

**Contract No. HY/2012/08  
Tuen Mun – Chek Lap Kok Link –  
Northern Connection Sub-sea Tunnel  
Section**

***Detailed Coral Translocation Methodology***

9 October 2013

**Environmental Resources Management**  
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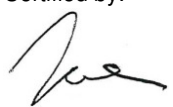


# Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

## Environmental Resources Management

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### Detailed Coral Translocation Methodology

Document Code: 0212330\_Coral Translocation\_Northern\_v3\_JT.doc

Client:  DBJV		Project No:  0212330			
Summary:  This document presents the Detailed Coral Translocation Methodology for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section.		Date: 9 October 2013			
		Approved by:  			
		Mr Craig Reid Partner			
		Certified by:  			
		Mr Jovy Tam ET Leader			
	Detailed Coral Translocation Methodology	CL	JT	CAR	09/10/13
Revision	Description	By	Checked	Approved	Date
<p>This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p> <p>This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.</p>		<p>Distribution</p> <p><input checked="" type="checkbox"/> Internal</p> <p><input type="checkbox"/> Public</p> <p><input checked="" type="checkbox"/> Confidential</p> <div style="text-align: right;">    </div>			

Your ref.  
Our ref. 5125599/ELT17972/SH/SO/el

Date: 16 October 2013

**By Email and Post**

**Dragages – Bouygues Joint Venture  
3/F, Island Place Tower  
510 King's Road  
North Point  
Hong Kong**

**Attn: Mr. Seved Robin**

Dear Seved,

**Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link Northern Connection Sub-  
sea Tunnel Section  
Certification of Detailed Coral Translocation Methodology V3**

We refer to your email dated 16 October 2013 regarding the Detailed Coral Translocation Methodology V3. We have no comments on the methodology. Our certification sheet is enclosed for your onward submissions to relevant government departments.

**Yours sincerely,  
for and on behalf of  
Atkins China Ltd**



**Sharifah Or  
Design Auditor**

**Encl.**

**Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link  
Northern Connection Sub-sea Tunnel Section  
Environmental Permit No.: EP-354/2009/A**

**EP Condition 2.6 – Detailed Coral Translocation Methodology**

**Design Auditor**

This certification references the Contractor's submissions dated Wednesday, 16 October 2013 (via email) providing the Detailed Coral Translocation Methodology V3 to provide findings of the pre-translocation surveys, identification of receptor sites for translocated corals from Pillar Point, details of the proposed procedures for the pre-translocation survey, coral translocation method and post-translocation monitoring method.

Condition 2.6 in the project Environmental Permit (EP-354/2009/A) states:

"The Permit Holder shall deposit with the Director, at least 1 month before the commencement of construction of the Project, three hard copies and one electronic copy of a detailed coral translocation methodology, including pre-translocation survey, identification of receiving sites and post-translocation monitoring."

To check whether the environmental requirements are fully complied with, the following documents have been reviewed together with the Detailed Coral Translocation Methodology V3 dated 9 October 2013:

- Environmental Impact Assessment Report and Environmental Monitoring and Audit Manual for Tuen Mun – Chek Lap Kok Link (AEIAR-146/2009); and
- Environmental Permit (EP-354/2009/A).

In accordance with the requirements of the project EM&A Manual, section 6.3.1.3, the above document has been checked and the measures have been fully incorporated into the reference plan. As such, the Design Auditor agrees that the proposed Detailed Coral Translocation Methodology V3 is adequate for monitoring and mitigating the potential ecological impacts of Contract No. HY/2012/08.

**Certified by:**



**Sharifah Or, Design Auditor**

**Date: 16 October 2013**

Ref.: HYDHZMBEEM00\_0\_1311L.13

17 October 2013

AECOM  
Supervising Officer Representative's Office  
Room 201, 2<sup>nd</sup> Floor,  
River Trade Terminal Office Building,  
201 Lung Mun Road, Tuen Mun, Hong Kong

By Fax (2450 3099) and By Post

Attention: Messrs. Edwin Ching / Andy Westmorelan

Dear Sir,

**Re: Agreement No. CE 48/2011 (EP)  
Environmental Project Office for the  
HZMB Hong Kong Link Road, HZMB Hong Kong Boundary Crossing Facilities,  
and Tuen Mun-Chek Lap Kok Link – Investigation**

**Contract No. HY/2011/08  
Tuen Mun – Chek Lap Kok Link  
Northern Connection Sub-sea Tunnel Section  
Detailed Coral Translocation Methodology v3 (EP Condition 2.6)**

Reference is made to the submission of a Detailed Coral Translocation Methodology certified by the ET Leader (ERM Ref: 0212330\_Coral\_Translocation\_Northern\_v3.doc dated on 9 October 2013) and also by the Design Auditor (Atkin's Ref: 5125599/ELT17972/SH/SO/el, dated on 16 October 2013) provided to us via emails on 11 and 17 October 2013, respectively.

We are pleased to inform you that we have no adverse comments on the revised Detailed Coral Translocation Methodology. We write to verify the captioned submission in accordance with Condition 2.6 of EP-354/2009/A.

Thank you for your kind attention. Please do not hesitate to contact the undersigned or the ENPO Leader Mr. Y H Hui should you have any queries.

Yours sincerely,



Tony Cheng  
Independent Environmental Checker  
Tuen Mun – Chek Lap Kok Link

c.c. HyD – Mr. Stephen Chan (By Fax: 3188 6614)  
HyD – Mr. Matthew Fung (By Fax: 3188 6614)  
AECOM – Mr. Conrad Ng (By Fax: 3922 9797)  
ERM – Mr. Jovy Tam (By Fax: 2723 5660)  
Dragages – Mr. C.F. Kwong (By Fax: 2670 2798)

Internal: DY, YH, SC, ENPO Site

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## CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>1.1</b>	<b>BACKGROUND</b>	<b>1</b>
<b>1.2</b>	<b>CORAL TRANSLOCATION FOR NORTHERN LANDFALL</b>	<b>1</b>
<b>1.3</b>	<b>ENVIRONMENTAL REQUIREMENTS FOR CORAL TRANSLOCATION</b>	<b>2</b>
<b>1.4</b>	<b>PURPOSE OF THIS REPORT</b>	<b>2</b>
<b>2</b>	<b>PRE-CONSTRUCTION SURVEY</b>	<b>3</b>
<b>2.1</b>	<b>PRE-CONSTRUCTION SURVEY AT THE DONOR SITE</b>	<b>3</b>
<b>2.2</b>	<b>PRE-CONSTRUCTION SURVEY AT THE RECEPTOR SITE (TAI MO TO)</b>	<b>5</b>
<b>2.3</b>	<b>ALTERNATIVE CORAL RECEPTOR SITE</b>	<b>7</b>
<b>3</b>	<b>REQUIREMENT OF PRE-TRANSLOCATION CORAL SURVEY</b>	<b>8</b>
<b>3.1</b>	<b>PRE-TRANSLOCATION AND TRANSLOCATION SURVEYS AT THE DONOR SITE</b>	<b>8</b>
<b>3.2</b>	<b>PRE-TRANSLOCATION SURVEY AT THE RECEPTOR SITE</b>	<b>9</b>
<b>4</b>	<b>CORAL TRANSLOCATION METHOD</b>	<b>13</b>
<b>4.1</b>	<b>CORAL TRANSLOCATION PROCEDURES</b>	<b>13</b>
<b>4.2</b>	<b>PRECAUTIONARY MEASURES OF CORAL TRANSLOCATION</b>	<b>14</b>
<b>5</b>	<b>POST-TRANSLOCATION CORAL MONITORING</b>	<b>15</b>
<b>5.1</b>	<b>MONITORING METHODOLOGY</b>	<b>15</b>
<b>6</b>	<b>SCHEDULE AND REPORTING OF CORAL TRANSLOCATION</b>	<b>18</b>
<b>6.1</b>	<b>TENTATIVE SCHEDULE</b>	<b>18</b>
<b>6.2</b>	<b>REPORTING</b>	<b>19</b>
<b>7</b>	<b>REFERENCE</b>	<b>20</b>



## 1.1

## BACKGROUND

According to the 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 Northwest New Territories (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-145/2009), 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.

Under *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of TM-CLKL (“the Contract”). ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) for the Contract.

## 1.2

## CORAL TRANSLOCATION FOR NORTHERN LANDFALL

According to the approved EIA Report of the TM-CLKL, the proposed reclamation work at the northern landfall area in Pillar Point would lead to direct loss of corals of low to moderate ecological value. In addition, the Project would also lead to elevation of suspended solid (SS) levels in the Tuen Mun area. Even with the application of a silt curtain system, SS were predicted to exceed the Water Quality Objectives (WQO) during approximately 11% of the wet season period. Coral translocation was therefore recommended for the coral colonies at Pillar Point prior to construction in order to reduce the potential marine ecological impacts of the northern landfall reclamation works. The approved EIA Report recommended that an area around Tai Mo To could be a suitable location for the receptor site(s).

According to *Condition 2.6* of the EP-354/2009A, the Permit Holder shall submit to the Director of Environmental Protection (DEP) for approval, at least one month before the commencement of construction of the Project, three hard copies and one electronic copy of a detailed coral translocation methodology, including pre-translocation survey, identification of receptor site and post-translocation monitoring.

In addition, according to *Section 6.4.3.1* of the EM&A Manual, a pre-construction survey of corals at Pillar Point and potential receptor site(s) should be conducted prior to the translocation works. The suitability of the potential receptor site(s) should be reviewed and verified, and alternative receptor site(s) be proposed if necessary. A Coral Translocation Proposal, which includes findings of the pre-construction surveys, should be submitted for AFCD's agreement. Coral translocation should then be undertaken prior to any major relevant construction works in accordance with the Detailed Coral Translocation Methodology prepared under *Condition 2.6* of the EP-354/2009A.

#### PURPOSE OF THIS REPORT

This Detailed Coral Translocation Methodology is prepared for the coral translocation exercise of the Northern Connection Sub-sea Tunnel Section of TM-CLKL. In accordance with *Condition 2.6* of the EP-354/2009A, the following information is presented in this document:

- Findings of the pre-construction surveys which were undertaken at the donor site at Pillar Point from December 2012 to February 2013 and at the proposed coral receptor site at Tai Mo To from December 2012 to January 2013;
- Identification of receptor site(s) for the translocated corals from Pillar Point;
- Details of the proposed procedures for the pre-translocation survey;
- Coral translocation method; and
- Post-translocation monitoring method.

This Detailed Coral Translocation Methodology will be submitted to the DEP for approval at least one month before the commencement of construction of the Northern Connection Sub-sea Tunnel Section of the TM-CLKL.



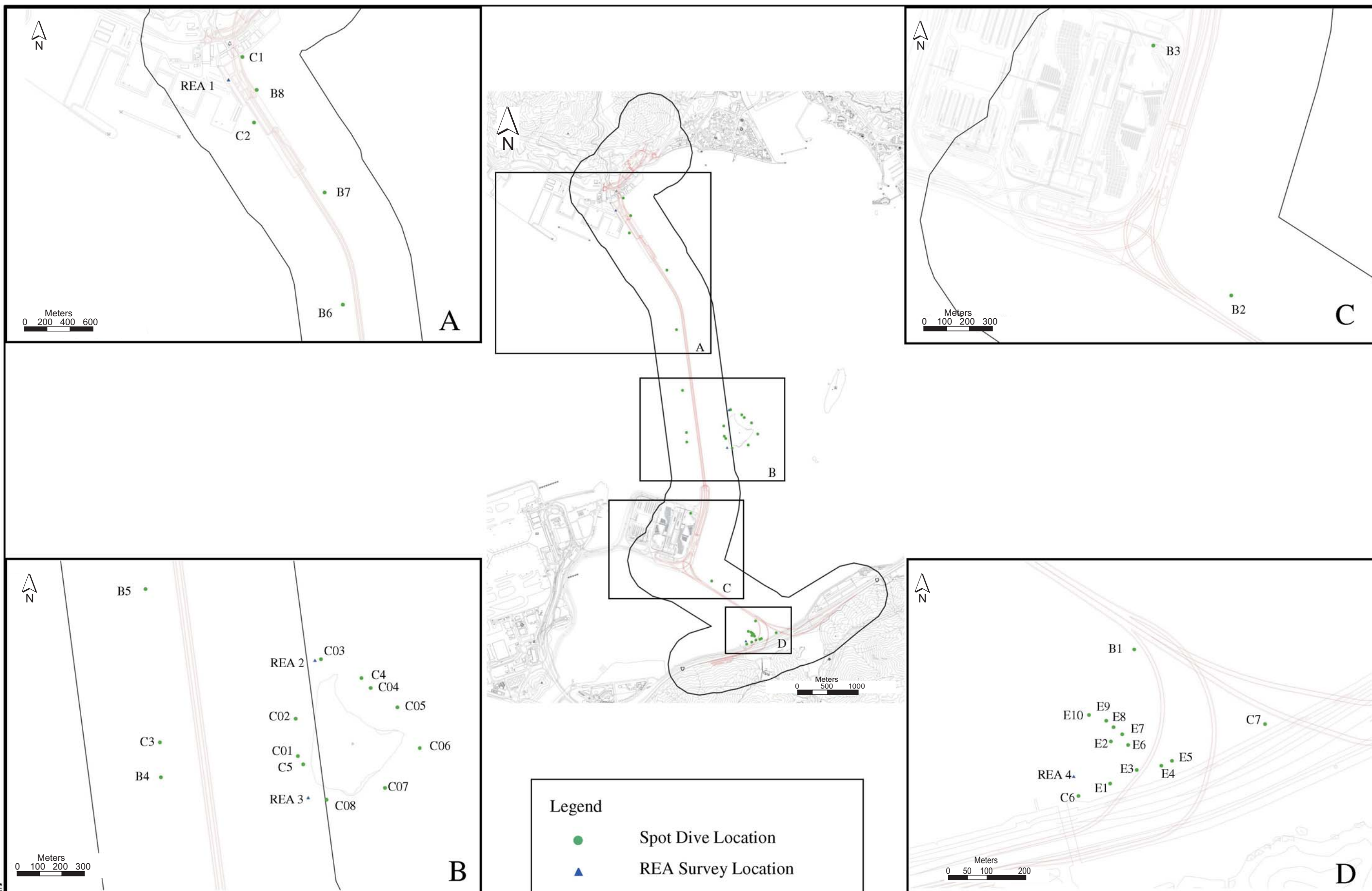


Figure 1.1 Location of Coral Surveys covered under  
TM-CLKL EIA Study (HyD, 2009)

SCALE	--	DATE	JUN. 2009
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		REV	--

## 2.1 PRE-CONSTRUCTION SURVEY AT THE DONOR SITE

Spot-check dives and Rapid Ecological Assessment (REA) surveys were conducted at the donor site at Pillar Point. The seabed of the survey site was mainly composed of natural bedrocks, boulders, artificial sloping boulders, and artificial vertical seawall. Three coral species (two hard coral and one gorgonian species) were recorded during the surveys. The survey results at Pillar Point are presented in the following sections.

### 2.1.1 Spot Check Dive

A total of 12 spot-check dives were carried out on 26<sup>th</sup> – 28<sup>th</sup> December 2012 as well as 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 8<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup> and 14<sup>th</sup> January 2013 (Figure 2.1). The survey sites (PP01 to PP12) were composed of artificial sloping boulders, vertical seawall and sandy / muddy substrates, with water depth ranging from 1 to 15 m. The survey sites supported limited marine life. Two hard coral species and one gorgonian species were found on boulder and seawall surfaces at spot-check dive sites PP01 to PP03. They were hard coral *Oulastrea crispata*, ahermatypic cup coral *Balanophyllia* sp., and gorgonian *Guaiaigorgia* sp. The coral species recorded are common in local Hong Kong waters. The percentage cover of the corals found was low (<5%) (Table 2.1).

**Table 2.1** *Species, Coverage and Size of Corals Found at Spot-Check Dive Sites at Pillar Point*

Site	Coral Species	Coverage (%)	Size in Height/ Diameter (cm)
PP01	<i>Balanophyllia</i> sp.	<1%	0.5-1
	<i>Guaiaigorgia</i> sp.	<1%	0.1-0.3
PP02	<i>Oulastrea crispata</i>	<5%	5-20
	<i>Balanophyllia</i> sp.	<1%	0.5-1
	<i>Guaiaigorgia</i> sp.	<5%	5-30
PP03	<i>Balanophyllia</i> sp.	<1%	0.5-1
	<i>Guaiaigorgia</i> sp.	<1%	10-30

### 2.1.2 REA

Two 100 m REA transects were surveyed on 6<sup>th</sup> February 2013 following the spot-check dives (Figure 2.2). Tables 2.2-3 summarize the ecological and substratum attributes, and the ranks of taxon abundance along the two REA transects.

Setting Out Point for Transect					
Point	Easting	Northing	Point	Easting	Northing
A1	812084.9188	824038.4230	A21	812886.9010	823974.0097
A2	811994.5198	824324.4790	A22	813101.5121	824102.2365
A3	812466.3268	824158.9550	A23	812947.6400	824359.7697
A4	812375.9278	824445.0110	A24	813094.7835	824282.0974
A5	812526.6690	824186.9901	A25	813224.2962	824065.3340
A6	812635.1136	824005.4881	A26	813524.7517	824244.8514
A7	812534.4218	824271.4978	A27	813545.8397	824404.5238
A8	812763.8802	824082.4241	A28	813481.0834	824512.9055
A9	812620.2663	824322.7885	A29	812910.6499	824590.2789
A10	812565.4451	824366.0878	A30	813064.5220	824332.7456
A11	812405.4159	824433.4907	A31	813622.5107	824666.1351
A12	812604.2617	824458.2468	A32	813468.6386	824923.6684
A13	812444.2325	824525.6497	A33	812756.7778	824847.8122
A14	812626.0455	824410.5995	A34	812885.0045	824633.2011
A15	812702.9815	824281.8329	A35	813185.9999	825104.2656
A16	812643.3223	824479.1671	A36	813314.2266	824889.6546
A17	812693.2633	824590.5489	A37	812613.1639	825088.1765
A18	812917.5926	824410.0596	A38	812731.1325	824890.7344
A19	812779.1077	824641.8396	A39	813117.4324	825121.5425
A20	812733.0289	824231.5430	A40	812999.4638	825318.9847

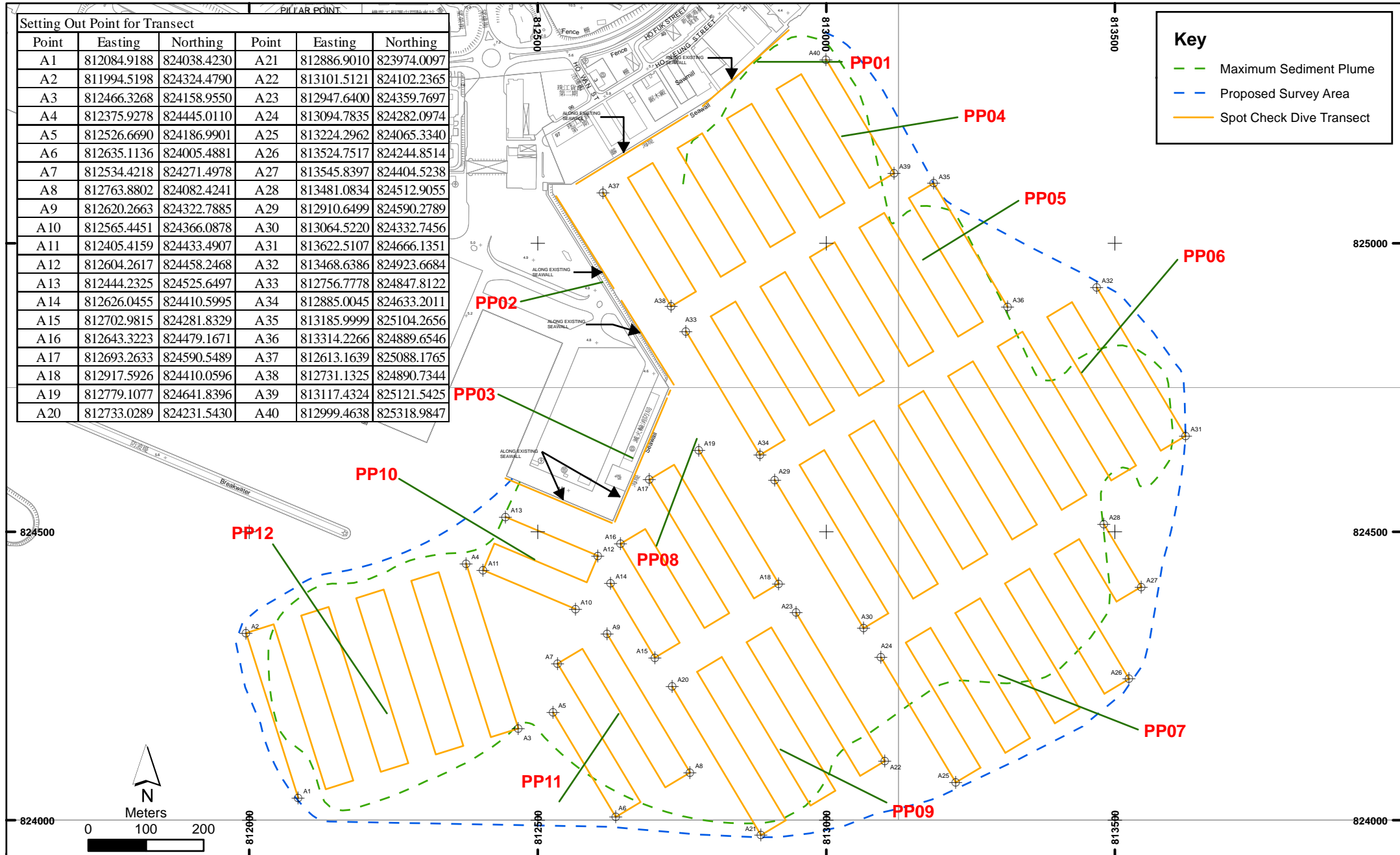


Figure 2.1

Spot-Check Dive Sites at Pillar Point

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Date: 10/9/2013

Environmental  
Resources  
Management



Setting Out Point for Transect

Point	Easting	Northing	Point	Easting	Northing
A1	812084.9188	824038.4230	A21	812886.9010	823974.0097
A2	811994.5198	824324.4790	A22	813101.5121	824102.2365
A3	812466.3268	824158.9550	A23	812947.6400	824359.7697
A4	812375.9278	824445.0110	A24	813094.7835	824282.0974
A5	812526.6690	824186.9901	A25	813224.2962	824065.3340
A6	812635.1136	824005.4881	A26	813524.7517	824244.8514
A7	812534.4218	824271.4978	A27	813545.8397	824404.5238
A8	812763.8802	824082.4241	A28	813481.0834	824512.9055
A9	812620.2663	824322.7885	A29	812910.6499	824590.2789
A10	812565.4451	824366.0878	A30	813064.5220	824332.7456
A11	812405.4159	824433.4907	A31	813622.5107	824666.1351
A12	812604.2617	824458.2468	A32	813468.6386	824923.6684
A13	812444.2325	824525.6497	A33	812756.7778	824847.8122
A14	812626.0455	824410.5995	A34	812885.0045	824633.2011
A15	812702.9815	824281.8329	A35	813185.9999	825104.2656
A16	812643.3223	824479.1671	A36	813314.2266	824889.6546
A17	812693.2633	824590.5489	A37	812613.1639	825088.1765
A18	812917.5926	824410.0596	A38	812731.1325	824890.7344
A19	812779.1077	824641.8396	A39	813117.4324	825121.5425
A20	812733.0289	824231.5430	A40	812999.4638	825318.9847

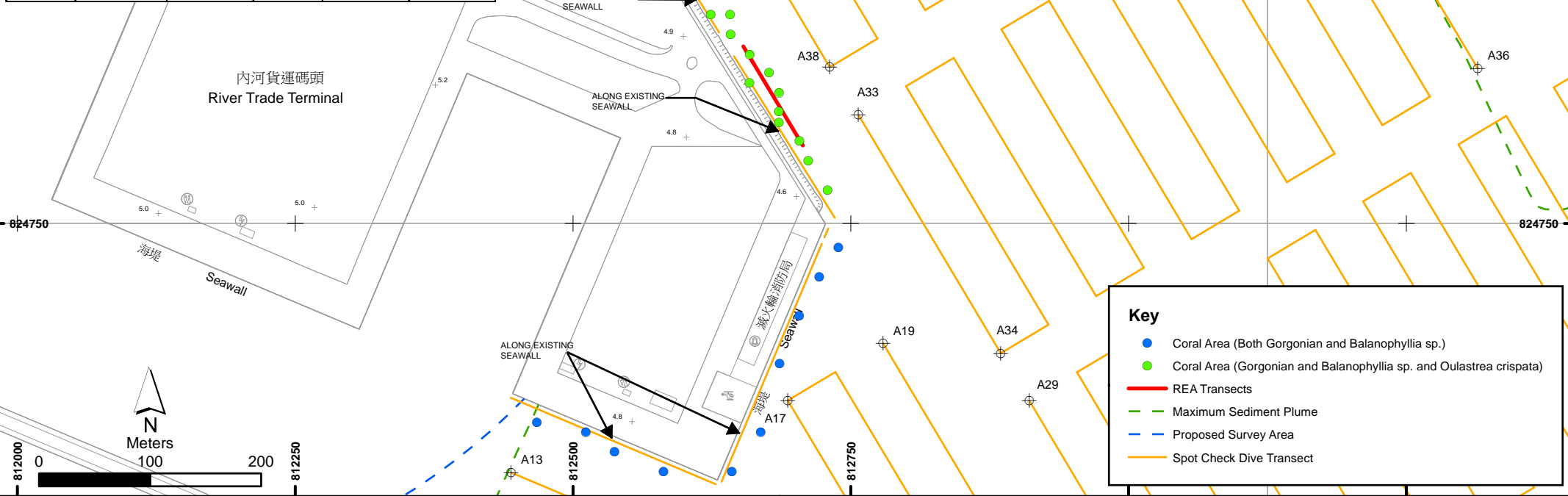


Figure 2.2

Indicative Locations of Coral Area and REA Transect at Pillar Point

**Table 2.2 Ecological and Substratum Attributes of the REA Transects at Pillar Point**

Ecological Attributes	REA 1 <sup>(1)</sup>	REA 2 <sup>(1)</sup>
Hard Coral	1	1
Dead Coral	0	0
Octocoral (Soft Corals and Gorgonians)	1	1
Anemone Beds	0	0
Dead Standing Corals	0	0
Other Benthos (sponges, zoanthids, ascidians and bryozoans)	1	1
Macroalgae	0	0
Substratum Attributes	REA 1 <sup>(1)</sup>	REA 2 <sup>(1)</sup>
Bedrock/ Continuous Pavement	0	0
Boulders Blocks (diam. >50cm)	6	5
Boulders Blocks (diam. <50cm)	2	3
Rubble	0	0
Other	0	0
Sand	0	2
Mud/Silt	0	0
Mud	0	0

Note: (1) Rank of percentage cover: 0 = None recorded; 1 = 1-5%; 2 = 6-10%; 3 = 11-30%; 4 = 31-50%; 5 = 51-75%; 6 = 76-100%

**Table 2.3 Ranks of Taxon Abundance of the REA Transects at Pillar Point**

Benthic Taxon	REA 1 <sup>(1)</sup>	REA 2 <sup>(1)</sup>
<i>Balanophyllia</i> sp.	2	2
<i>Oulastrea crispata</i>	3	3
<i>Guaiaigorgia</i> sp.	3	3
Sponges	3	3
Bryozoans	3	3
<i>Saccostrea cucullata</i>	3	3
<i>Perna viridis</i>	2	2

Note:

(1) Ordinal Ranks of Taxon Abundance: 0 = Absent; 1 = Sparse; 2 = Uncommon; 3 = Common; 4 = Abundant; 5 = Dominant

Sparse and patchy coverage (1 – 5%) of hard corals (*Balanophyllia* sp. and *Oulastrea crispata*) and gorgonians (*Guaiaigorgia* sp.) were recorded during the REA surveys. A total of 470 coral colonies of *Oulastrea crispata* and *Guaiaigorgia* sp. were recorded on boulder surfaces along the REA transects at an average depth of 5 m. They included 237 colonies of *Oulastrea crispata* (4 – 20 cm in diameter) and 233 colonies of *Guaiaigorgia* sp. (1 – 30 cm in height). In addition, patches of *Balanophyllia* sp. were also found on the boulder surfaces along the shoreline with very low coverage (<1%). As such, the number of *Balanophyllia* sp. colonies was not counted during the REA survey. The recorded corals were in fair health condition.

Fifty-two (52) out of the 470 recorded coral colonies (ie counting *Oulastrea crispata* and *Guaiaigorgia* sp. only) were attached to movable boulders (<50 cm in diameter). It is considered technically feasible to translocate these movable boulders to reduce the direct loss of corals. Prior to coral translocation, a more detailed pre-translocation survey is recommended to find out the exact number of coral colonies (both movable and non-movable) within the affected area.

Overall, all the corals (*Oulastrea crispata*, *Balanophyllia* sp. and *Guaiaigorgia* sp.) recorded during the REA survey are widespread and common across Hong Kong waters especially in the western waters with very low visibility. Owing to their commonness, sparse cover (< 5%), small size (most of the corals) and low species diversity and richness, the coral habitat of the surveyed area is considered as of low ecological value.

More detailed results of the dive surveys are provided in *Appendix A*.

Representative photographs of the habitats and species recorded are shown in *Appendix B*.

## 2.2 PRE-CONSTRUCTION SURVEY AT THE RECEPTOR SITE (TAI MO TO)

Spot-check dives and REA surveys were conducted at the receptor site (Tai Mo To) proposed in the approved EIA Report in December 2012. The seabed of the survey site was mainly composed of natural bedrocks and boulders. Two coral species (one hard coral and one gorgonian species) were recorded during the surveys.

### 2.2.1 Spot-Check Dive

A total of six spot-check dives were carried out on 13<sup>th</sup> December 2012 (*Figure 2.3*). The survey sites (TMT01 to THW06) were composed of bedrocks, boulders and sandy / muddy substrates, with water depth ranging from 1.5 m to 7.5 m. The survey sites supported limited marine life. One hard coral species and one gorgonian species were found on boulder surfaces at spot-check dive sites TMT01 and TMT02. They were ahermatypic cup coral *Balanophyllia* sp. and gorgonian *Guaiaigorgia* sp. The coral species recorded are common in local Hong Kong waters. The percentage cover of the corals found were low (<1%) (*Table 2.4*).

**Table 2.4** *Species, Coverage and Size of Corals found at Spot-Check Dive Sites at Tai Mo To*

Site	Coral Species	Coverage (%)	Size in Height/ Diameter (cm)
TMT01	<i>Balanophyllia</i> sp.	<1%	<1
	<i>Guaiaigorgia</i> sp.	<1%	10-25
TMT02	<i>Balanophyllia</i> sp.	<1%	<1
	<i>Guaiaigorgia</i> sp.	<1%	10-25

### 2.2.2 REA

A 100 m REA transect was surveyed on 10<sup>th</sup> January 2013 following the spot-check dives (*Figure 2.4*). *Tables 2.5-6* summarize the ecological and substratum attributes, and the ranks of taxon abundance along the REA transect.

Setting Out Point for Transect		
Point	Easting	Northing
B1	814413.4266	821539.7767
B2	814391.1889	821353.5676
B3	814388.3110	821329.2910
B4	814381.4727	821242.3050
B5	814409.7437	821159.9106
B6	814437.6878	821170.8252
B7	814411.5193	821246.4307
B8	814423.0721	821367.5518
B9	814444.0857	821543.5115

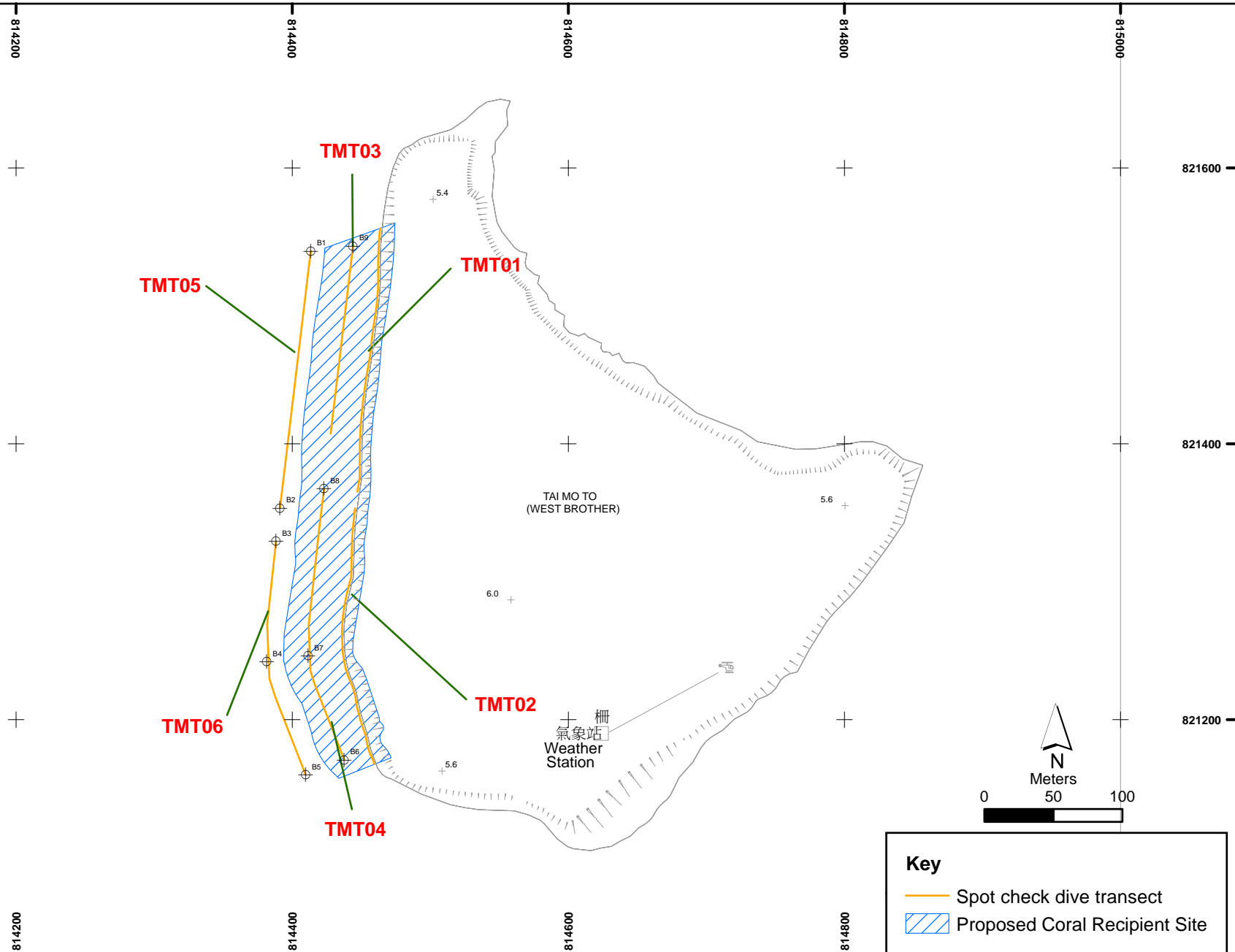


Figure 2.3

### Spot-Check Dive Sites at Tai Mo To

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Date: 10/9/2013

Environmental  
Resources  
Management





Setting Out Point for Transect		
Point	Easting	Northing
B1	814413.4266	821539.7767
B2	814391.1889	821353.5676
B3	814388.3110	821329.2910
B4	814381.4727	821242.3050
B5	814409.7437	821159.9106
B6	814437.6878	821170.8252
B7	814411.5193	821246.4307
B8	814423.0721	821367.5518
B9	814444.0857	821543.5115

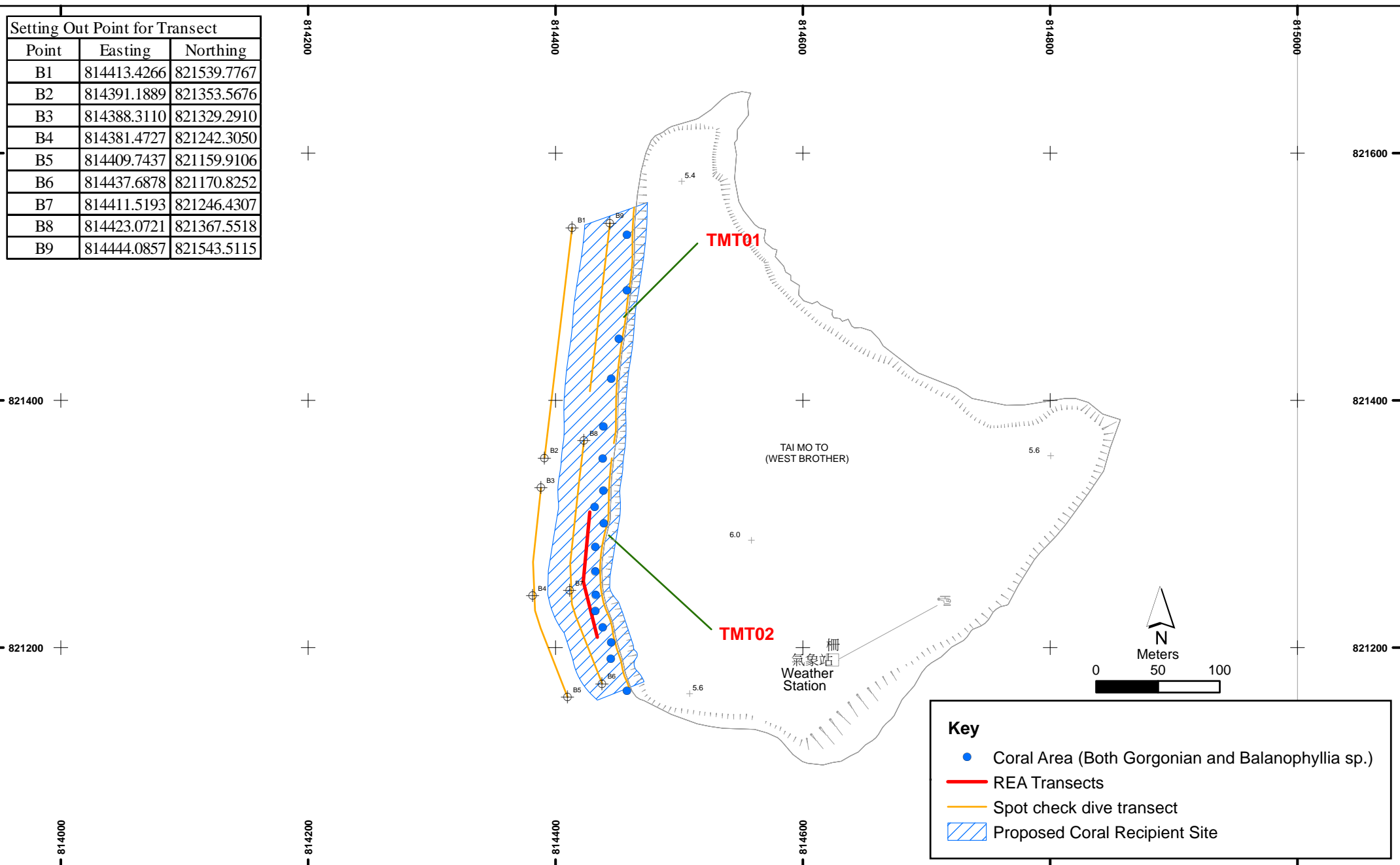


Figure 2.4

Indicative Locations of Coral Area and REA Transect at Tai Mo To

**Table 2.5**      *Ecological and Substratum Attributes of the REA Transects at Tai Mo To*

<b>Ecological Attributes</b>	<b>REA 1 <sup>(1)</sup></b>
Hard Coral	1
Dead Coral	0
Octocoral (Soft Corals and Gorgonians)	1
Anemone Beds	0
Dead Standing Corals	0
Other Benthos (sponges, zoanthids, ascidians and bryozoans)	1
Macroalgae	0
<b>Substratum Attributes</b>	<b>REA 1 <sup>(1)</sup></b>
Bedrock/ Continuous Pavement	2
Boulders Blocks (diam. >50cm)	4
Boulders Blocks (diam. <50cm)	3
Rubble	0
Other	0
Sand	2
Mud/Silt	0
Mud	0

Note: (1) Rank of percentage cover: 0 = None recorded; 1 = 1-5%; 2 = 6-10%; 3 = 11-30%; 4 = 31-50%; 5 = 51-75%; 6 = 76-100%

**Table 2.6**      *Ranks of Taxon Abundance of the REA Transects at Tai Mo To*

<b>Benthic Taxon</b>	<b>REA 1 <sup>(1)</sup></b>
<i>Balanophyllia</i> sp.	2
<i>Guaiaogorgia</i> sp.	2
Sponges	3
Bryozoans	3
<i>Saccostrea cucullata</i>	3
<i>Perna viridis</i>	2
<i>Sabellastarte japonica</i>	2

Note:

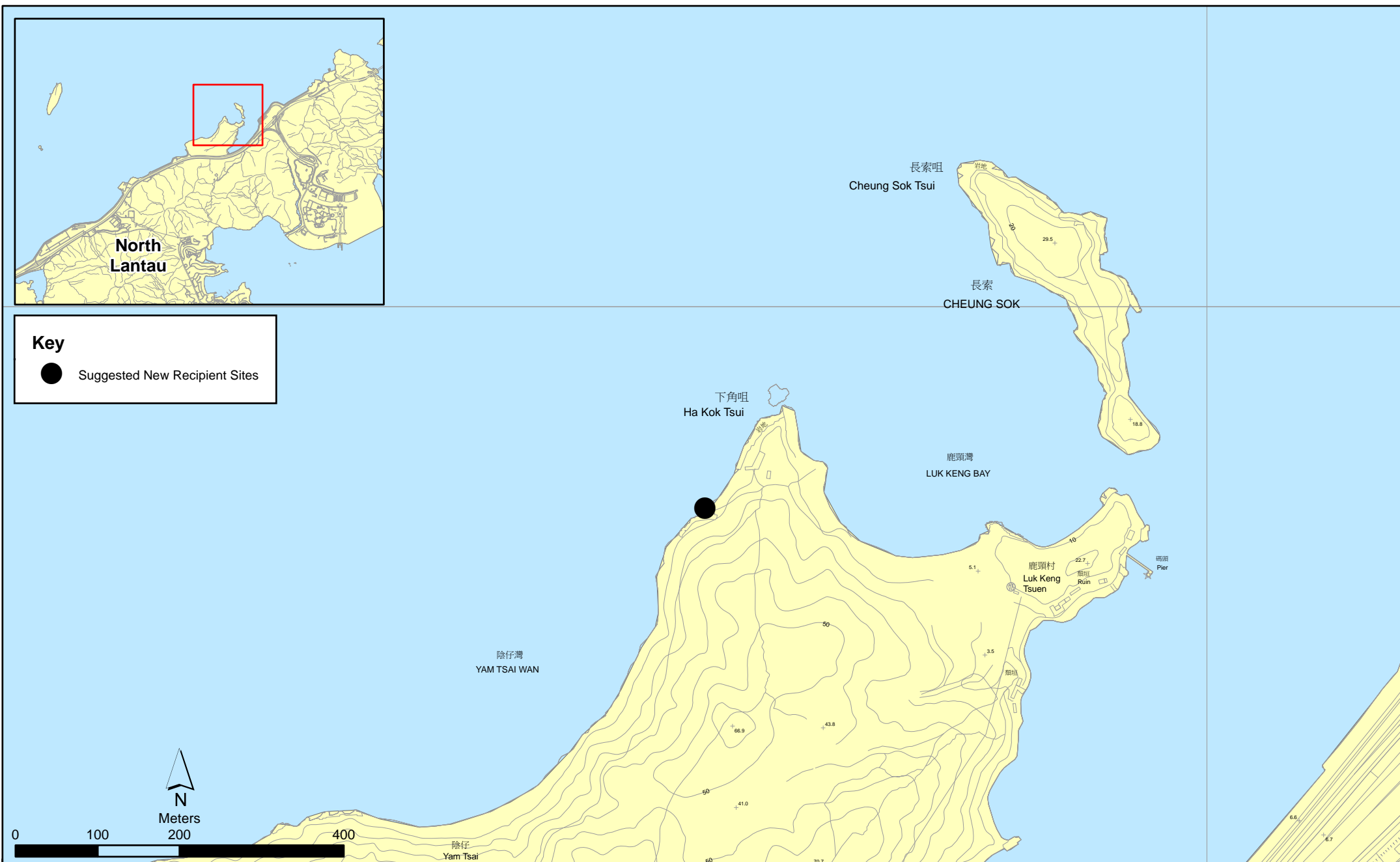
(1) Ordinal Ranks of Taxon Abundance: 0 = Absent; 1 = Sparse; 2 = Uncommon; 3 = Common; 4 = Abundant; 5 = Dominant

Sparse and patchy coverage (<1%) of hard coral (*Balanophyllia* sp.) and gorgonian (*Guaiaigorgia* sp.) were recorded during the REA survey. A total of 57 colonies of *Guaiaigorgia* sp. (10 – 25 cm in height) were recorded on bedrock or boulder surfaces along the REA transect at an average depth of 3.5 m. In addition, patches of *Balanophyllia* sp. were also found on the boulder surfaces along the shoreline with very low coverage (<1%). All recorded corals were in fair health condition.

More detailed results of the dive surveys are provided in *Appendix A*. Representative photographs of the habitats and species recorded are shown in *Appendix B*.

## 2.3 ALTERNATIVE CORAL RECEPTOR SITE

The EIA of the Project recommended that an area around Tai Mo To could be a suitable location for the receptor site. However, when compared with the donor site at Pillar Point, the underwater visibility at the suggested coral receptor site at Tai Mo To was very low during the spot-check dives and REA surveys and the site is very exposed. Since post-translocation monitoring is required after coral translocation, the very low underwater visibility and rough sea conditions at Tai Mo To would make it difficult to find the translocated corals at the site. In addition, the translocated corals may be displaced easily if the wave is too strong. Therefore, it is recommended to find a more suitable receptor site which is less exposed and with similar coral assemblages to the donor site (ie with presence of *Oulastrea crispata*, *Guaiaigorgia* sp. and *Balanophyllia* sp.). Recent coral surveys undertaken under Contract No. HY/2011/03 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between Scenic Hill and Hong Kong Boundary Facilities showed that *Oulastrea crispata*, *Guaiaigorgia* sp. and *Balanophyllia* sp. were found at Yam Tsai Wan of North Lantau which is a relatively less exposed site (Figure 2.5). It should also be noted that Yam Tsai Wan was selected as the receptor site for the coral translocation exercise of Contract No. HY/2011/03 under which corals had been translocated successfully to this receptor site in October 2012. Considering the above, it is recommended to select Yam Tsai Wan as the coral receptor site for the present translocation exercise of the northern landfall.



### 3.1 PRE-TRANSLOCATION AND TRANSLOCATION SURVEYS AT THE DONOR SITE

A coral mapping survey will be conducted at the donor site at Pillar Point as part of the pre-translocation coral survey. The location of the donor site is shown in *Figure 2.2*.

The location of any hard corals and gorgonians will be mapped. The size and health condition (including percentage cover of bleaching, mortality, degree of sedimentation) of the corals will be recorded. The feasibility of translocation of corals including but not limited to those of conservation importance will be assessed.

Coral colonies (i.e. those attached to movable boulders with diameter <50 cm, in good health condition, and feasible for translocation) proposed to be translocated will be identified, mapped and tagged during the survey. Each coral colony will be tagged using laminated, waterproof labels (approximately 20 cm x 10 cm), which will be tied onto boulders just adjacent to the coral colonies. Photograph(s) of each coral colony will be taken and additional information for each of the coral colonies will also be collected (e.g. depth, orientation, size of the attached boulders, general conditions immediately surrounding the coral colonies).

Substratum removal method is not suggested for translocating the three coral species (*Balanophyllia* sp., *Oulastrea crispata* and *Guaiaigorgia* sp.) found at Pillar Point. This is because the hard coral species *Balanophyllia* sp. and *Oulastrea crispata* are in encrusting growth form on the attached substrate. In addition, *Balanophyllia* sp. is a solitary coral species with single, small size polyp (ie mostly not larger than 5 mm in diameter for each individual) attached to the substrate. Substratum removal method would not be feasible as that would likely to damage the coral colonies and lead to a very low chance of survival during the translocation process. For the azooxanthellate gorgonian *Guaiaigorgia* sp., it depends on filter feeding with the tentacles capturing plankton and particulate matter from the water column. At the receptor site, it would be necessary to attach (or glue) them using epoxy or underwater cement to the seabed of an area with relatively stronger current to facilitate their filter feeding process. High mortality of gorgonian is expected at the receptor site due to the following reasons:

- According to overseas experience of gorgonian translocation, growing edge of the holdfast will recede or die back when the detached gorgonian is being glued to the substrate of the receptor site by epoxy or underwater cement <sup>(1)</sup>;

<sup>(1)</sup> Akins North America, Inc. (2011) Amendment No 1 to the Professional Services between the City of Miami Beach, Florida and Akins North America, Inc.

- Under relatively strong current, it is unlikely to be able to attach the gorgonian firmly to the substrate and high mortality is thus expected for the translocated gorgonian; and
- The colony of *Guaiagorgia* sp. does not exhibit an obvious central spine (please refer to *Appendix B* for photos of *Guaiagorgia* sp.) and it would be difficult to glue the detached gorgonian to the substrate, leading to easy detachment by current and consequently high mortality.

Considering the above and the lack of local experiences in adopting substratum removal method for gorgonian translocation, the substratum removal method is not recommended for the target translocated coral species at Pillar Point.

Since underwater visibility at the donor site is very low (<0.5m), relocating all tagged coral colonies after coral mapping is almost impossible. Therefore, coral translocation will be undertaken immediately after locating the movable coral colonies. Further details on the coral translocation procedure are presented in *Section 4*.

### 3.2

#### ***PRE-TRANSLOCATION SURVEY AT THE RECEPTOR SITE***

It is preferable to select a receptor site with the following characteristics:

- In the vicinity of the original coral colony;
- Not impacted by the Project or other construction/ activities;
- Presence of healthy coral community of the same species and similar hydrographical conditions as donor site; and
- With sufficient space to receive the newly translocated coral colonies.

As mentioned in the previous section, Tai Mo To is not a suitable receptor site due to the exposed and rough sea conditions, and the absence of *Oulastrea crispata*. Recent coral surveys for another project (*Contract No. HY/2011/03: Hong Kong-Zhuhai-Macao Bridge - Hong Kong Link Road*) showed that the coastline of Yam Tsai Wan is an optional coral receptor site for translocation as it shares similar habitat to the existing corals to be translocated (*Figure 2.5*).

A pre-translocation survey will be conducted at the proposed receptor site at Yam Tsai Wan to ensure its suitability before the translocation of corals commenced at the donor site of Pillar Point. A spot-check dive will be conducted at the proposed receptor site and its vicinity to check for the presence of healthy coral colonies such as hard coral *Oulastrea crispata* and gorgonian *Guaiagorgia* sp. which had been observed in previous surveys.

Following the spot-check dive, the substrate type and taxonomic composition of the receptor site will be assessed using REA method. The REA survey will be performed along a 100 m transect parallel to the coastline (based on the preliminary results from the spot-check dives). The substrate type along the

length of the transects will be recorded at 1 m intervals. The benthic cover, taxon abundance, and ecological attributes along the transects will also be recorded in a swathe of 2 m wide, 1 m either side of the transect.

The locations of the REA transects will be recorded on-site using a handheld GPS unit. The number of colonies, sizes and types of corals, their coverage, abundance, depth, health status of coral species will also be recorded. Photographs of representative taxa along the transects will also be taken during the surveys.

Health status of coral will be assessed by the following criteria:

- Gorgonian coral: Percentage of branches exhibiting partial mortality and secretion of mucus.
- Hard coral: Percentage of surface area exhibiting partial mortality and bleached/ bleached area using specially designed Coral Health Monitoring Chart (*Appendix C*).

The benthic cover (Tier I) and taxon abundance (Tier II) of the transect will be assessed in a swathe 2 m wide, 1 m either side of the transect. Two assessment categories (Tiers) will be used in the surveys, as follows:

Tier I – Categorization of Benthic Cover

Upon the completion of each transect, ecological and substratum attributes (*Table 3.1*) will be assigned to standard ranked ordinal categories (*Table 3.2*).

**Table 3.1** *Tier I Benthic Attribute Categories*

Ecological Attributes	Substratum Attributes
Hard Coral	<u>Hard Substrata</u>
Dead Coral	Bedrock/ Continuous Pavement
Octocoral (Soft Corals and Gorgonians)	Boulder blocks (diam. >50cm)
Anemone Beds	Boulder blocks (diam. <50cm)
Dead Standing Corals	Rubble
Other Benthos (sponges, zoanthids, ascidians and bryozoans)	Other
Macroalgae	<u>Soft Substrata</u>
	Sand
	Mud/Silt
	Mud

**Table 3.2** *Tier I Ordinal Ranks of Percentage Cover of Benthic Attributes*

Rank	Percentage Cover
0	None Recorded
1	1-5%
2	6-10%
3	11-30%
4	31-50%
5	51-75%
6	76-100%



For substratum attributes, it is preferable to record actual estimates of cover. The percentage of hard substrata vs. soft substrata can be provided (e.g. 80% and 20% respectively). The percentage cover of the types of hard or soft substrata could also then be presented (e.g. bedrock pavement 60%, rubble 20%, sand 15%, mud / silt 5%). Similarly, recording and presenting actual estimates of, for instance, hard and soft coral cover may be more informative (e.g. <1%).

## Tier II – Taxonomic Inventories to Define Types of Benthic Communities

An inventory of benthic taxa along each transect will be compiled during the survey. Taxa will be identified in situ to the following levels:

- Hard corals to species, where possible;
- Soft corals, anemones and conspicuous macroalgae to genus level, where possible;
- Other benthos (including sponges, zoanthids, ascidians and bryozoans) to genus level, where possible.

For each transect, each taxon in the inventory will be ranked in terms of abundance in the community (*Table 3.3*). The taxon categories will be ranked in terms of relative abundance of individuals, rather than the contribution to benthic cover along each transect. The ranks are visual assessments of abundance, rather than quantitative counts of each taxon. Representative photos of organisms will be taken.

**Table 3.3**      *Ordinal Ranks of Taxon Abundance*

Rank	Relative Abundance
0	Absent
1	Sparse
2	Uncommon
3	Common
4	Abundant
5	Dominant

In order to distinguish the natural variation in health status of corals and the health variation due to coral translocation, a certain number of natural coral colonies (eg 10 colonies) of the same species as those translocated from the donor site within and adjacent to the receptor site will be randomly selected and tagged. Baseline information will be collected for these tagged coral colonies before translocation and the type of information collected will be the same as those collected for the coral colony during the baseline survey at the donor site. The baseline information collected will be used for the purpose of post-translocation monitoring.

Upon completion of the pre-translocation surveys, the requirement for translocation and the required dimensions of the receptor site will be identified. If necessary, fine tuning / adjustment to the location of the preferred receptor site for successful translocation should be considered.

Once the exact location of the receptor site is marked, GPS coordinates will be recorded.

The pre-translocation survey should be carried out by a qualified marine biologist(s) with specialist knowledge of corals and sound experience at identifying sessile benthic taxa in the field. The qualification of the specialists proposed for the dive survey will be provided to and approved by AFCD prior to the pre-translocation survey.

Results of the baseline surveys at the donar and receptor sites will be presented in the Detailed Translocation Report to be submitted after completion of the coral translocation exercise (see *Section 6* below).

#### 4.1 CORAL TRANSLOCATION PROCEDURES

The following procedures will be performed during coral translocation to minimize stress and prevent damage to corals, as far as possible.

- Since the underwater visibility at the donor site is very low (<0.5m), relocating all tagged coral colonies after coral mapping is almost impossible. Therefore, coral translocation will be undertaken immediately after locating the movable coral colonies.
- All tagged movable boulder (with diameter <50 cm) supporting coral colony which is selected for translocation will be moved entirely as a whole object, lifted from the sea bottom and loaded to ship/boat with lifting bag.
- The coral colonies transferred onto the vessel will be fully submerged in seawater tanks of suitable size with continuous aeration onboard. Each seawater tank will hold no more than four boulders to avoid overcrowding.
- Ambient water quality parameters such as sea surface water temperature and dissolved oxygen will be measured once (with at least three replicates) at the coral donor site on the day of coral translocation. The seawater quality in the tanks will be checked every 10 minutes to ensure no fluctuation above 10% of ambient occurs to the seawater in which the coral colonies are submerged.
- Corals will be transported to the receptor site as soon as possible on the same day following the removal. The vessel will progress in a slow and steady speed (<5 knots) when approaching close to the receptor site.
- When arriving at the coral receptor site, SCUBA divers, under the supervision of marine biologist with relevant experience, will carefully place the boulders with coral colonies one by one to the seabed in order to minimize disturbance to the seabed and/or sediment. The coral colonies will be positioned to similar depths and orientations as their previous locations at the donor site as far as possible.
- Divers will tag translocated colonies at the receptor site with small plastic labels (e.g. with colony number) anchored or attached on nearby hard substratum using epoxy without touching the corals. All tags will be anchored in vicinity of the coral colonies at distances not so close to interfere with the potential growth. This would allow the revisit of the coral colonies during the post-translocation monitoring.
- Divers will record the size, location, health conditions (percentage of mortality and bleaching), percentage cover of sediment of each

translocated coral colony after the completion of translocation works using the same methodologies adopted in the pre-translocation coral survey. Photographs of each translocated coral upon completion of translocation will be taken and used as a baseline for future monitoring.

#### 4.2

#### *PRECAUTIONARY MEASURES OF CORAL TRANSLOCATION*

The following precautionary measures will be adopted during the coral translocation process:

- In the case where any tagged boulder with corals recorded during the pre-translocation survey no longer accommodates live coral growth, the boulder will not be moved. If additional boulders with coral that can be moved are discovered, these boulders will also be incorporated into the translocation works.
- Effort will be made to minimize the amount of contact by the diver and the length of time the boulders/rocks are handled. All the coral colonies attached on the boulders will be kept submerged at all times with a brief unavoidable exposure when transferred onto the vessel.
- The placement of boulders in tanks will ensure that the coral colonies are fully covered by seawater. Coral exposure to air should be avoided as far as possible during the translocation process from the donor site to the receptor site. Shading will also be provided by placing the seawater tanks under roof of the vessel to avoid exposure to direct sunlight.
- Constant supervision of the boulders and the correct orientation of the boulders in the seawater holding tanks will be carried out to ensure coral colonies are not being stressed or damaged on the way to the receptor site.
- The coral translocation should be carried out by a qualified marine biologist(s) with specialist knowledge of corals and sound experience in coral identification and translocation works. The qualification of the specialists proposed for the dive survey shall be provided to and approved by AFCD prior to the coral translocation.

### 5.1 MONITORING METHODOLOGY

After translocation is complete, an audit survey will be carried out to determine if all corals have been moved. The audit survey may be undertaken on the same day of completion of the coral translocations works or after that. Following the audit survey, the translocated coral colonies as well as the tagged natural coral colonies at the receptor site will be monitored once every three (3) months for a period of 12 months. The size, survival, health conditions (percentage of mortality / bleaching) and percentage cover of sediment of each translocated coral colony will be recorded during the monitoring, using the same methodology adopted during the pre-translocation survey. The general environmental conditions including weather, sea and tidal conditions of the coral receptor site will also be monitored. A sample of survey record form is provided in *Appendix D*.

Photographic records of the translocated and natural coral colonies will be taken as far as possible maintaining the same aspect and orientation as photographs taken for the pre-translocation surveys. All the tags for marking the translocated and natural coral colonies will be removed / retrieved once the monitoring programme is completed.

The results of the post-translocation monitoring should be reviewed with reference to findings of the pre-translocation survey and the data from original colonies at the receptor site.

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 monitoring results will be evaluated against Action and Limit Levels. Evaluation will be based on recorded changes in percentage of partial mortality of the corals. Action and Limit Levels are defined in *Table 5.1*.

**Table 5.1**      *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 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.	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 recorded on the original corals at the receptor site, then the Limit Level is exceeded.

If the defined Action Level or Limit Level for coral monitoring is exceeded, the actions as set out in *Table 5.2* will be implemented.

**Table 5.2** *Event and Action Plan for Post-Translocation Monitoring*

Event	Action			
	ET Leader	IEC	SOR	Contractor
Action Level Exceedance	<ol style="list-style-type: none"> <li>1. Check monitoring data</li> <li>2. Inform the IEC, SOR and Contractor of the findings;</li> <li>3. Increase the monitoring to at least once a month to confirm findings;</li> <li>4. Propose mitigation measures for consideration</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss monitoring with the ET and the Contractor;</li> <li>2. Review proposals for additional monitoring and any other measures submitted by the Contractor and advise the SOR accordingly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with the IEC additional monitoring requirements and any other measures proposed by the ET;</li> <li>2. Make agreement on the measures to be implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the SOR and confirm notification of the non-compliance in writing;</li> <li>2. Discuss with the ET and the IEC and propose measures to the IEC and the SOR;</li> <li>3. Implement the agreed measures.</li> </ol>
Limit Level Exceedance	<ol style="list-style-type: none"> <li>1. Undertake Steps 1-4 as in the Action Level Exceedance. If further exceedance of Limit Level, propose enhancement measures for consideration.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss monitoring with the ET and the Contractor;</li> <li>2. Review proposals for additional monitoring and any other measures submitted by the Contractor and advise the SOR accordingly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with the IEC additional monitoring requirements and any other measures proposed by the ET;</li> <li>2. Make agreement on the measures to be implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the SOR and confirm notification of the non-compliance in writing;</li> <li>2. Discuss with the ET and the IEC and propose measures to the IEC and the SOR;</li> <li>3. Implement the agreed measures.</li> </ol>



### 6.1 TENTATIVE SCHEDULE

Following approval of this Detailed Coral Translocation Methodology, the pre-translocation coral surveys will be undertaken at the receptor site of Yam Tsai Wan in October 2013. The receptor site survey will be followed by the pre-translocation survey and coral translocation at the donar site of Pillar Point which will be undertaken at the same time. Following completion of the coral translocation, an audit survey will be undertaken on the same day of completion of coral translocation or after that. It is expected that the pre-translocation coral surveys, coral translocation and audit survey will be completed by October 2013 and a tentative schedule is presented in *Table 6.1* below.

**Table 6.1** *Tentative Schedule of Pre-Translocation Coral Surveys, Coral Translocation Works and Audit Survey*

Day	Task
Day 1	Pre-translocation survey at the receptor site Yam Tsai Wan.
Day 2	Coral mapping at Pillar Point; Coral translocation from Pillar Point to Yam Tsai Wan.
Day 3	Coral mapping at Pillar Point; Coral translocation from Pillar Point to Yam Tsai Wan.
Day 4	Coral mapping at Pillar Point; Coral translocation from Pillar Point to Yam Tsai Wan.
Day 5	Coral mapping at Pillar Point; Coral translocation from Pillar Point to Yam Tsai Wan.
Day 6	Coral mapping at Pillar Point; Coral translocation from Pillar Point to Yam Tsai Wan.
Day 7	Audit survey to confirm that all target coral colonies for translocation have been removed from Pillar Point

The tentative schedule of the quarterly post-translocation monitoring is provided in *Table 6.2* below.

**Table 6.2**      *Schedule of Quarterly Post-Translocation Monitoring*

Post-Translocation Monitoring Survey	Timing
1 <sup>st</sup> Quarterly Monitoring	3 months after the translocation works
2 <sup>nd</sup> Quarterly Monitoring	6 months after the translocation works
3 <sup>rd</sup> Quarterly Monitoring	9 months after the translocation works
4 <sup>th</sup> Quarterly Monitoring	12 months after the translocation works

## 6.2

### *REPORTING*

A Detailed Translocation Report will be submitted to EPD and AFCD upon the completion of the translocation works. The locations, conditions and photographic records of the translocated corals and the conditions of the receptor site will be detailed in the report. This report will be submitted within two weeks from completion of the coral translocation works which is anticipated to be in late October 2013.

A Post-Translocation Monitoring Report will be submitted to EPD and AFCD two weeks after completion of each quarterly survey. The results of the post-translocation monitoring surveys should be reviewed with reference to the pre-translocation survey results and findings.

Highways Department, 2009. Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road - EIA Report. Prepared by Ove Arup & Partners Hong Kong Limited for Highways Department, The Government of Hong Kong Special Administrative Region.

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Highways Department, 2013. Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road Section between Scenic Hill and Hong Kong Boundary Crossing Facilities – Forth Post-Translocation Monitoring Report. Prepared by BMT Asia Pacific Limited, for Highways Department, The Government of Hong Kong Special Administrative Region.

## Appendix A

### Raw Data Recorded during the Dive Surveys at Pillar Point and Tai Mo To

Table 1

*Weather Condition during the Spot-Check Dives at Pillar Point*

Date	Weather Condition	Average Underwater Visibility
December 2012	Northeast force 4 to 5 Sunny	0.5m
December 2012	Northeast force 4 to 5 Sunny	1m
December 2012	East force 4 to 5 Sunny	1m
January 2013	East force 3 to 4 Sunny	1.5m
January 2013	East force 4 to 5 Sunny	1.5m
January 2013	North force 4 to 5 Sunny	0.5m
January 2013	North force 3 to 4 Sunny	0.5m
January 2013	Northeast force 3 to 4 Sunny	1.5m
January 2013	Northeast force 4 to 5 Sunny	0.5m
January 2013	Northeast force 3 to 4 Sunny	0.5m

Table 2

*GPS Location, Route Distance, Minimum Depth, Maximum Depth, Bottom Substrate and Underwater Visibility at Spot-Check Dive Sites at Pillar Point*

Site	Location (GPS) (Starting Point)	Route Distance (m)	Min. Depth (m)	Max. Depth (m)	Bottom Substrate	Visibility (m)
PP01	825367.588N 812936.978E	630	4	6	Vertical Seawall	0.5
PP02	825084.987N 812526.287E	390	1.4	7	Artificial Sloping Boulders	1
PP03	824757.617N 812732.638E	470	4.5	7	Vertical Seawall	1.5
PP04	825318.9847N 812999.4638E	2700	6	8	Sand/ Mud	0.5
PP05	825104.2656N 813185.9999E	3100	8	12	Sand/ Mud	0.5
PP06	824923.6684N 813468.6386E	4300	8	14	Sand/Mud	0.5
PP07	824512.9055N 813481.0834E	2400	12	15	Sand/Mud	0.5
PP08	824641.8396N 812779.1077E	1470	7	10	Sand/ Mud	0.5
PP09	824359.7697N 812947.6400E	1800	10	14	Sand/Mud	0.5
PP10	824525.6497N 812444.2325E	680	7.5	9	Sand/Mud	0.5
PP11	824322.7885N 812620.2663E	1400	10	14	Sand/Mud	0.5
PP12	824445.0110N 812375.9278E	2800	7	11	Sand/ Mud	0.5

**Table 3** *Species, Coverage and Size of Corals found at Spot-Check Dive Sites at Pillar Point*

Site	Coral Species	Coverage	Size in Height/ Diameter (cm)
PP01	<i>Balanophyllia</i> sp.	<1%	0.5-1
	<i>Guaiagorgia</i> sp.	<1%	10-30
PP02	<i>Oulastrea crispata</i>	<5%	5-20
	<i>Balanophyllia</i> sp.	<1%	0.5-1
PP03	<i>Guaiagorgia</i> sp.	<5%	5-30
	<i>Balanophyllia</i> sp.	<1%	0.5-1
	<i>Guaiagorgia</i> sp.	<1%	10-30

**Table 4** *Weather Condition during the REA Survey at Pillar Point*

Date	Weather Condition	Average Underwater Visibility
February 2013	East force 4 to 5 Sunny	0.5m

**Table 5** *GPS of Transect Starting Point and End Point, Maximum Depth, Bottom Substrate and Underwater Visibility of REA Transects at Pillar Point*

Transect	Location (GPS) (Starting Point)	Location (GPS) (End Point)	Max. Depth (m)	Bottom Substrate	Visibility (m)
REA 1	825058.724N	824960.204N	5	Artificial Sloping	0.5
	812552.850E	812610.492E		Boulders	
REA 2	824918.632N	824813.338N	5	Artificial Sloping	0.5
	812640.756E	812702.681E		Boulders	

**Table 6** *Size and Health Condition of Coral Colonies found at Transect REA 1 at Pillar Point*

Coral Number	Coral Species	Size in Height/ Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility <sup>(1)</sup>
1	<i>Guaiagorgia</i> sp.	13	0.1	Fair	No
2	<i>Guaiagorgia</i> sp.	12	0.1	Fair	No
3	<i>Guaiagorgia</i> sp.	15	0.2	Fair	No
4	<i>Guaiagorgia</i> sp.	20	0.2	Fair	No
5	<i>Guaiagorgia</i> sp.	12	0.3	Fair	No
6	<i>Oulastrea crispata</i>	15	0.3	Fair	No
7	<i>Guaiagorgia</i> sp.	21	0.4	Fair	No
8	<i>Oulastrea crispata</i>	18	0.5	Fair	No
9	<i>Oulastrea crispata</i>	5	0.5	Fair	No
10	<i>Oulastrea crispata</i>	15	0.5	Fair	No
11	<i>Oulastrea crispata</i>	10	0.6	Fair	No
12	<i>Oulastrea crispata</i>	12	0.6	Fair	No

(1) The translocation feasibility was determined based on the size of boulders measured at the time of the pre-construction survey. Corals that were attached to movable boulders of <50 cm in diameter were considered feasible to be translocated. Further evaluation of the translocation feasibility will be undertaken during the pre-translocation survey according to requirements stated in the current Detailed Coral Translocation Methodology.

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility <sup>(1)</sup>
13	<i>Guaiagorgia</i> sp.	21	1.2	Fair	No
14	<i>Guaiagorgia</i> sp.	25	1.2	Fair	No
15	<i>Guaiagorgia</i> sp.	13	1.4	Fair	No
16	<i>Guaiagorgia</i> sp.	15	1.4	Fair	No
17	<i>Guaiagorgia</i> sp.	13	1.6	Fair	No
18	<i>Guaiagorgia</i> sp.	15	1.7	Fair	No
19	<i>Oulastrea crispata</i>	18	2.3	Fair	No
20	<i>Oulastrea crispata</i>	10	2.3	Fair	No
21	<i>Oulastrea crispata</i>	5	2.4	Fair	No
22	<i>Oulastrea crispata</i>	7	2.4	Fair	No
23	<i>Oulastrea crispata</i>	5	2.4	Fair	No
24	<i>Oulastrea crispata</i>	8	2.5	Fair	No
25	<i>Oulastrea crispata</i>	11	2.6	Fair	No
26	<i>Oulastrea crispata</i>	13	2.6	Fair	No
27	<i>Oulastrea crispata</i>	10	2.7	Fair	No
28	<i>Oulastrea crispata</i>	8	2.8	Fair	No
29	<i>Oulastrea crispata</i>	10	2.8	Fair	No
30	<i>Oulastrea crispata</i>	7	2.9	Fair	No
31	<i>Oulastrea crispata</i>	5	2.9	Fair	No
32	<i>Oulastrea crispata</i>	13	2.9	Fair	No
33	<i>Oulastrea crispata</i>	8	3	Fair	No
34	<i>Oulastrea crispata</i>	9	3	Fair	No
35	<i>Guaiagorgia</i> sp.	18	3.5	Fair	No
36	<i>Guaiagorgia</i> sp.	21	3.5	Fair	No
37	<i>Guaiagorgia</i> sp.	17	3.5	Fair	No
38	<i>Guaiagorgia</i> sp.	23	3.7	Fair	No
39	<i>Guaiagorgia</i> sp.	28	3.7	Fair	No
40	<i>Guaiagorgia</i> sp.	23	3.9	Fair	No
41	<i>Guaiagorgia</i> sp.	20	3.9	Fair	No
42	<i>Oulastrea crispata</i>	15	4.5	Fair	No
43	<i>Oulastrea crispata</i>	16	4.5	Fair	No
44	<i>Oulastrea crispata</i>	13	4.6	Fair	No
45	<i>Oulastrea crispata</i>	14	4.7	Fair	No
46	<i>Oulastrea crispata</i>	10	4.7	Fair	No
47	<i>Oulastrea crispata</i>	5	4.7	Fair	No
48	<i>Oulastrea crispata</i>	11	4.8	Fair	No
49	<i>Oulastrea crispata</i>	16	4.8	Fair	No
50	<i>Guaiagorgia</i> sp.	28	5.3	Fair	No
51	<i>Guaiagorgia</i> sp.	30	5.4	Fair	No
52	<i>Guaiagorgia</i> sp.	23	5.5	Fair	No
53	<i>Guaiagorgia</i> sp.	16	5.5	Fair	No
54	<i>Guaiagorgia</i> sp.	17	5.6	Fair	No
55	<i>Guaiagorgia</i> sp.	21	5.6	Fair	No
56	<i>Guaiagorgia</i> sp.	22	5.6	Fair	No
57	<i>Guaiagorgia</i> sp.	16	5.8	Fair	No
58	<i>Oulastrea crispata</i>	19	6.7	Fair	No
59	<i>Oulastrea crispata</i>	10	6.7	Fair	No
60	<i>Oulastrea crispata</i>	5	6.7	Fair	No
61	<i>Oulastrea crispata</i>	6	6.8	Fair	No
62	<i>Oulastrea crispata</i>	5	6.8	Fair	No
63	<i>Oulastrea crispata</i>	11	6.8	Fair	No
64	<i>Oulastrea crispata</i>	6	6.9	Fair	No
65	<i>Oulastrea crispata</i>	5	6.9	Fair	No
66	<i>Oulastrea crispata</i>	9	7.2	Fair	No
67	<i>Guaiagorgia</i> sp.	25	7.2	Fair	No
68	<i>Guaiagorgia</i> sp.	20	7.8	Fair	No



Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility <sup>(1)</sup>
69	<i>Guaiagorgia</i> sp.	23	7.9	Fair	No
70	<i>Guaiagorgia</i> sp.	21	8.4	Fair	No
71	<i>Guaiagorgia</i> sp.	19	8.4	Fair	No
72	<i>Guaiagorgia</i> sp.	23	8.9	Fair	No
73	<i>Guaiagorgia</i> sp.	15	8.9	Fair	No
74	<i>Guaiagorgia</i> sp.	15	8.9	Fair	No
75	<i>Guaiagorgia</i> sp.	19	9.6	Fair	No
76	<i>Guaiagorgia</i> sp.	10	11	Fair	No
77	<i>Guaiagorgia</i> sp.	15	11	Fair	No
78	<i>Guaiagorgia</i> sp.	19	11	Fair	No
79	<i>Guaiagorgia</i> sp.	10	11.7	Fair	No
80	<i>Guaiagorgia</i> sp.	25	11.8	Fair	No
81	<i>Oulastrea crispata</i>	13	12.5	Fair	Yes
82	<i>Oulastrea crispata</i>	19	12.5	Fair	Yes
83	<i>Oulastrea crispata</i>	10	12.5	Fair	Yes
84	<i>Guaiagorgia</i> sp.	25	13.2	Fair	No
85	<i>Guaiagorgia</i> sp.	21	14.4	Fair	No
86	<i>Guaiagorgia</i> sp.	19	14.4	Fair	No
87	<i>Oulastrea crispata</i>	15	15.6	Fair	No
88	<i>Oulastrea crispata</i>	20	16.6	Fair	No
89	<i>Oulastrea crispata</i>	10	16.7	Fair	No
90	<i>Oulastrea crispata</i>	11	16.7	Fair	No
91	<i>Guaiagorgia</i> sp.	15	25.6	Fair	No
92	<i>Guaiagorgia</i> sp.	20	25.6	Fair	No
93	<i>Guaiagorgia</i> sp.	28	29.2	Fair	Yes
94	<i>Guaiagorgia</i> sp.	10	29.7	Fair	No
95	<i>Guaiagorgia</i> sp.	11	32.4	Fair	No
96	<i>Guaiagorgia</i> sp.	10	36	Fair	No
97	<i>Oulastrea crispata</i>	6	36	Fair	No
98	<i>Oulastrea crispata</i>	5	36.2	Fair	No
99	<i>Oulastrea crispata</i>	9	36.2	Fair	No
100	<i>Oulastrea crispata</i>	10	36.2	Fair	No
101	<i>Guaiagorgia</i> sp.	11	37.7	Fair	No
102	<i>Guaiagorgia</i> sp.	19	37.7	Fair	Yes
103	<i>Guaiagorgia</i> sp.	21	37.7	Fair	No
104	<i>Guaiagorgia</i> sp.	17	37.9	Fair	No
105	<i>Guaiagorgia</i> sp.	16	37.9	Fair	No
106	<i>Oulastrea crispata</i>	20	42	Fair	No
107	<i>Oulastrea crispata</i>	10	42.1	Fair	No
108	<i>Oulastrea crispata</i>	11	42.1	Fair	No
109	<i>Guaiagorgia</i> sp.	14	42.1	Fair	No
110	<i>Guaiagorgia</i> sp.	22	42.2	Fair	No
111	<i>Guaiagorgia</i> sp.	10	42.2	Fair	No
112	<i>Guaiagorgia</i> sp.	13	43.1	Fair	No
113	<i>Guaiagorgia</i> sp.	16	43.2	Fair	No
114	<i>Guaiagorgia</i> sp.	23	43.2	Fair	No
115	<i>Guaiagorgia</i> sp.	23	43.3	Fair	No
116	<i>Guaiagorgia</i> sp.	19	43.3	Fair	No
117	<i>Oulastrea crispata</i>	18	0.1	Fair	No
118	<i>Oulastrea crispata</i>	5	44.1	Fair	No
119	<i>Oulastrea crispata</i>	5	44.1	Fair	No
120	<i>Oulastrea crispata</i>	7	44.2	Fair	No
121	<i>Oulastrea crispata</i>	4	44.2	Fair	No
122	<i>Oulastrea crispata</i>	15	44.2	Fair	No
123	<i>Oulastrea crispata</i>	20	44.2	Fair	No
124	<i>Oulastrea crispata</i>	19	44.3	Fair	No

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility <sup>(1)</sup>
125	<i>Oulastrea crispata</i>	17	44.5	Fair	No
126	<i>Oulastrea crispata</i>	5	44.5	Fair	No
127	<i>Guaiagorgia</i> sp.	13	46.1	Fair	No
128	<i>Guaiagorgia</i> sp.	15	46.1	Fair	No
129	<i>Guaiagorgia</i> sp.	13	46.2	Fair	No
130	<i>Guaiagorgia</i> sp.	19	46.2	Fair	No
131	<i>Guaiagorgia</i> sp.	23	46.2	Fair	No
132	<i>Guaiagorgia</i> sp.	20	46.3	Fair	No
133	<i>Oulastrea crispata</i>	14	46.8	Fair	No
134	<i>Oulastrea crispata</i>	9	46.8	Fair	No
135	<i>Oulastrea crispata</i>	5	46.8	Fair	No
136	<i>Oulastrea crispata</i>	18	46.8	Fair	No
137	<i>Oulastrea crispata</i>	6	46.8	Fair	No
138	<i>Oulastrea crispata</i>	14	46.9	Fair	No
139	<i>Oulastrea crispata</i>	11	46.9	Fair	No
140	<i>Oulastrea crispata</i>	7	46.9	Fair	No
141	<i>Oulastrea crispata</i>	6	47	Fair	No
142	<i>Oulastrea crispata</i>	8	47	Fair	No
143	<i>Oulastrea crispata</i>	10	47	Fair	No
144	<i>Oulastrea crispata</i>	11	47.3	Fair	No
145	<i>Oulastrea crispata</i>	7	47.3	Fair	No
146	<i>Oulastrea crispata</i>	5	47.3	Fair	No
147	<i>Oulastrea crispata</i>	18	47.3	Fair	No
148	<i>Oulastrea crispata</i>	8	47.3	Fair	No
149	<i>Guaiagorgia</i> sp.	22	47.5	Fair	No
150	<i>Guaiagorgia</i> sp.	20	47.5	Fair	No
151	<i>Guaiagorgia</i> sp.	26	47.6	Fair	No
152	<i>Guaiagorgia</i> sp.	18	47.6	Fair	No
153	<i>Guaiagorgia</i> sp.	10	47.6	Fair	No
154	<i>Guaiagorgia</i> sp.	16	47.9	Fair	No
155	<i>Guaiagorgia</i> sp.	22	47.9	Fair	No
156	<i>Guaiagorgia</i> sp.	15	47.9	Fair	No
157	<i>Oulastrea crispata</i>	8	52.1	Fair	Yes
158	<i>Oulastrea crispata</i>	7	52	Fair	Yes
159	<i>Oulastrea crispata</i>	6	52.1	Fair	No
160	<i>Oulastrea crispata</i>	9	52.7	Fair	No
161	<i>Oulastrea crispata</i>	10	52.7	Fair	No
162	<i>Oulastrea crispata</i>	11	52.7	Fair	No
163	<i>Guaiagorgia</i> sp.	13	57.2	Fair	No
164	<i>Guaiagorgia</i> sp.	15	57.2	Fair	No
165	<i>Oulastrea crispata</i>	10	57.3	Fair	No
166	<i>Oulastrea crispata</i>	7	57.3	Fair	No
167	<i>Guaiagorgia</i> sp.	19	65.2	Fair	No
168	<i>Guaiagorgia</i> sp.	15	65.2	Fair	No
169	<i>Guaiagorgia</i> sp.	16	65.3	Fair	No
170	<i>Oulastrea crispata</i>	19	65.7	Fair	No
171	<i>Oulastrea crispata</i>	15	65.7	Fair	No
172	<i>Oulastrea crispata</i>	10	65.7	Fair	No
173	<i>Oulastrea crispata</i>	11	65.8	Fair	No
174	<i>Oulastrea crispata</i>	15	65.8	Fair	No
175	<i>Oulastrea crispata</i>	5	65.8	Fair	Yes
176	<i>Oulastrea crispata</i>	18	65.8	Fair	Yes
177	<i>Oulastrea crispata</i>	8	65.9	Fair	Yes
178	<i>Oulastrea crispata</i>	5	65.9	Fair	No
179	<i>Oulastrea crispata</i>	8	65.9	Fair	No
180	<i>Oulastrea crispata</i>	7	66	Fair	No

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility <sup>(1)</sup>
181	<i>Oulastrea crispata</i>	11	66.2	Fair	No
182	<i>Oulastrea crispata</i>	10	66.2	Fair	No
183	<i>Oulastrea crispata</i>	9	66.2	Fair	No
184	<i>Oulastrea crispata</i>	12	66.2	Fair	No
185	<i>Guaiagorgia</i> sp.	1	67.2	Fair	No
186	<i>Guaiagorgia</i> sp.	20	67.3	Fair	No
187	<i>Guaiagorgia</i> sp.	15	67.3	Fair	No
188	<i>Guaiagorgia</i> sp.	19	68.9	Fair	Yes
189	<i>Guaiagorgia</i> sp.	11	68.9	Fair	Yes
190	<i>Guaiagorgia</i> sp.	16	68.9	Fair	No
191	<i>Oulastrea crispata</i>	8	70.1	Fair	No
192	<i>Oulastrea crispata</i>	9	70.1	Fair	No
193	<i>Oulastrea crispata</i>	7	70.1	Fair	No
194	<i>Oulastrea crispata</i>	6	70.1	Fair	No
195	<i>Oulastrea crispata</i>	10	70.2	Fair	No
196	<i>Oulastrea crispata</i>	11	70.2	Fair	Yes
197	<i>Oulastrea crispata</i>	7	70.2	Fair	Yes
198	<i>Guaiagorgia</i> sp.	15	70.4	Fair	No
199	<i>Guaiagorgia</i> sp.	11	70.4	Fair	No
200	<i>Guaiagorgia</i> sp.	17	70.4	Fair	No
201	<i>Guaiagorgia</i> sp.	12	70.4	Fair	No
202	<i>Oulastrea crispata</i>	12	70.9	Fair	No
203	<i>Oulastrea crispata</i>	8	70.9	Fair	No
204	<i>Oulastrea crispata</i>	10	70.9	Fair	No
205	<i>Oulastrea crispata</i>	6	70.9	Fair	No
206	<i>Oulastrea crispata</i>	7	71	Fair	No
207	<i>Oulastrea crispata</i>	9	71	Fair	No
208	<i>Oulastrea crispata</i>	12	71	Fair	No
209	<i>Guaiagorgia</i> sp.	16	71.5	Fair	No
210	<i>Guaiagorgia</i> sp.	15	71.5	Fair	Yes
211	<i>Guaiagorgia</i> sp.	18	71.6	Fair	Yes
212	<i>Guaiagorgia</i> sp.	21	71.6	Fair	No
213	<i>Guaiagorgia</i> sp.	11	71.6	Fair	No
214	<i>Guaiagorgia</i> sp.	27	71.6	Fair	No
215	<i>Oulastrea crispata</i>	8	71.7	Fair	No
216	<i>Oulastrea crispata</i>	7	71.7	Fair	Yes
217	<i>Guaiagorgia</i> sp.	10	71.8	Fair	Yes
218	<i>Guaiagorgia</i> sp.	15	71.8	Fair	Yes
219	<i>Guaiagorgia</i> sp.	15	71.8	Fair	No
220	<i>Guaiagorgia</i> sp.	13	71.9	Fair	No
221	<i>Oulastrea crispata</i>	10	74.2	Fair	No
222	<i>Oulastrea crispata</i>	14	74.2	Fair	Yes
223	<i>Oulastrea crispata</i>	10	74.2	Fair	Yes
224	<i>Oulastrea crispata</i>	7	74.2	Fair	No
225	<i>Oulastrea crispata</i>	9	74.5	Fair	No
226	<i>Oulastrea crispata</i>	11	74.5	Fair	No
227	<i>Oulastrea crispata</i>	5	74.5	Fair	No
228	<i>Oulastrea crispata</i>	6	74.5	Fair	No
229	<i>Guaiagorgia</i> sp.	1	74.8	Fair	No
230	<i>Guaiagorgia</i> sp.	28	74.8	Fair	No
231	<i>Guaiagorgia</i> sp.	19	74.8	Fair	No
232	<i>Guaiagorgia</i> sp.	23	74.8	Fair	No
233	<i>Oulastrea crispata</i>	16	75.1	Fair	No
234	<i>Oulastrea crispata</i>	6	75.1	Fair	No
235	<i>Oulastrea crispata</i>	18	75.1	Fair	No
236	<i>Oulastrea crispata</i>	9	75.1	Fair	No

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility <sup>(1)</sup>
237	<i>Oulastrea crispata</i>	8	75.3	Fair	No
238	<i>Guaiagorgia</i> sp.	23	75.3	Fair	No
239	<i>Guaiagorgia</i> sp.	21	75.4	Fair	No
240	<i>Guaiagorgia</i> sp.	15	75.4	Fair	No
241	<i>Guaiagorgia</i> sp.	16	75.5	Fair	No
242	<i>Oulastrea crispata</i>	6	79	Fair	No
243	<i>Oulastrea crispata</i>	7	79.1	Fair	No
244	<i>Oulastrea crispata</i>	6	79.1	Fair	Yes
245	<i>Oulastrea crispata</i>	9	79.2	Fair	Yes
246	<i>Oulastrea crispata</i>	11	79.2	Fair	No
247	<i>Oulastrea crispata</i>	7	79.2	Fair	No
248	<i>Guaiagorgia</i> sp.	25	83	Fair	No
249	<i>Guaiagorgia</i> sp.	16	83	Fair	No
250	<i>Guaiagorgia</i> sp.	19	83.1	Fair	No
251	<i>Guaiagorgia</i> sp.	11	83.1	Fair	No
252	<i>Oulastrea crispata</i>	6	83.1	Fair	No
253	<i>Oulastrea crispata</i>	7	83.2	Fair	No
254	<i>Oulastrea crispata</i>	5	83.2	Fair	No
255	<i>Oulastrea crispata</i>	11	83.2	Fair	No
256	<i>Oulastrea crispata</i>	10	83.4	Fair	No
257	<i>Oulastrea crispata</i>	17	83.4	Fair	No
258	<i>Oulastrea crispata</i>	20	83.4	Fair	No
259	<i>Oulastrea crispata</i>	9	84.7	Fair	No
260	<i>Oulastrea crispata</i>	15	84.7	Fair	No
261	<i>Oulastrea crispata</i>	15	84.7	Fair	Yes
262	<i>Oulastrea crispata</i>	5	94.8	Fair	Yes
263	<i>Oulastrea crispata</i>	7	84.8	Fair	Yes
264	<i>Oulastrea crispata</i>	11	84.9	Fair	No
265	<i>Oulastrea crispata</i>	9	84.9	Fair	No
266	<i>Guaiagorgia</i> sp.	19	87	Fair	No
267	<i>Guaiagorgia</i> sp.	21	87.2	Fair	No
268	<i>Guaiagorgia</i> sp.	18	87.4	Fair	Yes
269	<i>Guaiagorgia</i> sp.	22	87.5	Fair	Yes
270	<i>Guaiagorgia</i> sp.	30	87.5	Fair	No
271	<i>Guaiagorgia</i> sp.	11	88	Fair	No
272	<i>Guaiagorgia</i> sp.	16	88.1	Fair	No
273	<i>Oulastrea crispata</i>	8	90.4	Fair	No
274	<i>Guaiagorgia</i> sp.	21	90.5	Fair	Yes
275	<i>Guaiagorgia</i> sp.	19	94	Fair	No

**Table 7** *Size and Health Condition of Coral Colonies found at Transect REA 2 at Pillar Point*

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility
1	<i>Guaiagorgia</i> sp.	15	0	Fair	No
2	<i>Guaiagorgia</i> sp.	17	0	Fair	No
3	<i>Guaiagorgia</i> sp.	21	0.3	Fair	No
4	<i>Guaiagorgia</i> sp.	22	0.3	Fair	No
5	<i>Guaiagorgia</i> sp.	17	0.5	Fair	No
6	<i>Guaiagorgia</i> sp.	10	0.5	Fair	No
7	<i>Guaiagorgia</i> sp.	30	0.6	Fair	No
8	<i>Guaiagorgia</i> sp.	12	0.6	Fair	No

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility
9	<i>Guaiagorgia</i> sp.	15	0.7	Fair	No
10	<i>Guaiagorgia</i> sp.	14	1	Fair	No
11	<i>Guaiagorgia</i> sp.	23	1	Fair	No
12	<i>Oulastrea crispata</i>	7	1.5	Fair	No
13	<i>Oulastrea crispata</i>	8	1.5	Fair	No
14	<i>Oulastrea crispata</i>	11	1.5	Fair	No
15	<i>Oulastrea crispata</i>	13	1.6	Fair	No
16	<i>Oulastrea crispata</i>	6	1.6	Fair	No
17	<i>Guaiagorgia</i> sp.	22	1.7	Fair	No
18	<i>Guaiagorgia</i> sp.	15	1.8	Fair	No
19	<i>Guaiagorgia</i> sp.	17	1.8	Fair	No
20	<i>Guaiagorgia</i> sp.	18	2.1	Fair	No
21	<i>Guaiagorgia</i> sp.	23	2.1	Fair	No
22	<i>Guaiagorgia</i> sp.	20	3.2	Fair	No
23	<i>Oulastrea crispata</i>	16	3.5	Fair	No
24	<i>Oulastrea crispata</i>	20	3.5	Fair	No
25	<i>Oulastrea crispata</i>	16	3.6	Fair	No
26	<i>Oulastrea crispata</i>	7	3.6	Fair	No
27	<i>Oulastrea crispata</i>	5	3.6	Fair	No
28	<i>Guaiagorgia</i> sp.	11	4.5	Fair	No
29	<i>Guaiagorgia</i> sp.	10	4.5	Fair	No
30	<i>Guaiagorgia</i> sp.	22	4.7	Fair	No
31	<i>Guaiagorgia</i> sp.	16	5.1	Fair	No
32	<i>Guaiagorgia</i> sp.	15	5.1	Fair	No
33	<i>Guaiagorgia</i> sp.	15	5.1	Fair	No
34	<i>Oulastrea crispata</i>	16	6.2	Fair	Yes
35	<i>Oulastrea crispata</i>	10	6.2	Fair	Yes
36	<i>Oulastrea crispata</i>	11	6.4	Fair	Yes
37	<i>Oulastrea crispata</i>	12	6.4	Fair	No
38	<i>Oulastrea crispata</i>	6	6.7	Fair	No
39	<i>Oulastrea crispata</i>	10	6.7	Fair	No
40	<i>Guaiagorgia</i> sp.	23	6.9	Fair	No
41	<i>Guaiagorgia</i> sp.	19	6.9	Fair	No
42	<i>Guaiagorgia</i> sp.	17	7.4	Fair	No
43	<i>Guaiagorgia</i> sp.	10	7.4	Fair	No
44	<i>Guaiagorgia</i> sp.	15	7.4	Fair	No
45	<i>Guaiagorgia</i> sp.	22	8.9	Fair	No
46	<i>Guaiagorgia</i> sp.	21	8.9	Fair	No
47	<i>Guaiagorgia</i> sp.	16	10.4	Fair	No
48	<i>Oulastrea crispata</i>	15	10.6	Fair	No
49	<i>Oulastrea crispata</i>	6	10.6	Fair	No
50	<i>Oulastrea crispata</i>	10	10.6	Fair	No
51	<i>Guaiagorgia</i> sp.	22	13.4	Fair	No
52	<i>Guaiagorgia</i> sp.	10	13.4	Fair	No
53	<i>Guaiagorgia</i> sp.	15	13.4	Fair	No
54	<i>Guaiagorgia</i> sp.	16	13.6	Fair	No
55	<i>Guaiagorgia</i> sp.	22	14.5	Fair	No
56	<i>Guaiagorgia</i> sp.	27	15.2	Fair	Yes
57	<i>Guaiagorgia</i> sp.	17	15.3	Fair	Yes
58	<i>Guaiagorgia</i> sp.	15	15.4	Fair	No
59	<i>Guaiagorgia</i> sp.	11	15.4	Fair	No
60	<i>Oulastrea crispata</i>	7	17	Fair	No
61	<i>Oulastrea crispata</i>	6	17.3	Fair	No
62	<i>Oulastrea crispata</i>	8	17.3	Fair	No
63	<i>Oulastrea crispata</i>	20	17.3	Fair	No
64	<i>Oulastrea crispata</i>	11	17.4	Fair	Yes

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility
65	<i>Oulastrea crispata</i>	6	17.4	Fair	Yes
66	<i>Oulastrea crispata</i>	8	17.4	Fair	No
67	<i>Oulastrea crispata</i>	14	17.6	Fair	No
68	<i>Guaiagorgia</i> sp.	13	21.2	Fair	No
69	<i>Guaiagorgia</i> sp.	16	21.4	Fair	No
70	<i>Guaiagorgia</i> sp.	14	22.5	Fair	Yes
71	<i>Guaiagorgia</i> sp.	17	22.8	Fair	Yes
72	<i>Guaiagorgia</i> sp.	21	22.9	Fair	Yes
73	<i>Guaiagorgia</i> sp.	10	32.4	Fair	No
74	<i>Guaiagorgia</i> sp.	11	32.5	Fair	No
75	<i>Guaiagorgia</i> sp.	16	36	Fair	No
76	<i>Guaiagorgia</i> sp.	15	36.1	Fair	No
77	<i>Oulastrea crispata</i>	16	39.1	Fair	No
78	<i>Oulastrea crispata</i>	14	39.2	Fair	No
79	<i>Oulastrea crispata</i>	17	39.2	Fair	Yes
80	<i>Oulastrea crispata</i>	11	39.2	Fair	Yes
81	<i>Oulastrea crispata</i>	7	39.2	Fair	No
82	<i>Oulastrea crispata</i>	8	39.6	Fair	No
83	<i>Oulastrea crispata</i>	6	39.6	Fair	No
84	<i>Oulastrea crispata</i>	5	42	Fair	No
85	<i>Oulastrea crispata</i>	10	42.7	Fair	No
86	<i>Guaiagorgia</i> sp.	11	55.6	Fair	No
87	<i>Guaiagorgia</i> sp.	16	56.1	Fair	No
88	<i>Guaiagorgia</i> sp.	16	56.2	Fair	No
89	<i>Oulastrea crispata</i>	14	56.3	Fair	No
90	<i>Oulastrea crispata</i>	18	56.3	Fair	No
91	<i>Oulastrea crispata</i>	8	56.3	Fair	No
92	<i>Oulastrea crispata</i>	11	56.4	Fair	No
93	<i>Guaiagorgia</i> sp.	29	57.2	Fair	No
94	<i>Guaiagorgia</i> sp.	17	57.8	Fair	No
95	<i>Guaiagorgia</i> sp.	27	57.9	Fair	No
96	<i>Guaiagorgia</i> sp.	12	57.9	Fair	No
97	<i>Oulastrea crispata</i>	11	57.9	Fair	No
98	<i>Oulastrea crispata</i>	16	60	Fair	No
99	<i>Guaiagorgia</i> sp.	21	60.2	Fair	No
100	<i>Guaiagorgia</i> sp.	26	60.2	Fair	No
101	<i>Guaiagorgia</i> sp.	20	60.5	Fair	No
102	<i>Guaiagorgia</i> sp.	11	60.5	Fair	Yes
103	<i>Guaiagorgia</i> sp.	16	60.6	Fair	Yes
104	<i>Guaiagorgia</i> sp.	16	60.7	Fair	No
105	<i>Oulastrea crispata</i>	14	60.7	Fair	No
106	<i>Guaiagorgia</i> sp.	19	62.2	Fair	No
107	<i>Guaiagorgia</i> sp.	11	62.3	Fair	No
108	<i>Guaiagorgia</i> sp.	16	62.5	Fair	No
109	<i>Guaiagorgia</i> sp.	16	62.5	Fair	No
110	<i>Oulastrea crispata</i>	15	63.3	Fair	No
111	<i>Oulastrea crispata</i>	20	63.3	Fair	Yes
112	<i>Oulastrea crispata</i>	6	63.5	Fair	Yes
113	<i>Oulastrea crispata</i>	11	63.5	Fair	No
114	<i>Oulastrea crispata</i>	16	63.6	Fair	No
115	<i>Oulastrea crispata</i>	13	63.7	Fair	No
116	<i>Guaiagorgia</i> sp.	17	64	Fair	No
117	<i>Guaiagorgia</i> sp.	21	64.1	Fair	No
118	<i>Guaiagorgia</i> sp.	22	64.1	Fair	No
119	<i>Guaiagorgia</i> sp.	26	64.2	Fair	Yes
120	<i>Guaiagorgia</i> sp.	15	64.2	Fair	Yes

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility
121	<i>Oulastrea crispata</i>	12	64.6	Fair	No
122	<i>Oulastrea crispata</i>	10	64.7	Fair	No
123	<i>Oulastrea crispata</i>	15	64.7	Fair	No
124	<i>Oulastrea crispata</i>	6	64.7	Fair	No
125	<i>Oulastrea crispata</i>	8	64.9	Fair	No
126	<i>Oulastrea crispata</i>	6	64.9	Fair	No
127	<i>Guaiagorgia</i> sp.	21	67.2	Fair	No
128	<i>Guaiagorgia</i> sp.	18	67.2	Fair	No
129	<i>Guaiagorgia</i> sp.	24	67.8	Fair	No
130	<i>Guaiagorgia</i> sp.	18	67.8	Fair	No
131	<i>Oulastrea crispata</i>	10	67.9	Fair	No
132	<i>Oulastrea crispata</i>	17	67.9	Fair	No
133	<i>Oulastrea crispata</i>	16	70.2	Fair	No
134	<i>Oulastrea crispata</i>	12	70.3	Fair	No
135	<i>Oulastrea crispata</i>	7	70.4	Fair	No
136	<i>Guaiagorgia</i> sp.	16	72.1	Fair	No
137	<i>Guaiagorgia</i> sp.	22	72.4	Fair	No
138	<i>Guaiagorgia</i> sp.	16	72.4	Fair	No
139	<i>Guaiagorgia</i> sp.	17	72.4	Fair	No
140	<i>Oulastrea crispata</i>	12	72.6	Fair	No
141	<i>Oulastrea crispata</i>	13	72.6	Fair	No
142	<i>Oulastrea crispata</i>	10	72.7	Fair	No
143	<i>Oulastrea crispata</i>	7	72.9	Fair	No
144	<i>Oulastrea crispata</i>	10	72.9	Fair	No
145	<i>Oulastrea crispata</i>	13	72.9	Fair	No
146	<i>Guaiagorgia</i> sp.	16	73	Fair	No
147	<i>Guaiagorgia</i> sp.	20	73.6	Fair	No
148	<i>Guaiagorgia</i> sp.	22	74.5	Fair	No
149	<i>Oulastrea crispata</i>	18	78.1	Fair	No
150	<i>Oulastrea crispata</i>	20	78.1	Fair	No
151	<i>Oulastrea crispata</i>	6	78.3	Fair	No
152	<i>Oulastrea crispata</i>	8	78.4	Fair	No
153	<i>Oulastrea crispata</i>	11	78.4	Fair	No
154	<i>Guaiagorgia</i> sp.	17	78.9	Fair	No
155	<i>Guaiagorgia</i> sp.	21	79	Fair	No
156	<i>Guaiagorgia</i> sp.	22	79.5	Fair	No
157	<i>Guaiagorgia</i> sp.	16	84.5	Fair	No
158	<i>Guaiagorgia</i> sp.	15	84.5	Fair	No
159	<i>Guaiagorgia</i> sp.	17	84.5	Fair	No
160	<i>Oulastrea crispata</i>	15	84.5	Fair	No
161	<i>Oulastrea crispata</i>	10	84.5	Fair	No
162	<i>Oulastrea crispata</i>	11	85.1	Fair	No
163	<i>Oulastrea crispata</i>	14	85.1	Fair	No
164	<i>Guaiagorgia</i> sp.	23	85.3	Fair	No
165	<i>Guaiagorgia</i> sp.	27	85.3	Fair	No
166	<i>Guaiagorgia</i> sp.	21	85.3	Fair	No
167	<i>Guaiagorgia</i> sp.	10	85.6	Fair	No
168	<i>Guaiagorgia</i> sp.	11	85.6	Fair	No
169	<i>Guaiagorgia</i> sp.	14	85.6	Fair	No
170	<i>Guaiagorgia</i> sp.	12	85.7	Fair	No
171	<i>Oulastrea crispata</i>	19	85.9	Fair	Yes
172	<i>Oulastrea crispata</i>	8	85.9	Fair	Yes
173	<i>Oulastrea crispata</i>	11	85.9	Fair	Yes
174	<i>Oulastrea crispata</i>	9	86.1	Fair	No
175	<i>Oulastrea crispata</i>	5	86.1	Fair	No
176	<i>Guaiagorgia</i> sp.	22	86.3	Fair	No

Coral Number	Coral Species	Size in Height / Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility
177	<i>Guaiagorgia</i> sp.	13	86.3	Fair	No
178	<i>Guaiagorgia</i> sp.	15	86.3	Fair	No
179	<i>Guaiagorgia</i> sp.	12	86.4	Fair	No
180	<i>Guaiagorgia</i> sp.	10	86.4	Fair	No
181	<i>Guaiagorgia</i> sp.	15	86.5	Fair	No
182	<i>Oulastrea crispata</i>	12	87.1	Fair	No
183	<i>Oulastrea crispata</i>	10	87.1	Fair	No
184	<i>Oulastrea crispata</i>	15	87.1	Fair	No
185	<i>Oulastrea crispata</i>	11	87.2	Fair	No
186	<i>Oulastrea crispata</i>	16	87.3	Fair	No
187	<i>Guaiagorgia</i> sp.	21	88.2	Fair	No
188	<i>Guaiagorgia</i> sp.	21	88.3	Fair	No
189	<i>Guaiagorgia</i> sp.	20	88.3	Fair	No
190	<i>Guaiagorgia</i> sp.	10	92.1	Fair	No
191	<i>Guaiagorgia</i> sp.	14	92.4	Fair	No
192	<i>Guaiagorgia</i> sp.	18	94	Fair	No
193	<i>Guaiagorgia</i> sp.	15	94.2	Fair	Yes
194	<i>Guaiagorgia</i> sp.	13	94.2	Fair	Yes
195	<i>Guaiagorgia</i> sp.	13	94.2	Fair	No

**Table 8** *Weather Condition during the Spot-Check Dives at Tai Mo To*

Date	Weather Condition	Average Underwater Visibility
December 2012	Northeast force 4 to 5 Sunny	0.5m

**Table 9** *GPS Location, Route Distance, Minimum Depth, Maximum Depth, Bottom Substrate and Underwater Visibility of Spot-Check Dive Sites at Tai Mo To*

Site	Location (GPS) (Starting Point)	Route Distance (m)	Min. Depth (m)	Max. Depth (m)	Bottom Substrate	Visibility (m)
TMT01	821548.983N 814460.231E	200	1.5	5.5	Bedrock/ Boulders	0.5
TMT02	821383.835N 814414.147E	190	1.5	2	Bedrock/ Boulders	0.5
TMT03	821543.5115N 814444.0857E	170	2.5	3.5	Sand/ Mud	0.5
TMT04	821367.5518N 814423.0721E	220	3	6	Sand/ Mud	0.5
TMT05	821539.7767N 814413.4266E	230	5	7.5	Sand/ Mud	0.5
TMT06	821329.291N 814388.311E	200	5	7	Sand/ Mud	0.5



**Table 10** *Species, Coverage and Size of Corals found at Spot-Check Dive Sites at Tai Mo To*

Site	Coral Species	Coverage	Size in Height/ Diameter (cm)
TMT01	<i>Balanophyllia</i> sp.	<1%	<0.1
	<i>Guaiagorgia</i> sp.	<1%	10-25
TMT02	<i>Balanophyllia</i> sp.	<1%	<0.1
	<i>Guaiagorgia</i> sp.	<1%	10-25

**Table 11** *Weather Condition during the REA Survey at Tai Mo To*

Date	Weather Condition	Average Underwater Visibility
January 2013	East force 4 to 5 Sunny	0.5m

**Table 12** *GPS of Transect Starting Point and Ending Point, Maximum Depth, Bottom Substrate and Underwater Visibility of REA Transects at Tai Mo To*

Transect	Location (GPS) (Starting Point)	Location (GPS) (End Point)	Max. Depth (m)	Bottom Substrate	Visibility (m)
REA 1	821337.727N 814414.147E	821212.501N 814437.723E	3.5	Bedrocks/ Boulders	0.5

**Table 13** *Size and Health Condition of Coral Colonies found at Transect REA 1 at Tai Mo To*

Coral Number	Coral Species	Size in Height/ Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility
1	<i>Guaiagorgia</i> sp.	10	4.2	Fair	No
2	<i>Guaiagorgia</i> sp.	11	5	Fair	No
3	<i>Guaiagorgia</i> sp.	15	7	Fair	No
4	<i>Guaiagorgia</i> sp.	12	7.5	Fair	No
5	<i>Guaiagorgia</i> sp.	20	12	Fair	No
6	<i>Guaiagorgia</i> sp.	20	12.2	Fair	No
7	<i>Guaiagorgia</i> sp.	15	16	Fair	No
8	<i>Guaiagorgia</i> sp.	25	16.3	Fair	No
9	<i>Guaiagorgia</i> sp.	17	24	Fair	No
10	<i>Guaiagorgia</i> sp.	18	28	Fair	No
11	<i>Guaiagorgia</i> sp.	14	28.5	Fair	No
12	<i>Guaiagorgia</i> sp.	16	32.4	Fair	No
13	<i>Guaiagorgia</i> sp.	10	32.8	Fair	Yes
14	<i>Guaiagorgia</i> sp.	21	33.9	Fair	No
15	<i>Guaiagorgia</i> sp.	14.	42	Fair	No
16	<i>Guaiagorgia</i> sp.	22	44.5	Fair	No
17	<i>Guaiagorgia</i> sp.	25	44.5	Fair	No
18	<i>Guaiagorgia</i> sp.	15	44.6	Fair	Yes
19	<i>Guaiagorgia</i> sp.	16	44.6	Fair	Yes
20	<i>Guaiagorgia</i> sp.	19	57	Fair	No
21	<i>Guaiagorgia</i> sp.	10	57.4	Fair	No
22	<i>Guaiagorgia</i> sp.	21	57.6	Fair	No
23	<i>Guaiagorgia</i> sp.	20	62	Fair	No

Coral Number	Coral Species	Size in Height/ Diameter (cm)	Distance on Transect (m)	Health Condition	Translocation Feasibility
24	<i>Guaiagorgia</i> sp.	15	62.1	Fair	Yes
25	<i>Guaiagorgia</i> sp.	14	62.2	Fair	No
26	<i>Guaiagorgia</i> sp.	10	62.2	Fair	No
27	<i>Guaiagorgia</i> sp.	10	65	Fair	Yes
28	<i>Guaiagorgia</i> sp.	15	65.5	Fair	No
29	<i>Guaiagorgia</i> sp.	15	65.5	Fair	No
30	<i>Guaiagorgia</i> sp.	14	65.7	Fair	No
31	<i>Guaiagorgia</i> sp.	16	65.8	Fair	Yes
32	<i>Guaiagorgia</i> sp.	14	65.8	Fair	No
33	<i>Guaiagorgia</i> sp.	21	67	Fair	No
34	<i>Guaiagorgia</i> sp.	19	67	Fair	Yes
35	<i>Guaiagorgia</i> sp.	20	67.1	Fair	No
36	<i>Guaiagorgia</i> sp.	14	67.2	Fair	No
37	<i>Guaiagorgia</i> sp.	10	67.2	Fair	No
38	<i>Guaiagorgia</i> sp.	15	67.7	Fair	No
39	<i>Guaiagorgia</i> sp.	16	82	Fair	No
40	<i>Guaiagorgia</i> sp.	17	82	Fair	No
41	<i>Guaiagorgia</i> sp.	10	82.1	Fair	No
42	<i>Guaiagorgia</i> sp.	10	82.4	Fair	No
43	<i>Guaiagorgia</i> sp.	12	82.6	Fair	No
44	<i>Guaiagorgia</i> sp.	10	82.5	Fair	No
45	<i>Guaiagorgia</i> sp.	15	83.4	Fair	Yes
46	<i>Guaiagorgia</i> sp.	10	83.5	Fair	No
47	<i>Guaiagorgia</i> sp.	14	83.5	Fair	No
48	<i>Guaiagorgia</i> sp.	10	84	Fair	No
49	<i>Guaiagorgia</i> sp.	19	86.2	Fair	No
50	<i>Guaiagorgia</i> sp.	14	88.1	Fair	No
51	<i>Guaiagorgia</i> sp.	15	88.7	Fair	No
52	<i>Guaiagorgia</i> sp.	21	92	Fair	No
53	<i>Guaiagorgia</i> sp.	22	92.4	Fair	No
54	<i>Guaiagorgia</i> sp.	13	93	Fair	Yes
55	<i>Guaiagorgia</i> sp.	25	94.5	Fair	No
56	<i>Guaiagorgia</i> sp.	12	94.6	Fair	No
57	<i>Guaiagorgia</i> sp.	10	95	Fair	No

## Appendix B

# Representative Photographs Taken during the Dive Surveys



Artificial Vertical Seawall



Natural Bedrocks and Boulders



*Guaiaigorgia sp.*



*Guaiaigorgia sp.*



*Oulastrea crispata*



*Oulastrea crispata*

Figure B1

Representative Photographs taken during the Dive Survey on 6<sup>th</sup>  
February 2013

FILE: P078118a1  
DATE: 11/09/2013

Environmental  
Resources  
Management





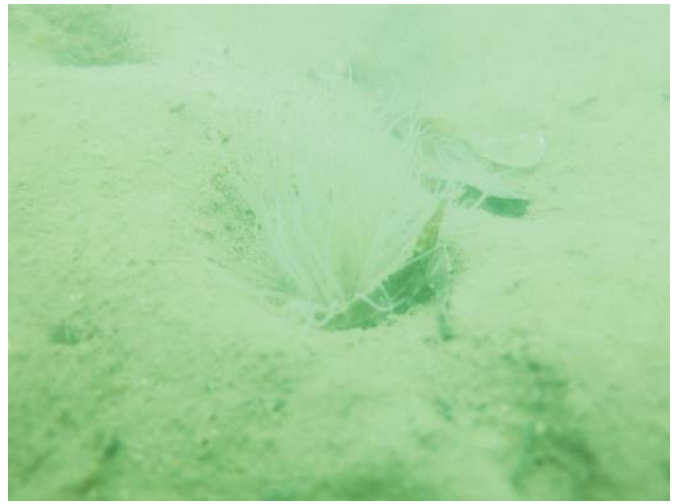
*Oulastrea crispata*



*Balanophyllia* sp.



*Balanophyllia* sp.



*Cerianthus filiformis*



*Perma viridis*

Figure B2

Representative Photographs taken during the Dive Survey on 6<sup>th</sup>  
February 2013

FILE: P078118a2  
DATE: 11/09/2013

Environmental  
Resources  
Management

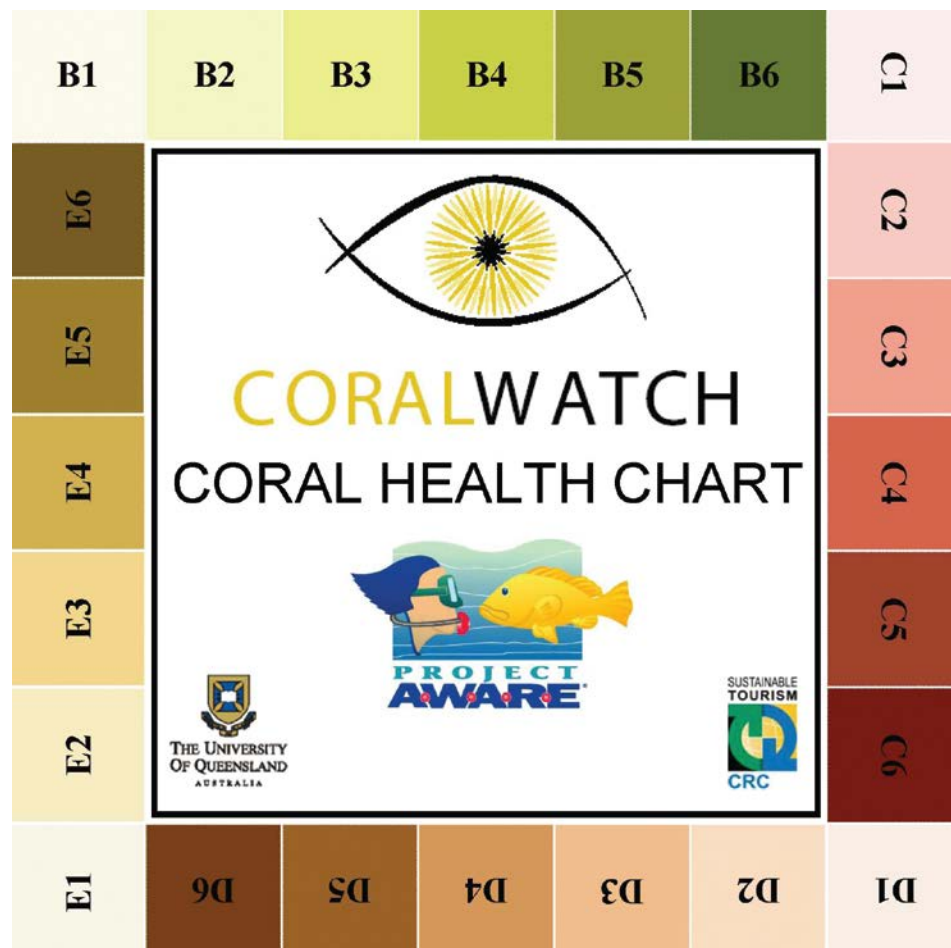




## Appendix C

# Coral Health Monitoring Chart

The Coral Health Monitoring Chart has four sample colours and six degrees of darkness (Code 1 to 6) for each sample colour indicating different stages of coral health condition. Code 1 is the lightest (representing bleaching) and Code 6 has the dark colour (representing the healthiest). During the REA survey, the lightest and darkest areas of each coral will be selected, and the colour of areas will be matched to the categories on the chart.



Appendix D

Sample Survey Record  
Form



## Appendix D Sample Survey Record Form

[illegible]