

THE OCEANWAY CORPORATION LTD

CORAL SURVEY,
PIER AREA
TUNG PING CHAU MARINE
PARK

The Hong Kong SAR Government

Coral Translocate and Baseline



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This report has been authorized by:

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EXECUTIVE SUMMARY

- The Hong Kong Government Civil Engineering and Development Department has been given the task of up-grading the only public pier facilities at Tung Ping Chau. In order to protect the unique coral communities that grow in the marine area around the island, the waters around Tung Ping Chau was designated a Marine Park in 2001. The Tung Ping Chau Pier is located inside the Marine Park and is the only pier serving the island. A very comprehensive EM&A procedure was therefore established for the works.
- Whilst the pier is not located in a dense coral area, there are corals in and around the pier structure and more substantial communities nearby. Therefore special care and the appropriate extra mitigation works were requested by the Authority in order to protect the corals communities in and around the works area.
- On 6th October 2005 a coral survey (Oceanway 2005a) determined that there were 41 coral colonies that would be affected by the installation of two caisson piles that were required for the up-grading of the pier. It was recommended that these colonies should be relocated in order to ensure their survival (Oceanway 2005a). As per the EM&A for this project, a coral relocation plan was submitted to the Authority and this plan was approved in December 2005.
- The coral relocation work was carried out on without event on the 26th January 2006 with all 41 colonies being moved to Core Area A, a specially protected area of coral in the Tung Ping Chau Marine Park (See Appendix A).
- At the same time a coral monitoring regime was established for:
 - a. 15 colonies located in and around the pier (Impact).
 - b. 15 colonies located ~100m from the pier (Control)
 - c. 15 colonies of the 41 relocated to Core Area A (Transplant).

The selected colonies were tagged and the required baseline data collected so that suitable impact monitoring could be carried as required by the EM&A for this project. The objective of the monitoring was to ensure that the works did not have a significant impact on the corals around the pier (Impact and Control Colonies) and that the transplanted colonies survive the ordeal of relocation (Transplant). The monitoring regime set up slightly exceeded the requirement of the EM&A. This was to allow for the actual site condition, proposed works and to take the monitoring of the relocated corals into account.
- This document is an account of the relocation exercise carried out in January 2006, and contains the baseline data for all corals tagged for monitoring.

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INTRODUCTION

The coral communities of Hong Kong are known as incipient reefs and are not typical of other high-latitude, non-reefal locations such as eastern and western Australia. Incipient reef coral areas have no calcium carbonate framework as a foundation for the corals, instead corals attach directly onto boulders and bedrock, forming simple pseudo fringing coral communities. Local coral communities are dominated by faviid species with massive, encrusting and foliaceous growth forms and over 84 species from 28 genera having been recorded. These corals tolerate wide annual fluctuations in water temperature (12-30°C) and salinity (20-35‰) (Cope 1982) and periodic typhoons.

On the 16th of November 2001, the waters around the small remote island of Tung Ping Chau was designated a marine park. This island is situated in the most north-eastern part of the Hong Kong SAR being only 3 kilometres from the Chinese Mainland and 11 kilometres from the rest of Hong Kong. The island is unique geomorphologically and the island, its shores and the surrounding marine area had been recognised as an area worthy of protection for at least four decades prior to the marine park designation (Morton 1996). A map showing the location of the island is in Figure 1.

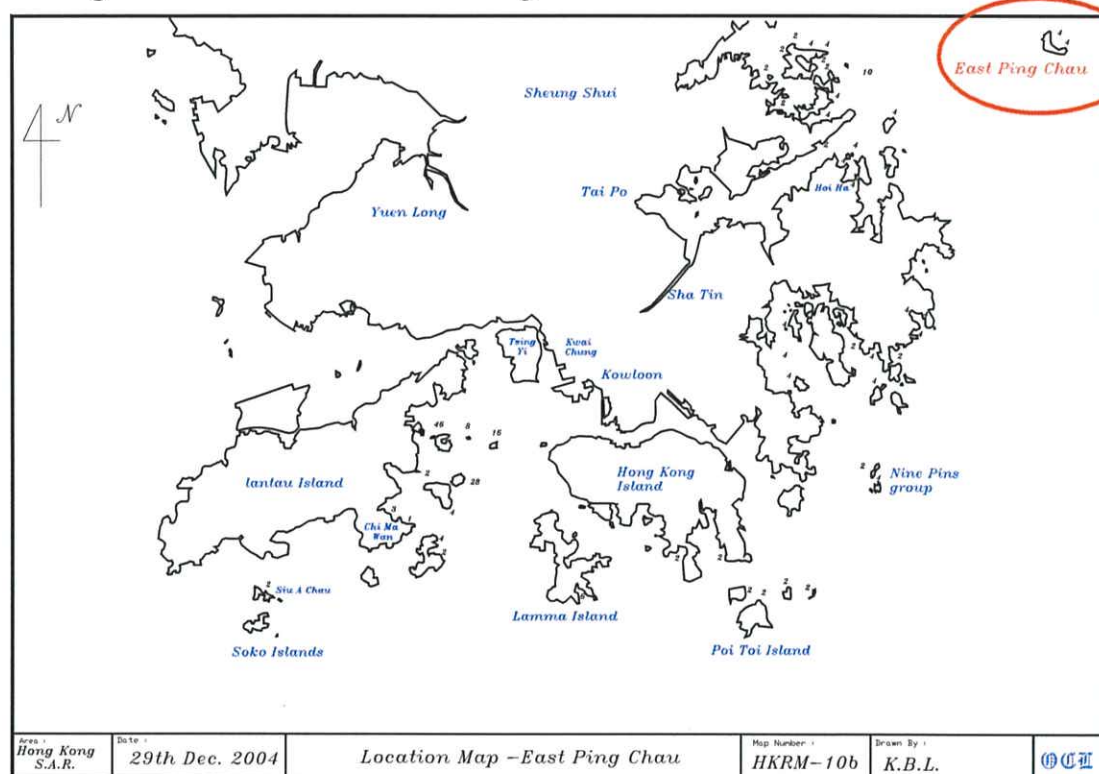


Figure 1. The location of Tung Ping Chau Island.

Scleractinian stony corals exist in areas around the island, with some of the best examples of the local Hong Kong communities on the north side of the island. Table 1. shows some of the parameters of these areas. From this data it is possible to determine the importance of the Tung Ping Chau coral areas as compared to all other known coral areas in Hong Kong. The Replenishment Index and diversity of the corals in this area are second to none with respect to any other locally known coral area. The size of the Tung Ping Chau coral area also makes it a very important centre of biodiversity for Hong Kong corals.

Table 1. Characteristics of the coral area around Tung Ping Chau, Hong Kong (Oceanway 2002a).

Parameter	Value	Highest recorded value for HK Corals (Location)
Community Type	Grade A	Grade A
Live coral cover (Max. recorded).	61.10 %	76.7% (Crescent Island)
Dead coral cover (Max recorded)	3.3%	68.5% (Tai Pai)
Rarity Index	1.72	4.19 (Long Ke Wan)
Replenishment Index	4.6	4.6 (Tung Ping Chau)
Diversity	45	45 (Tung Ping Chau)

The island has one pier that allows boat access. This pier is in dire need of up-grading and this work must be carried out with due consideration and protection to the surrounding marine environment. The up-grade works necessary to cater for the growing number of visitors to the island and for safety reasons.

In October 2005, a survey determined that there were 41 coral colonies that would be affected by the works associated with the installation of two caisson piles required for the pier works.

In January 2006, all of the colonies deemed to be impacted by the works were successfully relocated to Core Area A (Appendix A). A total of 45 colonies were tagged as part of a monitoring regime set up to monitor the necessary pier construction work:

- a. The status of the relocated coral colonies (15 relocated colonies).
- b. The status of the corals immediately around the works area (15 impact colonies).
- c. The status of the nearby coral area (15 control colonies).

This report contains the results of the relocation works and the baseline data of the tagged corals selected to monitor any impacts that the required construction works may have on the surrounding coral areas.

METHODOLOGIES

There are two methodologies carried out as part of this report. The first is for the coral relocation, the second is the collection of the baseline data. Each has been described separately.

Coral Relocation

Hard stony coral relocation involves three key activities; finding a suitable location, moving the corals and the stabilisation of the moved colonies. In order to ensure a maximum survival rate and minimum time for the relocated corals to return to normal activity and growth rates, several important rules must be followed. These rules are listed in point form in this document. This transplantation methodology is specifically designed for incipient reefs and scattered coral communities that exist around Hong Kong. It was tested at Pak A in Sai Kung, with a 98% colony survival rate for >8000 colonies. It was later refined and new stabilization methods using Sea-C-Cement included in 2003.

The Rules Established for Working with Hong Kong's Corals

- Corals need to be relocated to areas that have exactly the same environmental conditions as the areas they originally came from.
- Handling of corals needs to be kept to a minimum.
- It is best to move colonies with substratum.
- Special tools are required if the corals have to be separated from their substratum. These include special coral friendly gloves, long flat blades, small hammers and long (up to 1m) chisels. Removed corals should be kept as one piece wherever possible.
- The transplantation process needs to be completed quickly in order to keep stress to a minimum.
- The coral has to be moved on specially constructed lifters. For the Tung Ping Chau corals, four 100Kg lifters were used
- The transplantation of whole coral colonies (with the attached substrate, preferably) is much easier than transplanting pieces/fragments.
- Corals need to be kept out of direct sunlight and kept submerged as during transportation and stabilisation. No contact with air is allowed, no matter how brief. Corals collected from <5m should be kept in at least 1m of water.
- Competing and aggressive species have to be separated during transportation, even if this is only for a short time. If fragmentation of colonies occurs, fragments from individual colonies should be placed together as mixing fragments can cause lethal stress even to fragments of the same coral species.
- Transplanted corals need to be stabilised or firmly attached to substratum in order to achieve a reasonable success rate.
- The placement of different species of the transplanted corals needs to be carefully supervised. There must be a reasonable vacant area maintained around aggressive species.
- Orientation sensitive coral species must be marked to ensure that they are relocated in the same orientation in the new location. This will make a big difference to the future growth rate and time to recover to the new final growth rate.

Timing.

The only chief point of concern is the timing of this work. It should not be carried out in the middle of the coral spawning season (July to September). This was the case with this relocation.

Procedure.

The actual procedure has been refined from the work Oceanway has successfully carried out in Hong Kong over the past eight years.

1. Initial works

- A survey was to determine that the colonies are suitable to be transplanted. (Easily accessible, not fragile and in good health).
 - The key transplant environmental parameters of the donor area were measured using fixed data loggers for one month. This was carried out in July 2005.
 - The data logger information collected for the donor area was matched with suitable data received from other suitable areas. An area on the edge of Coral Area A was decided as being suitable.
 - The species makeup of the donor area was mapped.
 - All selected receiver area was mapped.
 - Upon commencement of work, the receiver area was also divided into sections with a 2.5m rope grid.
2. Each grid area was worked in succession. A CoralWatch survey was carried out on all colonies before the relocation commenced.
 3. During the transportation process the corals remained in water at an appropriate depth on specially designed floating lifters. Specifically aggressive species were moved in separate lifters with enough surrounding free area to allow enough time to relocate before they try and injure surrounding colonies. Aggressive species were never mixed with corals that are not aggressive during the transportation process.
 4. Larger coral colonies (>100cm²) were collected first and loaded onto the lifters. All colonies were carefully separated from their substratum using the specially designed and modified tools. They were collected and moved to a suitable staging area prior to being loaded onto the lifters.
 5. Smaller colonies (<100cm²) were collected next and moved to the staging area.
 6. Once all of the colonies had been collected, then they were loaded onto the lifters. Two for the large colonies, one for the small colonies and the last for the aggressive colonies.
 7. All lifters were moved together to the receiver area. The journey took 25 minutes. The slow movement of the corals ensured a minimum amount of damage due to any movement on the lifters.
 8. Once all colonies had arrived at the receiver location, the large colonies were stabilised first. Sea-C-Cement was used on all of these colonies.
 9. The smaller non-aggressive colonies were attached last. Very small colonies (<20cm²) were stabilised by incorporation into a boulder pile set up in the area.

10. The aggressive colonies were attached last. Care was taken to ensure that they had plenty of room around them for future growth.
11. Finally 15 colonies were tagged and all required particulars (refer to the Coral Colony Survey section below) were collected for these coral colonies. Either nail with tag or tag with the cable-tie imbedded into the Sea-C-Cement was used to mark the selected colonies.

Impact and Control Survey

In order to establish that the pier renovation works does not impact the surrounding coral areas an impact and control-monitoring regime was established. The procedures for the setting up of this are detailed in the EM&A for this project. The key clarifications applied at the site was the use of CoralWatch as the means to establish the condition of the corals and to scientifically measure the amount of bleaching and the use of 15 colonies for the Impact Monitoring and a similar amount, 15 colonies, for the Control Monitoring. The EM&A only required 5 colonies to be used for Control purposes and these colonies should be situated more than 100m from the pier. It was decided prudent to tag an equal number of colonies for both areas, with the control consisting of 8 colonies on one side of the pier and 7 on the other. By doing this a more meaningful comparison result can be determined from the CoralWatch data collected. It should be pointed out that during the writing of the EM&A for this project, the CoralWatch survey technique was not yet established so no provision could be made for it at that time. Since it is available now, it is prudent to incorporate it at this time and tag the necessary number of colonies required for a reliable result.

Coral Colony Tagging

Trained divers swam around the pier and located 15 suitable colonies for tagging. Colonies of similar size, similar species to the colonies at the pier and those known to clearly indicate to stress were selected. Colonies selected also had a reasonable horizontal profile in order to show sediment deposition. The process was repeated on both sides of the pier at a distance greater than 100m. Seven colonies were tagged on the northern side and 8 colonies on the southern side of the pier. Appendix B shows the location of all colonies tagged, including the relocated colonies. Steel rebars were installed nearby the recorded coral colonies, with tags attached to individually identify the corals recorded. Tags consisted of Perspex tags each with a unique identification number. These were attached to the rebars with a cable tie.

Tagged Coral Colony Survey

Details of each tagged colony were recorded. Typically the following data and parameters were noted.

- a. Species.
- b. Size (cm²)
- c. Growth form
- d. Partial Mortality
- e. Sediment (thickness, type and colour).
- f. The general health of the coral. This data will be supplemented with the CoralWatch data.

Divers knowledgeable with Hong Kong corals and trained to carry out such work collected this data. Each tagged colony was photographed and the location mapped.

CoralWatch Survey

In order to establish the health status of the tagged coral colonies in a repeatable way, a CoralWatch Survey was carried out on each colony. This included the relocated corals before and after the event (several hours apart). The data collected would be used to determine the status of the whole group of colonies, i.e. all Control Colonies, and all Impact Colonies as well as the individual colonies.

This survey technique provides a simple method of monitoring the condition of hard corals by the use of simple graded colour charts underwater. The University of Queensland, Australia, was responsible for developing this survey methodology. The colour charts are a standard and are based upon the actual colours of bleached and healthy corals. Each colour square corresponds to a concentration of symbionts (zooxanthellae) contained in the coral tissue and this is directly related to the coral's condition. The process is simple, accurate and non-invasive. It is expected that this survey will be repeated each time an Impact Survey is required in an area. This way a quick and reliable result comparison with the baseline results and the control area results may be achieved. This survey methodology allows individual coral colony stress to be identified rapidly.

Field Procedure

All recorded corals were surveyed using the Standard Chinese CoralWatch Chart. A total of 15 tagged corals were examined *in situ* in each area. The lightest and darkest colour match was determined. Data was recorded on prepared underwater sheets for later analysis. Care was taken to avoid the colour of the tips of the corals since there can be a delay in the colouration due to the required up-take time for zooxanthellae to enter the coral tissue.

Data Analysis

The data were arranged as groups for each site (Impact, Control and Transplant). The numerical difference and the colour score were calculated for each colony and the average for the entire group was determined.

Data Results

The results are presented graphically so that changes in the results can be clearly observed. Graphs will be compared over time with the actual colour data being compared cumulatively in a single graph for each area. These graphs show the area as a group of bars along a numerical axis indicating the level of bleaching. Typically the numbers from 0~5 are used. A value of 0 means no bleaching; values of 1 or 2 indicate mild and severe bleaching. Values of 3 or above indicate levels of bleaching with 3 meaning mild, 4 acute and 5 severe bleaching. The Cumulative Average result for each area is calculated as a single numerical value for each area. This value represents a general health value of the live tissue for the corals in an area. For this report a value of 1~6 is also used, with 1 being maximum stress, 6 being minimum stress (totally healthy).

Data Presentation

A map showing the locations of the coral colonies tagged during this survey is included. The scale for the map will be suitable for the small area surveyed. Data for each colony are presented in table form. The CoralWatch data results are presented as bar graphs for each area with the cumulative area average shown as a single figure also for each area.

RESULTS

The map showing the location of the Tung Ping Chau Pier is in Appendix A. The map showing the location of all of the tagged coral colonies is in Appendix B. Photographs of the tagged colonies are in Appendix C.

Translocated Coral Colonies

The complete list of colonies relocated to Core Area A as part of this project this project is listed in Table 2.

Table 2. – List of coral colonies relocated from the Pier site to Core Area A.

Colony Tag	Taxa	Size cm ²	Translocation prospect 0=poor 5=excellent	Health 0=poor 5=excellent	Remarks
1	<i>Porites lobata</i>	15	5	5	On large rock
2	<i>Porites lobata</i>	260	5	5	On large rock
3	<i>Leptastrea purpurea</i>	230	4	5	On large rock
4	<i>Porites lutea</i>	220	5	4	On pier footing
5	<i>Cyphastrea serailia</i>	150	5	5	On pier footing
6	<i>Porites lobata</i>	90	4	5	On large rock
7	<i>Leptastrea purpurea</i>	230	5	5	On large rock
8	<i>Leptastrea pruinosa</i>	18	4	5	On large rock
9	<i>Porites lutea</i>	220	5	4	On large rock
10	<i>Porites lutea</i>	55	5	5	On pier footing
11	<i>Pavona decussata</i>	19	5	5	On large rock
12	<i>Psammocora haimeana</i>	35	4	5	On small rock
13	<i>Platygyra acuta</i>	65	5	5	On pier footing
14	<i>Leptastrea purpurea</i>	180	4	5	On pier footing
15	<i>Platygyra acuta</i>	65	5	5	On large rock
16	<i>Platygyra acuta</i>	95	5	5	On pier footing
17	<i>Platygyra acuta</i>	210	5	5	On pier footing
18	<i>Leptastrea pruinosa</i>	35	5	5	On large rock
19	<i>Platygyra acuta</i>	210	5	4	On large rock
20	<i>Platygyra acuta</i>	140	5	5	On pier footing
21	<i>Porites lobata</i>	130	4	5	On large rock
22	<i>Leptastrea purpurea</i>	140	5	5	On large rock
23	<i>Platygyra acuta</i>	150	5	5	On large rock
24	<i>Platygyra acuta</i>	130	5	5	On large rock
25	<i>Platygyra acuta</i>	150	5	5	On large rock
26	<i>Porites lobata</i>	18	5	5	On large rock
27	<i>Porites lutea</i>	15	5	5	On large rock
28	<i>Leptastrea pruinosa</i>	10	5	5	On large rock
29	<i>Leptastrea pruinosa</i>	15	5	4	On large rock
30	<i>Psammocora haimeana</i>	80	5	5	On pier footing
31	<i>Platygyra acuta</i>	160	5	5	On pier footing
32	<i>Porites lobata</i>	19	5	5	On large rock
33	<i>Leptastrea pruinosa</i>	18	4	5	On large rock
34	<i>Platygyra acuta</i>	190	5	4	On large rock
35	<i>Platygyra acuta</i>	150	5	5	On large rock
36	<i>Favia rotumana</i>	140	5	5	On large rock
37	<i>Leptastrea purpurea</i>	85	4	5	On small rock
38	<i>Leptastrea purpurea</i>	19	5	5	On large rock
39	<i>Leptastrea purpurea</i>	60	5	5	On large rock
40	<i>Leptastrea purpurea</i>	70	5	5	On large rock
41	<i>Platygyra acuta</i>	75	5	5	On pier footing
Total area :		4,366			

All of these colonies were relocated without event. Fifteen colonies were tagged for monitoring. These are listed in Table 3. Baseline data on each of the selected colonies is also included in Table 3. A photograph of each tagged colony is in Appendix C1. The original locations of the translocated colonies are in Appendix B1 and the final location in B2.

Table 3. – List of the Relocated Coral Colonies tagged in Core Area A and their baseline data.

Tag	Species	Size cm ²	Sediment		Colour	Partial Mort. %
			%	Type		
T1	<i>Leptastrea purpurea</i>	230	0	\	\	5
T2	<i>Platygyra acuta</i>	150	0	\	\	3
T3	<i>Leptastrea purpurea</i>	230	0	\	\	5
T4	<i>Platygyra acuta</i>	95	0	\	\	10
T5	<i>Favia rotomana</i>	140	0	\	\	0
T6	<i>Porites lobata</i>	130	0	\	\	10
T7	<i>Pavona decussata</i>	19	0	\	\	5
T8	<i>Platygyra acuta</i>	190	0	\	\	5
T9	<i>Psammocora haimeana</i>	80	0	\	\	5
T10	<i>Porites lobata</i>	90	0	\	\	1
T11	<i>Platygyra acuta</i>	210	0	\	\	5
T12	<i>Platygyra acuta</i>	210	0	\	\	5
T13	<i>Platygyra acuta</i>	140	0	\	\	5
T14	<i>Cyphastrea serailia</i>	150	0	\	\	5
T15	<i>Platygyra acuta</i>	95	0	\	\	10

A CoralWatch survey was carried out on the tagged colonies immediately before and after the translocation. The results of the survey are in Figure 2. There is a visible reduction in coral health between the before and after data sets. The Cumulative Average also dropped from a value of 4.50 before to 4.03 after the relocation was carried out. Note that the Cumulative Average figure has a range from 1~6 with 6 being no stress and 1 being maximum stress.

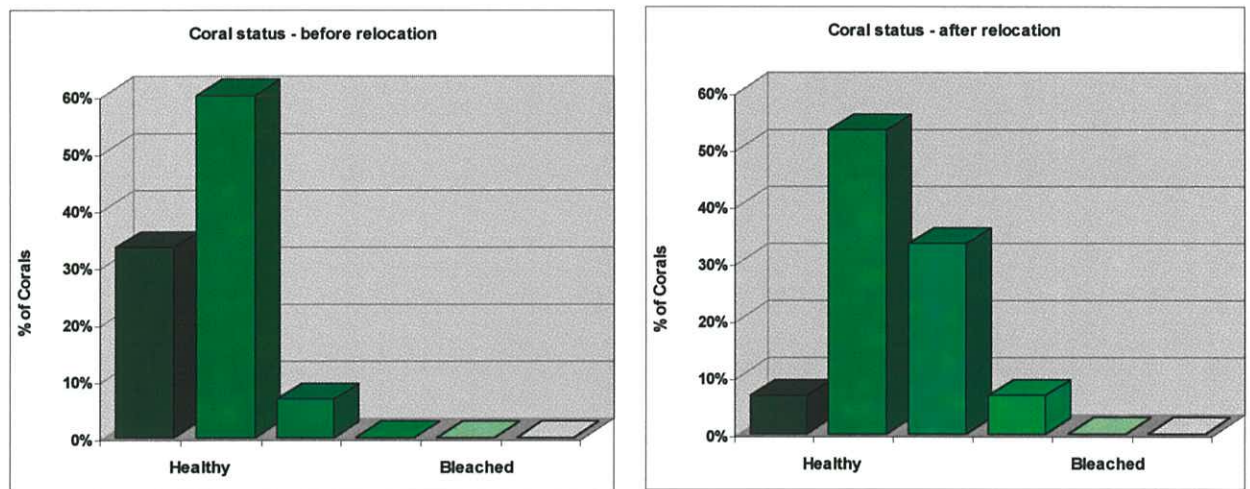


Figure 2. CoralWatch results from the Relocated Corals, before and after the relocation.

Impact Coral Colonies

A total of 15 coral colonies were tagged for impact monitoring for this project. These colonies are located nearby to the in-water works area (see Appendix B2 and B3). Colonies tagged were deemed suitable to indicate any impact to the surrounding coral communities from this work. Details of the current state of the tagged colonies are included in Table 4.

Table 4. – List of the Impact Coral Colonies tagged and their baseline data.

Tag	Species	Size cm ²	Sediment		Colour	Partial Mort. %
			%	Type		
I1	<i>Platygyra acuta</i>	250	5	Fine	CV406	0
I2	<i>Platygyra acuta</i>	260	5	Fine	CV406	5
I3	<i>Platygyra acuta</i>	240	5	Fine	CV406	0
I4	<i>Platygyra acuta</i>	210	5	Fine	CV406	0
I5	<i>Porites lobata</i>	150	5	Fine	CV406	0
I6	<i>Montipora venosa</i>	95	10	Fine	CV406	5
I7	<i>Pavona decussata</i>	55	0	\	\	5
I8	<i>Platygyra acuta</i>	200	5	Fine	CV406	5
I9	<i>Hydnophora exesa</i>	90	0	\	\	0
I10	<i>Favia rotumana</i>	120	5	Fine	CV406	5
I11	<i>Platygyra acuta</i>	110	5	Fine	CV406	5
I12	<i>Lithophyllon undulatum</i>	270	5	Fine	CV406	10
I13	<i>Favia speciosa</i>	170	10	Fine	CV406	5
I14	<i>Leptastrea purpurea</i>	250	10	Fine	CV406	0
I15	<i>Favia rotumana</i>	190	0	\	\	0

Note CV406 is a light grey colour

The CoralWatch data for these colonies is in Figure 3. The Cumulative Average was calculated to be 4.57. Note that the Cumulative Average figure has a range from 1~6 with 6 being no stress and 1 being maximum stress.

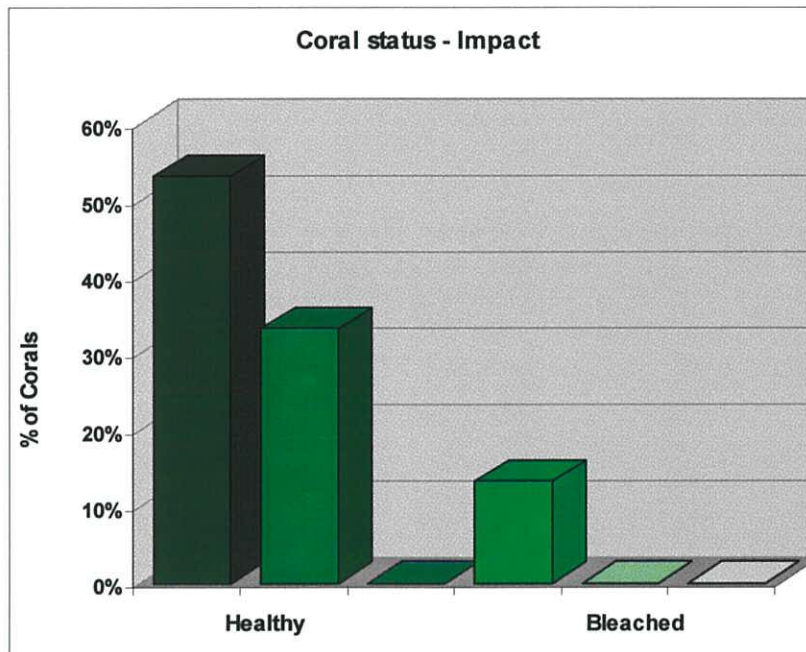


Figure 3. The CoralWatch result for the Impact Colonies.

Control Coral Colonies

A total of 15 coral colonies were tagged for control monitoring for this project. These colonies were located at least 100m either side of the works area (see Appendix B). Colonies tagged were deemed suitable to be used as a reference to determine any background changes in the coral community. The list of the corals is in Table 5. A map showing the location is in Appendix B2 and B3.

Table5. – List of the Control Coral Colonies tagged and their baseline data.

Tag	Species	Size cm ²	Sediment			Partial Mort. %	Location See Note 2
			%	Type	Colour		
C1	<i>Favia veroni</i>	260	5	Fine	CV406	5	A
C2	<i>Favia veroni</i>	190	5	Fine	CV406	5	A
C3	<i>Favia speciosa</i>	180	0	\	\	5	A
C4	<i>Leptastrea pruinosa</i>	260	5	Fine	CV406	0	A
C5	<i>Platygyra carnosus</i>	380	0	\	\	5	A
C6	<i>Favia speciosa</i>	250	0	\	\	5	A
C7	<i>Porites lobata</i>	380	5	Fine	CV406	10	A
C8	<i>Platygyra acuta</i>	250	0	\	\	0	A
C9	<i>Leptastrea purpurea</i>	290	5	Fine	CV406	5	B
C10	<i>Platygyra carnosus</i>	260	1	Fine	CV406	0	B
C11	<i>Leptastrea purpurea</i>	260	10	Fine	CV406	5	B
C12	<i>Platygyra acuta</i>	140	0	\	\	0	B
C13	<i>Platygyra acuta</i>	150	10	Fine	CV406	0	B
C14	<i>Favia veroni</i>	210	5	Fine	CV406	0	B
C15.	<i>Platygyra acuta</i>	220	0	\	\	0	B

Note 1/ CV406 is a light grey colour
 2/ Refer Appendix B

The CoralWatch data for these colonies is in Figure 4. The Cumulative Average was calculated to be 4.47. Note that the Cumulative Average figure has a range from 1~6 with 6 being no stress and 1 being maximum stress.

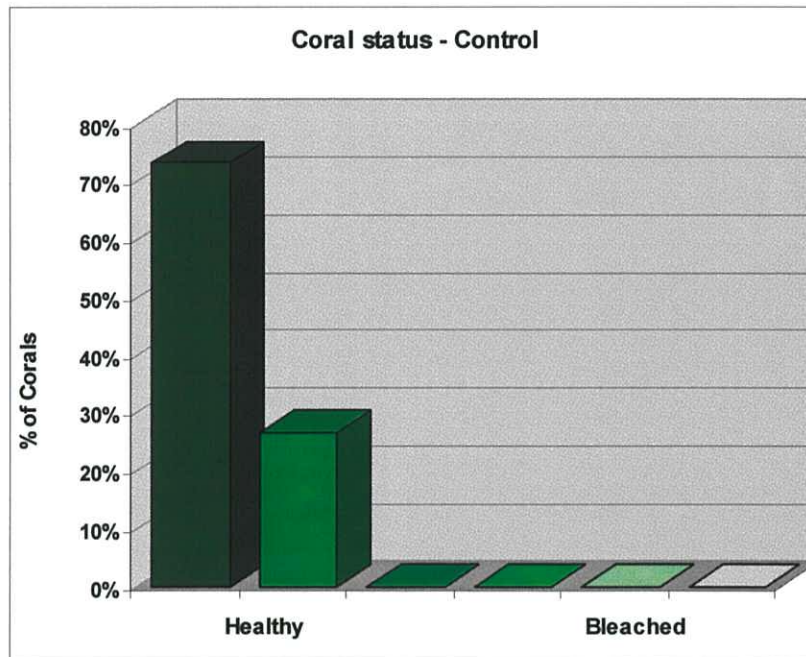


Figure 4. The CoralWatch result for the Control Colonies.

These results indicate that on the whole, the area of corals around the pier is slightly healthier than the corals in the control area. However, some colonies at the pier area have slightly more bleaching/blanching than the control colonies.

DISCUSSION

The results of the coral relocation indicate that it was successfully carried out. This was the first time that a CoralWatch Survey was carried out immediately prior to the relocation and then immediately after the reattachment of the colonies. The whole operation took only five hours and already the corals were showing signs of stress. These corals will be monitored using the same frequency as the Impact Monitoring. The EM&A specifies that bleaching, partial mortality, sediment and other relevant data concerning all colonies be recorded. This data will also be recorded for the translocated colonies. As well as this data CoralWatch data will be collected so that a comparison with other areas and between past surveys can be carried out. The results of the monitoring of the relocated colonies will form part of the Coral Performa as required by this project. The results will be separated from the figures used to determine whether any action limits have been exceeded for this project. Appendix D contains photographs of the relocation process.

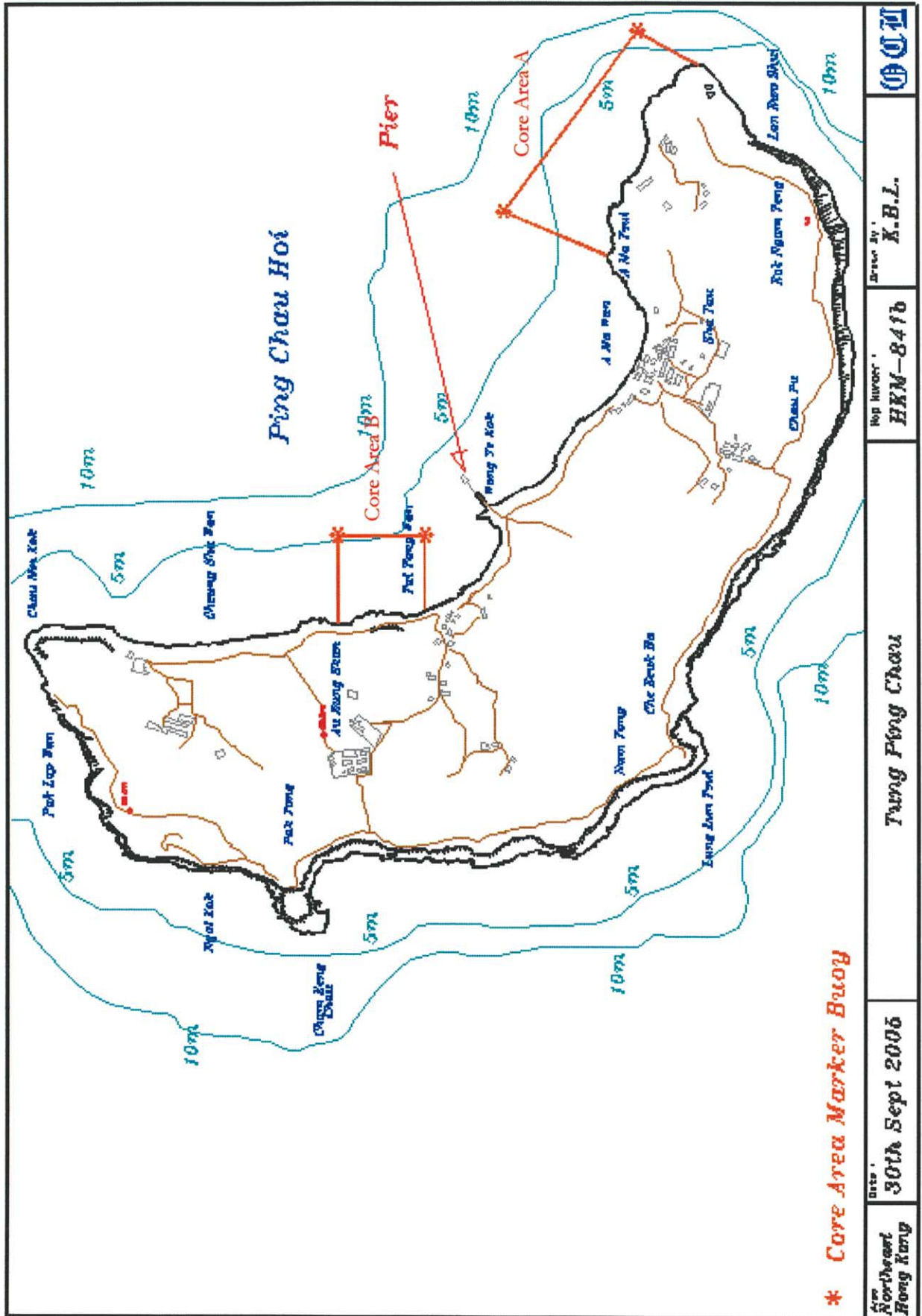
The data collected from the tagged impact and control coral colonies should be more than necessary to monitor this works site. The EM&A recommended that 5 colonies be tagged for the control. The total number tagged for this purpose was 15 colonies. This was to allow the CoralWatch Survey to be used with this project. Note that this survey methodology was not available when the EM&A was approved; however, it is prudent to include any advances in marine area monitoring that may have occurred since the document approval time provided they simplify and complement any required monitoring.

The Impact Monitoring is due to start with the beginning of the foundation work. The starting frequency is twice a week and this is to be varied depending upon the results of the first few surveys. The field work carried out as part of this Baseline Report sets up for the area for monitoring under the EM&A for this project.

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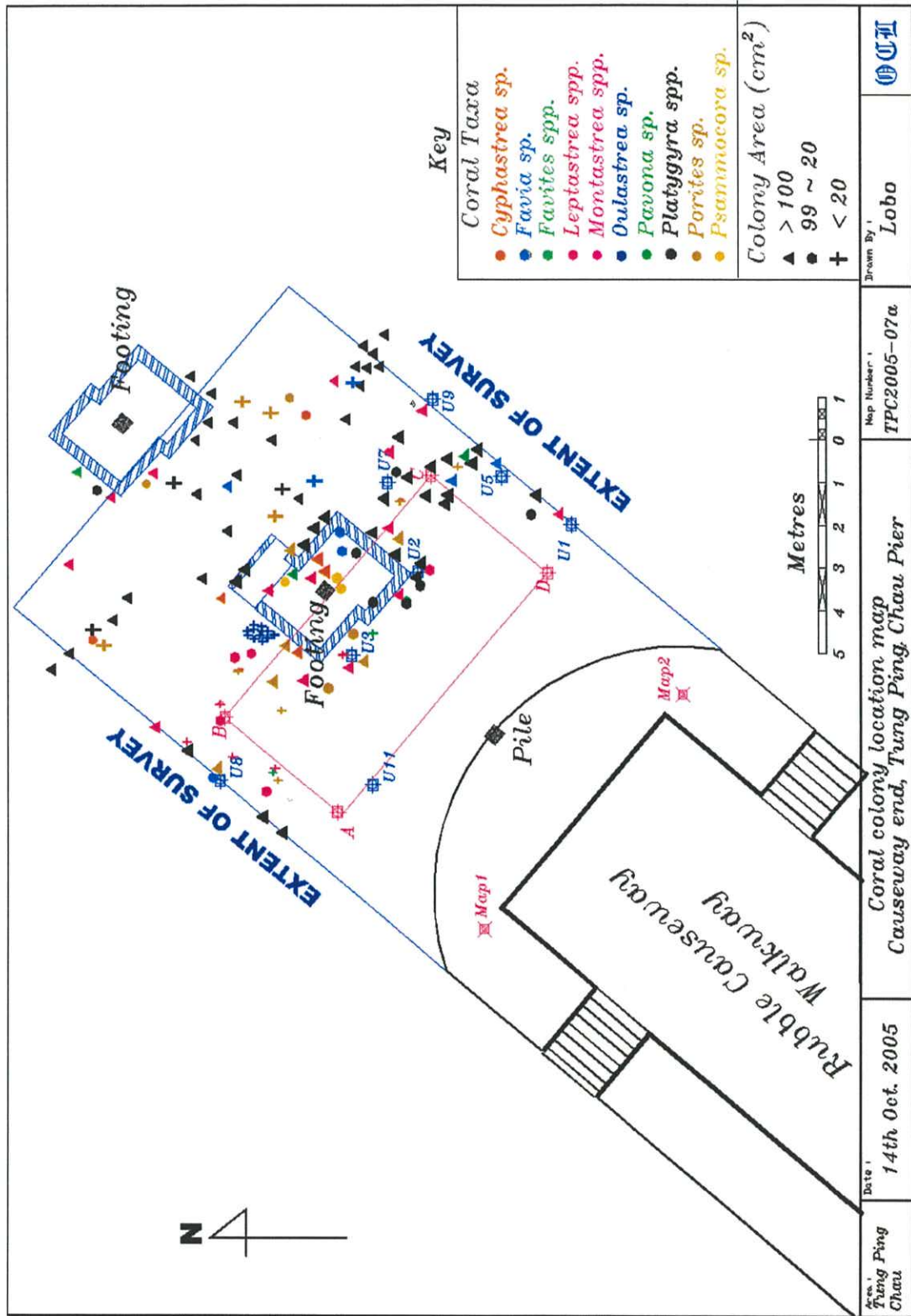
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APPENDIX A - TUNG PING CHAU MAP



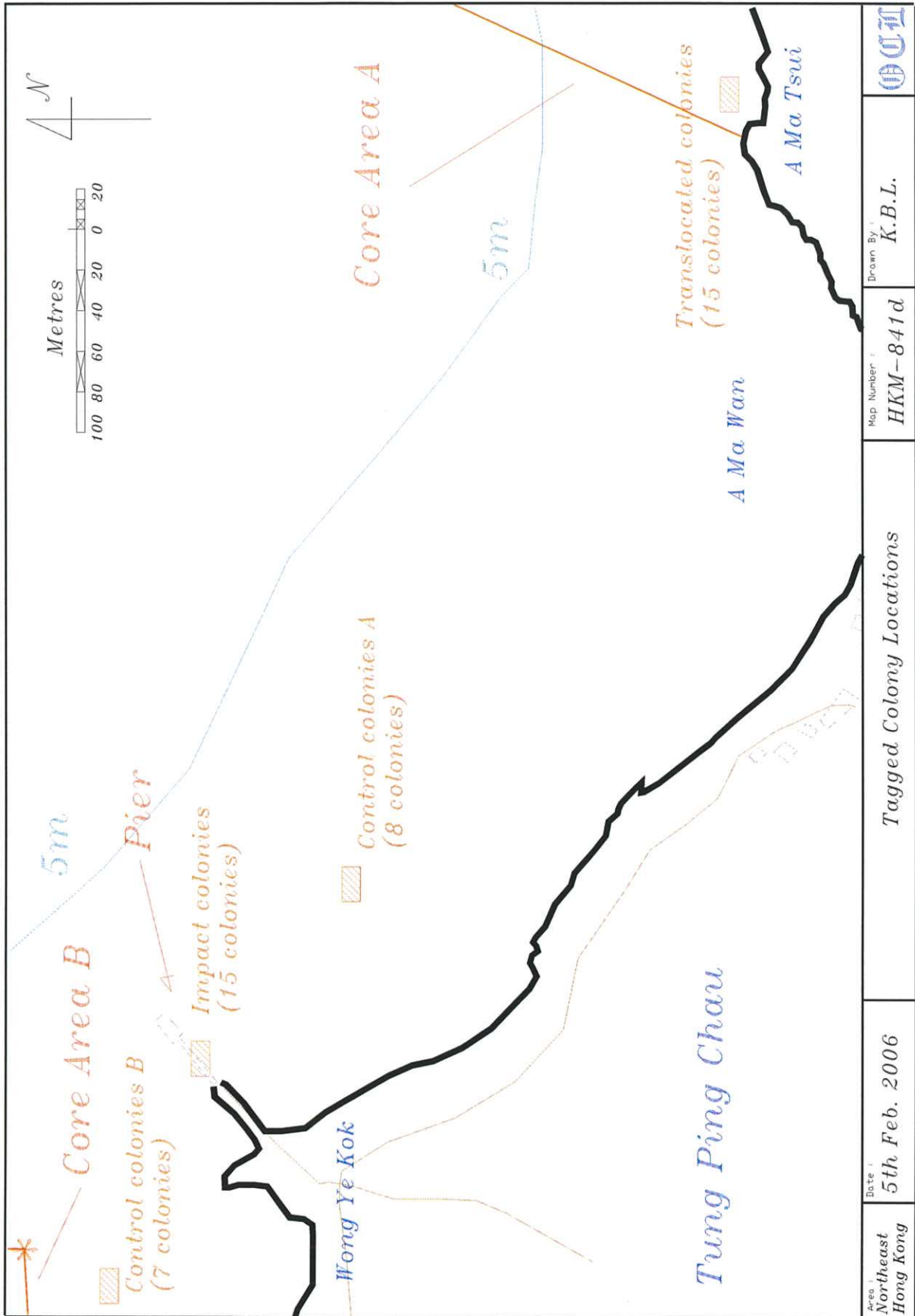
Area: Northeast Hong Kong	Date: 30th Sept 2006	Tung Ping Chau	Map Number: HKM-841b	Drawn By: K.B.L.	
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APPENDIX B1 – ORIGINAL LOCATION OF THE TRANSLOCATED CORALS



The translocated colonies were removed from the area marked A,B,C&D and 1m surrounding it.






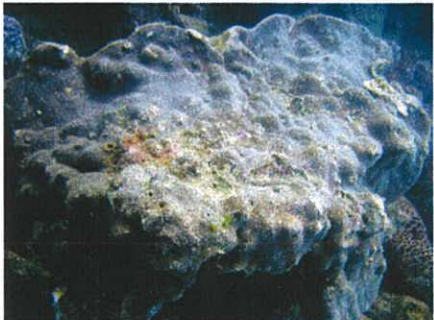




APPENDIX B2 - LOCATION OF THE TAGGED CORAL AREAS








APPENDIX B3 – LOCATION OF THE TAGGED CORALS WITHIN EACH AREA
















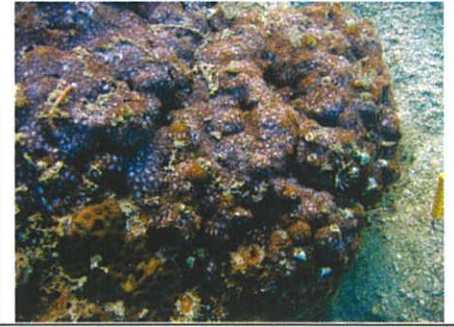

APPENDIX C1 – TAGGED COLONIES (TRANSLOCATION)

	<p>T1</p>		<p>T2</p>
	<p>T3</p>		<p>T4</p>
	<p>T5</p>		<p>T6</p>
	<p>T7</p>		<p>T8</p>
	<p>T9</p>		<p>T10</p>











	<p>T11</p>		<p>T12</p>
	<p>T13</p>		<p>T14</p>
	<p>T15</p>		






APPENDIX C2 - TAGGED COLONIES (IMPACT)

	<p>I1</p>		<p>I2</p>
	<p>I3</p>		<p>I4</p>
	<p>I5</p>		<p>I6</p>
	<p>I7</p>		<p>I8</p>
	<p>I9</p>		<p>I10</p>

	<p>I11</p>		<p>I12</p>
	<p>I13</p>		<p>I14</p>
	<p>I15</p>		

APPENDIX C3 – TAGGED COLONIES (CONTROL)

	<p>C1</p>		<p>C2</p>
	<p>C3</p>		<p>C4</p>
	<p>C5</p>		<p>C6</p>
	<p>C7</p>		<p>C8</p>
	<p>C9</p>		<p>C10</p>

	<p>C11</p>		<p>C12</p>
	<p>C13</p>		<p>C14</p>
	<p>C15</p>		

APPENDIX D – SELECTED PHOTOGRAPHS



Plate 1. The donor area under the pier. The white area in the foreground are the bubbles of the divers carrying out the translocation works.



Plate 2. A view of the mooring end of the pier.



Plate 3. A coral colony on the pier footing selected for removal and translocation.



Plate 4. Detaching one side of the coral colony, shown in Plate 3, from the substrate.



Plate 5. Detaching the other side of the coral colony, shown in Plate 3, from the substrate.



Plate 6. Successful detachment of the colony shown in Plate 3.



Plate 7. Another nearby colony being detached from the pier footing.



Plate 8. The colony shown in Plate 7. successfully detached.

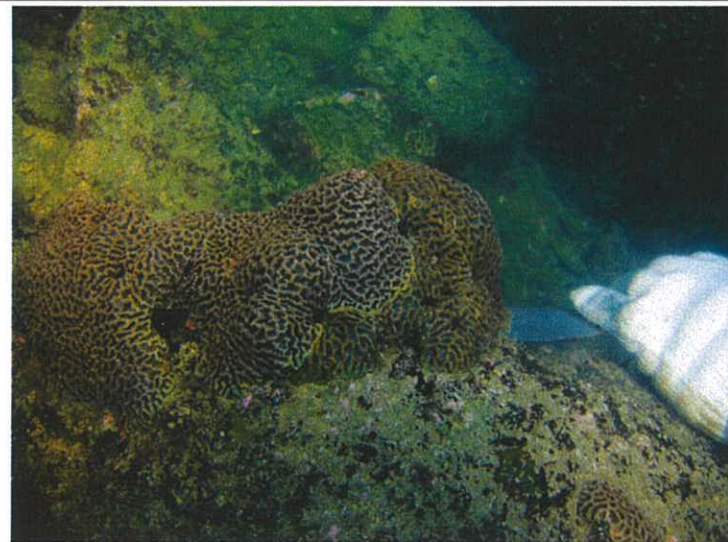


Plate 9. More coral colonies being detached from the pier footing.



Plate 10. A coral colony being moved to the temporary holding area before transportation to the Receiver Area.



Plate11. Colonies at the holding area pending transportation to the Receiver Area.



Plate 12. Colonies loaded onto the small 100kg lifter basket.



Plate 13. The Receiver Area before the corals arrived.

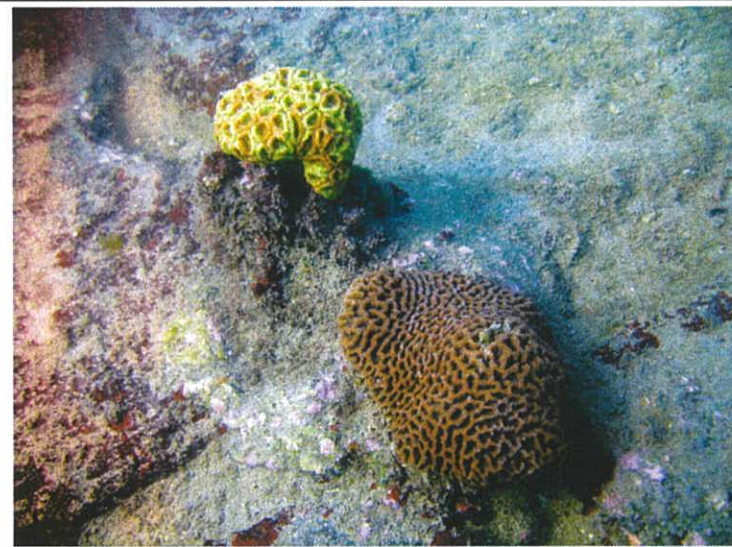


Plate 14. Two of the previously cemented coral colonies. The previous mitigation of the Receiver Area was carried out 12 months ago.



Plate 15. Freshly attached translocates in the Receiver Area.



Plate 16. A section of the Receiver Area after the translocation was completed.



Plate 17. One of the difficult to get at colonies relocated in the Receiver Area. The colony was eventually relocated along with the substratum it was attached to.



Plate 18. A healthy reattached coral colony 12 months post mitigation.