REPORT





Proposed 11kV Submarine Cables Replacement Connecting Liu Ko Ngam and Pak Sha Tau Tsui at Kat O

6th Weekly Coral Impact Monitoring Survey Report

15 February 2016

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Document Code: 0259952_Sixth Impact Coral Monitoring Report_v0.docx

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Summary This docu Survey R Replacer Kat O.	ument presents the 6 th Weekly Coral Impact Monitoring Report for the proposed 11kV Submarine Cables nent Connecting Liu Ko Ngam and Pak Sha Tau Tsui at	Date: 15 February 2016 Approved by:				
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Revision	Description	Ву	Checked	Approved	Date	
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1.1 BACKGROUND

CLP Power Hong Kong Limited (CLP) is replacing the existing 11 kV submarine cable connecting Liu Ko Ngam to Pak Sha Tau Tsui, Kat O in order to ensure continuous electricity supply on the island ("the Project" with location shown in *Figure 1.1*).

The Project involves the installation of an 11kV cable circuit consisting of two individual cables, with an intended burial depth up to 5 m for the submarine cable section and about 1 m for the land section. The two submarine cables (except the shore end sections which will be of only about 1 m separation and joining into a single cable trench at each landing site) will be 30 m away from each other and running parallel along the alignment. In areas (especially near the landing site) where the cable burial depth does not meet the requirements due to seabed geotechnical constraints, a protective cover such as a concrete slab will be adopted. The total length of the proposed cable alignment is approximately 880 m.

The cable installation process will only require minor works within the marine environment. Only small scale construction works are required onshore at each of the cable landing sites, i.e. Liu Ko Ngam and Pak Sha Tau Tsui, for connecting the submarine cable with existing overhead land cable systems.

Environmental assessment for the Project has been carried out as part of the Project Profile (Register No.: PP-489/2013) required under the *Environmental Impact Assessment Ordinance (EIAO)*. An Environmental Permit (EP) has been issued by Environmental Protection Department (EPD) on 27 Aug 2013 for the Project (EP-461/2013) ⁽¹⁾, which links directly to the Environmental Monitoring and Audit (EM&A) programme as well as the mitigation measures set out and agreed in the approved Project Profile (PP-489/2013) ⁽²⁾.

Construction of the Project commenced on 22 December 2015.

1.2 OBJECTIVES OF THE CORAL MONITORING PROGRAMME

Under the EM&A programme of the Project, a Coral Monitoring Programme is required to be implemented to verify the Project Profile ⁽³⁾ prediction that no unacceptable residual impacts to coral assemblages will occur provided that suitable mitigation measures, including the placement of a 5 m wide silt

Environmental Permit No. EP-461/2013. Available at : http://www.epd.gov.hk/eia/register/permit/latest/ep4612013.htm

⁽²⁾ ERM (2013) Replacement of the Existing 11KV Submarine Cable Circuit Connecting Liu Ko Ngam and Pak Sha Tau Tsui at Kat O – Project Profile submitted for Applications for Permission to Apply Directly for an Environmental Permit (PP-489/2013). Available at <u>http://www.epd.gov.hk/eia/register/profile/latest/dir229/dir229.pdf</u>

⁽³⁾ ERM (2013) Replacement of the Existing 11KV Submarine Cable Circuit Connecting Liu Ko Ngam and Pak Sha Tau Tsui at Kat O – Project Profile submitted for Applications for Permission to Apply Directly for an Environmental Permit (PP-489/2013). Available at <u>http://www.epd.gov.hk/eia/register/profile/latest/dir229/dir229.pdf</u>



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curtain for protecting the coral communities during dredging works, were implemented. In the event that significant adverse impacts are identified as a consequence of the works, monitoring would also allow for implementation of appropriate remedial actions to reduce such impacts. The Coral Monitoring Programme comprises Baseline, Impact and Post-Project monitoring before, during and after the Project construction, respectively.

1.3 PURPOSE OF THIS REPORT

The purpose of this 6th *Weekly Coral Impact Monitoring Survey Report* is to report findings of the 6th weekly coral impact monitoring surveys and investigate any observable impact due to the project on coral colonies near the cable landing sites at Pak Sha Tau Tsui and Liu Ko Ngam. Baseline Coral Monitoring Surveys were conducted on 29 and 30 October 2015 which provided baseline data prior to the commencement of the cable installation works. The 6th weekly coral impact monitoring survey was conducted on 1 February 2016 when landing trenching equipment were transferred to Liu Ko Ngam. Coral conditions recorded during impact monitoring are compared with the baseline conditions in order to identify any observable impacts on corals due to the project.

1.4 STRUCTURE OF THE REPORT

The remainder of the report is structured as follows:

- *Section 2: Coral Monitoring* Details the coral monitoring locations and frequency, monitoring methodology and impact coral monitoring results, and the compliance with the Action and Limit Levels in accordance with the approved *Coral Translocation and Monitoring Plan* ⁽¹⁾.
- *Section 3: Conclusion -* Concludes the representativeness of the impact coral monitoring results for the Project compared to baseline.

⁽¹⁾ ERM (2014) Replacement of the Existing 11KV Submarine Cable Circuit Connecting Liu Ko Ngam and Pak Sha Tau Tsui at Kat O. Coral Translocation and Monitoring Plan

2 CORAL MONITORING

2.1 INTRODUCTION

Construction of the Project commenced on 22 December 2015. During the weekly reporting period of 1 to 7 February 2016, works were only carried out on 1 February 2016. Therefore, the 6th weekly coral impact monitoring surveys were conducted on 1 February 2016 at two impact stations at Liu Ko Ngam and Pak Sha Tau Tsui (outside and on either side of the working corridor) and at the control station situated to the north/ east of Tsing Chau (*Figure 2.1*).

Weather condition was rainy on 1 February 2016 during the survey with ripples. Underwater visibility at Pak Sha Tau Tsui, Liu Ko Ngam and Tsing Chau was around 1 to 2 m during the surveys on 1 February 2016.

2.2 MONITORING METHODOLOGY

A total of 30 healthy coral colonies were tagged and surveyed at each of the impact and control stations on 29 and 30 October 2015 during the baseline monitoring surveys. These tagged colonies were re-visited and monitored during the impact monitoring to investigate any observable impact of the cable installation works on coral colonies near the cable landing sites. The coral monitoring results were evaluated against the Action and Limit Levels based on the conditions of the corals recorded during impact monitoring as well change in sediment cover on corals prior to and during cable installation works (please refer to *Table 2.1* for the Action and Limit Levels and *Table 2.2* for actions proposed to be undertaken in case of exceedance of the levels).

Photographic records of each coral colony tagged in the Baseline Survey were collected from an angle that best represents the entire colony, and photographs maintaining the same aspect and orientation were taken in Impact Monitoring Surveys (see *Annex A*). Adoption of the same monitoring method allows for direct comparison of baseline data with the impact monitoring data in order to determine any changes in conditions of corals after commencement of the cable installation works. Should impacts caused by the cable installation process to corals be identified, appropriate remedial action can be implemented to reduce such impacts (*Table 2.2*).

Table 2.1Action and Limit Levels for Coral Monitoring

Level	Descriptions
Action Level	If during the Impact Monitoring a 15% increase in the percentage of
	sedimentation on the corals occurs at more than 20% of the tagged coral
	colonies at the Impact Monitoring Station, which is not recorded at the Control
	Monitoring Station, then the Action Level is exceeded.



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Level	Descriptions
Limit Level	If during the Impact Monitoring a 25% increase in the percentage of
	sedimentation on the corals occurs at more than 20% of the tagged coral
	colonies at the Impact Monitoring Station, which is not recorded at the Control
	Monitoring Station, then the Limit Level is exceeded.

Table 2.2 Action for Action / Limit Level Exceedance for Coral Monitoring

Event	Contractor						
Action Level Exceedance	Step 1 - compare results with water quality monitoring results and repeat coral sampling event within two days, if Action Level is still exceeded notify AFCD.						
	Step 2 - discuss with cable installation contractor the most appropriate method of reducing suspended solids during cable installation (e.g. reduce cable laying speed/volume of water used during installation, increase effectiveness of silt curtain).						
	Step 3 - repeat survey after implementation of mitigation for confirmation of compliance.						
	Step 4 - if non compliance continues - increase measures in Step 2 and repeat measurements in Step 3. If non compliance occurs a third time, suspend cable installation operations.						
Limit Level Exceedance	Undertake Steps 1-3 immediately, if further non compliance continues at the Limit Level, suspend cable installation operations until an effective solution is identified.						

2.3 IMPACT MONITORING RESULTS

2.3.1 Comparison against Action and Limit Levels

The species, size range, partial mortality, bleaching and sediment cover (sediment thickness, type and colour) of the tagged coral colonies were recorded and summarized in Tables 2.3 to 2.5 for the three monitoring stations. Photographic records of the tagged coral colonies are shown in *Annex A*. A total of 28 tagged coral colonies were located at Pak Sha Tau Tsui and Liu Ko Ngam and 29 tagged coral colonies were located at Tsing Chau, during the 6th weekly coral impact monitoring surveys (same as 5th weekly coral impact monitoring except additionally PSTT19 at Pak Sha Tau Tsui was located). Inability to locate certain tagged corals during the dive surveys is possibly due to the loss of the tags or poor visibility experienced during the survey. According to the approved Coral Translocation and Monitoring Plan, a minimum of 20 coral colonies are required to be tagged for monitoring at each station. As a precautionary approach, a total of 30 coral colonies were tagged at each station to ensure that an adequate number of tagged colonies (i.e. not less than 20 colonies) can be re-visited to reveal any observable impacts to corals, in particular when difficulty of relocating the tagged corals is encountered at these stations with typical low underwater visibility (i.e. visibility of 0.5 to 1 m recorded during the translocation works) or due to the loss of the tags.

Findings of the 6th weekly coral impact monitoring surveys revealed none of the tagged coral colonies recorded an increase in sediment cover of more than 15% on 1 February 2016 which indicated the Action Levels or Limit Levels for

coral monitoring were not exceeded (*Table 2.1*). There did not appear to be any signs of impacts or deterioration in the general health and condition of the tagged coral colonies as a result of the Project.

Tag no.	Species	Size range (<10, 10-50; >50cm)	Partial Mortality (%)	Bleaching (%)	Sediment cover (%)	Percentage increase in sediment cover (%)	Sediment Thickness (<1mm; 1mm; >1mm)	Sediment Type (Mud/ Sand)	Sediment Color
Baseline Mon	itoring on 29 October 2015	,					,	,	
PSTT2	Favites flexuosa	<10	<1	<1	<1	N/A	<1	N/A	N/A
PSTT3	Favites flexuosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT4	Dipsastraea rotumana	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT5	Favites chinensis	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT6	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT7	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT8	Goniastrea aspera	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT9	Cyphastrea serailia	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT10	Leptastrea pruinosa	>50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT11	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT12	Goniastrea aspera	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT13	Leptastrea pruinosa	<10	<1	<1	<1	N/A	<1	N/A	N/A
PSTT14	Dipsastraea rotumana	<10	<1	<1	<1	N/A	<1	N/A	N/A
PSTT15	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT16	Leptastrea purpurea	>50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT18	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT20	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT21	Porites sp.	10-50	5	<1	<1	N/A	<1	N/A	N/A
PSTT22	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT23	Porites sp.	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT24	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT25	Leptastrea purpurea	>50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT26	Favites chinensis	>50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT27	Porites sp.	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT28	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT29	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
PSTT30	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
Impact Monit	oring on 1 February 2016								
PSTT2	Favites flexuosa	<10	<1	<1	<1	0	<1	N/A	N/A
PSTT3	Favites flexuosa	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT4	Dipsastraea rotumana	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT5	Favites chinensis	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT6	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT7	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT8	Goniastrea aspera	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT9	Cyphastrea serailia	10-50	<1	<1	<1	0	<1	N/A	N/A

 Table 2.3
 Species, Size, Partial Mortality, Bleaching and Sediment Cover of Tagged Coral Colonies at Pak Sha Tau Tsui (Impact Site)

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Tag no.	Species	Size range	Partial	Bleaching	Sediment	Percentage	Sediment Thickness	Sediment	Sediment
		(<10, 10-50;	Mortality (%)	(%)	cover (%)	increase in	(<1mm; 1mm;	Type (Mud/	Color
		>50cm)				sediment cover (%)	>1mm)	Sand)	
PSTT10	Leptastrea pruinosa	>50	<1	<1	<1	0	<1	N/A	N/A
PSTT11	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT12	Goniastrea aspera	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT13	Leptastrea pruinosa	<10	<1	<1	<1	0	<1	N/A	N/A
PSTT14	Dipsastraea rotumana	<10	<1	<1	<1	0	<1	N/A	N/A
PSTT15	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT16	Leptastrea purpurea	>50	<1	<1	<1	0	<1	N/A	N/A
PSTT18	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT20	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT21	Porites sp.	10-50	5	<1	<1	0	<1	N/A	N/A
PSTT22	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT23	Porites sp.	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT24	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT25	Leptastrea purpurea	>50	<1	<1	<1	0	<1	N/A	N/A
PSTT26	Favites chinensis	>50	<1	<1	<1	0	<1	N/A	N/A
PSTT27	Porites sp.	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT28	Leptastrea pruinosa	10-50	1	<1	<1	0	<1	N/A	N/A
PSTT29	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
PSTT30	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A

Note: PSTT1 and PSTT17 could not be located during both monitoring days and the results are not presented in the table.

Tag no.	Species	Size range (<10, 10-50; >50cm)	Partial Mortality (%)	Bleaching (%)	Sediment cover (%)	Percentage increase in sediment cover (%)	Sediment Thickness (<1mm; 1mm; >1mm)	Sediment Type (Mud/ Sand)	Sediment Color
Baseline Mo	nitoring on 30 October 2015						,		
LKN1	Dipsastraea rotumana	<10	<1	<1	<1	N/A	<1	N/A	N/A
LKN2	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN3	Cyphastrea japonica	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN4	Favites pentagona	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN5	Dipsastraea rotumana	<10	<1	<1	<1	N/A	<1	N/A	N/A
LKN6	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN8	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN9	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN11	Echinophyllia aspera	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN12	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN13	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN14	Dipsastraea rotumana	<10	<1	<1	<1	N/A	<1	N/A	N/A
LKN15	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN16	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN17	Leptastrea pruinosa	'10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN18	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN19	Platygyra acuta	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN20	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN21	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN22	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN23	Leptastrea purpurea	>50	<1	<1	<1	N/A	<1	N/A	N/A
LKN24	Porites sp.	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN25	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN26	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN27	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN28	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN29	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
LKN30	Dipsastraea rotumana	<10	<1	<1	<1	N/A	<1	N/A	N/A
Impact Moni	itoring on 1 February 2016								
LKN1	Dipsastraea rotumana	<10	<1	<1	<1	0	<1	N/A	N/A
LKN2	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN3	Cyphastrea japonica	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN4	Favites pentagona	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN5	Dipsastraea rotumana	<10	<1	<1	<1	0	<1	N/A	N/A

Table 2.4 Species, Size, Partial Mortality, Bleaching and Sediment Cover of Tagged Coral Colonies (Impact Site)

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Tag no.	Species	Size range (<10, 10-50; >50cm)	Partial Mortality (%)	Bleaching (%)	Sediment cover (%)	Percentage increase in sediment cover (%)	Sediment Thickness (<1mm; 1mm; >1mm)	Sediment Type (Mud/ Sand)	Sediment Color
LKN6	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN8	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN9	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN11	Echinophyllia aspera	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN12	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN13	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN14	Dipsastraea rotumana	<10	<1	<1	<1	0	<1	N/A	N/A
LKN15	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN16	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN17	Leptastrea pruinosa	'10-50	<1	<1	<1	0	<1	N/A	N/A
LKN18	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN19	Platygyra acuta	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN20	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN21	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN22	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN23	Leptastrea purpurea	>50	<1	<1	<1	0	<1	N/A	N/A
LKN24	Porites sp.	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN25	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN26	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN27	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN28	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN29	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
LKN30	Dipsastraea rotumana	<10	<1	<1	<1	0	<1	N/A	N/A

Note: LKN7 and LKN10 could not be located during both monitoring days and the results are not presented in the table.

Tag no.	Species	Size range (<10, 10-50; >50cm)	Partial Mortality (%)	Bleaching (%)	Sediment cover (%)	Percentage increase in sediment cover (%)	Sediment Thickness (<1mm; 1mm; >1mm)	Sediment Type (Mud/ Sand)	Sediment Color
Baseline M	onitoring on 30 October 2015	,					,	,	
TC1	Dipsastraea rotumana	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC2	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC3	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC5	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC6	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC7	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC8	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC9	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC10	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC11	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC12	Dipsastraea rotumana	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC13	Favities pentagona	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC14	Lithophyllon undulatum	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC15	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC16	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC17	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC18	Porities sp.	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC19	Dipsastraea rotumana	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC20	Lithophyllon undulatum	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC21	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC22	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC23	Leptastrea purpurea	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC24	Cyphastrea japonica	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC25	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC26	Leptastrea pruinosa	>50	<1	<1	<1	N/A	<1	N/A	N/A
TC27	Leptastrea pruinosa	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC28	Favities pentagona	10-50	<1	<1	<1	N/A	<1	N/A	N/A
TC29	Leptastrea pruinosa	>50	<1	<1	<1	N/A	<1	N/A	N/A
TC30	Leptastrea pruinosa	>50	<1	<1	<1	N/A	<1	N/A	N/A
Impact Mor	nitoring on 1 February 2016								
TC1	Dipsastraea rotumana	10-50	<1	<1	<1	0	<1	N/A	N/A
TC2	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC3	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
TC5	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC6	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A

Table 2.5	Species, Size, I	Partial Mortality,	Bleaching	and Sediment	Cover of	Tagged Coral	l Colonies at	t Tsing Chau	(Control Site)
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Tag no.	Species	Size range	Partial	Bleaching	Sediment	Percentage increase	Sediment Thickness	Sediment Type	Sediment
5	-	(<10, 10-50;	Mortality (%)	(%)	cover (%)	in sediment cover (%)	(<1mm; 1mm;	(Mud/	Color
		>50cm)					>1mm)	Sand)	
TC7	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC8	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC9	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC10	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC11	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC12	Dipsastraea rotumana	10-50	<1	<1	<1	0	<1	N/A	N/A
TC13	Favities pentagona	10-50	<1	<1	<1	0	<1	N/A	N/A
TC14	Lithophyllon undulatum	10-50	<1	<1	<1	0	<1	N/A	N/A
TC15	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC16	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC17	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC18	Porities sp.	10-50	<1	<1	<1	0	<1	N/A	N/A
TC19	Dipsastraea rotumana	10-50	<1	<1	<1	0	<1	N/A	N/A
TC20	Lithophyllon undulatum	10-50	<1	<1	<1	0	<1	N/A	N/A
TC21	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC22	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC23	Leptastrea purpurea	10-50	<1	<1	<1	0	<1	N/A	N/A
TC24	Cyphastrea japonica	10-50	<1	<1	<1	0	<1	N/A	N/A
TC25	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC26	Leptastrea pruinosa	>50	<1	<1	<1	0	<1	N/A	N/A
TC27	Leptastrea pruinosa	10-50	<1	<1	<1	0	<1	N/A	N/A
TC28	Favities pentagona	10-50	<1	<1	<1	0	<1	N/A	N/A
TC29	Leptastrea pruinosa	>50	<1	<1	<1	0	<1	N/A	N/A
TC30	Leptastrea pruinosa	>50	<1	<1	<1	0	<1	N/A	N/A

Notes: TC4 could not be located during both monitoring days and the results are not presented in the table.

2.3.2 Rapid Ecological Assessment (REA) Survey

Baseline REA surveys were conduct on 29 and 30 October 2015 at the two impact and one control stations on the subtidal marine conditions according to the methodology presented in the *Coral Translocation and Baseline Monitoring Survey Report*. REA surveys were conducted during the impact monitoring surveys on 1 February 2016 to determine any observable impacts to coral assemblages due to the cable installation works. Data collected during the REA surveys are presented in *Annex B*.

Results obtained during the REA surveys in the baseline surveys in October 2015 and the 6th weekly coral impact monitoring surveys on 1 February 2016 were noted to be similar except that turf algae was recorded at both of the impact and control stations. At Pak Sha Tau Tsui, the seabed was predominately composed of hard substrates of small boulders (<50 cm) and rubble while Liu Ko Ngam was predominately composed of small boulders (<50 cm). Cover of hard corals ranged from 6 to 10% at both impact stations. Ten (10) and fourteen (14) species of hard corals were recorded at Pak Sha Tau Tsui and Liu Ko Ngam, respectively. At the control station at Tsing Chau, the seabed was predominately composed of hard substrates of small boulders (<50 cm), rubble and rock (<26 cm). Cover of hard corals was similar to the impact stations which range from 6 to 10 %. A total of eight (8) hard coral species were recorded at Tsing Chau during the survey.

Overall, the REA results showed that the general health and condition of the coral assemblages are similar between the baseline and the 6th weekly monitoring.

CONCLUSION

3

The 6th Weekly Coral Impact Monitoring Surveys were carried out on 1 February 2016 at two impact stations and one control station in accordance with the EM&A Requirements in the *Project Profile* and the *Coral Translocation and Monitoring Plan*. During the impact monitoring, the tagged coral colonies were re-visited and monitored at each station. The conditions of the tagged coral colonies during the Coral Impact Monitoring Surveys are compared with the baseline conditions which were recorded prior to the commencement of the cable installation works.

No exceedances of the Action and Limit Levels were identified during the 6th weekly coral impact monitoring surveys on 1 February 2016. There thus did not appear to be any signs of impacts or deterioration in the general health and condition of the tagged coral colonies as a result of the project at the landing sites. Results of REA surveys also indicated no observable impact to the coral assemblages.

Coral impact monitoring surveys will be conducted twice weekly during any process of the cable installation, including landing site preparation, cable laying and landing works, and backfilling. Findings of further coral impact monitoring surveys will be presented in subsequent *Weekly Coral Impact Monitoring Survey Reports* in order to determine any observable impacts to the tagged corals as well as the coral assemblages as a result of the cable installation process. In the event that significant adverse impacts are identified as a consequence of the works, monitoring would also allow for implementation of appropriate remedial actions to reduce such impacts.

The current monitoring schedule is presented in Annex C.

Annex A

Photographic Record of Tagged Coral Colonies

Annex A1 – Corals Tagged at Pak Sha Tau Tsui



Tag No.: PSTT-6 (Leptastrea purpurea)





Tag No.: PSTT-7 (Leptastrea pruinosa)



Tag No.: PSTT-8 (Goniastrea aspera)



Tag No.: PSTT-9 (Cyphastrea serailia)



Tag No.: PSTT-10 (Leptastrea pruinosa)



Tag No.: PSTT-11 (Leptastrea purpurea)



Tag No.: PSTT-12 (Goniastrea aspera)



Tag No.: PSTT-13 (Leptastrea pruinosa)



Tag No.: PSTT-14 (Dipsastraea rotumana)



Tag No.: PSTT-15 (Leptastrea purpurea)



Tag No.: PSTT-16 (Leptastrea purpurea)



Tag No.: PSTT-18 (Leptastrea pruinosa)



Tag No.: PSTT-19 (Leptastrea pruinosa)



Tag No.: PSTT-20 (Leptastrea pruinosa)



Tag No.: PSTT-21 (Porites sp.)



Tag No.: PSTT-22 (Leptastrea pruinosa)



A5



Tag No.: PSTT-28 (Leptastrea pruinosa)



Tag No.: PSTT-29 (Leptastrea purpurea)



Tag No.: PSTT-30 (Leptastrea purpurea)

Annex A2 – Corals Tagged at Liu Ko Ngam





Tag No.: LKN-2 (Leptastrea pruinosa)



Tag No.: LKN-3 (Cyphastrea japonica)



Tag No.: LKN-4 (Favites pentagona)



Tag No.: LKN-5 (Dipsastraea rotumana)



Tag No.: LKN-6 (Leptastrea pruinosa)



Tag No.: LKN-8 (Leptastrea pruinosa)



Tag No.: LKN-9 (Leptastrea pruinosa)



Tag No.: LKN-11 (Echinophyllia aspera)



Tag No.: LKN-12 (Leptastrea purpurea)



Tag No.: LKN-13 (Leptastrea pruinosa)



Tag No.: LKN-14 (*Dipsastraea rotumana*)



Tag No.: LKN-15 (Leptastrea purpurea)



Tag No.: LKN-16 (Leptastrea purpurea)



Tag No.: LKN-17 (Leptastrea pruinosa)



Tag No.: LKN-18 (Leptastrea purpurea)



Tag No.: LKN-19 (Platygyra acuta)



Tag No.: LKN-20 (Leptastrea pruinosa)



Tag No.: LKN-21 (Leptastrea purpurea)



Tag No.: LKN-22 (Leptastrea purpurea)



Tag No.: LKN-23 (*Leptastrea purpurea*)



Tag No.: LKN-24 (Porites sp.)



Tag No.: LKN-25 (Leptastrea pruinosa)



Tag No.: LKN-26 (Leptastrea pruinosa)



Tag No.: LKN-27 (Leptastrea pruinosa)



Tag No.: LKN-28 (Leptastrea pruinosa)

Tag No.: LKN-29 (Leptastrea pruinosa)



Tag No.: LKN-30 (Dipsastraea rotumana)

Annex A3 - Corals Tagged at Tsing Chau



Tag No.: TC-1 (Dipsastraea rotumana)



Tag No.: TC-2 (Leptastrea pruinosa)



Tag No.: TC-3 (Leptastrea purpurea)



Tag No.: TC-5 (Leptastrea pruinosa)



Tag No.: TC-6 (Leptastrea pruinosa)



Tag No.: TC-7 (Leptastrea pruinosa)



Tag No.: TC-8 (Leptastrea pruinosa)



Tag No.: TC-9 (Leptastrea pruinosa)



Tag No.: TC-10 (Leptastrea pruinosa)



Tag No.: TC-11 (Leptastrea pruinosa)



Tag No.: TC-12 (Dipsastraea rotumana)



Tag No.: TC-13 (Favities pentagona)



Tag No.: TC-14 (Lithophyllon undulatum)



Tag No.: TC-15 (Leptastrea pruinosa)



Tag No.: TC-16 (Leptastrea pruinosa)





Tag No.: TC-18 (Porities sp.)



Tag No.: TC-19 (Dipsastraea rotumana)



Tag No.: TC-20 (Lithophyllon undulatum)



Tag No.: TC-21 (Leptastrea pruinosa)



Tag No.: TC-22 (Leptastrea pruinosa)



Tag No.: TC-23 (Leptastrea purpurea)



Tag No.: TC-24 (Cyphastrea japonica)



Tag No.: TC-25 (Leptastrea pruinosa)



Tag No.: TC-26 (Leptastrea pruinosa)



Tag No.: TC-27 (Leptastrea pruinosa)



Tag No.: TC-28 (Favities pentagona)



Tag No.: TC-29 (Leptastrea pruinosa)



Tag No.: TC-30 (Leptastrea pruinosa)

Annex B

Results of REA Surveys

Date	Site	Hard	Dead	Soft	Black Coral	Macroalgae	Turf Algae
		Coral	Coral	Coral			
Baseline on	PSTT	2	2	0	0	0	0
29-30/10/15	LKN	2	3	0	0	0	0
	TC	2	2	0	0	0	0
Impact	PSTT	2	2	0	0	0	1
monitoring	LKN	2	3	0	0	0	1
on 1/2/16	TC	2	2	0	0	0	1

Table B1 Rank of Ecological Seabed Attributes along the REA Survey Transects

Note: PSTT = Pak Sha Tau Tsui, LKN = Liu Ko Ngam & TC = Tsing Chau.

Table B2 Rank of Physical Seabed Attributes along the REA Survey Transects

		Hard Substrata					Soft Substrata			
Date	Site	Bedrock/	Boulder	Boulder	Rubble	Rock	Other	Sand	Mud/Silt	Mud
		continuous	Blocks (>	Blocks (<		(< 26				
		pavement	50 cm)	50 cm)		cm)				
Baseline on	PSTT	0	1	4	3	2	0	1	1	0
29 -30/10/15	LKN	0	1	5	3	3	0	1	1	0
	TC	0	0	4	4	3	0	2	2	0
Impact	PSTT	0	1	4	3	2	0	1	1	0
monitoring	LKN	0	1	5	3	3	0	1	1	0
on 1/2/16	TC	0	0	4	4	3	0	2	2	0

Note: PSTT = Pak Sha Tau Tsui, LKN = Liu Ko Ngam & TC = Tsing Chau.

Date	Species	Pak Sha Tau Tsui	Liu Ko Ngam	Tsing Chau
Baseline on 29 -	Cyphastrea japonica	0	2	1
30/10/15	Cyphastrea serailia	1	2	0
	Echinophyllia aspera	0	1	3
	Dipsastraea rotumana	3	3	0
	Favites acuticollis	0	2	0
	Favites chinensis	2	0	0
	Favites flexuosa	2	2	0
	Favites pentagona	0	2	1
	Goniastrea aspera	2	0	0
	Leprastrea priunosa	4	4	4
	Leptastrea purpurea	3	3	4
	Lithophyllon undulatum	0	0	2
	Oulastrea cripsata	1	0	0
	Pavona decussata	3	4	4
	Platygyra acuta	0	1	0
	Porites sp.	3	2	2
	Total Species	10	12	8
Impact	Cyphastrea japonica	0	2	1
monitoring on	Cyphastrea serailia	1	2	0
1/2/16	Echinophyllia aspera	0	1	3
	Dipsastraea rotumana	3	3	0
	Favites acuticollis	0	2	0
	Favites chinensis	2	0	0
	Favites flexuosa	2	2	0
	Favites pentagona	0	2	1
	Goniastrea aspera	2	0	0
	Leprastrea priunosa	4	4	4
	Leptastrea purpurea	3	3	4
	Lithophyllon undulatum	0	0	2
	Oulastrea cripsata	1	0	0
	Pavona decussata	3	4	4
	Platygyra acuta	0	1	0
	Porites sp.	3	2	2
	Total Species	10	12	8

Table B3 Relative Abundance of Hard Coral Species Recorded during the REA Survey

Table B4 Relative Abundance of Species (excluding Hard Coral) Recorded during the REASurvey

Date	Genus	Pak Sha Tau Tsui	Liu Ko Ngam	Tsing Chau
Baseline on 29-	Sponge	2	3	1
30/10/15	Sea anemones	0	1	1
	Zoanthids	2	0	0
	Tunicates	1	2	0
	Molluscs	4	4	3
•	Total Species	4	4	3
Impact	Sponge	2	3	1
monitoring on	Sea anemones	0	1	1
1/2/16	Zoanthids	2	0	0
	Tunicates	1	2	0
	Molluscs	4	4	3
	Total Species	4	4	3

Annex C

Tentative Survey Schedule

Coral Impact Monitoring Schedule Dec 2015 - Feb 2016

Public Holiday	(No Works carried out)					
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Dec	02-Dec	03-Dec	04-Dec	05-Dec
06-Dec	07-Dec	08-Dec	09-Dec	10-Dec	11-Dec	12-Dec
13-Dec	14-Dec	15-Dec	16-Dec	17-Dec	18-Dec	19-Dec
20 Dec	21 Doo	22 Doo	22 Doo	24 Doo	25 Doo	26 Doo
20-Dec	21-Dec	22-Dec	Impact Monitoring at	24-Dec	20-Dec	20-Dec
			PSTT. LKN and TC			
27-Dec	28-Dec	29-Dec	30-Dec	31-Dec	01-Jan	02-Jan
	Impact Monitoring at			Impact Monitoring at		
	PSTT, LKN and TC			PSTT, LKN and TC		
02 lon	04 lon	05 lon	06 lan	07 lan	08 lon	00. Ion
05-541	Impact Monitoring at	00-Jan	00-5411	Impact Monitoring at	00-3411	09-Jan
	PSTT, LKN and TC			PSTT, LKN and TC		
	,					
10-Jan	11-Jan	12-Jan	13-Jan	14-Jan	15-Jan	16-Jan
	Impact Monitoring at			Impact Monitoring at		
	PSTT, LKN and TC			PSTT, LKN and TC		
17-Jan	18-Jan	19-Jan	20-Jan	21-Jan	22-Jan	23-Jan
in our	Impact Monitoring at	10 Udit	20 0411	Impact Monitoring at	22 0011	20 0011
	PSTT, LKN and TC			PSTT, LKN and TC		
	No Works					
24-Jan	25-Jan	26-Jan	27-Jan	28-Jan	29-Jan	30-Jan
	No cont	ruction works are sche	eduled. Therefore, no c	oral impact monitoring	surveys are planned in	parallel.
31-Jan	01-Feb	02-Feb	03-Feb	04-Feb	05-Feb	06-Feb
	Impact Monitoring at		1	•		
	PSTT, LKN and TC	No contruction wor	rks are scheduled. The	refore no coral impact	monitoring surveys are	a nlanned in narallel
			ing are seneatied. The		monitoring surveys are	plannea în paranei.
					10 5 1	10 5 1
07-Feb	08-Feb	09-Feb	10-Feb	11-Feb	12-Feb	13-Feb
				No contruction wor	ks are scheduled. There	efore, no coral impact
				monitorir	ng surveys are planned	in parallel.
14-Feb	15-Feb	16-Feb	17-Feb	18-Feb	19-Feb	20-Feb
			Sched	ule TBC	1	
21-Feb	22-Eeb	23-Eab	24-Feb	25-Eeb	26-Eab	27-Eeb
21-Feb	22-1-60	20-FED	Z4-Feb	2J-Feb	20-FeD	21-Feb
			Sched	ule TBC		

 Note: (1) The schedule of coral monitoring is subject to change depending on the weather condition and the work programme of the cable installation works.

 (2) It was assumed that the marine works would be completed in 60 days, thus, impact coral monitoring was arranged for 8 weeks initially (excluding public holidays).

 (3) PSTT = Pak Sha Tau Tsui; LKN = Liu Ko Ngam; TC = Tsing Chau

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