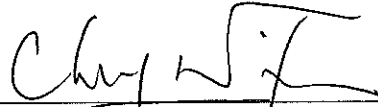


Paul Y. Construction Co. Limited

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 (3rd)
(Version 1.0)

June 2010

Certified By	 (Environmental Team Leader)
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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 3rd Post-translocation Coral Monitoring conducted on 5th June 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 4th 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.

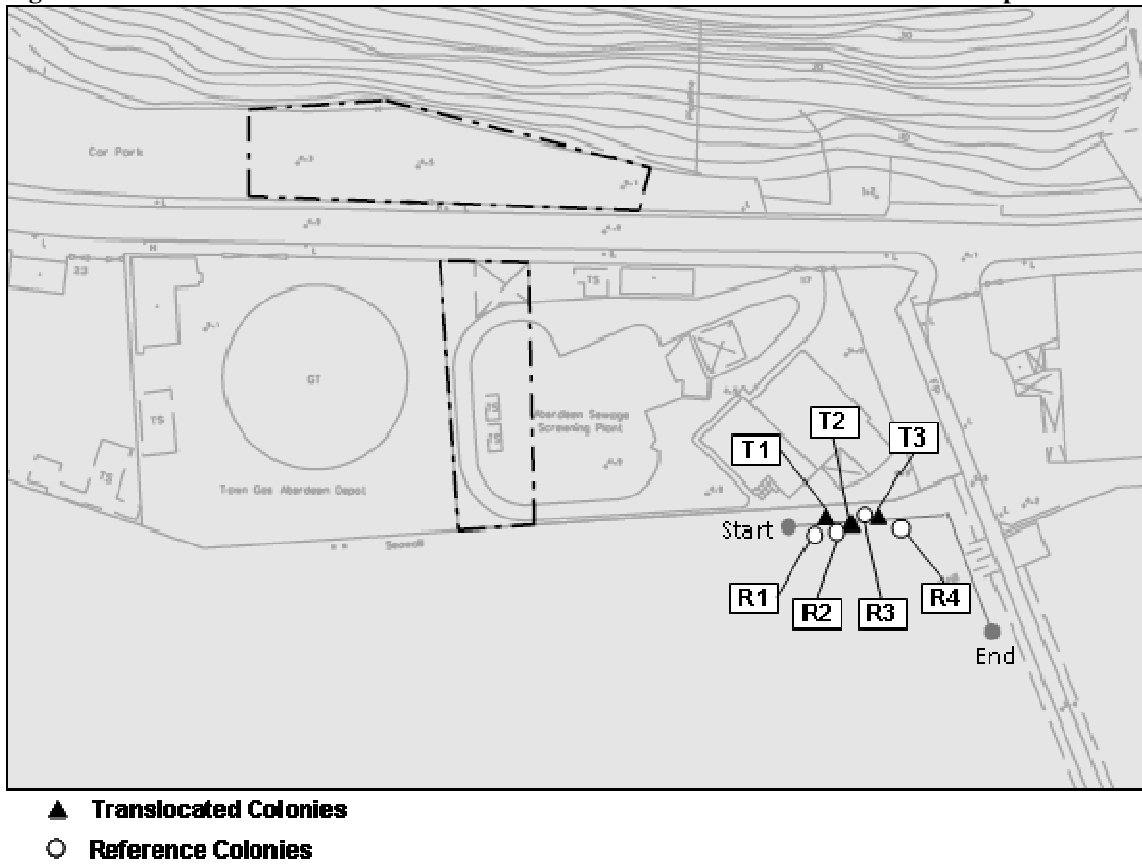
2.2.5 The geometric diameter of each colonies was measured following Lam (2000) to evaluate the growth parameter as the following equation,

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

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 5th June 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	5 th June 2010
Sedimentation on Rock surfaces (mm)	0-2
Visibility (m)	2 – 3
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 generally minor increase in sedimentation in both Translocated and Reference Coral Colonies for 1 to 6%. No Bleaching was recorded across all colonies. New partially mortality was recorded in T3 for 2%, which was likely to be caused by abrasion.

3.1.4 Measures on geometric diameter review increases in all colonies. For the Translocated Colonies, growth ranged from 1.3 to 2.7 mm since April 2010; while for the Reference Colonies, growth ranged from 0.3 to 4.2 mm over the past 2 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 and 5 June 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	5/6/2010	30/1/10 (baseline)	6/3/10	10/4/10	5/6/2010	30/1/10 (baseline)	6/3/10	10/4/10	5/6/2010	30/1/10 (baseline)	6/3/10	10/4/10	5/6/2010
T01	<i>Oulastrea crispata</i>	3	0	0 -	2 ▲	3 ▲	0	0 -	0 -	0 -	0	0 -	0 -	0 -	16.7	16.7 -	16.7 -	18.0 ▲
T02	<i>Oulastrea crispata</i>	4	2	1 ▼	1 ▼	4 ▲	0	0 -	0 -	0 -	0	0 -	0 -	0 -	20.4	20.4 -	20.5 ▲	23.2 ▲
T03	<i>Oulastrea crispata</i>	6	2	3 ▲	3 ▲	6 ▲	0	0 -	0 -	0 -	0	0 -	0 -	2 ▲	29.6	29.6 -	29.7 ▲	31.9 ▲

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	5/6/2010	30/1/10 (baseline)	6/3/10	10/4/10	5/6/2010	30/1/10 (baseline)	6/3/10	10/4/10	5/6/2010	30/1/10 (baseline)	6/3/10	10/4/10	5/6/2010
R01	<i>Oulastrea crispata</i>	4	2	1 ▼	1 ▼	2 -	0	0 -	0 -	0 -	0	0 -	0 -	0 -	19.1	19.1 -	19.1 -	23.3 ▲
R02	<i>Oulastrea crispata</i>	5	0	2 ▲	3 ▲	6 ▲	0	0 -	0 -	0 -	0	0 -	0 -	0 -	24.9	24.9 -	24.9 -	25.2 ▲
R03	<i>Oulastrea crispata</i>	6	0	1 ▲	1 ▲	4 ▲	0	0 -	0 -	0 -	0	0 -	0 -	0 -	29.8	29.8 -	29.8 -	31.2 ▲
R04	<i>Oulastrea crispata</i>	8	1	1 -	3 ▲	2 ▲	0	0 -	0 -	0 -	0	0 -	0 -	0 -	39.6	39.6 -	39.7 ▲	41.6 ▲

4 SUMMARY AND CONCLUSION

- 4.1.1 In the monitoring survey conducted on 5th June 2010, sedimentation on both Translocated and Reference Coral Colonies showed a general increase in minor level (< 6%). The variation was believed to be resulted from combined environmental factors such as monsoonal wind, tidal current, peripheral transports, substratum type, etc. No increase in bleaching suggested the unlikely adverse effect caused by the observed sedimentation.
- 4.1.2 Record of mortality was recorded in T03, which was likely caused physically by abrasion as indicated by the damage of the underlying skeleton. The mortality led to sedimentation around the damaged area. Further observation is necessary to monitor if the mortality remain stable or further increase.
- 4.1.3 Growth was evidenced in all translocated and reference coral colonies in terms of geometric diameters. The rate of increment was 0.7 to 1.3 mm mo⁻¹ for the tranlocated colonies; and 0.1 to 2.1 mm mo⁻¹ for the reference colonies. The growth is primarily contributed by the increase in site of the corallites rather than development of new corallite. The observed growth at the recipient site suggested the suitable environmental condition for inhabitation of the translocated colonies.
- 4.1.4 The growth rate observed in the present survey is comparable to previous study of the same species in local water (0.9 to 1.04 mm mo⁻¹ over 12 month observation) (Lam 2000). The general higher values in the present survey may be attributed to the higher growth rate in summer (Lam 2000). Moreover, 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 four month of translocation. Growth was recorded in all translocated and reference coral colonies. Further monitoring in the 8th month after translocation will be performed in order to assess for the effectiveness of the coral translocation.

5 REFERENCES

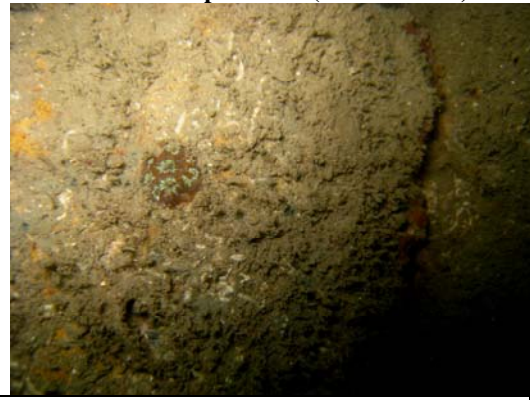
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APPENDIX

Appendix I Photos of Translocated & Reference Corals at the Recipient Site (5th June 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 (5th June 2010)



R2 *Oulastrea crispata*



R2 *Oulastrea crispata*



R3 *Oulastrea crispata*



R3 *Oulastrea crispata*



R4 *Oulastrea crispata*



R4 *Oulastrea crispata*