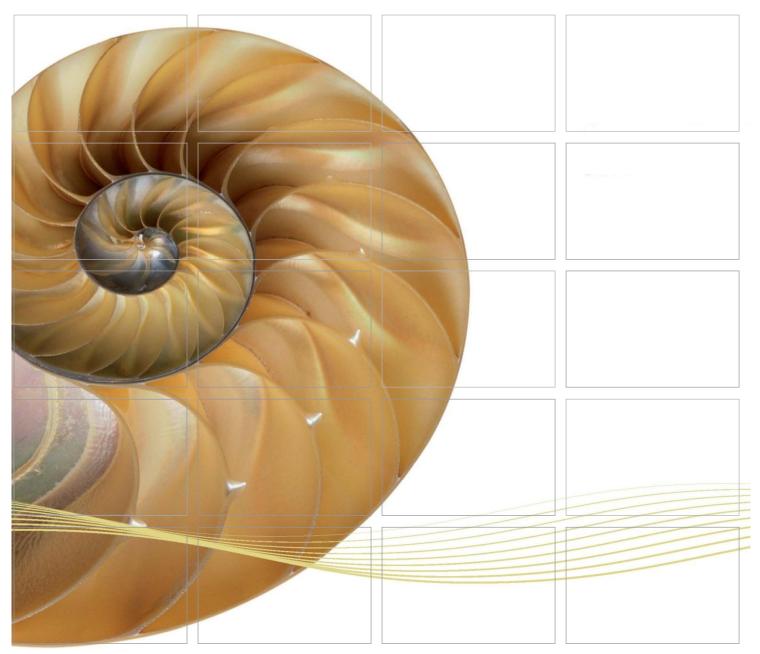
#### Report



# Contract No. HY/2012/07 Tuen Mun – Chek Lap Kok Link – Southern Connection Viaduct Section

Fourth Quarterly Post-Translocation Coral Monitoring Report

10 November 2014

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# Contract No. HY/2012/07 Tuen Mun – Chek Lap Kok Link – Southern Connection Viaduct Section

Fourth Quarterly Post-Translocation Coral Monitoring Report

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#### 1 INTRODUCTION

#### 1.1 BACKGROUND

According to findings of the Northwest New Territories (NWNT) Traffic and Infrastructure Review conducted by the Transport Department, Tuen Mun Road, Ting Kau Bridge, Lantau Link and North Lantau Highway would be operating beyond capacity after 2016. This forecast has been based on the estimated increase in cross boundary traffic, developments in the NWNT, and possible developments in North Lantau, including the Airport developments, the Lantau Logistics Park (LLP) and the Hong Kong – Zhuhai – Macao Bridge (HZMB). In order to cope with the anticipated traffic demand, two new road sections between NWNT and North Lantau – Tuen Mun – Chek Lap Kok Link (TM-CLKL) and Tuen Mun Western Bypass (TMWB) are proposed.

An Environmental Impact Assessment (EIA) of TM-CLKL was prepared in accordance with the EIA Study Brief (No. ESB-175/2007) and the *Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM)*. The EIA Report was submitted under the Environmental Impact Assessment Ordinance (EIAO) in August 2009. Subsequent to the approval of the EIA Report (EIAO Register Number AEIAR-146/2009), an Environmental Permit (EP-354/2009) for TM-CLKL was granted by the Director of Environmental Protection (DEP) on 4 November 2009, and EP variation (*EP-354/2009A*) was issued on 8 December 2010. Another application for variation of environmental permit (VEP) (*EP-354/2009/B*) was granted on 28 January 2014.

Pursuant to Condition 2.6 of the EP, the Detailed Coral Translocation Methodology (1) has been submitted on 9 October 2013 and was subsequently approved by the DEP for this Contract. Coral translocation was undertaken for the coral colonies at Tai Ho Wan on 24 October 2013 prior to the construction of temporary staging and the Southern Connection Viaduct Section in order to reduce the potential marine ecological impacts by translocating movable coral colonies to the receptor site at Yam Tsai Wan. In accordance with the Detailed Coral Translocation Methodology, the translocated coral colonies as well as the tagged natural coral colonies at the receptor site should be monitored once every three (3) months for a period of 12 months after the coral translocation exercise.

#### 1.2 PURPOSE OF THIS REPORT

The purpose of this *Fourth Quarterly Post-Translocation Coral Monitoring Report* is to report findings of the Fourth Quarterly Post-translocation Coral Monitoring which is undertaken at the receptor site, Yam Tsai, Wan, to

 ERM (October 2013) Detailed Coral Translocation Methodology. Prepared under Contract No. HY/2012/07 – TM-CLKL Southern Connection Viaduct Section monitor the updated status of translocated corals from the donor site at Tai Ho Wan. The results of the post-translocation monitoring are reviewed with reference to findings of the pre-translocation survey in order to assess any observable changes in status of the translocated coral colonies. Post-translocation monitoring results are also evaluated against Action and Limit Levels which are based on recorded changes in percentage of partial mortality of the corals.

#### 1.3 STRUCTURE OF THIS REPORT

The remainder of the report is structured as follows:

- Section 2: Fourth Quarterly Post-Translocation Details the methodology and results of the Fourth Quarterly Post-translocation Coral Monitoring.
- Section 3: Schedule of Quarterly Post-translocation Coral Monitoring –
  Details the schedule of the First to Fourth Quarterly Post-translocation Coral Monitoring.
- **Section 4: Conclusion -** Concludes the First to Fourth Quarterly Posttranslocation Coral Monitoring results for the Contract.

#### 2.1 POST-TRANSLOCATION MONITORING METHODOLOGY

Pre-translocation surveys were undertaken at the donor site of Tai Ho Wan and receptor site of Yam Tsai Wan to collect baseline data on translocated coral colonies from Tai Ho Wan and natural coral colonies at Yam Tsai Wan during the coral translocation exercise in October 2013. During the pre-translocation survey, thirteen (13) *Guaiagorgia* sp. colonies, which were successfully translocated from Tai Ho Wan to Yam Tsai Wan, were tagged for monitoring. In addition to the translocated coral colonies, ten (10) colonies of *Guaiagorgia* sp. were tagged at the receptor site. Each of the tagged coral colonies was identified at least to genus levels and photographed. The following data were recorded for each tagged coral colonies during the pre-translocation survey:

- Genus/ Species;
- Size (Maximum diameter/ height);
- Mortality (%);
- Bleaching (%); and,
- Sediment (%).

During the Post-translocation Coral Monitoring, the tagged coral colonies were re-visited for monitoring using the same methodology as the pre-translocation survey. Photographic records of the translocated and natural coral colonies were taken by maintaining the same aspect and orientation as photographs taken for the pre-translocation surveys as far as possible. The adoption of the same monitoring method would allow for direct comparison of baseline pre-location data with the post-translocation monitoring data in order to determine any changes in conditions of corals. The general environmental conditions including weather, sea and tidal conditions of the coral receptor site were also monitored.

The results of the post-translocation monitoring were reviewed with reference to findings of the pre-translocation surveys undertaken at the donor and receptor sites. If observations of any die-off / abnormal conditions of the translocated corals are made during the post-translocation monitoring, the ET should inform the Contractor, Independent Environmental Checker (IEC) / Environmental Project Office (ENPO), and AFCD, and liaise with AFCD to investigate any mitigation measures needed.

Post-translocation Coral Monitoring results were evaluated against Action and Limit Levels which is based on the recorded changes in the percentage of partial mortality of the corals (*Table 2.1*). If the defined Action Level or Limit Level for coral monitoring is exceeded, the actions set out in *Table 2.2* will be implemented.

Table 2.1 Action and Limit Levels for Post-Translocation Coral Monitoring

Parameter	Action Level Definition	Limit Level Definition
Mortality	If during Impact Monitoring a 15% increase in the percentage of partial mortality on	If during Impact Monitoring a 25% increase in the percentage of partial mortality on
	the corals occurs at more than 20% of the translocated coral colonies that is not	the corals occurs at more than 20% of the translocated coral colonies that is not
	recorded on the original corals at the receptor site, then the Action Level is exceeded.	recorded on the original corals at the receptor site, then the Limit Level is exceeded.

Table 2.2 Event and Action Plan for Post-Translocation Coral Monitoring

Event		Actio	on	
	ET Leader	IEC S	GOR C	Contractor
Action Level	Check monitoring data	1. Discuss monitoring with the ET and	. Discuss with the IEC additional 1	. Inform the SOR and confirm
Exceedance	<ol><li>Inform the IEC, SOR as Contractor of the findings;</li></ol>	nd the Contractor; 2. Review proposals for additional	monitoring requirements and any other measures proposed by the ET;	notification of the non-compliance in writing;
	<ol><li>Increase the monitoring to at lea once a month to confirm findings;</li></ol>		<ol> <li>Make agreement on the measures to 2 be implemented.</li> </ol>	Discuss with the ET and the IEC and propose measures to the IEC
	4. Propose mitigation measures f consideration	or advise the SOR accordingly.	3	and the SOR; . Implement the agreed measures.
Limit Level Exceedance	<ol> <li>Undertake Steps 1-4 as in the Action Level Exceedance. If furth exceedance of Limit Level, proposenhancement measures from consideration.</li> </ol>	er the Contractor;	monitoring requirements and any other measures proposed by the ET;	notification of the non-compliance in writing;
		<u> </u>	3	. Implement the agreed measures.

#### 2.2 FOURTH QUARTERLY POST-TRANSLOCATION CORAL MONITORING RESULTS

The Fourth Quarterly Post-translocation Coral Monitoring was carried out at the receptor site, Yam Tsai Wan, on 23 October 2014. The weather conditions during the survey date are summarized in *Table 2.3*. Location of the survey area at the receptor site is presented in *Figure 2.1*.

Table 2.3 Weather Conditions during the Fourth Quarterly Post-Translocation Coral Monitoring Survey

Date	Location	Condition	<b>Underwater Visibility</b>
23 October 2014	Receptor site:	East force 5 to 6	Less than 0.5 m
	Yam Tsai Wan	Cloudy	

The species, size, mortality percentage, bleaching percentage and percentage of sediment cover of the translocated coral colonies and natural coral colonies recorded during the Fourth Quarterly Post-translocation Monitoring Surveys were summarized in *Tables 2.4* and *2.5*. Photographic records taken during the Fourth Quarterly Post-translocation Coral Monitoring are shown in *Annex A*.

Findings of the Fourth Quarterly Post-translocation Monitoring indicated that the Action or Limit Levels for coral monitoring were not exceeded as increase in percentage of partial mortality was not detected for both the tagged translocated and natural coral colonies when comparing to the pretranslocation dataset (*Tables 2.4 & 2.5*). As such, it is considered not necessary to undertake any action in accordance with the Event and Action Plan.

Overall, findings of the Fourth Quarterly Post-translocation Monitoring did not appear to indicate any deterioration in the general health conditions of the translocated and natural coral colonies at the receptor site during this quarterly period.



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Post-translocation Coral Monitoring Survey Area under both Contract No. HY/2012/07 and HY/2012/08

Environmental Resources Management



Table 2.4 Sizes, Partial Mortality, Bleaching and Sediment Cover of Tagged Translocated Coral Colonies from Donor Site, Tai Ho Wan, recorded during the Pre-translocation, First, Second, Third and Fourth Quarterly Post-translocation Coral Monitoring Surveys

Coral #	Species	Size (cm) – Max Diameter/ Height	Partial Mortality (%)	Percentage Increase in Partial Mortality (%) (1)	Bleaching (%)	Sediment (%)
Pre-transloca	tion Survey on 23 Octob	er 2013 at the donor site, Tai Ho Wa	n			
1	Guaiagorgia sp.	7	0	N/A	N/A	0
2	Guaiagorgia sp.	9	0	N/A	N/A	0
3	Guaiagorgia sp.	5	0	N/A	N/A	0
4	Guaiagorgia sp.	8	0	N/A	N/A	0
5	Guaiagorgia sp.	13	10	N/A	N/A	0
6	Guaiagorgia sp.	8	70	N/A	N/A	0
7	Guaiagorgia sp.	6	0	N/A	N/A	0
8	Guaiagorgia sp.	7	0	N/A	N/A	0
9	Guaiagorgia sp.	19	50	N/A	N/A	0
10	Guaiagorgia sp.	15	35	N/A	N/A	0
11	Guaiagorgia sp.	22	55	N/A	N/A	0
12	Guaiagorgia sp.	14	20	N/A	N/A	0
13	Guaiagorgia sp.	16	45	N/A	N/A	0
rst Quarter		al Monitoring Survey on 17 Januar	y 2014 at the Receptor Site,		·	
1	Guaiagorgia sp.	7	0	0	N/A	0
2	Guaiagorgia sp.	9	0	0	N/A	0
3	Guaiagorgia sp.	5	0	0	N/A	0
4	Guaiagorgia sp.	8	0	0	N/A	0
5	Guaiagorgia sp.	13	10	0	N/A	0
6	Guaiagorgia sp.	8	70	0	N/A	0
7	Guaiagorgia sp.	6	0	0	N/A	0
8	Guaiagorgia sp.	7	0	0	N/A	0
9	Guaiagorgia sp.	19	50	0	N/A	0
10	Guaiagorgia sp.	15	35	0	N/A	0
11	Guaiagorgia sp.	22	55	0	N/A	0
12	Guaiagorgia sp.	14	20	0	N/A	0
13	Guaiagorgia sp.	16	45	0	N/A	0
econd Quar		Coral Monitoring Survey on 16 Apr	il 2014 at the Receptor Site,	Yam Tsai Wan	,	
1	Guaiagorgia sp.	7	0	0	N/A	0
2	Guaiagorgia sp.	9	0	0	N/A	0
3	Guaiagorgia sp.	5	0	0	N/A	0
4	Guaiagorgia sp.	8	0	0	N/A	0

Coral #	Species	Size (cm) - Max Diameter/ Height	Partial Mortality (%)	Percentage Increase in Partial Mortality (%) (1)	Bleaching (%)	Sediment (%)
5	Guaiagorgia sp.	13	10	0	N/A	0
6	Guaiagorgia sp.	8	70	0	N/A	0
7	Guaiagorgia sp.	6	0	0	N/A	0
8	Guaiagorgia sp.	7	0	0	N/A	0
9	Guaiagorgia sp.	19	50	0	N/A	0
10	Guaiagorgia sp.	15	35	0	N/A	0
11	Guaiagorgia sp.	22	55	0	N/A	0
12	Guaiagorgia sp.	14	20	0	N/A	0
13	Guaiagorgia sp.	16	45	0	N/A	0
Third Quarte	erly Post-translocation Co	oral Monitoring Survey on 24 July 2	2014 at the Receptor Site, Ya	m Tsai Wan		
1	Guaiagorgia sp.	7	0	0	N/A	0
2	Guaiagorgia sp.	9	0	0	N/A	0
3	Guaiagorgia sp.	5	0	0	N/A	0
4	Guaiagorgia sp.	8	0	0	N/A	0
5	Guaiagorgia sp.	13	10	0	N/A	0
6	Guaiagorgia sp.	8	70	0	N/A	0
7	Guaiagorgia sp.	6	0	0	N/A	0
8	Guaiagorgia sp.	7	0	0	N/A	0
9	Guaiagorgia sp.	19	50	0	N/A	0
10	Guaiagorgia sp.	15	35	0	N/A	0
11	Guaiagorgia sp.	22	55	0	N/A	0
12	Guaiagorgia sp.	14	20	0	N/A	0
13	Guaiagorgia sp.	16	45	0	N/A	0
Fourth Quart	terly Post-translocation C	oral Monitoring Survey on 23 Octo	ber 2014 at the Receptor Si	te, Yam Tsai Wan		
1	Guaiagorgia sp.	7	0	0	N/A	0
2	Guaiagorgia sp.	9	0	0	N/A	0
3	Guaiagorgia sp.	5	0	0	N/A	0
4	Guaiagorgia sp.	8	0	0	N/A	0
5	Guaiagorgia sp.	13	10	0	N/A	0
6	Guaiagorgia sp.	8	70	0	N/A	0
7	Guaiagorgia sp.	6	0	0	N/A	0
8	Guaiagorgia sp.	7	0	0	N/A	0
9	Guaiagorgia sp.	19	50	0	N/A	0
10	Guaiagorgia sp.	15	35	0	N/A	0
11	Guaiagorgia sp.	22	55	0	N/A	0
12	Guaiagorgia sp.	14	20	0	N/A	0
13	Guaiagorgia sp.	16	45	0	N/A	0

#### Note:

(1) Represents percentage increase in partial mortality from the Pre-translocation Surveys to the Post-translocation Coral Monitoring Surveys.

(2) N/A = Not Applicable

Table 2.5 Sizes, Mortality, Bleaching and Sediment of Tagged Natural Coral Colonies at Receptor Site, Yam Tsai Wan, recorded during the Pretranslocation, First, Second, Third and Fourth Quarterly Post-translocation Coral Monitoring Surveys

Coral #	Species	Size (cm) - Max. Diameter/ Height	Partial Mortality (%)	Percentage Increase in Partial Mortality (%) (1)	Bleaching (%)	Sediment (%)
re-transloca	tion Survey on 24 Octobe					
1	Guaiagorgia sp.	25	5	N/A	N/A	0
2	Guaiagorgia sp.	32	35	N/A	N/A	0
3	Guaiagorgia sp.	28	15	N/A	N/A	0
4	Guaiagorgia sp.	38	25	N/A	N/A	0
5	Guaiagorgia sp.	27	40	N/A	N/A	0
6	Guaiagorgia sp.	28	25	N/A	N/A	0
7	Guaiagorgia sp.	21	10	N/A	N/A	0
8	Guaiagorgia sp.	26	30	N/A	N/A	0
9	Guaiagorgia sp.	19	50	N/A	N/A	0
10	Guaiagorgia sp.	35	35	N/A	N/A	0
irst Quarter	ly Post-translocation Mon	nitoring Survey on 17 January 2014		·	·	
1	Guaiagorgia sp.	25	5	0	N/A	0
2	Guaiagorgia sp.	32	35	0	N/A	0
3	Guaiagorgia sp.	28	15	0	N/A	0
4	Guaiagorgia sp.	38	25	0	N/A	0
5	Guaiagorgia sp.	27	40	0	N/A	0
6	Guaiagorgia sp.	28	25	0	N/A	0
7	Guaiagorgia sp.	21	10	0	N/A	0
8	Guaiagorgia sp.	26	30	0	N/A	0
9	Guaiagorgia sp.	19	50	0	N/A	0
10	Guaiagorgia sp.	35	35	0	N/A	0
econd Quar		Ionitoring Survey on 16 April 2014			·	
1	Guaiagorgia sp.	25	5	0	N/A	0
2	Guaiagorgia sp.	32	35	0	N/A	0
3	Guaiagorgia sp.	28	15	0	N/A	0
4	Guaiagorgia sp.	38	25	0	N/A	0
5	Guaiagorgia sp.	27	40	0	N/A	0
6	Guaiagorgia sp.	28	25	0	N/A	0
7	Guaiagorgia sp.	21	10	0	N/A	0
8	Guaiagorgia sp.	26	30	0	N/A	0
9	Guaiagorgia sp.	19	50	0	N/A	0
10	Guaiagorgia sp.	35	35	0	N/A	0

Coral #	Species	Size (cm) - Max. Diameter/ Height	Partial Mortality (%)	Percentage Increase in Partial Mortality (%) (1)	Bleaching (%)	Sediment (%)
Third Quarte	erly Post-translocation Mo	nitoring Survey on 24 July 2014				
1	Guaiagorgia sp.	25	5	0	N/A	0
2	Guaiagorgia sp.	32	35	0	N/A	0
3	Guaiagorgia sp.	28	15	0	N/A	0
4	Guaiagorgia sp.	38	25	0	N/A	0
5	Guaiagorgia sp.	27	40	0	N/A	0
6	Guaiagorgia sp.	28	25	0	N/A	0
7	Guaiagorgia sp.	21	10	0	N/A	0
8	Guaiagorgia sp.	26	30	0	N/A	0
9	Guaiagorgia sp.	19	50	0	N/A	0
10	Guaiagorgia sp.	35	35	0	N/A	0
Fourth Quar	terly Post-translocation M	onitoring Survey on 23 October 201	4			
1	Guaiagorgia sp.	25	5	0	N/A	0
2	Guaiagorgia sp.	32	35	0	N/A	0
3	Guaiagorgia sp.	28	15	0	N/A	0
4	Guaiagorgia sp.	38	25	0	N/A	0
5	Guaiagorgia sp.	27	40	0	N/A	0
6	Guaiagorgia sp.	28	25	0	N/A	0
7	Guaiagorgia sp.	21	10	0	N/A	0
8	Guaiagorgia sp.	26	30	0	N/A	0
9	Guaiagorgia sp.	19	50	0	N/A	0
10	Guaiagorgia sp.	35	35	0	N/A	0

Note:

Represents percentage increase in partial mortality from the Pre-translocation Surveys to the Post-translocation Coral Monitoring Surveys.  $N/A = Not \ Applicable$ (1)

## 3 SCHEDULE OF QUARTERLY POST-TRANSLOCATION CORAL MONITORING

Post-Translocation Coral Monitoring was conducted every three (3) months for a period of 12 months. The schedule of the First to Fourth Quarterly Post-translocation Coral monitoring is provided in *Table 3.1* below.

#### Table 3.1 Schedule of Quarterly Post-Translocation Coral Monitoring

Post-Translocation Monitoring Survey (1)	Timing
1st Quarterly Monitoring	3 months after the translocation works
	Conducted on 17 January 2014
2 <sup>nd</sup> Quarterly Monitoring	6 months after the translocation works
	Conducted on 16 April 2014
3 <sup>rd</sup> Quarterly Monitoring	9 months after the translocation works
	Conducted on 24 July 2014
4th Quarterly Monitoring	12 months after the translocation works
	Conducted on 23 October 2014

Note:

<sup>(1)</sup> Shaded cell indicates completed quarterly monitoring.

#### 4 CONCLUSION

The Fourth Quarterly Post-Translocation Coral Monitoring has been carried out on 23 October 2014 at the receptor site, Yam Tsai Wan, as per the requirements stipulated in the *Detailed Coral Translocation Methodology*. During the monitoring, 13 translocated coral colonies and 10 natural coral colonies were re-visited and monitored at the receptor site, Yam Tsai Wan. The conditions of the translocated and natural coral colonies during the Fourth Quarterly Post-Translocation Coral Monitoring are compared with the pre-translocation conditions which were recorded during the coral translocation exercise in October 2013.

Action and Limit Levels for the partial mortality of tagged corals were established based on the Pre-translocation Coral Monitoring results. By evaluating against the derived Action and Limit Levels, no exceedances of the Action and Limit Levels were identified during the Fourth Quarterly Post-Translocation Coral Monitoring on 23 October 2014. There thus did not appear to be any deterioration in the general conditions of the translocated and natural coral colonies at the receptor site, Yam Tsai Wan.

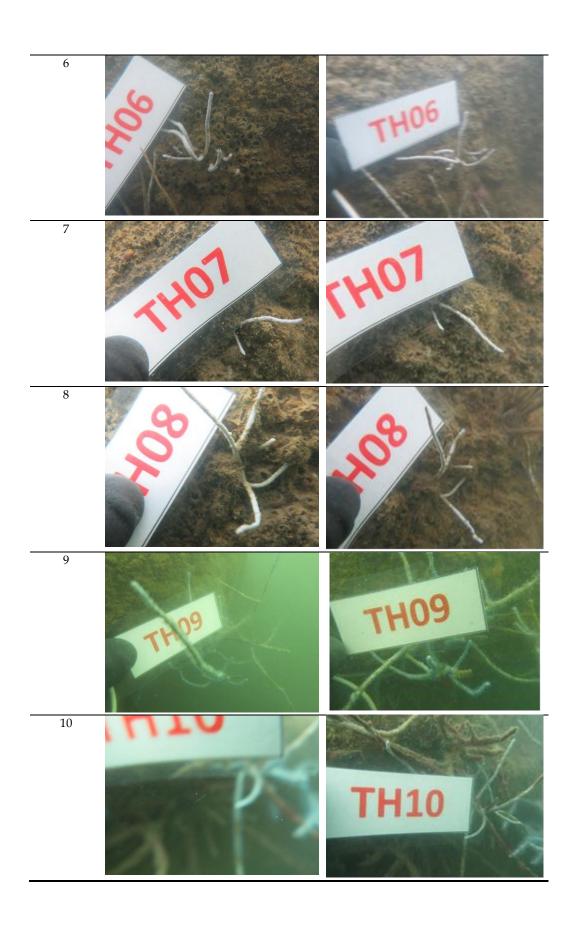
Overall, the coral translocation exercise is considered to be undertaken successfully as the translocated corals did not show any sign of deterioration in condition at the receptor site during the First to Fourth Quarterly Post-translocation Coral Monitoring survey.

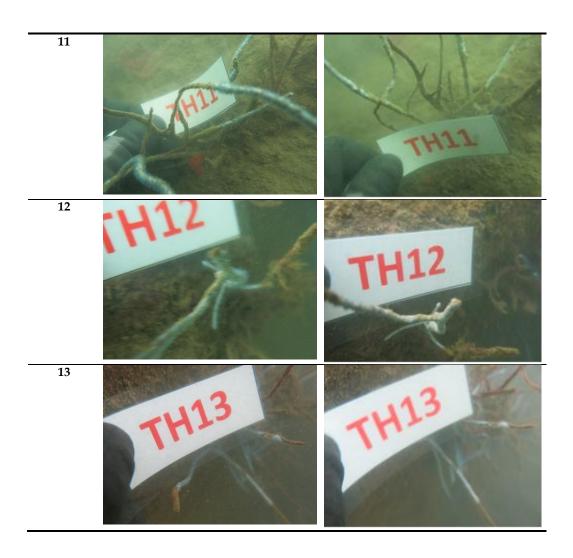
#### Annex A

Photographic Records of Tagged Translocated Coral Colonies and Tagged Natural Coral Colonies

A1 Photographic Records of Tagged Translocated Coral Colonies from the Donar Site (Tai Ho Wan) at Yam Tsai Wan

Coral #	Pre-Translocation Monitoring	4th Quarterly Post-Translocation Monitoring
1	TH01	TH01
2	TH02	1H02
3	THU3	H03
4	TH04	THOA
5	THD5	1405





A2 Photographic Records of Tagged Natural Coral Colonies at Receptor Site, Yam Tsui Wan

