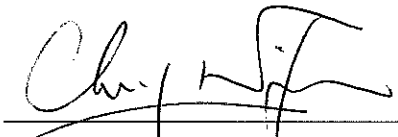


Paul Y. Construction Co. Limited

Contract No. DC/2008/09
Harbour Area Treatment Scheme
Stage 2A
Construction of Sewage Conveyance
System from Ap Lei Chau to Aberdeen
Report for Post-translocation Coral Monitoring (2nd)
(Version 1.0)

April 2010

Certified By 
(Environmental Team Leader)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties

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1 INTRODUCTION

1.1 Project Background

- 1.1.1 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.
- 1.1.2 Construction work of the seawall is expected to impact the existing epibenthic organisms at the Working Site. Previous underwater ecological survey (Eco-Enviro Consultants Company 2007) showed that the seabed around the working area was of low ecological value due to the low abundance and richness of epibenthic biota. Three colonies of hard coral, however, were identified within the Working Site. Translocation of the colonies was proposed to mitigate the impact on the standing corals.
- 1.1.3 Cinotech Consultants Limited (CINOTECH) was employed by the Contractor to form an Environmental Team (ET) with marine ecologist to undertake the environmental monitoring services for the project. The marine ecologist is required to conduct Pre-Translocation Survey, Recipient Site Survey, Coral Translocation and Post-Translocation Monitoring of the impacted hard coral colonies.
- 1.1.4 Translocation of 3 colonies from Working Site to the Recipient Site was completed on 30th January 2010. Immediate impact on the translocated colonies was not evidenced immediately after the translocation exercise as reported in the report for Recipient Site Survey and Coral Translocation. The potential effect of the translocated colonies with respect to inhabitation in the new environment, however, shall be assessed through a series of Post-translocation Monitoring.
- 1.1.5 The coral translocation was conducted on 30th January 2010. According to the EM&A Manual, the transplanted coral colonies should be regularly checked by qualified marine ecologist on every 3 months for a year after translocation. However, for the better monitoring for the translocated corals, a proposal was submitted for changing the Post-translocation monitoring to be conducted at the 1st, 2nd, 4th and 8th month after the translocation. The proposal was verified by IEC on 23rd February 2010 and approved by EPD on 26th February 2010.
- 1.1.6 A total of 4 post-translocation monitoring was proposed to assess the status of the coral. The tentative monitoring schedule is,

Monitoring	Tentative Survey Month
1 st	March 2010
2 nd	April 2010
3 rd	June 2010
4 th	October 2010

1.1.7 This report presents the results of the 2nd Post-translocation Coral Monitoring conducted on 10th April 2010.

2 METHODOLOGY

2.1 Post-translocation Coral Monitoring

2.1.1 Coral monitoring was conducted at the Recipient Site (**Fig. 2.1**). In order to identify background environmental perturbations that are not associated with the translocation, four colonies originated at the Recipient Site were tagged as the Reference Colonies. Location (GPS coordinates) of the Recipient Site and conditions during the survey are summarized in Table 3.1.

2.2 Monitoring Requirements

2.2.1 The monitoring programme comprises a Pre-translocation Survey and Coral Tagging, Coral Translocation and Post-translocation Monitoring. Coral Translocation was completed on 30th January 2010.

2.2.2 Post-translocation Monitoring aims to determine whether impacts are occurring on the translocated corals after the moving exercise. A particular focus is the effects of sedimentation, bleaching and mortality on corals.

2.2.3 According to the approval proposal for changing the Post-translocation coral monitoring, coral monitoring should be conducted at the 1st, 2nd, 4th and 8th months after the Coral Translocation. This report presents the results of Monitoring Survey in the 2nd month of Coral Translocation.

2.2.4 Dive surveys were conducted to record the health status of the tagged corals, including the 3 translocated colonies and 4 original colonies at the Recipient Site. The recorded parameters included area of the coral colonies, level of sedimentation, area of bleaching and partial mortality.

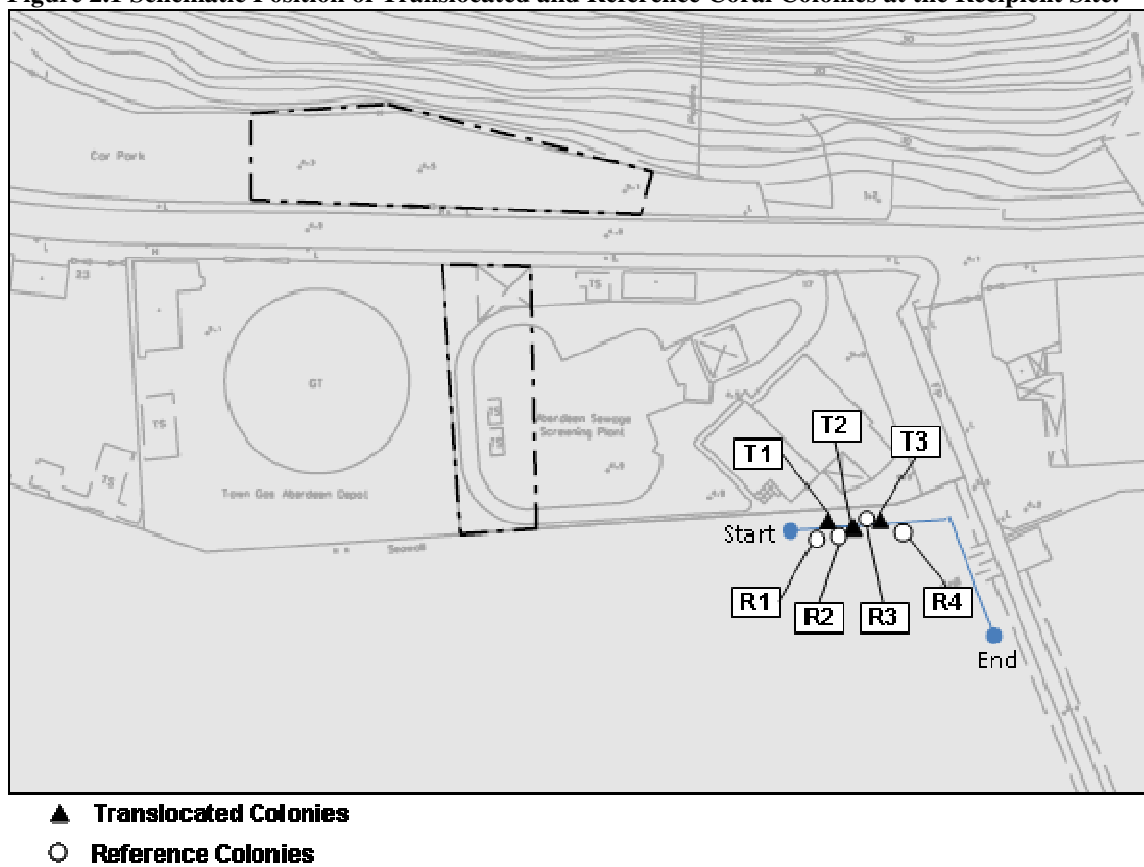
2.2.5 The geometric diameter of each colonies was measured following Lam (2000) to evaluate the growth parameter as the following equation,

$$\sqrt{\text{max. diagonal length} \times \text{length} \perp \text{to max. diagonal length}}$$

2.2.6 The condition of each tagged coral colony was recorded by taking photographs that best represents the entire colony. General physical parameters were recorded for each survey site, including visibility, weather, tidal conditions and water current.

2.2.7 Health and growth parameters were compared against the baseline data collected on the date of Coral Translocation immediately after the moving exercise (30th January 2010). In case of recorded changes (increase) in any health parameters for over 15% with respect to the baseline level, the health condition of the coral colonies is regarded impacted significantly and shall be notified for consideration of mitigation measures.

Figure 2.1 Schematic Position of Translocated and Reference Coral Colonies at the Recipient Site.



3 RESULTS

3.1 Post-translocation Coral Survey

3.1.1 The Post-translocation Coral Survey was conducted on 10th April 2010. The physical conditions of the survey site are summarized in Table 3.1.

Table 3.1 Post-translocation Coral Survey – Physical Conditions

Site	Recipient Site
GPS Coordinates	N 22°14'52.62" E 114°08'35.22"
Date	10 th April 2010
Sedimentation on Rock surfaces (mm)	1-2
Visibility (m)	1.0 – 1.5
Weather	East Wind; Beaufort force 2-3; Cloudy
Tide	Flood
Current (Knot)	0

3.1.2 Percentages of sedimentation, bleaching and mortality of each tagged colony are presented in Tables 3.2. Photographs of each tagged coral are illustrated in **Appendix I**.

3.1.3 When compared with baseline data immediate after translocation (30th January 2010), there was minor change in the health parameters in both Translocated and Reference Coral Colonies. Increased sedimentation was recorded in T03, R02, R03 and R04 with <3%; while decreased in sedimentation level was observed in T02 and R01 by 1%. Bleaching and mortality was not recorded in any of the colonies.

3.1.4 Measures on geometric diameter showed increases in colonies T02, T03 and R04 by 0.1 mm implied observable growth in the colonies when compared with baseline data.

Table 3.2 Recipient Site - Percentage of Sedimentation, Bleaching and Mortality of the Translocated and Reference Coral Colonies in Translocation (30 Jan 2010) and the Post-translocation Monitoring Surveys (6 Mar 2010 and 10 Apr 2010). “▲” and “▼” indicate increased and decreased in percentage, respectively, when compared with baseline level.

Translocated Coral Colony

Code	Coral Species	Area (cm ²)	Sedimentation (%)			Bleaching (%)			Mortality (%)			Geometric diameter (mm)		
			30/1/10 (baseline)	6/3/10	10/4/10	30/1/10 (baseline)	6/3/10	10/4/10	30/1/10 (baseline)	6/3/10	10/4/10	30/1/10 (baseline)	6/3/10	10/4/10
T01	<i>Oulastrea crispata</i>	3	0	0 -	0	0	0 -	0 -	0	0 -	0 -	16.7	16.7 -	16.7 -
T02	<i>Oulastrea crispata</i>	4	2	1 ▼	1 ▼	0	0 -	0 -	0	0 -	0 -	20.4	20.4 -	20.5 ▲
T03	<i>Oulastrea crispata</i>	6	2	3 ▲	3 ▲	0	0 -	0 -	0	0 -	0 -	29.6	29.6 -	29.7 ▲

Reference Coral Colony

Code	Coral Species	Area (cm ²)	Sedimentation (%)			Bleaching (%)			Mortality (%)			Geometric diameter (mm)		
			30/1/10 (baseline)	6/3/10	10/4/10	30/1/10 (baseline)	6/3/10	10/4/10	30/1/10 (baseline)	6/3/10	10/4/10	30/1/10 (baseline)	6/3/10	10/4/10
R01	<i>Oulastrea crispata</i>	4	2	1 ▼	1 ▼	0	0 -	0 -	0	0 -	0 -	19.1	19.1 -	19.1 -
R02	<i>Oulastrea crispata</i>	5	0	2 ▲	3 ▲	0	0 -	0 -	0	0 -	0 -	24.9	24.9 -	24.9 -
R03	<i>Oulastrea crispata</i>	6	0	1 ▲	1 ▲	0	0 -	0 -	0	0 -	0 -	29.8	29.8 -	29.8 -
R04	<i>Oulastrea crispata</i>	8	1	1 -	3 ▲	0	0 -	0 -	0	0 -	0 -	39.6	39.6 -	39.7 ▲

4 SUMMARY AND CONCLUSION

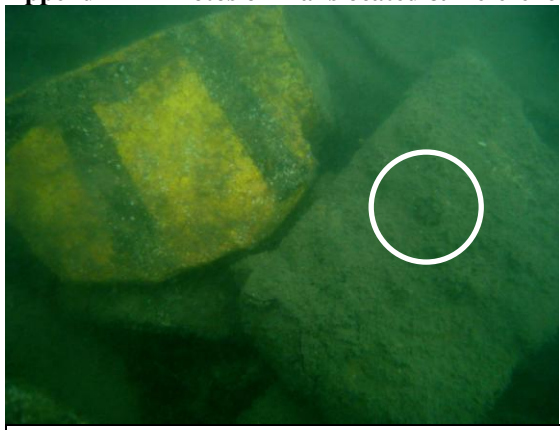
- 4.1.1 In the monitoring survey conducted on 10th April 2010, sedimentation on both Translocated and Reference Coral Colonies showed little change when compared with the baseline data (30th January 2010) immediate after translocation. No any increment in bleaching or mortality was recorded.
- 4.1.2 Among all the colonies, level of sedimentation on the colonies varied within a small range (<3%) without an observable trend. The variation was believed to be resulted from combined environmental factors such as monsoonal wind, tidal current, peripheral transports, substratum type, etc. The nil change in bleaching and partial mortality suggested no adverse effect was caused by the observed sedimentation.
- 4.1.3 Growth was recorded in selected colonies, as indicated by the increase in geometric diameters. The increment was generally contributed by the minor growth at the edge of corallites and no observable development of new corallite was recorded. The observed growth at the recipient site suggested the suitability of the environmental condition for inhabitation of the translocated colonies. A longer parallel monitoring of both translocated and reference coral colonies is regarded necessary to evaluate the effectiveness of the translocation.
- 4.1.4 Growth of the same species in local water has been shown to be 0.9 to 1.04 mm mo⁻¹ over a 12 month period (Lam 2000), which was higher than the record in the present survey over a 2-month period. Nonetheless, growth rate is affected by various environmental factors such as season, temperature and surrounding sedimentation level, which may cause variation in growth rates from the record in the NE Hong Kong waters (Lam 2000).
- 4.1.5 In summary, the monitoring survey showed that the health status of the coral colonies was normal after two month of translocation. Growth was recorded in 2 translocated and 1 reference coral colonies. Further monitoring in the 4th and 8th month after translocation will be performed in order to assess for the effectiveness of the coral translocation.

5 REFERENCES

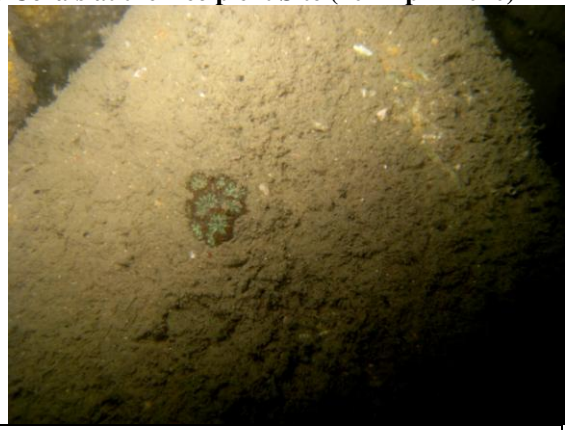
- Agriculture, Fisheries and Conservation Department (2004) Ecological Status and Revised Species Records of Hong Kong's Scleractinian Corals. Hong Kong: Agriculture, Fisheries and Conservation Department, HKSAR
- Chan A.L.K., Choi C.L.S., McCorry D., Chan K.K., Lee M.W. and Ang Put Jr. (2005) Field Guide to Hard Corals of Hong Kong. 1st Edition (Eds. W.C. Chan and Edward Stokes). Friends of the Country Parks and Cosmos Books Ltd, Hong Kong.
- Lam K.K.Y. (2000) Early growth of a pioneer recruited coral *Oulastrea crispata* (Scleractinia, Faviidae) on PFA-concrete blocks in a marine park in Hong Kong, China. Marine Ecology Progress Series 205:133-121

APPENDIX

Appendix I Photos of Translocated & Reference Corals at the Recipient Site (10th April 2010)



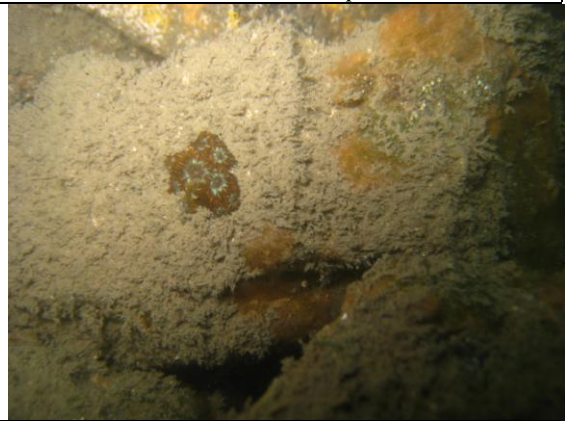
T1 *Oulastrea crispata*



T1 *Oulastrea crispata*



T2 *Oulastrea crispata*



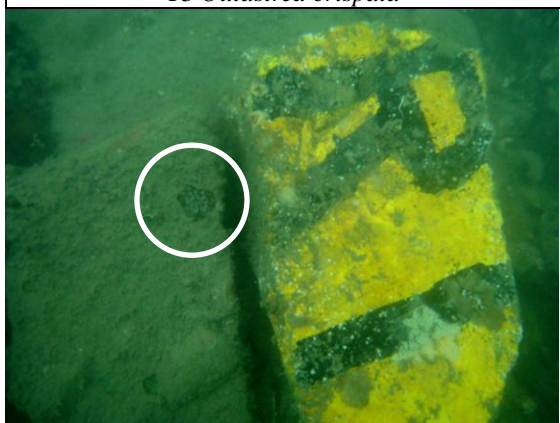
T2 *Oulastrea crispata*



T3 *Oulastrea crispata*



T3 *Oulastrea crispata*



R1 *Oulastrea crispata*



R1 *Oulastrea crispata*

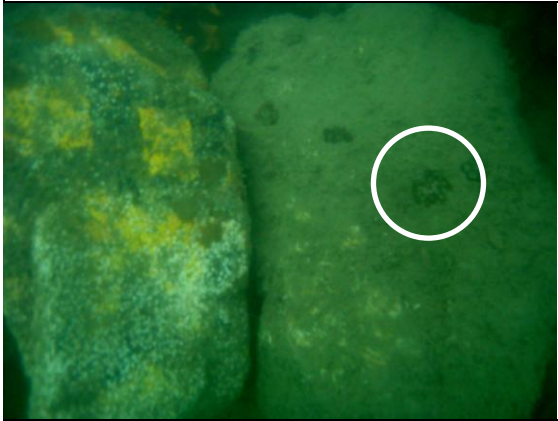
Appendix I (con't) Photos of Translocated & Reference Corals at the Recipient Site (10th April 2010)



R2 *Oulastrea crispata*



R2 *Oulastrea crispata*



R3 *Oulastrea crispata*



R3 *Oulastrea crispata*



R4 *Oulastrea crispata*



R4 *Oulastrea crispata*