd\0359722\_Vessel\_Survey\_Wet\_BPPS.mxd  
Date: 18/4/2018

Environmental  
Resources  
Management



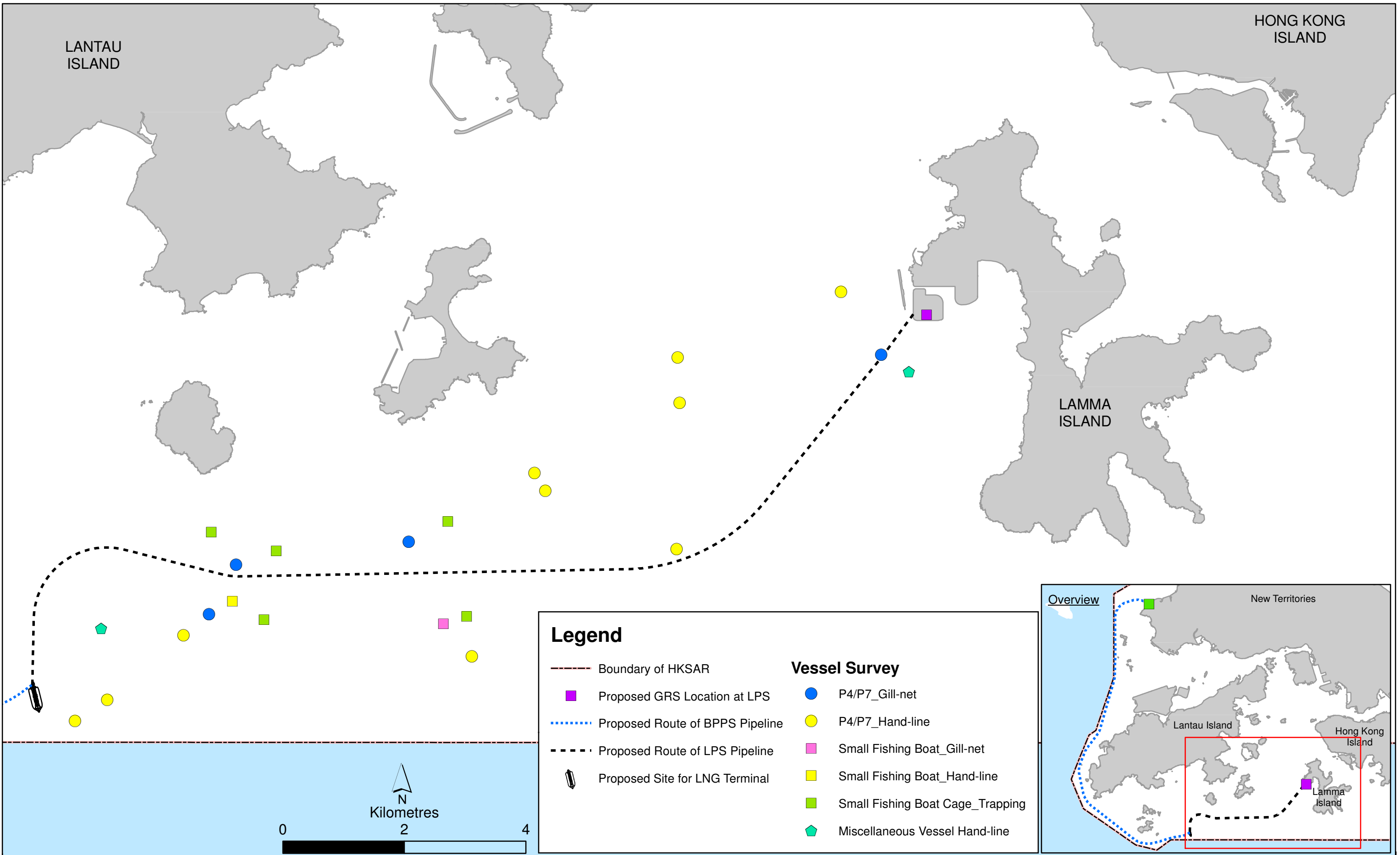


Figure 10C.3

Results of Vessel Survey in Wet Season

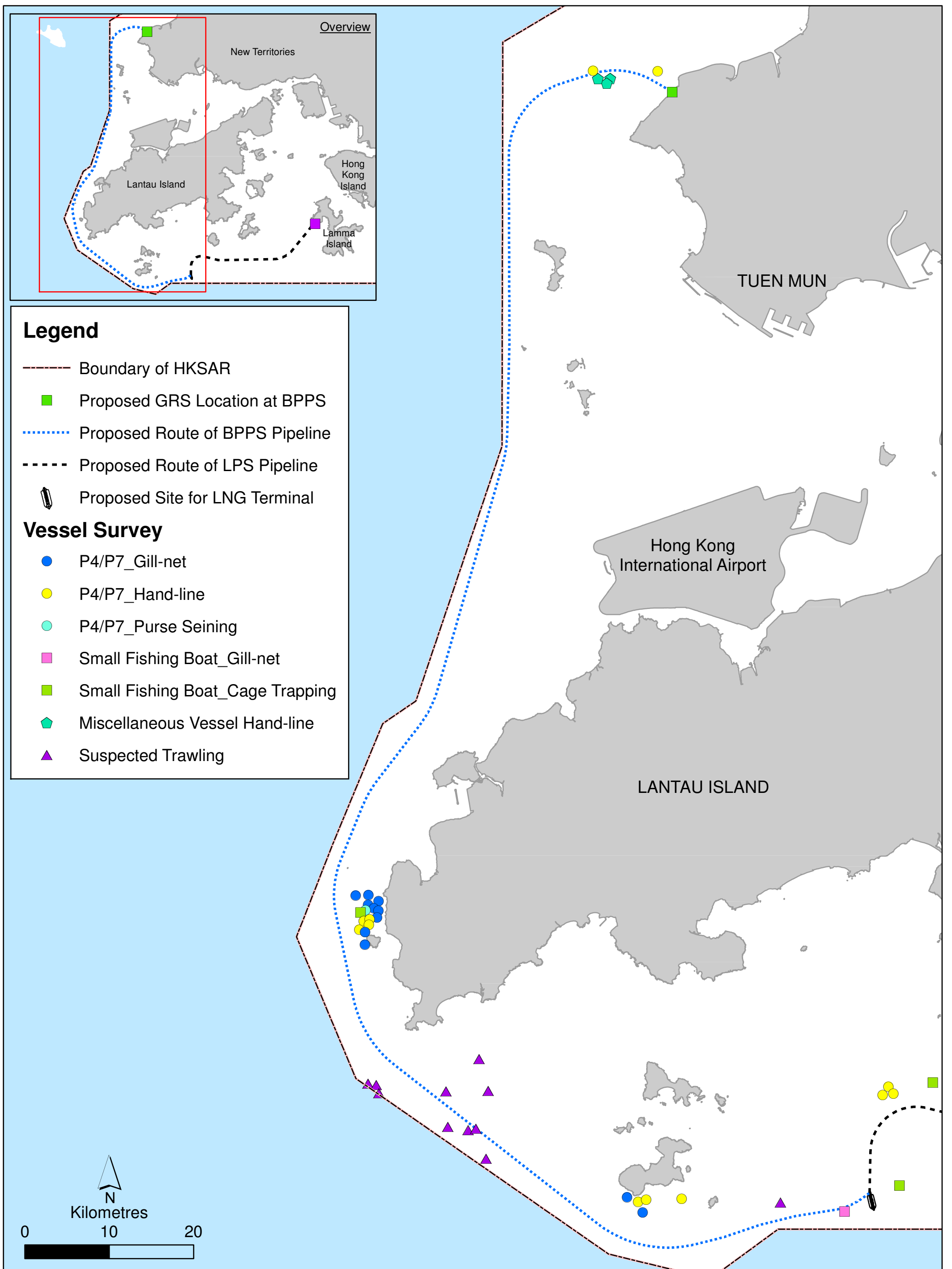


Figure 10C.4

Results of Vessel Survey in Dry Season

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Date: 30/4/2018

Environmental  
Resources  
Management



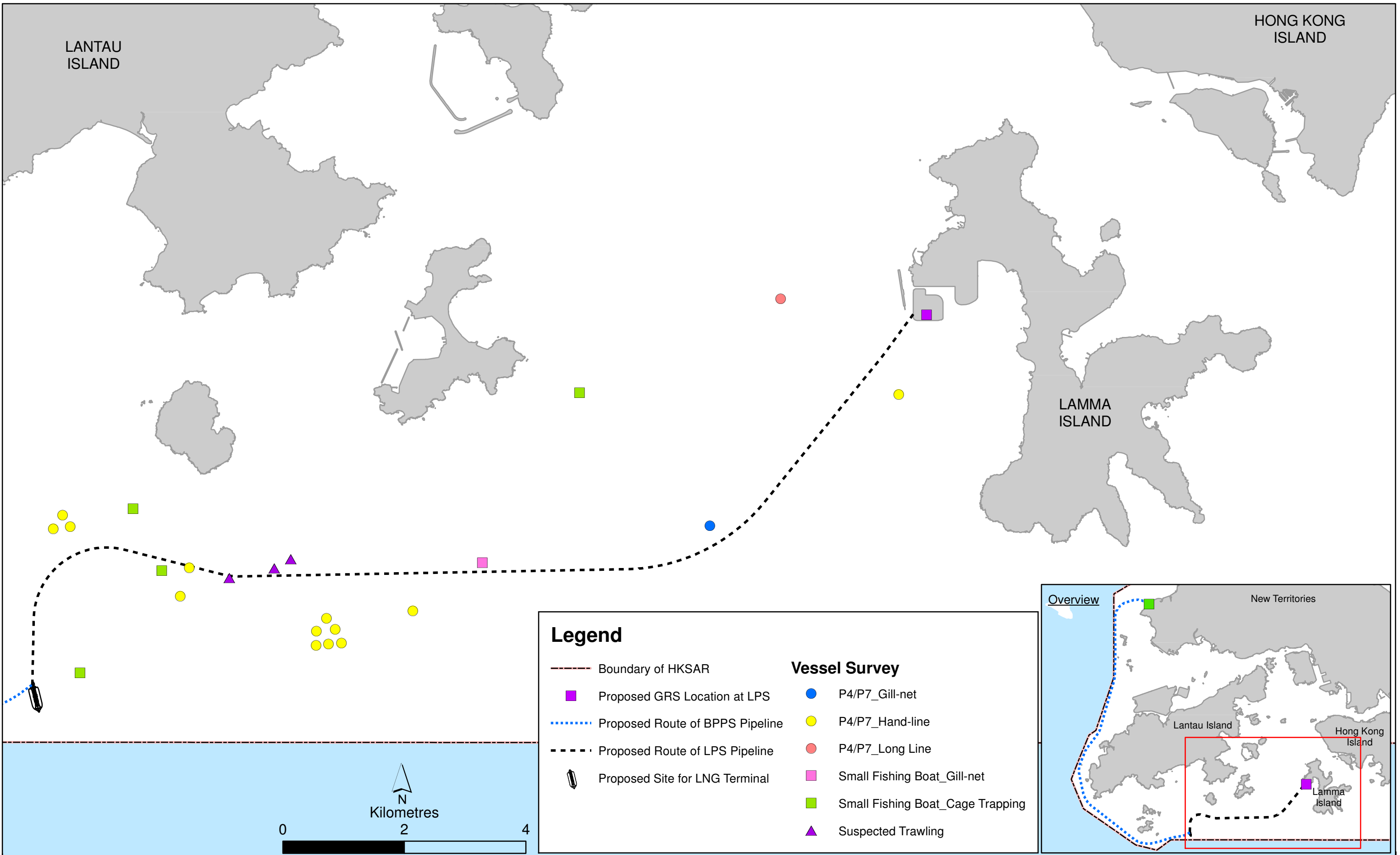


Figure 10C.5

Results of Vessel Survey in Dry Season