


**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 (4<sup>th</sup>)**  
**(Version 2.0)**

October 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.

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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 30<sup>th</sup> January 2010. Immediate impact on the translocated colonies was not evidenced immediate 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 30<sup>th</sup> 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 1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup> and 8<sup>th</sup> month after the translocation. The proposal was verified by IEC on 23<sup>rd</sup> February 2010 and approved by EPD on 26<sup>th</sup> 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 <sup>st</sup>	March 2010
2 <sup>nd</sup>	April 2010
3 <sup>rd</sup>	June 2010
4 <sup>th</sup>	October 2010

1.1.7 This report presents the results of the 4<sup>th</sup> Post-translocation Coral Monitoring conducted on 30<sup>th</sup> October 2010.

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## 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 30<sup>th</sup> 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 1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup> and 8<sup>th</sup> months after the Coral Translocation. This report presents the results of Monitoring Survey in the 4<sup>th</sup> 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.

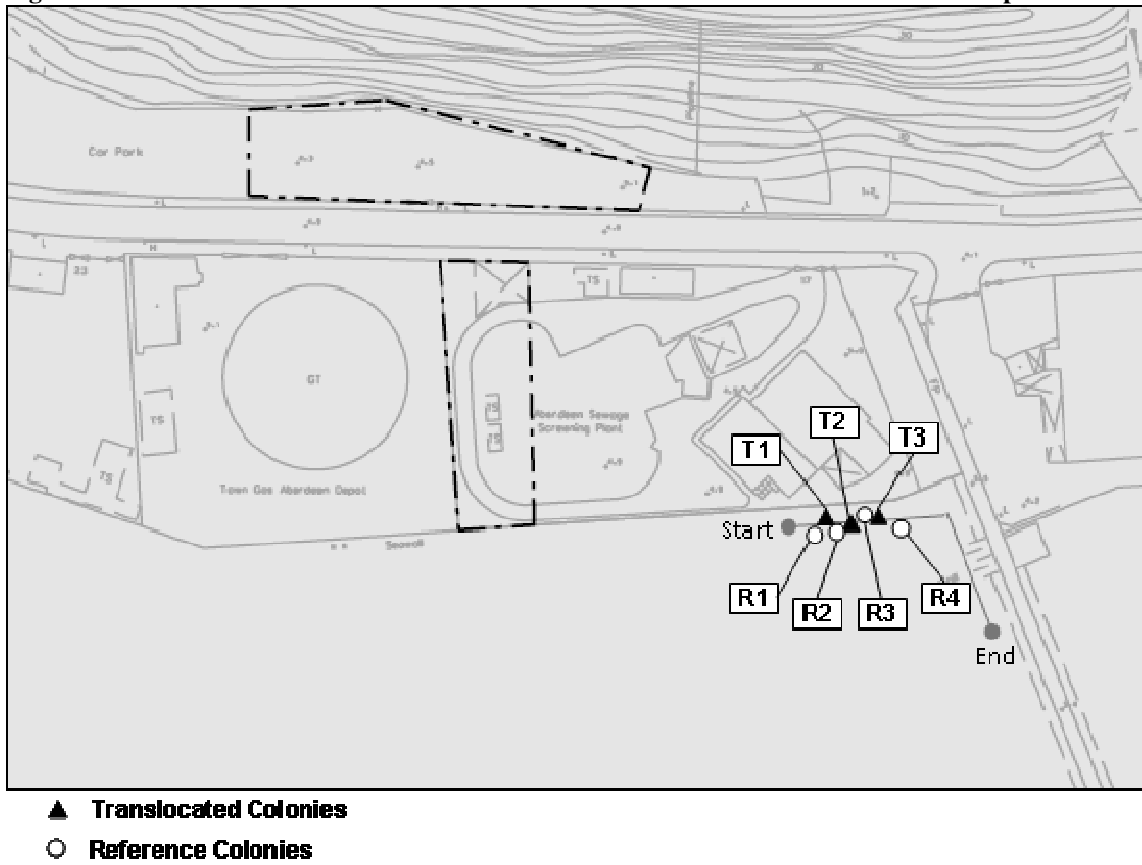
2.2.5 The geometric diameter of each colonies was measured following Lam (2000) to evaluate the growth parameter as the following equation,

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

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 (30 Jan 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 30<sup>th</sup> October 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	30 <sup>th</sup> October 2010
Sedimentation on Rock surfaces (mm)	0-3
Visibility (m)	0.5
Weather	East Wind; Beaufort force 2-3; Sunny
Tide	Flood
Current (Knot)	0 – 0.5

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 (30<sup>th</sup> January 2010), there was generally minor increase in sedimentation in both Translocated and Reference Coral Colonies for 1 to 4%. No bleaching was recorded across all colonies. The mortality rate recorded in T3 during the June 2010 survey (2%) showed no further increase in the present monitoring; a decrease in value to 1.8% was attributed to the growth of the colonies. No other partial mortality was observed in other tagged or reference colonies.

3.1.4 Measures on geometric diameter review increases in all colonies. For the Translocated Colonies, growth ranged from 2.2 to 3.0 mm since June 2010; while for the Reference Colonies, growth ranged from 1.3 to 6.1 mm over the past 4 months.

**Table 3.2 Recipient Site - Percentage of Sedimentation, Bleaching and Mortality of the Translocated and Reference Coral Colonies in Translocation (30 January 2010) and the Post-translocation Monitoring Surveys (6 March, 10 April, 5 June 2010 and 30 October 2010). “▲” and “▼” indicate increased and decreased in percentage, respectively, when compared with baseline level.**

#### Translocated Coral Colony

Code	Coral Species	Area (cm <sup>2</sup> )	Sedimentation (%)					Bleaching (%)					Mortality (%)					Geometric diameter (mm)				
			30/1/2010 (baseline)	6/3 /2010	10/4 /2010	5/6 /2010	30/10 /2010	30/1/2010 (baseline)	6/3 /2010	10/4 /2010	5/6 /2010	30/10 /2010	30/1/2010 (baseline)	6/3 /2010	10/4 /2010	5/6 /2010	30/10 /2010	30/1/2010 (baseline)	6/3 /2010	10/4 /2010	5/6 /2010	30/10 /2010
T01	<i>Oulastrea crispata</i>	3	0	0 -	2 ▲	3 ▲	2 ▲	0	0 -	0 -	0 -	0 -	0	0 -	0 -	0 -	0 -	16.7	16.7 -	16.7 -	18.0 ▲	20.2▲
T02	<i>Oulastrea crispata</i>	4	2	1 ▼	1 ▼	4 ▲	4 ▲	0	0 -	0 -	0 -	0 -	0	0 -	0 -	0 -	0 -	20.4	20.4 -	20.5 ▲	23.2 ▲	26.2 ▲
T03	<i>Oulastrea crispata</i>	6	2	3 ▲	3 ▲	6 ▲	2 -	0	0 -	0 -	0 -	0 -	0	0 -	0 -	2 ▲	1.8▲	29.6	29.6 -	29.7 ▲	31.9 ▲	34.7 ▲

#### Reference Coral Colony

Code	Coral Species	Area (cm <sup>2</sup> )	Sedimentation (%)					Bleaching (%)					Mortality (%)					Geometric diameter (mm)				
			30/1/2010 (baseline)	6/3 /2010	10/4 /2010	5/6 /2010	30/10 /2010	30/1/2010 (baseline)	6/3 /2010	10/4 /2010	5/6 /2010	30/10 /2010	30/1/2010 (baseline)	6/3 /2010	10/4 /2010	5/6 /2010	30/10 /2010	30/1/2010 (baseline)	6/3 /2010	10/4 /2010	5/6 /2010	30/10 /2010
R01	<i>Oulastrea crispata</i>	4	2	1 ▼	1 ▼	2 -	1 ▼	0	0 -	0 -	0 -	0 -	0	0 -	0 -	0 -	0 -	19.1	19.1 -	19.1 -	23.3 ▲	29.5 ▲
R02	<i>Oulastrea crispata</i>	5	0	2 ▲	3 ▲	6 ▲	4 ▲	0	0 -	0 -	0 -	0 -	0	0 -	0 -	0 -	0 -	24.9	24.9 -	24.9 -	25.2 ▲	26.5 ▲
R03	<i>Oulastrea crispata</i>	6	0	1 ▲	1 ▲	4 ▲	4 ▲	0	0 -	0 -	0 -	0 -	0	0 -	0 -	0 -	0 -	29.8	29.8 -	29.8 -	31.2 ▲	32.6 ▲
R04	<i>Oulastrea crispata</i>	8	1	1 -	3 ▲	2 ▲	2 ▲	0	0 -	0 -	0 -	0 -	0	0 -	0 -	0 -	0 -	39.6	39.6 -	39.7 ▲	41.6 ▲	43.9 ▲



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## 4 SUMMARY AND CONCLUSION

- 4.1.1 In the monitoring survey conducted on 30<sup>th</sup> October 2010, sedimentation on both Translocated and Reference Coral Colonies showed a general increase in minor level (< 5%). The variation was believed to be resulted from combined environmental factors such as monsoonal wind, tidal current, peripheral transports, substratum type, etc. No bleaching was observed in all monitored colonies which suggested that no adverse effect that may be resulted from the increase in sedimentation.
- 4.1.2 The partial mortality in T03 was recorded in June 2010, which was likely caused by physical abrasion. A decrease in percentage mortality was recorded due to the growth of the colonies, as well as no further increase in the mortality area. The observation suggested that the recorded damage did not pose further impact on the colony. The general health of the colony was also reflected by the similar growth rate as compared with the other colonies.
- 4.1.3 Growth was evidenced in all translocated and reference coral colonies in terms of geometric diameters. The rate of increment was 0.5 to 0.8 mm mo<sup>-1</sup> for the translocated colonies; and 0.3 to 1.5 mm mo<sup>-1</sup> for the reference colonies. The growth is contributed by both the increase in size and number of corallites. The growth increment was lower but comparable to the observation from the 2<sup>nd</sup> (April 2010) to 3<sup>rd</sup> (June 2010) monitoring (i.e. 0.7 to 1.3 mm mo<sup>-1</sup> for the translocated colonies and 0.1 to 2.1 mm mo<sup>-1</sup> for the reference colonies) The observed growth at the recipient site suggested that the environmental conditions are suitable for the translocated coral colonies for inhabitation.
- 4.1.4 Over the whole monitoring period, the growth rate observed in the present survey (0.2 to 1.3 mm mo<sup>-1</sup> over 8 month) is comparable to previous study of the same species (wild, non-translocated colonies) in local water at Hoi Ha Wan (0.9 to 1.04 mm mo<sup>-1</sup> over 12 month observation) (Lam 2000). However, growth rate is affected by various environmental factors such as season, temperature and surrounding sedimentation level, which may cause variation in growth rates of the present study at the Southern waters from the record in the Northeastern waters (Lam 2000).
- 4.1.5 In summary, the 4 post-translocation coral monitoring conducted over 8 months after the coral translocation showed no significant increase in level of sedimentation, bleaching and mortality rate in the Translocated Colonies. Growth of the colonies was recorded over the post-translocation period at a comparable rate as the original Reference Colonies, as well as the past record in local water. The generally normal health status and growth of the translocated colonies indicated no adverse impact from translocation and their ability to adapt to the environment at the recipient site. The coral translocation exercise is regarded complete and successful, and no further monitoring is suggested for the Translocated Colonies.

## 5 REFERENCES

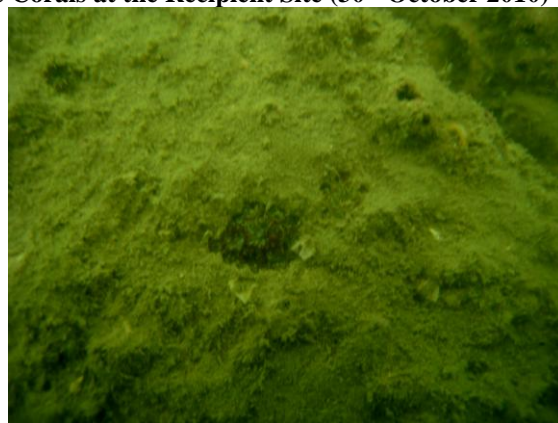
- Agriculture, Fisheries and Conservation Department (2004) Ecological Status and Revised Species Records of Hong Kong's Scleractinian Corals. Hong Kong: Agriculture, Fisheries and Conservation Department, HKSAR
- Chan A.L.K., Choi C.L.S., McCorry D., Chan K.K., Lee M.W. and Ang Put Jr. (2005) Field 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 (30<sup>th</sup> October 2010)



T1 *Oulastrea crispata*



T1 *Oulastrea crispata*



T2 *Oulastrea crispata*



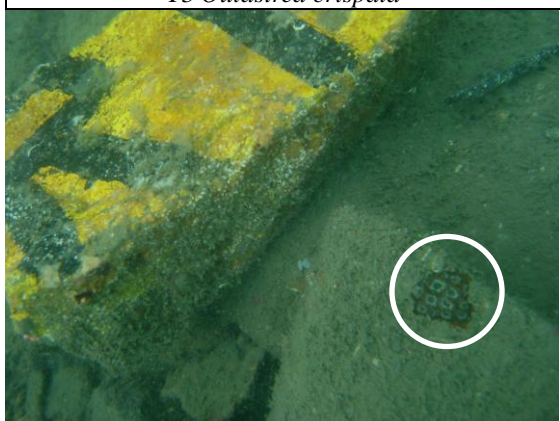
T2 *Oulastrea crispata*



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 (30<sup>th</sup> October 2010)



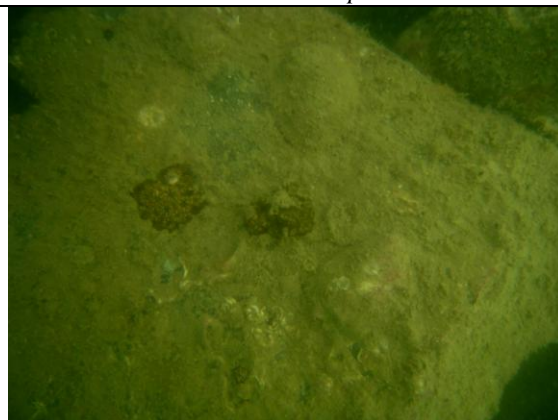
R2 *Oulastrea crispata*



R2 *Oulastrea crispata*



R3 *Oulastrea crispata*



R3 *Oulastrea crispata*



R4 *Oulastrea crispata*



R4 *Oulastrea crispata*