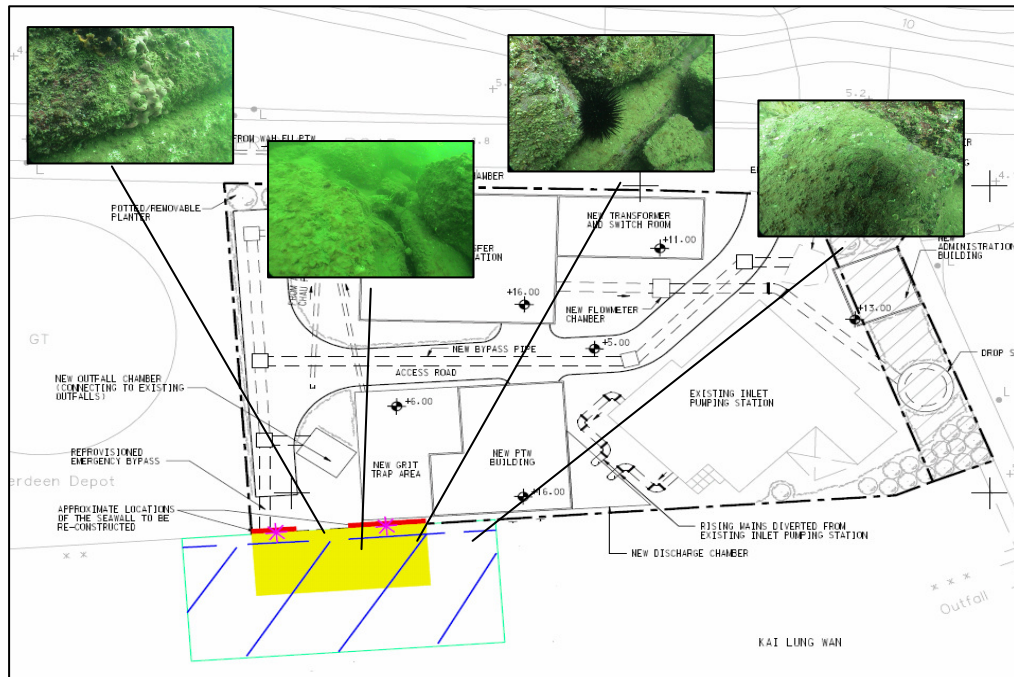


Agreement No. CE 43/2005
Harbour Area Treatment Scheme (HATS) Stage 2A
Environmental Impact Assessment Study - Investigation

FINAL REPORT

SPOT-CHECK RECONNAISSANCE DIVES AND RAPID ECOLOGICAL ASSESSMENT SURVEY



ECO-ENVIRO CONSULTANTS COMPANY

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Summary

- Spot-check dives survey were carried out at 8 sites outside the shore of Aberdeen Preliminary Treatment Works (PTW).
- The surveyed sites were mainly composed rubble seawalls, boulders/rock and mud. Common sea urchin, sponges, tubeworms and bryozoans were found at the survey sites. The animals found are in low abundance, low diversity and sparsely distributed.
- Only one hard coral species *Oulastrea crispata* was found at Site 4 during spot-check survey. It is a common coral species widespread across Hong Kong waters and is known to withstand harsh marine environment.
- Rapid Ecological Assessment (REA) survey was carried out at the proposed work area. A 100 meter transect was laid parallel to the shore of the PTW.
- Eight *Oulastrea crispata* colonies were found. They are of very small size (about 3 to 5 cm) and found in low coverage. Only three colonies are located within the affected area and all of them are grown on small rocks or boulders less than 50cm in diameter.
- The corals found at the survey site are common species 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 habitat of the survey site is considered as having low ecological value. No other rare or species of conservation value were recorded during the surveys.
- As an additional measure to protect corals, it is recommended to translocate the three colonies of *Oulastrea crispata* to the eastern part of the PTW (80 m away from the proposed area) with similar marine habitats.

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1. Introduction

- 1.1 Under the Harbour Area Treatment Scheme (HATS) Stage 2A, the existing Preliminary Treatment Works (PTWs) are required to be upgraded. The proposed upgrading work will be carried out close to and along the existing seawalls of Aberdeen PTW located at Tin Wan Praya Road and beside Aberdeen West Typhoon Shelter. The proposed seawall re-construction work will be conducted at Kai Lung Wan.
- 1.2 Concerning the habitat loss due to the seawall re-construction work, it was decided to carry out subtidal surveys in and within the vicinity of the proposed re-construction area to collect ecological information for project evaluation. Spot-check dives and rapid ecological assessment (REA) survey were conducted along the proposed affected area in order to provide a quick assessment about the seabed environment and subtidal habitats, such as coral assemblage at the area. The size, type, species and condition of corals, if found and their translocation feasibility was also recorded during the field surveys.

2. Methodology

Spot-check Reconnaissance Dives

- 2.1 Spot-check dives covered the entire proposed work and surrounding areas as well as the seawalls subjected to reconstruction works.
- 2.2 For each dive, the following information was recorded:
- locations (GPS);
 - distance surveyed;
 - visibility;
 - number of coral colonies;
 - sizes of coral colonies;
 - estimate of % hard coral and soft coral cover;
 - colonies health condition;
 - coral colonies translocation feasibility;
 - 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 (REA) 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 sites.
- 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 REA technique (**Appendix A**).

2.5 Photographs of representative coral species in the surveyed areas were also taken using an underwater digital camera.

2.6 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 29th January 2007 and the weather conditions were summarized in **Table 1**.

Table 1 Weather Condition for the Spot-Check Dives on 29th January 2007

Date	Condition	Average Underwater Visibility
29 January 2007	- Northeast force 5 to 6 - Sunny periods	1.5m

3.2 A total of 8 spot-check dives were carried out during the survey day (**Figure 1**). The GPS location, route distance, maximum depth, bottom substrate and bottom visibility of 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 8

Site	Location (GPS) (Starting Point)	Route Distance (m)	Max. Depth (m)	Bottom Substrate	Visibility (m)
1	E 114°08'32.5"	5	4	Boulder/Sand	1.5
	N 22°14'52.8"				
2	E 114°08'33.0"	10	4	Boulder/Sand	1.5
	N 22°14'52.8"				
3	E 114°08'33.2"	15	4	Boulder/Sand	1.5
	N 22°14'52.9"				
4	E 114°08'33.6"	5	4	Boulder/Sand	1.5
	N 22°14'52.9"				
5	E 114°08'32.2"	13	8	Boulder/Mud	1.5
	N 22°14'52.9"				
6	E 114°08'32.7"	25	10	Boulder/Mud	1
	N 22°14'52.3"				
7	E 114°08'33.3"	25	10	Boulder/Mud	1
	N 22°14'52.2"				
8	E 114°08'33.5"	18	10	Mud	1.5
	N 22°14'52.4"				

- 3.3 In Sites 1 to 4, the maximum depth is around 4m and the bottom was mainly composed with big boulders and sand plus the artificial seawalls at the shore (**Photo Plate 1**). However, in Sites 5 to 8, the bottom is mainly composed with mud with scattered boulders. The depth ranges from 4m at the beginning to 10m at the end of the survey site.
- 3.4 Sponges, bryozoans and tubeworms: *Sabelastarte japonica* (**Photo Plate 2**) could be found on the rubble seawalls and boulders of the surveyed sites in which they are commonly found in Hong Kong water. The common purple sea urchin: *Anthocidaris crassispina* (**Photo Plate 2**) were found on the boulders of Sites 3 and 4. All animals found in the above sites were common species (**Appendix B**), occurred in low abundance and sparsely distributed. No rare or species of conservation value were recorded during the survey.
- 3.5 In Site 4, one colony of hard coral *Oulastrea crispata* was found (**Photo Plate 2**). 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. The size of the colony is about 5 cm in diameter. More detailed study was carried out during REA survey.

Table 3 Species, Coverage and Size of Corals Found at Spot-Check Site 4

Site	Coral species	Coverage	Size (Diameter)
4	<i>Oulastrea crispata</i>	<1%	5 cm

Rapid Ecological Assessment Survey

- 3.6 The survey was performed at the same day as spot-check dive on 29th January 2007. A 100 m transect was laid at the area with coral found during spot-check dive survey (**Figure 1**) and covered the whole proposed work area. The GPS coordinates of Starting and Ending point of the 100 m transect were summarized in **Table 4**.

Table 4 GPS Coordinates of Transect Starting and Ending, Maximum Depth, Bottom Substrate and Bottom Visibility of REA

Location (GPS) (Starting Point)	Location (GPS) (End Point)	Max. Depth (m)	Bottom Substrate	Visibility (m)
E 114°08'32.5"	E 114°08'36.7"	4	Boulders/Sandy	1.5
N 22°14'52.8"	N 22°14'53.0"			

- 3.7 The transect was laid across the whole proposed work area and adjacent area with hard bottom substrate. The start point was the western end of the spot-check survey area while the end point was eastern part of the artificial seawalls next to the Aberdeen West Typhoon Shelter.
- 3.8 The whole survey site is mainly composed with big boulders and small rocks (**Table 5**). Boulders located close to the starting of the transect were covered by a 5mm thick muddy sediment which can only support limited marine lives. More marine lives could be found at the eastern part of the transect such as sponges, bryozoans, tubeworms: *Sabelastarte japonica* and common purple sea urchin: *Anthocidaris crassispina*.

Table 5 REA Ecological and Substratum attributes of the Survey Site

Ecological attributes	Rank
Hard coral	0.5
Octocoral (soft corals and gorgonians)	0
Black Corals	0
Dead standing corals	0
Substratum Attributes	
Bedrock/continuous pavement	1
Boulder Blocks (diam.>50cm)	3
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	1
Mud/Silt	0

* 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%.

3.9 The site supported a sparse and patchy cover (1-5%) of hard coral. A total of eight coral colonies (**Table 6**) were found during the REA survey and three of them are located on the boulders and rocks within the proposed work area while the other five are located at the end of the transect. They were of very small size (about 3 to 5 cm in diameter), in low coverage and all belonged to a single species *Oulastrea crispata*. All the corals are in fair condition.

Table 6 Size, Distance Along the Transect, Health Condition and Translocation Feasibility of Coral Colonies found at Survey Site

Coral Number	Coral Species	Size (cm)	Distance along the transect (m)	Health Condition	Translocation feasibility
1	<i>Oulastrea crispata</i>	5	30	Fair	Yes
2	<i>Oulastrea crispata</i>	3	38	Fair	Yes
3	<i>Oulastrea crispata</i>	5	40	Fair	Yes
4	<i>Oulastrea crispata</i>	4	90	Fair	Yes
5	<i>Oulastrea crispata</i>	3	91	Fair	Yes
6	<i>Oulastrea crispata</i>	4	98	Fair	Yes
7	<i>Oulastrea crispata</i>	3	98	Fair	Yes
8	<i>Oulastrea crispata</i>	3	99	Fair	Yes

3.10 *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.

4. Discussion

Spot-check Reconnaissance Dives

- 4.1 The bottoms of the Sites 1 to 4 surveyed are mainly composed with rubbles seawalls and boulders/rocks. The bottoms of Sites 5 to 8 are mainly composed with mud with scattered boulders.
- 4.2 Only a few common marine animals were found in the sites such as sponges, bryozoans, tubeworms: *Sabelastarte japonica* and common purple sea urchin: *Anthocardis crassispina*.
- 4.3 Only one colony of hard coral: *Oulastrea crispata* were recorded and its located at Site 4. REA survey was required to carry out for further detailed study.

Rapid Ecological Assessment Survey

- 4.5 There were eight *Oulastrea crispata* colonies found at this site. They were of very small size (about 3 to 5 cm in diameter) and in low coverage. Only three hard coral colonies were located with the proposed work area while others were located at the end of the transect.
- 4.6 Other than isolated patches of small coral colonies, common marine invertebrate such as sea urchins: *Anthocardis crassispina*, sponges, bryozoans and tubeworms: *Sabelastarte japonica* were found at survey site.
- 4.7 The abundance and species diversity of invertebrates found in survey area is relatively low when compared with other areas in Hong Kong. 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 site is considered as having low ecological value given the low abundance and species diversity of marine fauna found in the area.

5. Recommendations

- 5.1 The proposed works would result in permanent loss of subtidal habitats and the marine ecological surveys indicated that they are all mainly muddy and sandy sea bottom supported with limited marine life. Only 3 colonies of a single hard coral (*Oulastrea crispate*) were found to be located within the proposed work area. The corals found at this site are widespread and common across Hong Kong waters including more turbid and harsh environment in the western waters. Owing to their commonness, sparse cover (only 3 colonies), small size and occurred in low species diversity and richness, the marine ecological habitats of the site was of low ecological value. The survey also noted that the potentially impact corals are attached to movable small boulders and it is technical feasible to translocate them to avoid any direct loss. As an additional measure to protect the corals, translocation of the corals found the site is recommended.

5.2 During the REA survey, it was found that the bottom substrate at the end of the 100 m transect is quite similar to the bottom substrate of the proposed work area. Five coral colonies were also found during the survey. The area at the end of the 100 m transect is about 80 m away from the proposed work area. Therefore this area will be a suitable recipient site for translocating the affected corals.

6. References

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

END

Figure 1 Spot-Check Dive Sites and REA Site

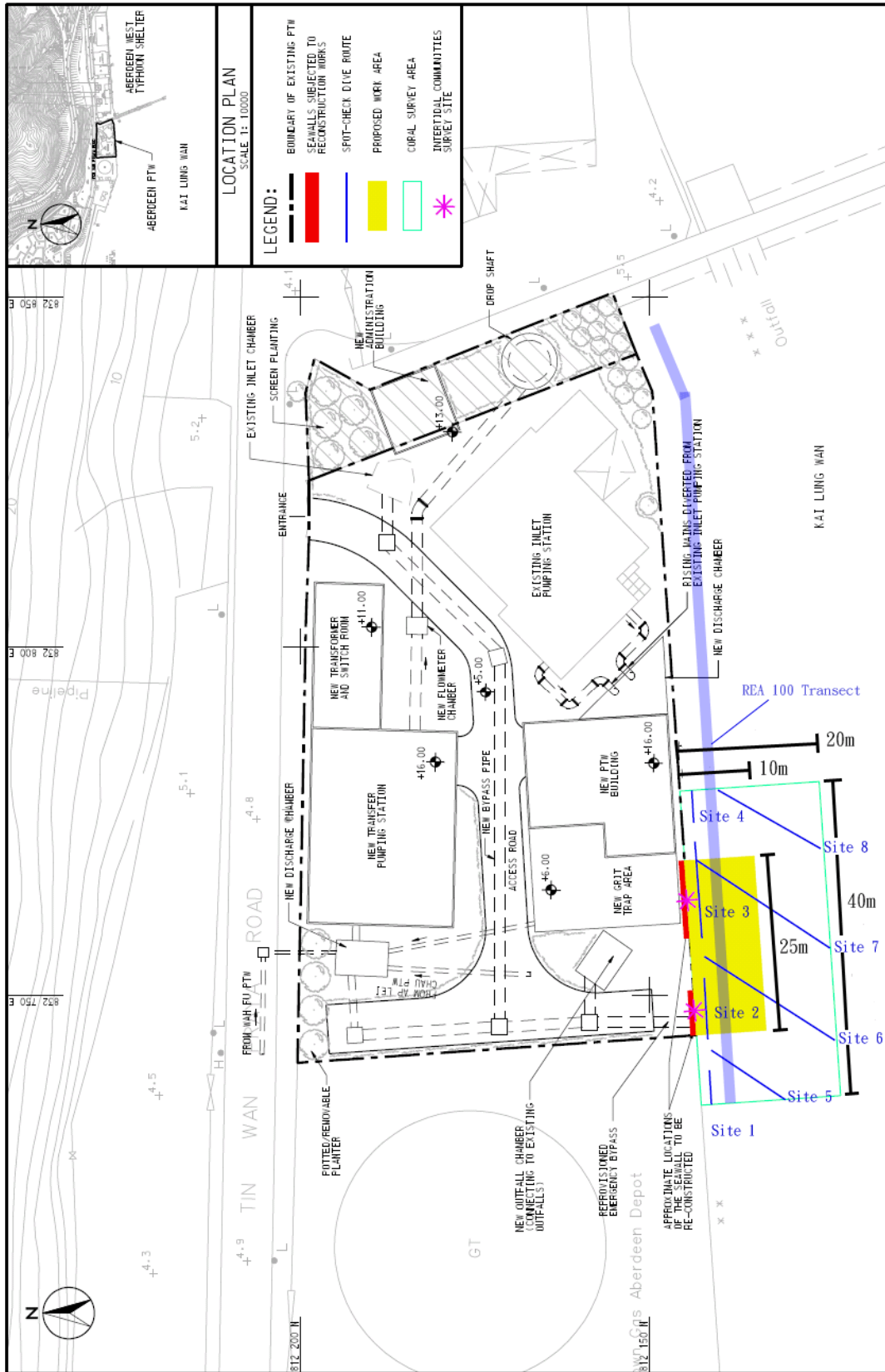
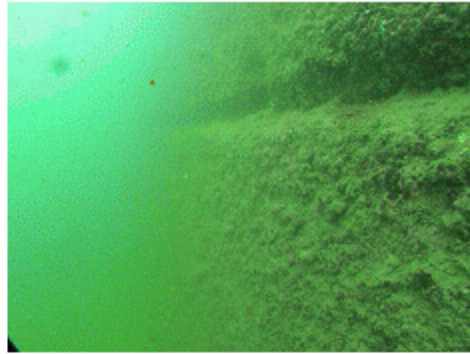
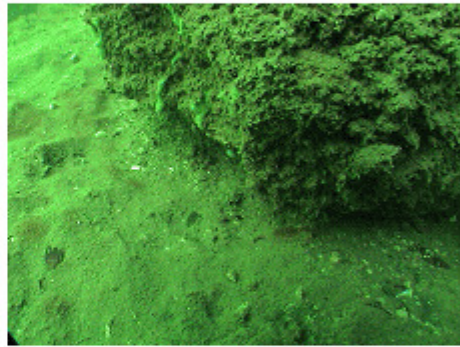
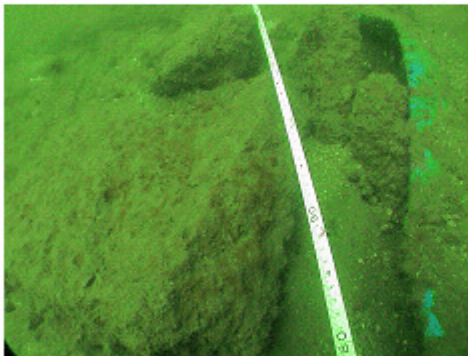


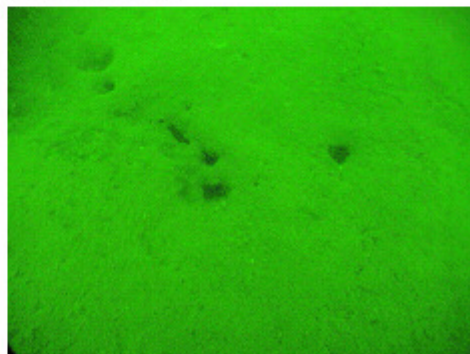
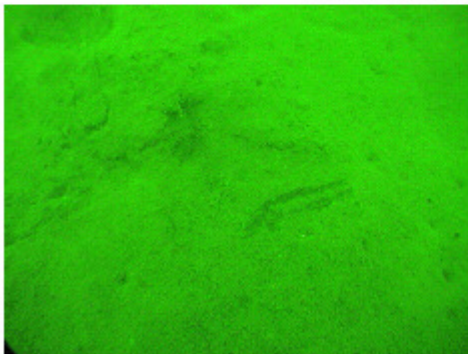
Photo Plate 1



Landmark of Survey Site and Rubble Seawall

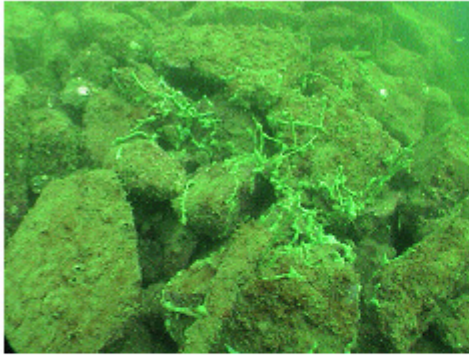


Rubbles and Sandy Bottom



Muddy Bottom

Photo Plate 2



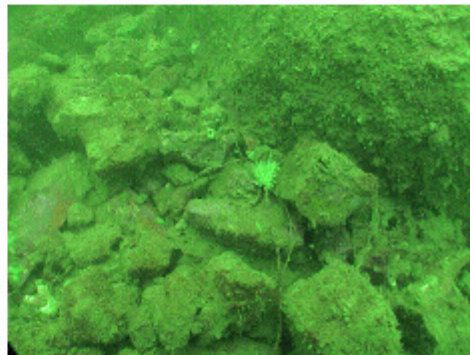
Sponges



Bryozoans



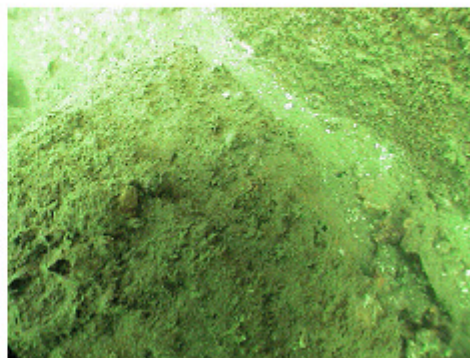
Anthocidaris crassispina



Sabelastarte japonica



Oulastrea crispata



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 compiled 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, <i>Sabelastarte japonica</i>	Nil	-
2	Sponges	Nil	-
3	Sponges, <i>Sabelastarte japonica</i> , <i>Anthocidaris crassispina</i>	Nil	-
4	Unknown Sponges, <i>Sabelastarte japonica</i> , <i>Anthocidaris crassispina</i>	<i>Oulastrea crispata</i>	Common
5	Sponges, <i>Sabelastarte japonica</i>	Nil	-
6	Sponges, <i>Sabelastarte japonica</i>	Nil	-
7	Sponges, <i>Sabelastarte japonica</i>	Nil	-
8	Sponges	Nil	-

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

Site #	GPS	Substrate	Max. Depth	Invertebrates	Visibility

Appendix D Sample of Data Sheet Using at REA Survey

Site Name:			Date:		
GPS Location:			Max. Depth:		
Starting Point:			Visibility:		
			Substrate:		
Ending Point:		Dominated Animals:			
Coral sp.	Size	Distance	on	Health	Translocation
		Transect		Condition	Feasibility