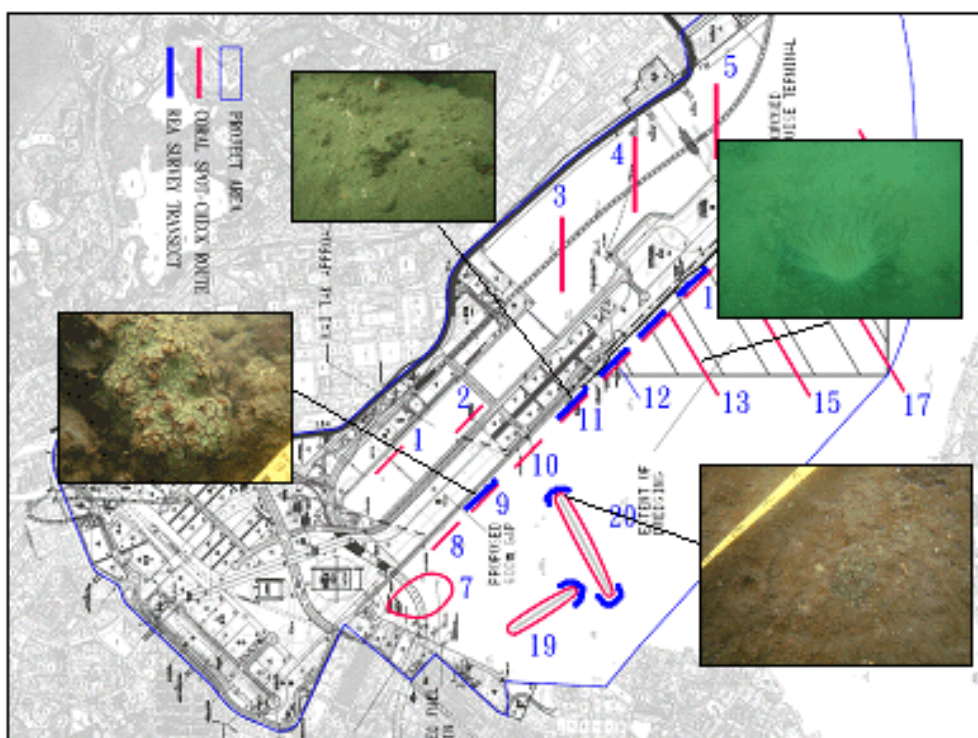


Appendix 14.9

Dive Survey Report

Agreement No. CE 35/2006 (CE)
KAI TAK DEVELOPMENT ENGINEERING STUDY
CUM DESIGN AND CONSTRUCTION OF ADVANCE WORKS –
INVESTIGATION, DESIGN AND CONSTRUCTION

SPOT-CHECK AND RAPID ECOLOGICAL ASSESSMENT SURVEY REPORT



ECO-ENVIRO CONSULTANTS COMPANY

May 2007

Summary

- Spot-Check Dives Survey were carried out at 20 sites at the Kai Tak Airport Area.
- The survey sites are mainly composed with boulders and rocks. All the boulder/rock substrates were dominated by common sponges, tubeworms and bryozoans. The animals found are in low abundance, low diversity and sparsely distributed.
- Hard corals were found at sites 9, 11, 12, 13, 14, 16, 19 and 20. Only one coral species *Oulastrea crispata* was found. It is a common coral species widespread across Hong Kong waters and is known to withstand harsh marine environment.
- The size of coral colonies ranging from less than 1cm to 30cm in diameter.
- REA surveys were carried out at sites 9, 11, 12, 13, 14, 16, 19 and 20. A 100 meter transect was laid parallel to the shore at the area where corals were found during spot-check dives.
- At all REA sites, the % of *Oulastrea crispata* colonies were found to be in low coverage (1-5%). All the corals grow on boulder or rocks.
- The corals found at the above 8 sites are pioneer and opportunistic species which are commonly found across Hong Kong waters including the more turbid and harsh western waters. Owing to the sparse cover, small size, low species richness and commonness of the coral species found, the marine habitats are considered as low ecological value when compared with other coral areas in Hong Kong. No rare species were recorded during the surveys.

Table of Contents

SUMMARY	I
TABLE OF CONTENTS.	II
LISTS OF TABLES, FIGURES AND APPENDICES.....	III
1. Scope of works.....	1
2. Methodology	1
Spot-check Reconnaissance Dives.....	1
Rapid Ecological Assessment Survey.....	1
3. Result.....	2
Spot-check Reconnaissance Dives.....	2
Rapid Ecological Assessment Survey.....	4
Site 9	5
Site 11	6
Site 12	6
Site 13	7
Site 14	8
Site 16	9
Site 19	10
Site 20 (SW).....	10
Site 20 (NE)	11
4. Discussion.....	12
Spot-check Reconnaissance Dives.....	12
Rapid Ecological Assessment Survey.....	12
Sites 9, 11, 12, 13, 14 and 16.....	12
Sites 19 and 20.....	13
5. References.....	13

Lists of Tables, Figures and Appendices

Table 1: Weather Condition for the Spot-Check Dives on 11th, 12th, 13th and 14th April 2007	2
Table 2: GPS Location, Route Distance, Maximum Depth Bottom Substrate and Bottom Visibility of Spot-Check Dive Sites 1 to 20	2
Table 3: Species, Coverage and Size of Corals Found at Spot-Check Sites 9, 11, 12, 13, 14, 16, 19 and 20	4
Table 4: Weather Condition for the REA Survey on 28th - 30th April 2007.....	4
Table 5: GPS of Transect Starting and Ending, Maximum Depth, Bottom Substrate and Bottom Visibility of Sites 9, 11, 12, 13, 14, 16, 19 and 20.....	4
Table 6: REA Ecological and Substratum Attributes of Site 9	5
Table 7: REA Ecological and Substratum Attributes of Site 11	6
Table 8: REA Ecological and Substratum Attributes of Site 12	7
Table 9: REA Ecological and Substratum Attributes of Site 13	7
Table 10: REA Ecological and Substratum Attributes of Site 14	8
Table 11: REA Ecological and Substratum Attributes of Site 16	9
Table 12: REA Ecological and Substratum Attributes of Site 19	10
Table 13: REA Ecological and Substratum Attributes of Site 20 (SW)	11
Table 14: REA Ecological and Substratum Attributes of Site 20 (NE)	11
Figure 1: Spot-Check Dive Sites and REA Site.....	15
Photo Plate 1.....	16
Photo Plate 2.....	17
Photo Plate 3.....	18
Appendix A: Rapid Ecological Assessment	19
Appendix B: Dominated Animals and Corals at Spot-Check Sites.....	20
Appendix C: Sample of Data Sheet Using at Spot-Check Dive Survey	21
Appendix D: Sample of Data Sheet Using at REA Survey.....	22

1. Scope of works

- 1.1 The first objective of this work is conducting coral spot-check survey at the proposed dive routes to obtain ecological information on the baseline marine condition at Kai Tak Area. Locations with coral found during the spot-check survey were proposed for further Rapid Ecological Assessment (REA).
- 1.2 The second objective of this work is conducting Rapid Ecological Assessment (REA) survey at the proposed suitable sites in order to provide more detailed baseline information of the corals in the Kai Tak Area.

2. Methodology

Spot-check Reconnaissance Dives

- 2.1 Spot-check dives were carried out according to Figure 1. 20 proposed areas (site 1-20) were covered during the survey.
- 2.2 For each dive, the following information was recorded:
 - locations (GPS);
 - distance surveyed;
 - visibility;
 - sizes of coral colonies;
 - estimate of % hard coral and soft coral cover;
 - colonies health condition;
 - conservation status of coral species in Hong Kong waters.
- 2.3 In this way, areas with corals were located and suitable locations to carry out the REA surveys were determined.

Rapid Ecological Assessment Survey

- 2.4 A 100m horizontal transects were set following the contour of the seabed at area according to the corals communities that found in the Spot-Check Site.
- 2.5 The benthic cover, taxon abundance, and ecological attributes of the transect above were recorded in a swathe 2 m wide, 1 m either side of the transects, following the Rapid Ecological Assessment (REA) technique (Appendix A).
- 2.6 Photographs of representative coral species in the surveyed areas were also taken using an underwater digital camera.
- 2.7 Information concerning the physical nature of the surveyed site was recorded during the survey. This consisted of observations regarding the degree of exposure of the site to wave action, the nature of the substrate type and the topographic profile of the sites.

3. Result

Spot-check Reconnaissance Dives

3.1 The spot-check dives were carried out on 11th – 14th April 2007 and the weather conditions were summarized in Table 1.

Table 1 Weather Condition for the Spot-Check Dives on 11th, 12th, 13th and 14th April 2007

Date	Condition	Average Underwater Visibility
11 April 2007	- East force 4 to 5, occasionally 6 offshore - Sunny periods	1.0m
11 April 2007	- Northeast force 5 - Sunny periods	1.0m
11 April 2007	- East force 5 to 6 - Sunny periods	1.5m
11 April 2007	- North force 4, occasionally force 5 to 6 - Fine and dry	1.0m

3.2 A total of 20 spot-check dives were carried out during the 2-day surveys (Figure 1). The GPS location, route distance, maximum depth, bottom substrate and bottom visibility each surveyed sites were summarized in Table 2.

Table 2 GPS Location, Route Distance, Maximum Depth Bottom Substrate and Bottom Visibility of Spot-Check Dive Sites 1 to 20

Site	Location (GPS) (Starting Point)	Route Distance (m)	Max. Depth (m)	Bottom Substrate	Visibility (m)
1	E 114°12'53.6"	140	7	Seawall	<0.5
	N 22°18'50.0"				
2	E 114°12'45.9"	140	6.5	Boulder	<0.5
	N 22°18'37.8"				
3	E 114°12'56.2"	260	11	Mud and Sand	<0.5
	N 22°18'33.6"				
4	E 114°13'00.2"	260	11	Mud and Sand	<0.5
	N 22°18'28.5"				
5	E 114°13'05.8"	260	12.5	Mud and Sand	<0.5
	N 22°18'20.1"				
6	E 114°12'58.2"	140	15	Boulder	1.0
	N 22°18'12.3"				
7	E 114°11'43.9"	580	10	Mud and Sand	1.0
	N 22°19'10.7"				
8	E 114°11'51.1"	150	5	Boulder	1.0
	N 22°19'09.4"				

9	E 114°11'53.9"	140	5	Boulder	1.5
	N 22°19'06.9"				
10	E 114°11'59.3"	140	5.5	Boulder	1.5
	N 22°19'00.8"				
11	E 114°12'14.1"	140	7	Boulder	1.0
	N 22°18'48.3"				
12	E 114°12'22.7"	140	7	Rubble Seawall/Muddy	1.5
	N 22°18'39.9"				
13	E 114°12'29.1"	480	16	Boulder/Muddy	1.5
	N 22°18'33.9"				
14	E 114°12'35.2"	140	8	Boulder/Mud/Sand	1.5
	N 22°18'28.6"				
15	E 114°12'37.9"	540	20	Boulder	1.0
	N 22°18'26.3"				
16	E 114°12'50.3"	140	8	Boulder	1.5
	N 22°18'15.5"				
17	E 114°12'57.5"	780	22	Mud and Sand	1.0
	N 22°18'08.0"				
18	E 114°13'04.3"	420	22	Mud and Sand	1.0
	N 22°18'01.2"				
19	E 114°11'51.3"	600	16	Boulder	1.5
	N 22°18'33.7"				
20	E 114°12'01.0"	840	15	Boulder	1.5
	N 22°18'33.0"				

- 3.3 In all the 20 spot-check sites, the bottom substrates are mainly boulder at shallow water. Bottom substrates are mainly sand and mud at deeper water. Common sponges (Photo Plate 1) could be found in most of the sites. Besides, in most of the survey sites, a tubeworm, *Sabelastarte japonica* (Photo Plate 1) was found on the boulders. The long spin sea urchin: *Diadema setosum* (Photo Plate 1) was found on the boulders of sites 6, 13, 14, 16, 19 and 20. All animals found in the above sites were common species, occurred in low abundance and sparsely distributed. No rare or species of conservation value were recorded during the survey.
- 3.4 For the muddy bottoms (Photo Plate 3), they were dominated by common tube anemone: *Cerianthus filiformis* (Photo Plate 2). It could be found at all sites with muddy bottoms.
- 3.5 Isolated patches of hard coral *Oulastrea crispata* were found at sites 9, 11, 12, 13, 14, 16, 19 and 20 (Table 3). This is the only one species that was found during the spot-check dives. This species can be commonly found in Hong Kong water including the more turbid and harsh western waters.
- 3.6 At sites 9, 11, 12, 13, 14 and 16, all *Oulastrea crispata* (Photo Plates 2 & 3) colonies of small size (<1cm to 30cm in diameter) were found during the survey. They were in very low coverage (<1%) and they are all in fair condition. More detailed studies at these sites were carried out during REA survey. At sites 19

and 20, the horizontal visibility was around 1.5m and colonies of *Oulastrea crispata* (Photo Plates 2 & 3) were also found during the spot-check survey (Table 3). Corals found were located at the Southeast side of site 19 and both Northeast and Southwest side of site 20. The size of the coral colonies is about 3cm to 15cm in diameter and all are attached to the big boulders of that site. More detailed studies at sites 19 and 20 were carried out during REA study.

Table 3 Species, Coverage and Size of Corals Found at Spot-Check Sites 9, 11, 12, 13, 14, 16, 19 and 20

Site	Coral species	Coverage	Size (Diameter)
9	<i>Oulastrea crispata</i>	<1%	3cm to 15cm
11	<i>Oulastrea crispata</i>	<1%	<1cm to 30cm
12	<i>Oulastrea crispata</i>	<1%	1cm to 8cm
13	<i>Oulastrea crispata</i>	<1%	1cm to 10cm
14	<i>Oulastrea crispata</i>	<1%	2cm to 20cm
16	<i>Oulastrea crispata</i>	<1%	3cm to 15cm
19	<i>Oulastrea crispata</i>	<1%	4cm to 15cm
20	<i>Oulastrea crispata</i>	<1%	5cm to 15cm

Rapid Ecological Assessment Survey

3.7 The survey was performed on 28th – 30th April 2007 for the eight sites. The weather was sunny and the sea was windy and the visibility was fair (approximately 1.5m). A 100m transect was laid at the area with coral found during the spot-check dive survey (Figure 1).

Table 4 Weather Condition for the REA Survey on 28th - 30th April 2007

Date	Condition	Average Underwater Visibility
28 April 2007	- East force 4, becomes 5 later - Sunny period	1.0m
29 April 2007	- Northeast force 4 to 5 - Sunny period	1.5m
30 April 2007	- Northeast force 5 - Cloudy	1.5m

Table 5 GPS of Transect Starting and Ending, Maximum Depth, Bottom Substrate and Bottom Visibility of Sites 9, 11, 12, 13, 14, 16, 19 and 20

Site	Location (GPS) (Starting Point)	Location (GPS) (End Point)	Max. Depth (m)	Bottom Substrate	Visibility (m)
9	E 114°12'02.2"	E 114°12'04.5"	5	Boulders and Rocks	1.5
	N 22°18'59.4"	N 22°00'			
11	E 114°12'18.0"	E 114°12'22.3"	7	Boulders and Rocks	1.5
	N 22°18'44.5"	N 22°18'41.1"			
12	E 114°12'25.0"	E 114°12'29.1"	7	Boulders and Rocks	1.5
	N 22°18'38.0"	N 22°18'34.4"			
13	E 114°12'32.1"	E 114°12'35.9"	7	Boulders and Rocks	1.5
	N 22°18'32.6"	N 22°18'29.1"			

14	E 114°12'39.7"	E 114°12'44.4"	7	Boulders and Rocks	1.5
	N 22°18'25.5"	N 22°18'21.4"			
16	E 114°12'49.1"	E 114°12'52.6"	8	Boulders and Rocks	1.5
	N 22°18'16.6"	N 22°18'14.5"			
19	E 114°11'44.0"	E 114°11'41.3"	8	Boulders and Rocks	1.5
	N 22°18'37.2"	N 22°18'34.8"			
20 (SW)	E 114°11'43.7"	E 114°11'47.3"	7	Boulders and Rocks	1.5
	N 22°18'32.1"	N 22°18'29.4"			
20 (NE)	E 114°12'01.2"	E 114°12'03.3"	8	Boulders and Rocks	1.5
	N 22°18'44.2"	N 22°18'41.7"			

Site 9

- 3.8 A 100m transect was laid down along the coral area of site 9 (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.
- 3.9 This site is mainly composed of boulders and rocks down to 6 meters depth along the surveyed route (Table 6). Areas deeper than 6 meters are mainly muddy and sandy bottoms. The site supported limited marine life (tubeworms). Only some common sponges (Photo Plate 1), and sea urchins: *Diadema setosum*, were found at the surface of the boulders.

Table 6 REA Ecological and Substratum Attributes of Site 9

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

- 3.10 The site supported a sparse and patchy cover (1-5%) of hard coral. All of them were found on the surface of boulders and rocks during the REA survey. They were of small size (about 3 to 15 cm in diameter), in low coverage and all

belonged to a single species *Oulastrea crispata*. All the corals are in fair condition.

- 3.11 *Oulastrea crispata* is a very common species of hard coral found in Hong Kong water. It is especially adapted to harsh environment and it can be found in many places in Hong Kong.

Site 11

- 3.12 A 100m transect was laid down along the coral area of site 11 (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.

- 3.13 This site is mainly composed of boulders and rocks down to 7 meters depth along the surveyed route (Table 7). Areas deeper than 7 meters are mainly muddy and sandy bottoms. The site supported only limited marine life including tubeworms and sea urchins: *Diadema setosum*.

Table 7 REA Ecological and Substratum Attributes of Site 11

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

- 3.14 Patches of hard corals were found in this site and the coverage is less than 5%. All the corals are located on the surfaces of boulders and rocks. They were of small size (<1cm to 30 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispata*. All the corals are in fair condition.

Site 12

- 3.15 A 100m transect was laid down along the coral area of site 12 (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.

- 3.16 This site is mainly composed of boulders and rocks down to 7 meters depth along the surveyed route (Table 8). Areas deeper than 6 meters are mainly muddy and sandy bottoms. The site supported limited marine life (tube anemone). Only some common sponges (Photo Plate 1), and sea urchins: *Diadema setosum*, were found at the surface of the boulders.

Table 8 REA Ecological and Substratum Attributes of Site 12

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

- 3.17 Patches of hard corals were found in this site and the coverage is less than 5%. They were of very small size (about 1 to 8 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispate*. All the corals are in fair condition.

Site 13

- 3.18 A 100m transect was laid down along the coral area of site 13 (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.
- 3.19 This site is mainly composed of boulders and rocks down to 6 meters depth along the surveyed route (Table 9). Areas deeper than 6 meters are mainly muddy and sandy bottoms. The site supported limited marine life (tube anemone). Only some common sponges (Photo Plate 1), and sea urchins: *Diadema setosum*, were found at the surface of the boulders.

Table 9 REA Ecological and Substratum Attributes of Site 13

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0

Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

- 3.20 Patches of hard corals were found in this site and the coverage is less than 5%. They were of small size (about 1 to 10 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispata*. All the corals are in fair condition.

Site 14

- 3.21 A 100m transect was laid down along the coral area of site 14 (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.
- 3.22 This site is mainly composed of boulders and rocks down to 6 meters depth along the surveyed route (Table 10). Areas deeper than 6 meters are mainly muddy and sandy bottoms. The site supported limited marine life (tube anemone). Only some common sponges (Photo Plate 1), and sea urchins: *Diadema setosum*, were found at the surface of the boulders.

Table 10 REA Ecological and Substratum Attributes of Site 14

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0

Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

- 3.23 Patches of hard corals were found in this site and the coverage is less than 5%. They were all small size (about 2 to 20 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispate*. All the corals are in fair condition.

Site 16

- 3.24 A 100m transect was laid down along the coral area of site 16 (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.

- 3.25 This site is mainly composed of boulders and rocks down to 6 meters depth along the surveyed route (Table 11). Areas deeper than 6 meters are mainly muddy and sandy bottoms. The site supported limited marine life (tube anemone). Only some common sponges (Photo Plate 1), and sea urchins: *Diadema setosum*, were found at the surface of the boulders.

Table 11 REA Ecological and Substratum Attributes of Site 16

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

- 3.26 Patches of hard corals were found in this site and the coverage is less than 5%. They were of small size (about 3 to 15 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispate*. All the corals are in fair condition.

Site 19

- 3.27 A 100m transect was laid down along the coral area of site 19 (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.
- 3.28 This site is mainly composed of boulders and rocks down to 6 meters depth along the surveyed route (Table 12). Areas deeper than 6 meters are mainly muddy and sandy bottoms. The site supported limited marine life (tube anemone). Only some common sponges (Photo Plate 1), and sea urchins: *Diadema setosum*, were found at the surface of the boulders.

Table 12 REA Ecological and Substratum Attributes of Site 19

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

- 3.29 Patches of hard corals were found in this site and the coverage is less than 5%. They were of small size (about 4 to 15 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispate*. All the corals are in fair condition.

Site 20 (SW)

- 3.30 A 100m transect was laid down along the coral area of site 20 (SW) (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.
- 3.31 This site is mainly composed of boulders and rocks down to 6 meters depth along the surveyed route (Table 13). Areas deeper than 6 meters are mainly muddy and sandy bottoms. The site supported limited marine life (tube anemone). Only some common sponges (Photo Plate 1), and sea urchins: *Diadema setosum*, were found at the surface of the boulders.

Table 13 REA Ecological and Substratum Attributes of Site 20 (SW)

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

- 3.32 Patches of hard corals were found in this site and the coverage is less than 5%. They were of small size (about 5 to 15 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispate*. All the corals are in fair condition.

Site 20 (NE)

- 3.33 A 100m transect was laid down along the coral area of site 20 (NE) (Figure 1). The substrate composition and percentage of coral cover were estimated during the survey.
- 3.34 This site is mainly composed of boulders and rocks down to 6 meters depth along the surveyed route (Table 14). Areas deeper than 6 meters are mainly muddy and sandy bottoms. The site supported limited marine life (tube anemone). Only some common sponges (Photo Plate 1), and sea urchins: *Diadema setosum*, were found at the surface of the boulders.

Table 14 REA Ecological and Substratum Attributes of Site 20 (NE)

Ecological Attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	Rank
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	4

Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

3.35 Patches of hard corals were found in this site and the coverage is less than 5%. They were of small size (about 5 to 15 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispata*. All the corals are in fair condition.

4. Discussion

Spot-check Reconnaissance Dives

- 4.1 The hard substrates of the survey sites were mainly composed with big boulders and medium to small size rocks at sites 2, 6, 8, 9, 10 11, 12, 13, 14, 16, 19 and 20. Boulders and rocks were found from the shore down to 5 ~ 8m. Muddy and sandy bottoms were appeared at the deeper water of these sites. At site 13, the first 140m was composed with boulders and rocks only while for the rest of the site, it was composed with muddy and sandy bottom only.
- 4.2 Seawalls were appeared at site 1 down to 7m and the visibility at this site is less than 0.5m. At depth below 7m, it appeared to be all muddy and sandy substrate.
- 4.3 Muddy and sandy substrates were found at sites 3, 4, 5, 7, 15, 17 and 18. No hard substrate was recorded at these 7 sites.
- 4.4 At all the 20 spot-check sites, only limited marine life were found. Some common organisms, such as sponges, bryozoans, green mussels and tubeworms were found at the hard substrates. Muddy substrates were dominated by tube anemone. They are all common species and found in very low abundance and diversity.
- 4.5 Hard coral: *Oulastrea crispata* was recorded at sites 9, 11, 12, 13, 14, 16, 19 and 20 and this is the only one species found in the eight sites. REA surveys were required to carry out at these eight sites for further detailed study.

Rapid Ecological Assessment Survey

Sites 9, 11, 12, 13, 14 and 16

- 4.6 These six sites were located at the southwest part of the Kai Tai Airport runway. The sites are characterized by medium size boulders and small rocks. As the sites are located within the Kowloon Bay, it is well protected from strong currents and wave action.

- 4.7 Patches of colonies *Oulastrea crispata* were found on the surfaces of boulders and rocks at these eight sites and the coverage is less than 5%. The size of the coral colonies ranged from <1cm to 30cm in diameter. In general, most of the colonies appeared to be in small size (~3cm to 8cm). At sites 11, 12 and 13, coral colonies with size less than 1cm were recorded and they appeared to have one single polyp only. These small coral polyps may be newly settled last summer. Other small colonies appeared to have a few polyps too.
- 4.8 Other than isolated patches of small coral colonies, common marine invertebrate such as sea urchins: *Diadema setosum*, sponges, snails, tubeworms: *Sabelastarte japonica* and tube anemone: *Cerianthus filiformis* were found at these 6 sites.
- 4.9 The abundance and species diversity of invertebrates found in sites 9, 11, 12, 13, 14 and 16 is relatively low when compared with other areas. Only one single coral species was found and this species is common across Hong Kong waters and tolerant to more turbid and harsh environment. The sites are considered as having low ecological value given the low abundance and species diversity of marine fauna found in the area.

Sites 19 and 20

- 4.10 Sites 19 and 20 are the wave breakers and located at the inner part of Kowloon Bay. Since these sites are part of the typhoon shelter, they are well protected from wave action and human activities. These two sites are mainly composed with large size boulders down to 16m deep. When compared to other sites in the survey, the sizes of the boulders are much bigger and less rocks.
- 4.11 Small patches of coral colonies *Oulastrea crispata* were found on the surfaces of boulders and small rocks at these two sites and the coverage is less than 5%. The small patches of coral colonies are mainly located at the southeast part of site 19 and both southwest and northeast part of site 20. The size of the corals recorded ranged from 4cm to 15cm in diameter and this is the only species found at these two sites.
- 4.12 Other than isolated patches of small coral colonies, common marine invertebrate such as sea urchins: *Diadema setosum*, sponges, snails, tubeworms: *Sabelastarte japonica* and tube anemone: *Cerianthus filiformis* were found at these 2 sites.
- 4.13 The abundance and species diversity of invertebrates found in sites 19 and 20 is relatively low when compared with other areas. Only one single coral species was found and this species is common across Hong Kong waters and tolerant to more turbid and harsh environment. The sites are considered as having low ecological value given the low abundance and species diversity of marine fauna found in the area.

5. References

Brian Morton and John Morton. 1983. *The Sea Shore Ecology of Hong Kong*. Hong Kong University Press.

Binnie Consultants Limited. 1995. Marine Ecology of Hong Kong: Report on Underwater Dive Surveys. Volume I. Civil Engineering Department Geotechnical Engineering Office

Katharina Fabricius and Philip Alderslade 2001. *Soft Corals and Sea Fans: A comprehensive guide to the tropical shallow-water genera of the Central-West Pacific, the Indian Ocean and the Red Sea*. AIMS.

The Oceanway Corporation Ltd. 2003. *Report: Field Diving Surveys of Corals for the Environmental and Engineering Feasibility Assessment Studies (EEFS) in Relation to the way forward of The Harbour Area Treatment Scheme (HATS)*.

Chan A.L.K., Choi, C.L.S., McCorry D., Chan K.K., Lee, M.W., and Put, A. Jr. 2005. *Field Guide to Hard Corals of Hong Kong*. AFCD.

END

Figure 1 Spot-Check Dive Sites and REA Site

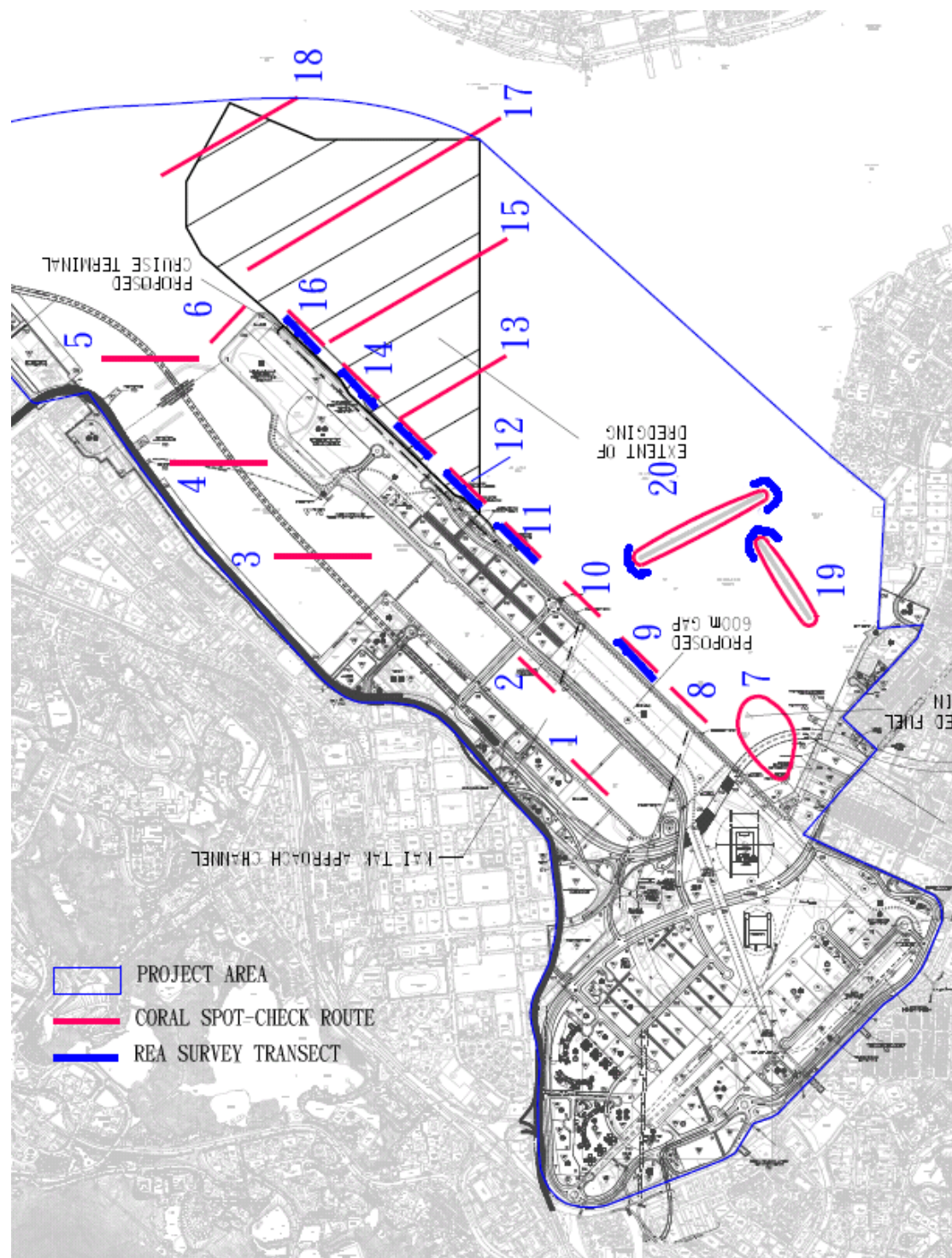


Photo Plate 1



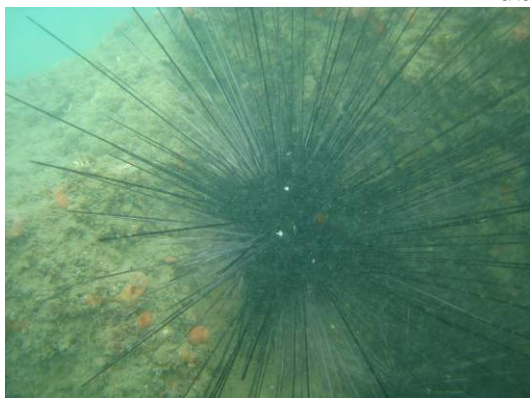
Sponge



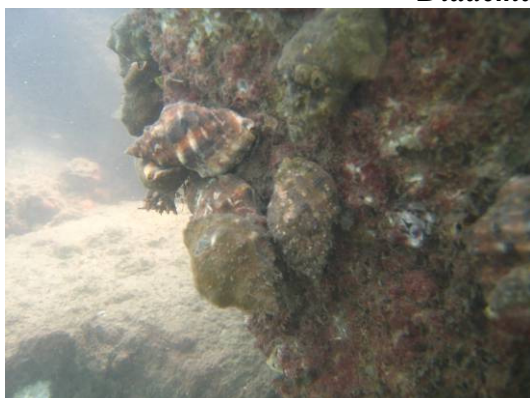
Common Green Mussels



Tubeworms



***Diadema* Sea Urchin**

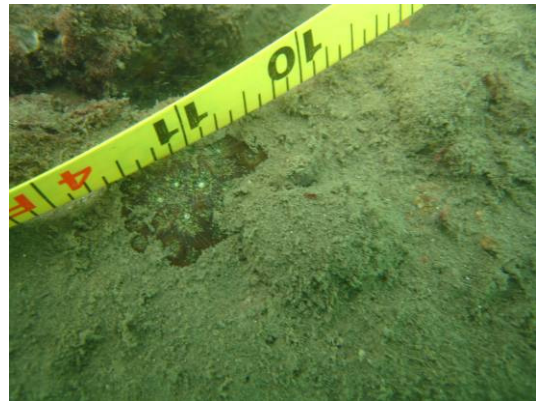


Sea Snails

Photo Plate 2



Tube Anemone



Oulastrea crispata

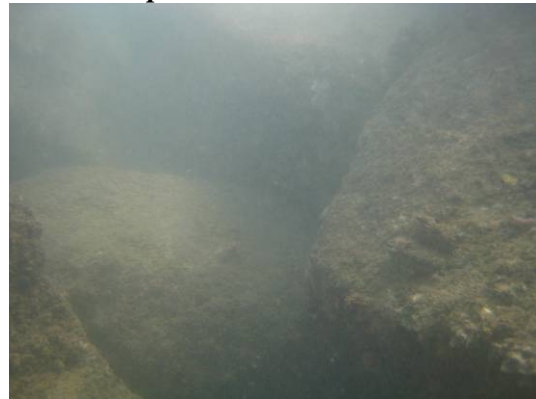


Oulastrea crispata

Photo Plate 3



Newly settled *Oulastrea crispata*



Rocks and Boulders



Sand and Muddy Bottom



Land Marks at the Survey Sites

Appendix A Rapid Ecological Assessment

Five ecological and seven substratum attributes shall be assessed on site and by reviewing video footages. Each of the attributes (Table 1) should be assigned to one of the seven standard ranked categories (from zero to six, representing percentage cover from none to over 76%)(Table 2).

An inventory of benthic taxa should also be complied for the P transect and bounce five points. Taxa shall be identified in situ to the following levels: 1) Hard corals to species level where possible; 2) Soft corals, anemones and macroalgae to genus level where possible; and 3) Other benthos to genus level where possible or phylum with growth form. Each taxon in the inventory shall also be ranked to one of the six categories (Table 3) in terms of abundance (from 0 to 5, representing from absent to dominant) in the community.

Table 1 Ecological and Substratum attributes used in REA

Ecological attributes
Hard coral
Octocoral (soft corals and gorgonians)
Black Corals
Dead standing corals
Substratum
Bedrock/continuous pavement
Boulder Blocks (diam.>50cm)
Boulder Blocks (diam.<50cm)
Rubble
Other
Soft Substrata
Sand
Mud

Table 2 Ranking of Ecological and substratum attributes

Rank	Percentage cover (%)
0	None recorded
0.5	1-5
1	6-10
2	11-30
3	31-50
4	51-75
5	76-100

Table 3 Ranking of Benthos abundance

Rank	Abundance
0	Absent
1	Sparse
2	Uncommon
3	Common
4	Abundant
5	Dominant

Appendix B Dominated Animals and Corals at Spot-Check Sites

Site	Dominated Animals	Coral Species	Coral Rarity
1	Sponges	Nil	-
2	Sponges and tubworm	Nil	-
3	<i>Cerianthus filiformis</i>	Nil	-
4	<i>Cerianthus filiformis</i>	Nil	-
5	<i>Cerianthus filiformis</i>	Nil	-
6	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	Nil	-
7	<i>Cerianthus filiformis</i>	Nil	-
8	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	Nil	-
9	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	<i>Oulastrea crispata</i>	Common
10	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	Nil	-
11	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	<i>Oulastrea crispata</i>	Common
12	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	<i>Oulastrea crispata</i>	Common
13	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	<i>Oulastrea crispata</i>	Common
14	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	<i>Oulastrea crispata</i>	Common
15	<i>Cerianthus filiformis</i>	Nil	-
16	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	<i>Oulastrea crispata</i>	Common
17	<i>Cerianthus filiformis</i>	Nil	-
18	<i>Cerianthus filiformis</i>	Nil	-
19	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	<i>Oulastrea crispata</i>	Common
20	Sponges, <i>Sabelastarte japonica</i> , <i>Cerianthus filiformis</i>	<i>Oulastrea crispata</i>	Common

Appendix C Sample of Data Sheet Using at Spot-Check Dive Survey

[illegible]

Appendix D Sample of Data Sheet Using at REA Survey

[illegible]