CONTRACT NO: HK/2009/05

WANCHAI DEVELOPMENT PHASE II AND CENTRAL WANCHAI BYPASS

SAMPLING, FIELD MEASUREMENT AND TESTING WORK (STAGE 1)

POST-TRANSLOCATION CORAL MONITORING REPORT

- JUNE 2010 -

CLIENT:

Civil Engineering and Development Department

And

Highways Department

PREPARED BY:

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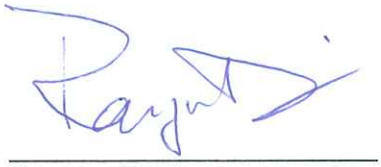

Raymond Dai
Environmental Team Leader

DATE:

8 July 2010

ENVIRON

Ref.: AACWBIECEM00_0_0352L.10 21 July 2010

Lam Geotechnics Limited
11/F Centre Point
181-185 Gluocester Road
Wan Chai, Hong Kong

By Post and Fax (2882 3331)

Attention: Mr. Raymond Dai

Dear Sir,

Re: Contract No. HK/2009/05
Wan Chai Development Phase II and Central-Wan Chai Bypass – Sampling, Field Measurement and Testing Work (Stage 1)
Post-translocation Coral Monitoring Report (June 2010)

Reference is made to your submission of the Post-translocation Coral Monitoring Report dated 8 July 2010 by E-mail for our review and comment.

Please be informed that we have no adverse comments on the captioned submission. We write to verify the captioned report as per the requirements of the Coral Translocation Plan deposited under Condition 2.10 of FEP-01/356/2009 and EP-356/2009.

Thank you for your kind attention.

Yours sincerely,

David Yeung
Independent Environmental Checker

c.c.	CEDD	Mr. Patrick Keung	by fax: 2577 5040
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1 INTRODUCTION

1.1 Project Background

1.1.1 Under the Wan Chai Development Phase II and Central-Wan Chai Bypass Project, the proposed reclamation works and the associated dredging activities are expected to post direct and indirect impacts on the marine ecology. Baseline marine ecological survey conducted in 2007 and February 2010 revealed and confirmed the presence of hard and gorgonian corals at the ex-PCWA Basin (Site 13) and North Point (Site 27).

1.1.2 Translocation of the affected colonies from Site 13 and Site 27 to a Recipient Site at Junk Bay was conducted since 20 February 2010 to mitigate the impact on the standing corals. A total of 19 coral colonies (*Oulastrea crispate*) from coral Donor Site (Site 13) and 1 gorgonian sea whip (*Echinomuricea* sp.) from coral Donor Site (Site 27) were tagged and translocated to the recipient site (Junk Bay) in February 2010.

1.1.3 Post-translocation monitoring is needed to identify the condition of the coral colonies translocated. To do this, a total of 15 reference coral colonies (10 *Oulastrea crispate* and 5 gorgonian sea whips) were tagged in the Recipient Site. On each post-translocation monitoring, information of each colony on health status (percentage of mortality, sedimentation and bleaching) should be reviewed and used as reference to evaluate the impact of translocation on the corals from Donor Sites.

1.1.4 Lam Geotechnics Limited (LAM) was employed by the Civil Engineering and Development Department to serve as the Environmental Team (ET) to conduct the post-translocation coral monitoring for the project.

1.1.5 This report presents the results of the 2nd post-translocation coral monitoring conducted at Junk Bay in June 2010.

2 METHODOLOGY

2.1 Post-translocation Coral Monitoring at Recipient Site (Junk Bay)

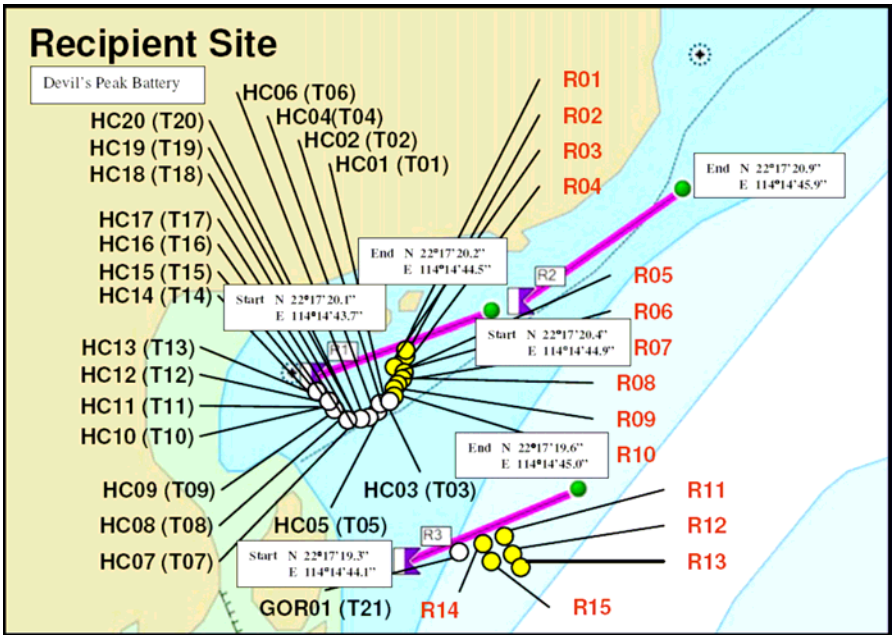
2.1.1 The 2nd post re-translocation coral monitoring was conducted at Junk Bay (Fig. 2.1) on 26 June 2010. The health status of a total of 21 translocated coral colonies (20 hard corals *Oulastrea crispata* and 1 gorgonian sea whip *Echinomericeae sp*.) and 15 reference coral colonies (10 hard corals *Oulastrea crispata* and 5 gorgonian sea whips *Echinomericea sp*.) at the Recipient Site (Junk Bay) were monitored in the survey.

2.2 Monitoring Requirements

2.2.1 Following coral translocation in February 2010, post-translocation coral monitoring events have been scheduled. Monitoring should be conducted at the 1st (i.e. March 2010), 4th (June 2010) 7th (September 2010) and 10th (December 2010) months at the Recipient Site (Junk Bay) in order to evaluate the health status of the translocated corals. The results of the baseline data from the previous report for coral translocation should be used as reference and reviewed during each post-translocation coral monitoring.

2.2.2 The parameters on percentage of mortality, sedimentation and bleaching should be recorded for each translocated and reference coral colony at the Recipient Site. The condition of each coral colony should be recorded by taking photographs that best represents the entire colony. General environmental conditions include weather and sea condition at the recipient site should be recorded during each monitoring.

Fig. 2.1 Map Showing the Location of the Coral Recipient Site (R). Location and code of each coral colony are shown. Hard and gorgonian corals are located at shallow (R1) and deep (R3) areas, respectively.



2.3 Compliance / Event Action Plan

2.3.1 Coral monitoring results were evaluated against Action and Limit Levels. Evaluation were based on recorded changes in,

- Percentage of partial mortality
- Percentage of sediment cover
- Percentage of bleaching

2.3.2 Action and Limit Levels are defined in Table 2.1

2.3.3 If the defined Action Level or Limit Levels for coral monitoring were exceeded, the stepwise procedures should be implemented in accordance to the EM&A manual to reverse the unfavourable impact on the coral communities.

Table 2.1 Action and Limit Level for Coral Monitoring.

Parameter	Action Level Definition	Limit Level Definition
Sedimentation	If during Impact Monitoring a 15% increase in the percentage of sediment cover on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded on the original corals at the Recipient Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of sediment cover occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded on the original corals at the Recipient Site, then the Limit Level is exceeded.
Bleaching	If during Impact Monitoring a 15% increase in the percentage of bleaching (bleached white) on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded on the original corals at the Recipient Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of bleaching (bleached white) occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded on the original corals at the Recipient Site, then the Limit Level is exceeded.
Mortality	If during Impact Monitoring a 15% increase in the percentage of partial mortality on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded on the original corals at the Recipient Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of partial mortality occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded on the original corals at the Recipient Site, then the Limit Level is exceeded.

2.3.4 During the post-translocation monitoring observations, if action or limit level was exceeded, the ET should inform AFCD and in liaison with AFCD to investigate any measures needed.

3 RESULTS

3.1 Post-Translocation Coral Monitoring at Recipient Site (Junk Bay)

3.1.1 The 2nd Post-translocation coral monitoring was conducted on 26 June 2010. The locations of the tagged corals are shown in Figure 2.1, and survey conditions in Table 3.1. Physical conditions and health status of the recorded colonies are presented in Table 3.2. Pictures of each translocated and reference coral colonies are presented in Appendix I.

Table 3.1 Physical Conditions during the survey.

Site	Shallow area (R1)	Deep area (R3)
GPS Coordinates	N 22°17'20.1" E 114°14'43.7"	N 22°17'19.3" E 114°14'44.1"
Date	26 June 2010	
Depth	3-5m	8-10m
Sedimentation on rock surfaces (mm)	~ 3-4	~ 3-5
Visibility (m)	0.5	0.5-1
Weather	Southwest wind; Heavy rain patches	
Tide	Spring, flood tide	
Current (Knot)	~0.5-1.0	~1.0

Hard Coral Colonies at Shallow area (R1)

3.1.2 Sedimentation was found in all hard coral colonies, ranged from 2 to 6%. No bleaching and partial mortality was recorded (Table 3.2). Only one colony T17 showed low percentage of bleaching (6%). No significant change in percentage of sedimentation, bleaching and partial mortality was observed on the other translocated (T01 to T20) and reference (R01 to R10) colonies, when compared with the baseline survey.

Gorgonian Corals at Deep area (R3)

3.1.3 Sedimentation was found in all soft coral colonies, ranged from 4 to 6%. No bleaching and partial mortality was recorded (Table 3.2). No significant change in percentage of sedimentation, bleaching and partial mortality was observed on both translocated (T21) and reference (R11 to R15) colonies, when compared with the baseline survey (Table 3.2).

Table 3.2 Recipient Site - Percentage sedimentation, Bleaching and Mortality of the Reference and Translocated Coral Colonies in Baseline survey (February 2010) and 1st post-translocation monitoring (March 2010). Symbols ↑ and ↓ indicate increase and decrease of percentage, respectively.

Recipient Site (Shallow area, R1)

Code	Coral Species	Area (cm^2)	Sedimentation (%)		Bleaching (%)		Mortality (%)	
			20 Feb 2010 (baseline)	26 Jun 2010 (2nd monitoring)	20 Feb 2010 (baseline)	26 Jun 2010 (2nd monitoring)	20 Feb 2010 (baseline)	26 Jun 2010 (2nd monitoring)
R01	*O. crispata*	25	2	4 ↑	0	0	0	0
R02	*O. crispata*	20	1	4 ↑	0	0	0	0
R03	*O. crispata*	10	2	2	0	0	0	0
R04	*O. crispata*	60	1	5 ↑	0	0	0	0
R05	*O. crispata*	10	0	2 ↑	0	0	0	0
R06	*O. crispata*	15	1	2 ↑	0	0	0	0
R07	*O. crispata*	50	2	3 ↑	0	0	0	0
R08	*O. crispata*	70	0	6 ↑	0	0	0	0
R09	*O. crispata*	20	0	4 ↑	0	0	0	0
R10	*O. crispata*	15	2	2	0	0	0	0
T01	*O. crispata*	8	1	5 ↑	0	0	0	0
T02	*O. crispata*	25	2	5 ↑	0	0	0	0
T03	*O. crispata*	6	2	5 ↑	0	0	0	0
T04	*O. crispata*	9	2	5 ↑	0	0	0	0
T05	*O. crispata*	10	3	4 ↑	0	0	0	0
T06	*O. crispata*	22	1	4 ↑	0	0	0	0
T07	*O. crispata*	12	2	5 ↑	0	0	0	0
T08	*O. crispata*	38	1	2 ↑	0	0	0	0
T09	*O. crispata*	16	1	2 ↑	0	0	0	0
T10	*O. crispata*	6	1	2 ↑	0	0	0	0
T11	*O. crispata*	45	1	4 ↑	0	0	0	0
T12	*O. crispata*	15	3	4 ↑	0	0	0	0
T13	*O. crispata*	25	3	4 ↑	0	0	0	0
T14	*O. crispata*	18	0	5 ↑	0	0	0	0
T15	*O. crispata*	12	0	5 ↑	0	0	0	0
T16	*O. crispata*	9	1	5 ↑	0	0	0	0
T17	*O. crispata*	26	1	5 ↑	0	6 ↑	0	0
T18	*O. crispata*	18	3	5 ↑	0	0	0	0
T19	*O. crispata*	6	2	5 ↑	0	0	0	0
T20	*O. crispata*	8	2	4 ↑	0	0	0	0

Recipient Site (Deep area, R3)

Code	Coral Species	Height (cm)	Sedimentation (%, mm)		Bleaching (%)		Mortality (%)	
			20 Feb 2010 (baseline)	26 Jun 2010 (2nd monitoring)	20 Feb 2010 (baseline)	26 Jun 2010 (2nd monitoring)	20 Feb 2010 (baseline)	26 Jun 2010 (2nd monitoring)
R11	*Echinomuricea* sp.	25	0	4 ↑	0	0	0	0
R12	*Echinomuricea* sp.	25	0	5 ↑	0	0	0	0
R13	*Echinomuricea* sp.	15	0	5 ↑	0	0	0	0
R14	*Echinomuricea* sp.	25	0	5 ↑	0	0	0	0
R15	*Echinomuricea* sp.	20	0	5 ↑	0	0	0	0
T21	*Echinomuricea* sp.	40	0	6 ↑	0	0	0	0

4 DISCUSSION

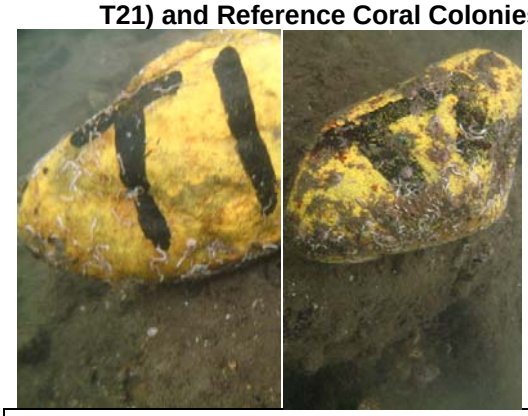
4.1.1 All the coral colonies showed no significant change in sedimentation, bleaching and partial mortality when compared with the baseline survey. As a result of the heavy rainfall in the week before the survey, sediments were transported to sea by hillstreams. This may explain the slightly increased in sedimentation in almost all coral colonies.

4.1.2 The translocated coral colonies were generally healthy, as indicated by low level of sedimentation, bleaching and mortality. NO significant post-translocation impact on the corals was observed and NO Action Level or Limit Level for coral monitoring was exceeded.

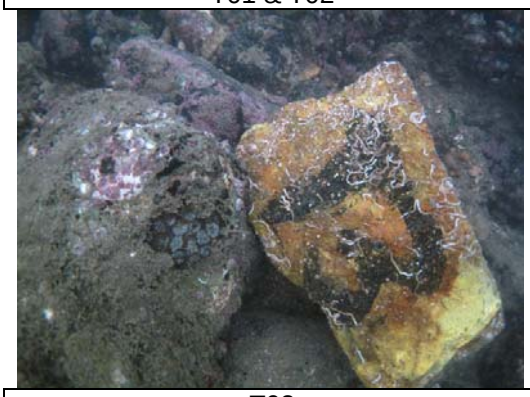
4.1.3 In order to evaluate the effectiveness of the translocation, longer term, regular, post-translocation monitoring should be conducted to assess the status of the translocated colonies. Monitoring should be performed at the 7th (i.e. September 2010) and 10th (i.e. December 2010) month after the translocation. Any change in health status in both translocated and reference coral colonies should be monitored and compared with the previous and baseline surveys.

APPENDIX

Appendix I Photo Record of 2nd Post-translocation Monitoring for Translocated (T01 to T21) and Reference Coral Colonies (R01 to R15) at Recipient Site.



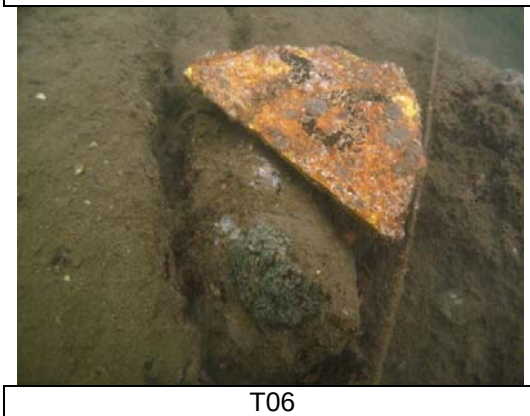
T01 & T02 *Oulastrea crispata*



T03 *Oulastrea crispata*

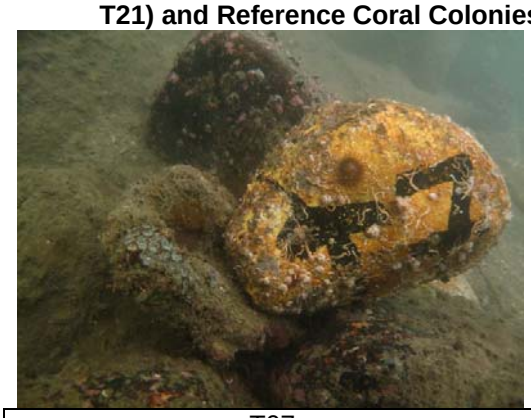
T04 *Oulastrea crispata*

T05 *Oulastrea crispata*



T06 *Oulastrea crispata*

Appendix I Photo Record of 2nd Post-translocation Monitoring for Translocated (T01 to T21) and Reference Coral Colonies (R01 to R15) at Recipient Site.




T07	*Oulastrea crispata*

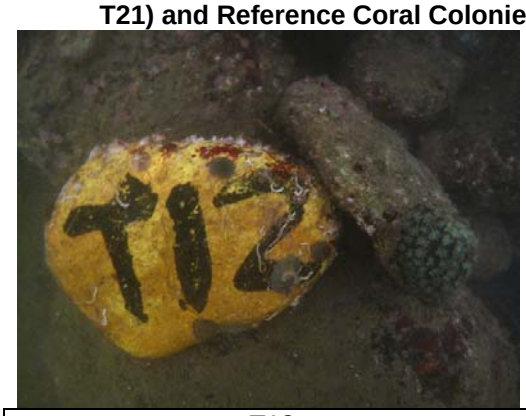
T08	*Oulastrea crispata*

T09	*Oulastrea crispata*

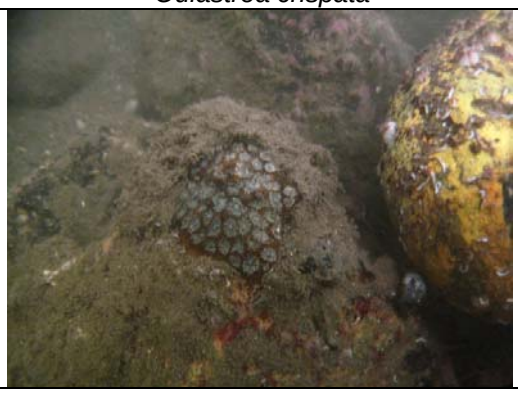
T10	*Oulastrea crispata*

T11	*Oulastrea crispata*

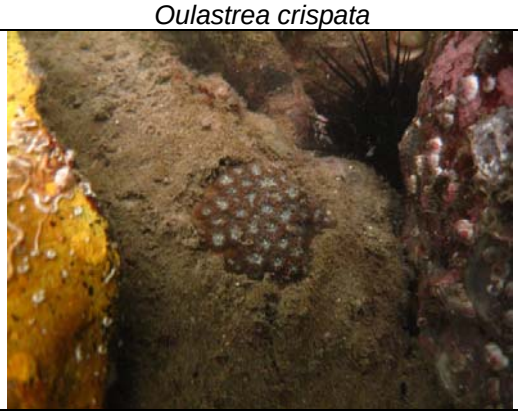
Appendix I Photo Record of 2nd Post-translocation Monitoring for Translocated (T01 to T21) and Reference Coral Colonies (R01 to R15) at Recipient Site.




T12	*Oulastrea crispata*

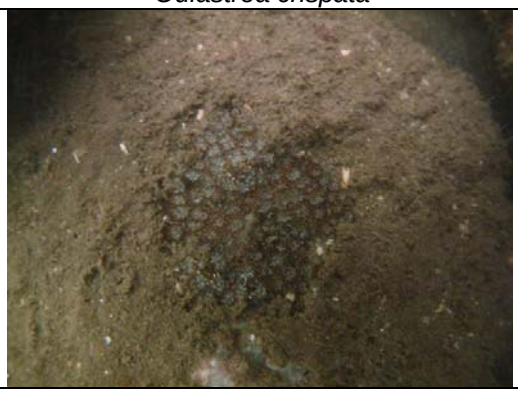



T13	*Oulastrea crispata*

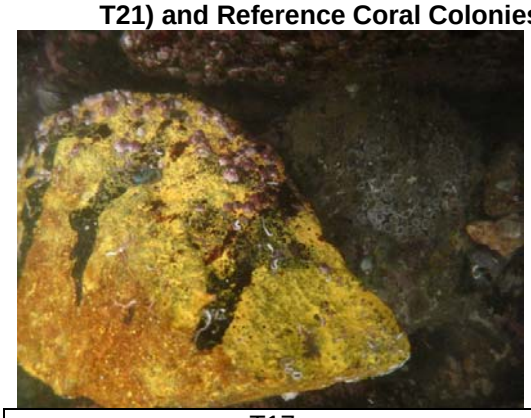
T14	*Oulastrea crispata*


T15	*Oulastrea crispata*

T16	*Oulastrea crispata*

Appendix I Photo Record of 2nd Post-translocation Monitoring for Translocated (T01 to T21) and Reference Coral Colonies (R01 to R15) at Recipient Site.

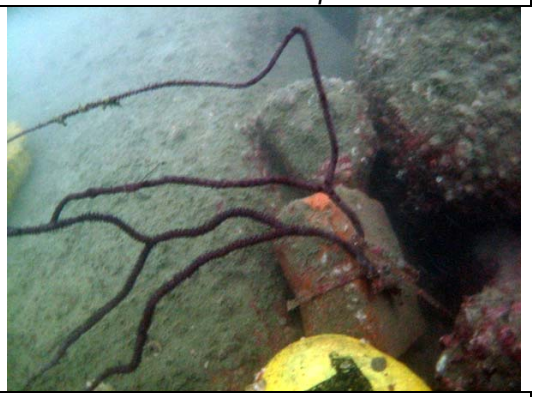


T17 *Oulastrea crispata*

T18 *Oulastrea crispata*

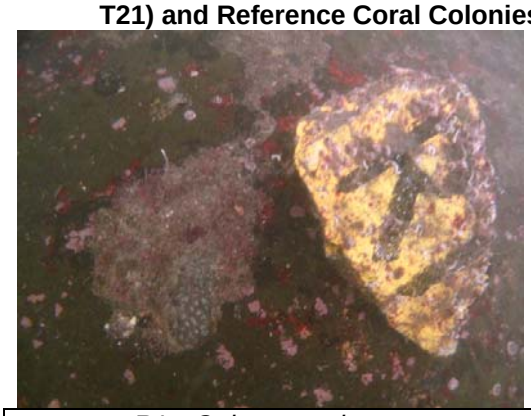
T19 *Oulastrea crispata*

T20 *Oulastrea crispata*



T21 *Echinomuricea* sp.

Appendix I Photo Record of 2nd Post-translocation Monitoring for Translocated (T01 to T21) and Reference Coral Colonies (R01 to R15) at Recipient Site.



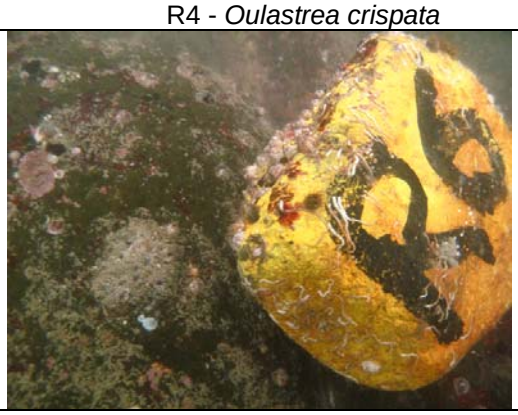
R1 - *Oulastrea crispata*

R2 - *Oulastrea crispate*

R3 - *Oulastrea crispata*

R4 - *Oulastrea crispata*

R5 - *Oulastrea crispata*

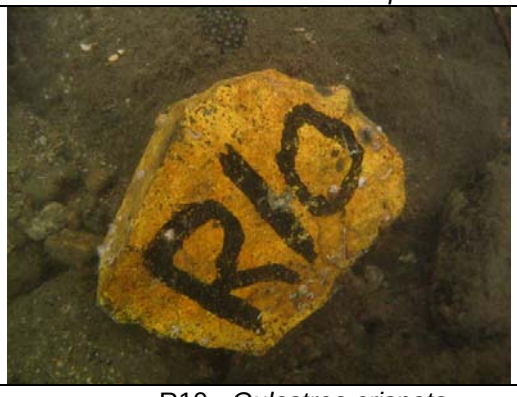


R6 - *Oulastrea crispata*

R7 - *Oulastrea crispata*

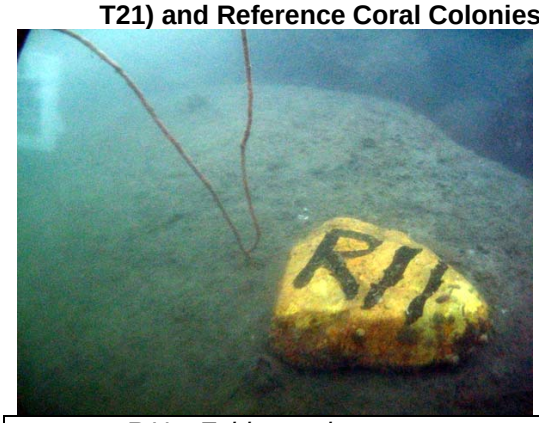
R8 - *Oulastrea crispata*

R9 - *Oulastrea crispata*



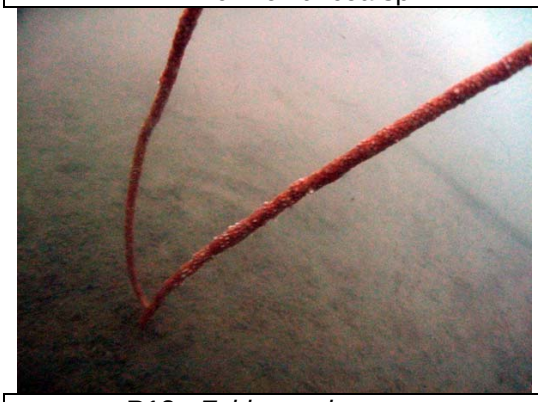
R10 - *Oulastrea crispata*

Appendix I Photo Record of 2nd Post-translocation Monitoring for Translocated (T01 to T21) and Reference Coral Colonies (R01 to R15) at Recipient Site.

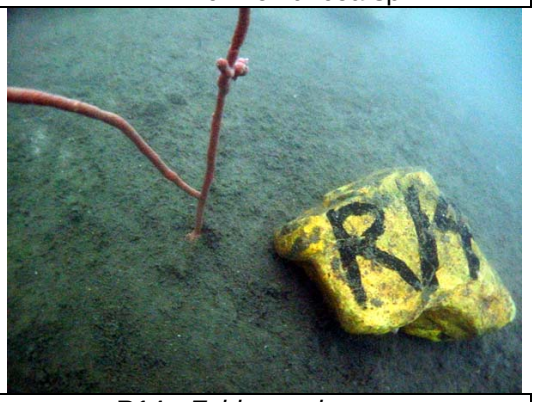


R11 - *Echinomuricea* sp.

R12 - *Echinomuricea* sp.



R13 - *Echinomuricea* sp.



R14 - *Echinomuricea* sp.

R15 - *Echinomuricea* sp.