



Appendix 7C-1 Report of Intertidal Survey Conducted in 2023

EIA for I-Park2 at Tsang Tsui


**REPORT ON
INTERTIDAL COMMUNITIES SURVEY
(WET AND DRY SEASON)**



ECO-ENVIRO CONSULTANTS COMPANY

September 2023

INTERTIDAL SURVEY – WET AND DRY SEASON

Faunal /floral group under study	Key surveyor				
	Full Name	Brief description of relevant experience	No. of years of relevant experience	Signature	Date
Intertidal Fauna	Keith Kei	Major project including: - Central water ecological study for 14 sites intertidal survey in wet and dry season	More than 20 years		8/Sept/23

Summary

- The intertidal ecological surveys were undertaken on the coastline at Tsang Tsui in March and July 2023.
- The transect was begun at the high tide mark and extended to the low tide level (less than 1m), and were approximately 4m in length
- The survey site was composed with artificial slopping boulders
- A total of 19 species of animals were found during the walk-through survey in both wet and dry season.
- No species of conservation importance or nursery/breeding activities was observed or recorded on the site
- The surveyed site exhibited a low epifauna diversity and abundance.
- The ecological value of the surveyed site is low

Table of Contents

SUMMARY I

TABLE OF CONTENTSII

TABLES, FIGURES AND APPENDIXES.....II

1. INTRODUCTION.....1

2. METHODOLOGY1

3. RESULTS1

4. DISCUSSION.....4

Tables, Figures and Appendixes

TABLE 1 WALK-THROUGH SURVEY DATA.....1

TABLE 2 DATA OF WET SEASON SURVEY.....3

TABLE 3 DATA OF DRY SEASON SURVEY.....3

**TABLE 4 DIVERSITY INDEX AND EVENNESS INDEX AT THE
SAMPLING SITES in Wet and Dry Season.....4**

TABLE 8 EVALUATION OF THE INTERTIDAL HABITAT SITE T3.....5

FIGURE 1 SITE T3.....6

PHOTO PLATE 1.....7

PHOTO PLATE 2.....8

**APPENDIX A SAMPLE OF FIELD DATA SHEET FOR INTERTIDAL
SURVEY.....9**

1. Introduction

1.1 This section presents the findings of the intertidal survey conducted in the Tsang Tsui as part of the marine ecological study.

2. Methodology

2.1 A qualitative walk-through survey was conducted to find out the intertidal flora and fauna present and their occurrence around the whole survey area (**Figure 1**). Qualitative walk-through survey was conducted at Sites T1 and T2 in dry season to fill the data gap. Site T3 had not been surveyed in past studies and thus qualitative walk-through survey was conducted at Site T3 during both dry and wet seasons.

2.2 Quantitative transect survey was conducted at Site T3 and one line transect was established on the surveyed location (Site T3 – N22°25’15.70” E113°54’54.08”) (**Figure 1**).

2.3 The line transect was laid along the artificial slopping boulder and begun at the high tide mark and extended to the low tide level (tidal level below 1m), and was approximately 4m in length. Quadrat samples with a sampling dimension 0.5 m x 0.5 m were taken at 1m intervals along the transect. All organisms found in each quadrat were identified and recorded to the lowest possible taxonomic level (at least Genus level). Mobile fauna were counted in terms of abundance per unit area. Sessile species, such as algae (encrusting, foliose and filamentous), barnacles and oysters, in each quadrat were also identified to the lowest possible taxonomic level (at least Genus level) and estimated as percentage cover on the rock surface.

3. Results

3.1 Intertidal ecological survey was undertaken at the coastline of Tsang Tsui on 11th March and 28th July 2023 (**Photo plate 1**).

3.2 The survey sites were located at the artificial slopping boulders at the middle and western part of Tsang Tsui Ash lagoons (**Figure 1**).

Walk-Through Survey

3.3 The walk-through surveys were conducted at early morning of 11th March 2023 for Site T1, T2 and T3 and the afternoon of 28th July 2023 for T3 with 2 surveyors. Surveyors covered the coastline in one hour time within the survey area.

3.4 A total of 16 (T1), 17 (T2) and 19 (T3) species of fauna and flora (**Photo Plate 2**) were found during the walk-through survey along the survey sites (**Table 1**). All the species found during the walk-through survey are common and no conservation importance.

Table 1 Walk-Through Survey Data in Site T1, T2 and T3

Species Name	Dry Season			Wet Season	Rarity in Hong Kong
	T1	T2	T3	T3	

Species Name	Dry Season			Wet Season	Rarity in Hong Kong
Encrusting Algae					
<i>Hildenbrandia rubra</i>	x	x	x	x	Common
<i>Hildenbrandia occidentalis</i>	x	x	x	x	Common
Erect Algae					
<i>Gelidium pusillum</i>	x	x	x	x	Common
Bivalves					
<i>Saccostrea cucullata</i>	x	x	x	x	Very Common
<i>Septifer virgatus</i>	x	x	x	x	Very Common
Barnacles					
<i>Capitulum mitella</i>	x	x	x	x	Very Common
<i>Balanus amphitrite</i>		x	x	x	Very Common
<i>Tetraclita squamosa</i>	x	x	x	x	Very Common
Sea Anemone					
<i>Haliplanella lineata</i>			x	x	Common
Limpet / False Limpet					
<i>Patelloida saccharina</i>	x	x	x	x	Very Common
<i>Nipponacmea concinna</i>	x	x	x	x	Very Common
Nerite					
<i>Nerita albicilla</i>	x	x	x	x	Very Common
Periwinkle					
<i>Echinolittorina radiata</i>	x	x	x	x	Very Common
<i>Littoraria articulata</i>	x	x	x	x	Very Common
Planaxid Snail					
<i>Planaxis sulcatus</i>	x	x	x	x	Common
Whelks					
<i>Thais clavigera</i>	x	x	x	x	Very Common
<i>Thais luteostoma</i>	x	x	x	x	Very Common
True Crabs					
<i>Hemigrapsus sanguineus</i>			x	x	Very Common
Sea Slaters					
<i>Ligia exotica</i>	x	x	x	x	Common
Total No. of Species	16	17	19	19	

Intertidal Transect Survey

3.5 A total of 15 and 13 species were recorded at Site T3 along the transect during wet season and dry season survey, respectively. Their numbers were shown in **Table 2 – 3** below (low tide mark – quadrat 1 and extended to the high tide level – quadrat 4). Total number of individuals ranged from 133 (wet season) and 81 (dry season).

3.6 Generally, encrusting algae *Hildenbrandia rubra* and *Hildenbrandia occidentalis*, snail *Echinolittorina radiata* (**Photo plate 2**) and *Littoraria articulata*, limpet

Patelloida saccharina and *Nipponacmea concinna*, barnacle *Tetraclita squamosa*, bivalves *Saccostrea cucullata* and *Septifer virgatus* were the common species on this site. *Saccostrea cucullata* and *Tetraclita squamosa* were the dominant species at the lower tidal level, while *Echinolittorina radiata* was dominant at the higher tidal level.

3.7 All the species record during the survey was either very common or common in Hong Kong. No species of conservation importance or nursery/breeding activities was observed or recorded on this site.

Table 2 Data of Wet Season Survey at Site T3

Species Name	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4
Encrusting Algae				
<i>Hildenbrandia rubra</i>		5%	10%	
<i>Hildenbrandia occidentalis</i>			10%	15%
Erect Algae				
<i>Gelidium pusillum</i>		5%		
Bivalves				
<i>Saccostrea cucullata</i>		50%	40%	
<i>Septifer virgatus</i>	15%	10%		
Barnacles				
<i>Capitulum mitella</i>		<1%	<1%	
<i>Tetraclita squamosa</i>		35%	25%	
Sea Anemone				
<i>Haliplanella lineata</i>			2	
Limpet / False Limpet				
<i>Patelloida saccharina</i>	15	10		
<i>Nipponacmea concinna</i>	5	8		
Periwinkle				
<i>Echinolittorina radiata</i>			25	15
<i>Littoraria articulata</i>		15	20	
Whelks				
<i>Thais clavigera</i>			2	
<i>Thais luteostoma</i>	2	4		
Sea Slaters				
<i>Ligia exotica</i>		4	2	4
Total No. of Species	15			
Total No. of Individuals	133*			

*Only mobile animals are counted.

Table 3 Data of Dry Season Survey at Site T3

Species Name	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4
Encrusting Algae				
<i>Hildenbrandia rubra</i>		10%	10%	

Species Name	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4
<i>Hildenbrandia occidentalis</i>			15%	10%
Erect Algae				
<i>Gelidium pusillum</i>	15%	10%		
Bivalves				
<i>Saccostrea cucullata</i>		50%	35%	
<i>Septifer virgatus</i>	20%	15%		
Barnacles				
<i>Capitulum mitella</i>		<1%	<1%	
<i>Tetraclita squamosa</i>		25%	30%	
Limpet / False Limpet				
<i>Patelloida saccharina</i>	8	11		
<i>Nipponacmea concinna</i>	4	3		
Periwinkle				
<i>Echinolittorina radiata</i>			15	10
<i>Littoraria articulata</i>		10	13	
Whelks				
<i>Thais clavigera</i>		1	1	
<i>Thais luteostoma</i>	2	3		
Total No. of Species	13			
Total No. of Individuals	81*			

*Only mobile animals are counted.

4. Discussion

- 4.1 The abundance of the intertidal fauna was generally low. All the surveyed areas are composed of artificial vertical seawall or artificial sloping boulders with extensive human activities.
- 4.4 The ecological evaluation of Site T3 along the coastline of Tsang Tsui Lagoon is presented in **Table 4** below. Given the low diversity community structure and no species of conservation importance present, this area is therefore not of special conservation importance in terms of intertidal communities and is of low ecological value.

Table 4 Evaluation of the intertidal habitat of Site T3

Criteria	Evaluation
Naturalness	Low. The whole area is mainly composed of artificial sloping boulders
Size	Medium. T3 is a representative site of the hard shore of Tsang Tsui Ash Lagoon. The hard shore of the entire Tsang Tsui Ash Lagoon covers a total length around 2 km
Diversity	Low diversity epifauna community, supporting a range of common species – mainly gastropods.

Criteria	Evaluation
Rarity	The hard shore habitat is not rare and no rare species or species of conservation importance were recorded during the surveys.
Re-creatability	Can be recreated using boulder seawall
Fragmentation	N/A
Linkage	Ecological linkage was not observed.
Potential Value	Potential value is limited due to factors including narrow shore length and depth, and disturbance from nearby quarry activities.
Nursery / Breeding Ground	No special value as nursery/breeding ground was found.
Age	N/A
Wildlife Abundance / Richness	High abundance of gastropods, but low species richness.
Ecological Value	Low value.

Figure 1 Sites T1, T2 and T3

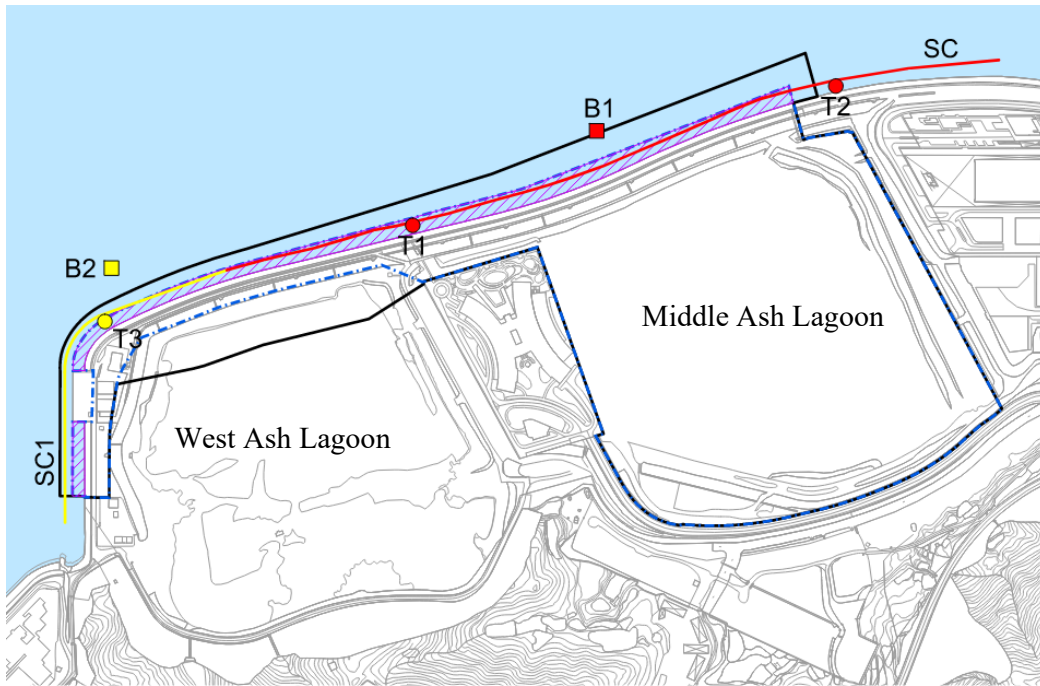


Photo Plate 1



Site T1

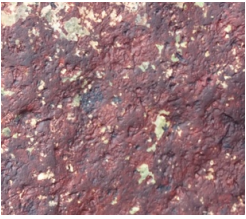


















Site T2



Site T3

Photo Plate 2

			
<i>Hildenbrandia rubra</i>	<i>Hildenbrandia occidentalis</i>	<i>Gelidium pusillum</i>	<i>Saccostrea cucullata</i>
			
<i>Septifer virgatus</i>	<i>Capitulum mitella</i>	<i>Balanus amphitrite</i>	<i>Tetraclita squamosa</i>
			
<i>Haliplanella lineata</i>	<i>Patelloida saccharina</i>	<i>Nipponacmea concinna</i>	<i>Nerita albicilla</i>
			
<i>Echinolittorina radiata</i>	<i>Littoraria articulata</i>	<i>Planaxis sulcatus</i>	<i>Thais clavigera</i>
			
<i>Thais luteostoma</i>	<i>Hemigrapsus sanguineus</i>	<i>Ligia exotica</i>	

Appendix A Sample of Field Data Sheet for Intertidal Survey

Site Name (Transect #):		Date:	
GPS Location:		Transect Distance:	
Starting Point:		Notes:	
Quadrat #	Species	No. of Individual	



Appendix 7C-2 Report of Intertidal Survey Conducted in 2024


EIA for I-Park2 at Tsang Tsui

**REPORT ON
INTERTIDAL COMMUNITIES SURVEY
(WET SEASON)**



ECO-ENVIRO CONSULTANTS COMPANY

July 2024

Faunal /floral group under study	Key surveyor				
	Full Name	Brief description of relevant experience	No. of years of relevant experience	Signature	Date
Intertidal Fauna	Keith Kei	Major project including: - Central water ecological study for 14 sites intertidal survey in wet and dry season	More than 20 years		17/July24

Summary

- The Intertidal ecological surveys at Site T1 and T2 were undertaken on the coastline at Tsang Tsui in June 2024.
- The transect was begun at the high tide mark and extended to the low tide level (less than 1m), and were approximately 4m in length
- The survey site was composed with artificial slopping boulders
- A total of 16 species of animals were found during the walk-through survey.
- No species of conservation importance or nursery/breeding activities was observed or recorded on the site
- The surveyed site exhibit a low epifauna diversity and abundance.
- The ecological value of the surveyed site is low

Table of Contents

SUMMARY I

TABLE OF CONTENTSII

TABLES, FIGURES AND APPENDIXES.....II

1. INTRODUCTION.....1

2. METHODOLOGY1

3. RESULTS1

4. DISCUSSION.....4

Tables, Figures and Appendixes

TABLE 1 WALK-THROUGH SURVEY DATA.....1

TABLE 2 DATA OF SITE T1.....2

TABLE 3 DATA OF SITE T2.....3

**TABLE 4 DIVERSITY INDEX AND EVENNESS INDEX AT THE
SAMPLING SITES4**

TABLE 5 EVALUATION OF THE INTERTIDAL HABITAT SITE T1.....4

TABLE 6 EVALUATION OF THE INTERTIDAL HABITAT SITE T2.....5

FIGURE 1 SITE T3.....6

PHOTO PLATE 1.....7

**APPENDIX A SAMPLE OF FIELD DATA SHEET FOR INTERTIDAL
SURVEY.....8**

1. Introduction

1.1 This section presents the findings of the intertidal survey conducted in the Tsang Tsui as part of the marine ecological study.

2. Methodology

2.1 A qualitative walk-through survey was conducted to find out the Intertidal flora and fauna present and their occurrence around the whole survey area.

2.2 Two locations were surveyed, and two line transects was established on the surveyed locations (Site T1 – N22°25’19.39” E113°55’02.88”, Site T2 - N22°25’24.90” E113°55’21.84”) (**Figure 1**).

2.3 Both transects were laid along the artificial slopping boulder and begun at the high tide mark and extended to the low tide level (tidal level below 1m) and was approximately 4m in length. Quadrat samples with a sampling dimension 0.5 m x 0.5 m were taken at 1m intervals along the transects. All organisms found in each quadrat were identified and recorded to the lowest possible taxonomic level (at least Genus level). Mobile fauna were counted in terms of abundance per unit area. Sessile species, such as algae (encrusting, foliose and filamentous), barnacles and oysters, in each quadrat were also identified to the lowest possible taxonomic level (at least Genus level) and estimated as percentage cover on the rock surface.

3. Results

3.1 Intertidal ecological survey was undertaken at the coastline of Tsang Tsui on 21st June 2024 (**Photo plate 1**).

3.2 Site T1 and T2 was located at the artificial slopping boulders of Tsang Tsui lagoon (**Figure 1**).

Walk-Through Survey

3.3 The walk-through surveys of Site T1 and T2 were conducted at late afternoon of 21st June 2024 with 2 surveyors. Surveyors covered the coastline in one hour time within the survey area.

3.4 A total of 16 species of fauna and flora (T1:15, T2:17) were found during the walk-through survey along the survey sites (**Table 1**). All the species found during the walk-through survey are common and no conservation importance.

Table 1 Walk-Through Survey Data

Species Name	T1	T2	Rarity in Hong Kong
Encrusting Algae			
<i>Hildenbrandia rubra</i>	x	x	Common
<i>Hildenbrandia occidentalis</i>	x	x	Common
Bivalves			

Species Name	T1	T2	Rarity in Hong Kong
<i>Saccostrea cucullata</i>	x	x	Very Common
<i>Septifer virgatus</i>	x	x	Very Common
Barnacles			
<i>Capitulum mitella</i>	x	x	Very Common
<i>Balanus amphitrite</i>	x	x	Very Common
<i>Tetraclita squamosa</i>	x	x	Very Common
Limpet / False Limpet			
<i>Patelloida saccharina</i>	x	x	Very Common
<i>Nipponacmea concinna</i>	x	x	Very Common
Nerite			
<i>Nerita albicilla</i>	x	x	Very Common
Periwinkle			
<i>Echinolittorina radiata</i>	x	x	Very Common
<i>Littoraria articulata</i>	x	x	Very Common
Planaxid Snail			
<i>Planaxis sulcatus</i>	x	x	Common
Whelks			
<i>Thais clavigera</i>	x	x	Very Common
True Crabs			
<i>Hemigrapsus sanguineus</i>		x	Very Common
Sea Slaters			
<i>Ligia exotica</i>	x	x	Common
Total No. of Species	15	16	

Intertidal Transect Survey

3.6 Two line transects (T1 and T2) were surveyed. A total of 12 species were recorded at each transect. Their numbers were shown in **Table 2 – 3** below (low tide mark – quadrat 1 and extended to the high tide level – quadrat 4). Total number of individuals ranged from 164 (T1) and 129 (T2).

3.7 Number of species are the same in both sites (12) and total number of individuals were higher in Site T1 (T1:164, T2:129). Both Site T1 and T2 are composed of artificial slopping seawall.

3.8 Generally, encrusting algae, *Hildenbrandia rubra* and *Hildenbrandia occidentalis*, snail *Echinolittorina radiata* and *Littoraria articulate*, Limpet *Patelloida saccharina* and *Nipponacmea concinna*, barnacle *Tetraclita squamosa*, bivalves *Saccostrea cucullata* and *Septifer virgatus* were the common species on this site. *Saccostrea cucullata* and *Tetraclita squamosa* was the dominant species at the lower tidal level, while *Echinolittorina radiata* was dominant at the higher tidal level.

3.9 All the species record during the survey was either very common or common in Hong Kong. No species of conservation importance or nursery/breeding activities was observed or recorded on this site.

Table 2 Data of Site T1

Species Name	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4
Encrusting Algae				
<i>Hildenbrandia rubra</i>		10%	15%	
<i>Hildenbrandia occidentalis</i>			5%	10%
Bivalves				
<i>Saccostrea cucullata</i>		35%	55%	
<i>Septifer virgatus</i>	10%	15%		
Barnacles				
<i>Capitulum mitella</i>		<1%	<1%	
<i>Tetraclita squamosa</i>		25%	30%	
Limpet / False Limpet				
<i>Patelloida saccharina</i>	12	16		
<i>Nipponacmea concinna</i>	6	11		
Periwinkle				
<i>Echinolittorina radiata</i>			19	24
<i>Littoraria articulata</i>		30	27	
Whelks				
<i>Thais clavigera</i>			3	
Sea Slaters				
<i>Ligia exotica</i>			5	11
Total No. of Species	12			
Total No. of Individuals	164 *			

*Only mobile animals are counted.

Table 3 Data of Site T2

Species Name	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4
Encrusting Algae				
<i>Hildenbrandia rubra</i>		5%	10%	
<i>Hildenbrandia occidentalis</i>			10%	10%
Bivalves				
<i>Saccostrea cucullata</i>		40%	30%	
<i>Septifer virgatus</i>	15%	20%		
Barnacles				
<i>Capitulum mitella</i>		<1%	<1%	
<i>Tetraclita squamosa</i>		15%	30%	
Limpet / False Limpet				
<i>Patelloida saccharina</i>	9	10		
<i>Nipponacmea concinna</i>	10	7		

Species Name	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4
Periwinkle				
<i>Echinolittorina radiata</i>			17	16
<i>Littoraria articulata</i>		24	19	
Whelks				
<i>Thais clavigera</i>		2		
Sea Slaters				
<i>Ligia exotica</i>			10	5
Total No. of Species	12			
Total No. of Individuals	129 *			

*Only mobile animals are counted.

4. Discussion

4.1 The abundance of the intertidal fauna was generally low. All the surveyed areas are composed artificial sloping boulders.

4.4 The ecological evaluation of the coastline of Tsang Tsui Lagoon is presented in **Table 5** below. Given the low diversity community structure and no species of conservation importance present, this area is therefore not of special conservation importance in terms of intertidal communities and is of low ecological value.

Table 5 Evaluation of the intertidal habitat of Site T1

Criteria	Evaluation
Naturalness	Low. The whole area is mainly composed of artificial sloping boulders
Size	Medium. T1 is a representative site of the hard shore of Tsang Tsui Ash Lagoon. The hard shore of the entire Tsang Tsui Ash Lagoon covers a total length around 2 km.
Diversity	Low diversity epifauna community, supporting a range of common species – mainly gastropods.
Rarity	The hard shore habitat is not rare and no rare species or species of conservation importance were recorded during the surveys.
Re-creatability	Can be recreated using boulder seawall
Fragmentation	N/A
Linkage	Ecological linkage was not observed.
Potential Value	Potential value is limited due to factors including narrow shore length and depth, and disturbance from nearby quarry activities.
Nursery / Breeding Ground	No special value as nursery/breeding ground was found.
Age	N/A
Wildlife Abundance / Richness	High abundance of gastropods, but low species richness.

Criteria	Evaluation
Ecological Value	Low value.

Table 6 Evaluation of the intertidal habitat of Site T2

Criteria	Evaluation
Naturalness	Low. The whole area is mainly composed of artificial slopping boulders
Size	Medium. T1 is a representative site of the hard shore of Tsang Tsui Ash Lagoon. The hard shore of the entire Tsang Tsui Ash Lagoon covers a total length around 2 km.
Diversity	Low diversity epifauna community, supporting a range of common species – mainly gastropods.
Rarity	The hard shore habitat is not rare and no rare species or species of conservation importance were recorded during the surveys.
Re-creatability	Can be recreated using boulder seawall
Fragmentation	N/A
Linkage	Ecological linkage was not observed.
Potential Value	Potential value is limited due to factors including narrow shore length and depth, and disturbance from nearby quarry activities.
Nursery / Breeding Ground	No special value as nursery/breeding ground was found.
Age	N/A
Wildlife Abundance / Richness	High abundance of gastropods, but low species richness.
Ecological Value	Low value.

Figure 1 Site T1 and T2



Photo Plate 1



Appendix A Sample of Field Data Sheet for Intertidal Survey

Site Name (Transect #):			Date:
GPS Location:			Transect Distance:
Starting Point:		Notes:	
Quadrat #	Species	No. of Individual	



Appendix 7C-3 Benthic Survey Report




EIA for I-Park2 at Tsang Tsui

**REPORT ON
BENTHIC COMMUNITIES SURVEY
(WET AND DRY SEASON)**



ECO-ENVIRO CONSULTANTS COMPANY

September 2023

Faunal /floral group under study	Key surveyor				
	Full Name	Brief description of relevant experience	No. of years of relevant experience	Signature	Date
Benthic Fauna	Keith Kei	Major project including: - Central water ecological study for 22 sites benthic survey in wet and dry season	More than 10 years		8/Sept/23
Benthic Fauna	Dr. Alice Chan	Major project including: - Central water ecological study for 22 sites benthic survey in wet and dry season	More than 15 years		8/Sept/23
Benthic Fauna	Dr. Mark Shea	Major project including: - Central water ecological study for 22 sites benthic survey in wet and dry season	More than 15 years		8/Sept/23

1. INTRODUCTION

1.1 This report presents the findings of benthic community survey for I-Park2 project at offshore area of Tsang Tsui.

2. METHOD

2.1 Subtidal benthos survey was conducted at 2 locations (B1 and B2) Dry Season and 1 location (B2) in Wet Season. Survey locations are shown in **Figure 1** and their coordinates are listed in Table 2.1 Benthic grab survey was conducted once in each of the dry and wet seasons. At each survey location, three grab samples were collected from the seabed and each replicate was composed of one grab sample.

Table 2.1 GPS Coordinates of the Benthic Sampling Location B1 to B6

Sampling Point	Latitude (N)	Longitude (E)
B1	809811	831558
B2	809223	831392

2.2 The benthic grab surveys were conducted utilizing a modified Van Veen grab sampler (960 cm² sampling area; 11,000 cm³ capacity) with a supporting frame attached to a swiveling hydraulic winch cable. Sediments for biological analysis were sieved on board the survey vessel. The sediments were washed into a sieve stack (comprising 1 mm² and 500 µm² meshes) and gently rinsed with seawater to remove all fine material. Attention will be paid to any presence of amphioxus on the sieve stack. Following rinsing, any material remaining on the two screens were combined and carefully rinsed using a minimal volume of seawater into pre-labelled thick triple-bagged ziplock plastic bags. A 5% solution of borax-buffered formalin containing Rose Bengal in seawater was then added to the bag to ensure tissue preservation. Samples were sealed in plastic containers for transfer to the taxonomy laboratory for sorting and identification

Parameter Measured

2.3 The parameter to be measured for subtidal benthos analysis are:

- Total number of species (diversity)
- Abundance of each species recorded (biomass)

Laboratory Analyses

2.5 The benthic laboratory performed sample re-screening after the samples have been held in formalin for a minimum 24 hours to ensure adequate fixation of the organisms. Individual samples from the 500 µm² and 1 mm² mesh sieves were gently rinsed with fresh water into a 250 µm² sieve to remove the formalin from the sediments. Sieves were partially filled while rinsing a specific sample to maximize washing efficiency and prevent loss of material. All material retained on the sieve was placed in a labelled plastic jar, covered with 70%

ethanol, and lightly agitated to ensure complete mixing of the alcohol with sediments. Original labels were retained with the re-screened sample material.

- 2.6 Standard and accepted techniques were used for sorting organisms from the sediments. Small fractions of a sample were placed in a petri dish under a 10- power magnification dissecting microscope and scanned systematically with all animals and fragments removed using forceps. Each petri dish was sorted at least twice to ensure removal of all animals. Organisms representing major taxonomic groups, such as Polychaeta, Arthropoda, Mollusca and miscellaneous taxa were sorted into separate, labelled vials containing 70% ethanol.
- 2.7 Taxonomic identifications were performed by qualified and experienced specialist using stereo dissecting and high-power compound microscopes. These are generally to the species level except for unidentified taxa, which were identified to genera as far as practical. The careful sampling procedure employed minimizes fragmentation of organisms. If breakage of soft-bodied organisms occurred, only anterior portions of fragments were counted, although all fragments were retained and weighed for biomass determinations (wet weight).

2.8 Data will be analysed by diversity index (H') and evenness index (J) as the formula below

$$H = -\sum_{j=1}^S p_j \ln p_j$$

Shannon-Weaver Diversity Index (H'):

Pielou's Species evenness index (J): $J = H'/\ln(S)$

3. RESULT

- 3.1 The Dry Season and Wet Season benthic sampling was conduct in March and June 2023 respectively. In each season, three replicates were collected at each relevant sampling site.
- 3.2 Overall, a total of 276 (Wet Season) and 244 (Dry Season) benthic fauna specimens were collected from the 15 and 18 grab samples during Wet Season and Dry Season survey respectively. All fauna were identified to family and genus/species level, except for some juveniles and damaged one. Fauchald (1977), Huang Z.G. (1994) and Rouse & Pleijel (2001) were used as the references for species identification and nomenclature.
- 3.3 A total of 4 animal phyla comprising of 18 families and 24 species were identified on both wet and dry season survey. The benthic fauna composition is dominated by Annelida. The data of benthic faunal abundance and biomass are presented in Appendix A1 and A2. Summary of the data is given in the Table 3.1 below.

Table 3.1 Summary of Number of Families and Number of Species Recorded during the Wet and Dry Season Survey

Phylum	Number of families		Number of Species	
	Wet Season	Dry Season	Wet Season	Dry Season
Annelida	10	8	12	9
Arthropoda	2	2	2	2
Sipuncula	1	1	1	1
Mollusca	1	1	1	1
Total	14	12	16	13

3.3 On average, 18.3 (Wet Season) and 14.2 (Dry Season) specimens were collected from each grab. The total biomass is 0.22 g and 0.43 g for all grab samples, with an average of 0.072 g and 0.071 g per grab sample for wet season and dry season respectively. The average individual wet weight is 0.004 g/specimen and 0.005 g/specimen for wet and dry seasons respectively. Summarized data is shown in table 3.2 below:

Table 3.2 Summary of No. of Specimens and Biomass Recorded During the Wet Season and Dry Season Survey

Parameter	Wet Season		Dry Season	
	Overall	Per grab sample	Overall	Per grab sample
No. of specimens	55	18.3	85	14.2
Biomass (g)	0.215	0.07167	0.425	0.07083
Average Individual Wet Weight (g)	0.004		0.005	

3.4 The number of specimens from individual samples during the Wet Season survey was ranged from the highest at B2-3 (21) to the lowest at B2-2 (15). The highest biomass per replicate was observed at B2-2 (0.090g). Station B2-3 (0.054g) exhibited the lowest biomass. The benthic fauna composition in terms of biomass contribution is dominated by Annelida (85.45%), followed by Arthropoda (7.27%), Sipuncula (3.64%) and Mollusca (3.64%) (Figure 2). The number of species in Wet Season survey ranged from 8 (in Station B2-2) to 9 (in Stations B2-1 and B2-3). Benthic Shannon-Weaver diversity index (H') and Pielou's Species evenness index (J) ranged from 0.96 to 0.98 in the wet season survey as shown in Table 3.3 below.

3.5 The number of specimens from individual samples during the Dry Season survey was ranged from the highest at B1-2 (20) to the lowest at B2-2 (10). The highest biomass per replicate was observed at B1-3 (0.111g). Station B2-3 (0.027g) exhibited the lowest biomass. The benthic fauna composition in terms of biomass contribution is dominated by Annelida (75.29%), whilst the same contribution was recorded for Sipuncula (8.24%), Sipuncula (8.24%) and Mollusca (8.24%) (Figure 3). The number of species recorded in Dry Season survey ranged from 7 (in Station B2-2) to 9 (in Stations B1-1 and B2-1). Benthic Shannon-Weaver diversity index (H') and Pielou's Species evenness index (J) ranged from 0.96 to 0.98 in the dry season survey as shown in Table 3.4 below.

Table 3.3 Abundance, Number of Species, Biomass, Diversity Index and Evenness among the 5 Sites during Wet Season Survey

Sampling Location	Replicates	No. of Specimens	Number of Species	Biomass (g)	Shannon-Weaver Diversity (H')	Pielou's Species Evenness (J')
B2	B2-1	19	9	0.071	2.13	0.97
	B2-2	15	8	0.090	1.99	0.96
	B2-3	21	9	0.054	2.15	0.98

Table 3.4 Abundance, Number of Species, Biomass, Diversity Index and Evenness among the 6 Sites during Dry Season Survey

Sampling Location	Replicates	No. of Specimens	Number of Species	Biomass (g)	Shannon-Weaver Diversity (H')	Pielou's Species Evenness (J')
B1	B1-1	14	9	0.090	2.14	0.98
	B1-2	20	8	0.096	2.04	0.98
	B1-3	15	8	0.111	1.99	0.96
B2	B2-1	14	9	0.048	2.14	0.98
	B2-2	10	7	0.053	1.89	0.97
	B2-3	12	8	0.027	2.02	0.97

4. DISCUSSION

4.1 In general, the surveyed area was dominated by Annelida (more than 85% in Figure 2 and more than 75% in Figure 3 during wet and dry season survey respectively). The recorded species mainly belong to the Polychaeta species and they are all common species.

4.2 Species richness, diversity and evenness indices are inter-related. A diversity index integrates two components: the total number of species (d) and the distribution of individuals among species, into a single number (H'). H' is usually high (e.g. >3 or 4) in environmentally undisturbed benthic communities, and low (e.g. <1) in highly disturbed communities. All sites showed medium Diversity index.

4.2 No rare species or species with conservation important was recorded during the survey.

4.3 The survey sites are considered of low ecological value.

5. References:

Fauchald K. (1977) The Polychaete Worms Definitions And Keys To Orders, Families And Genera.

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Huang Z.G. (1994). Marine Species and Their Distributions in China's Seas. China Ocean Press, Beijing.

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Figure 1 Survey Locations B1 and B2

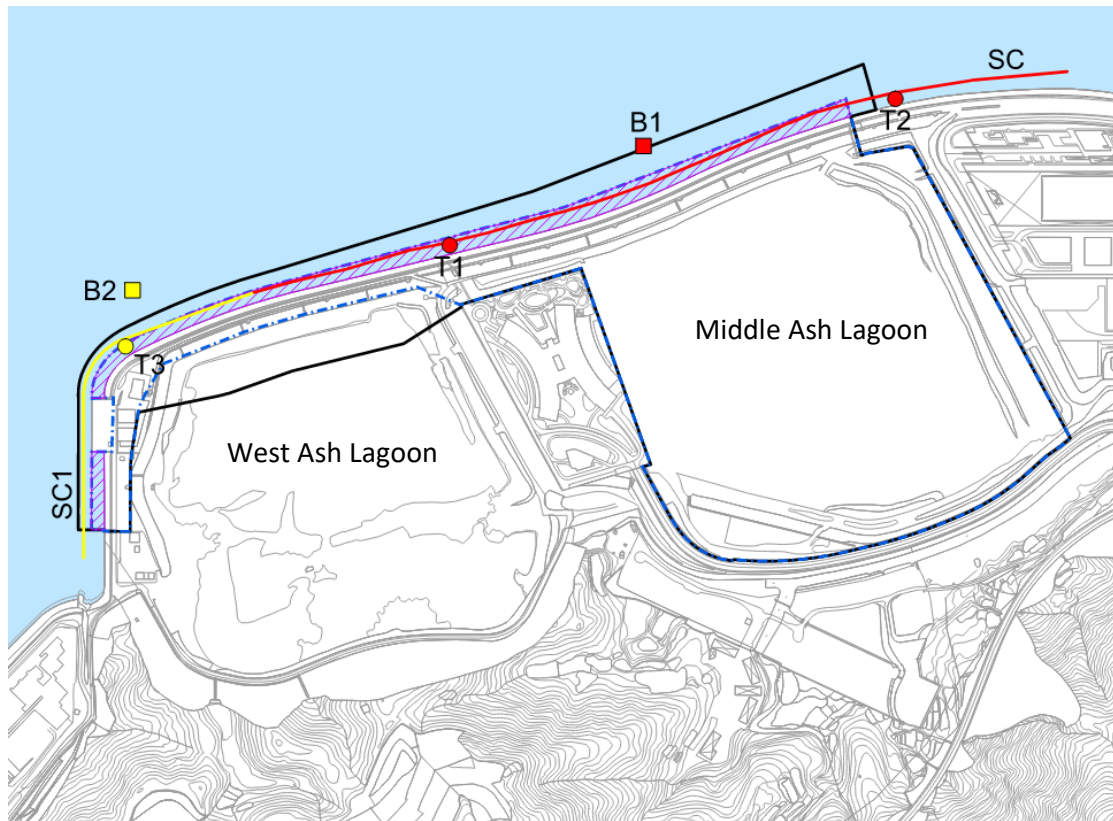


Figure 2 Benthic Fauna Composition (by Biomass) for Wet Season Survey

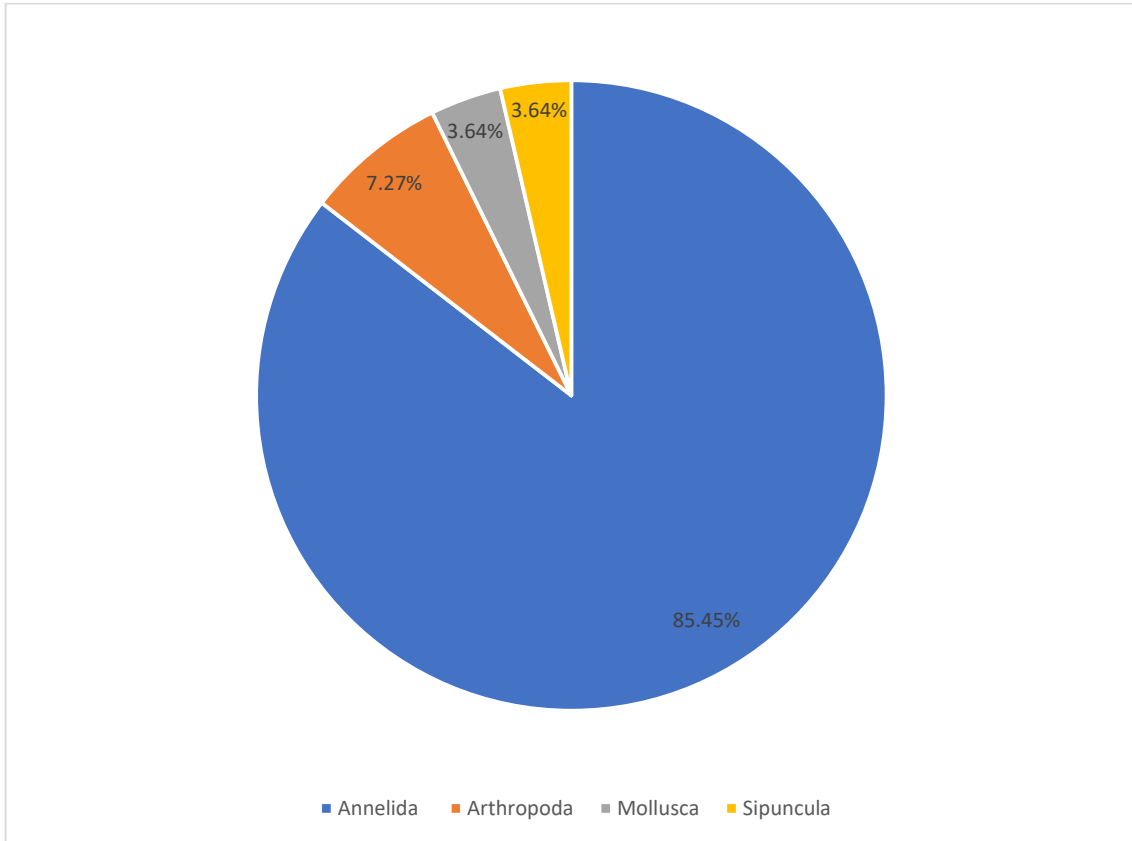
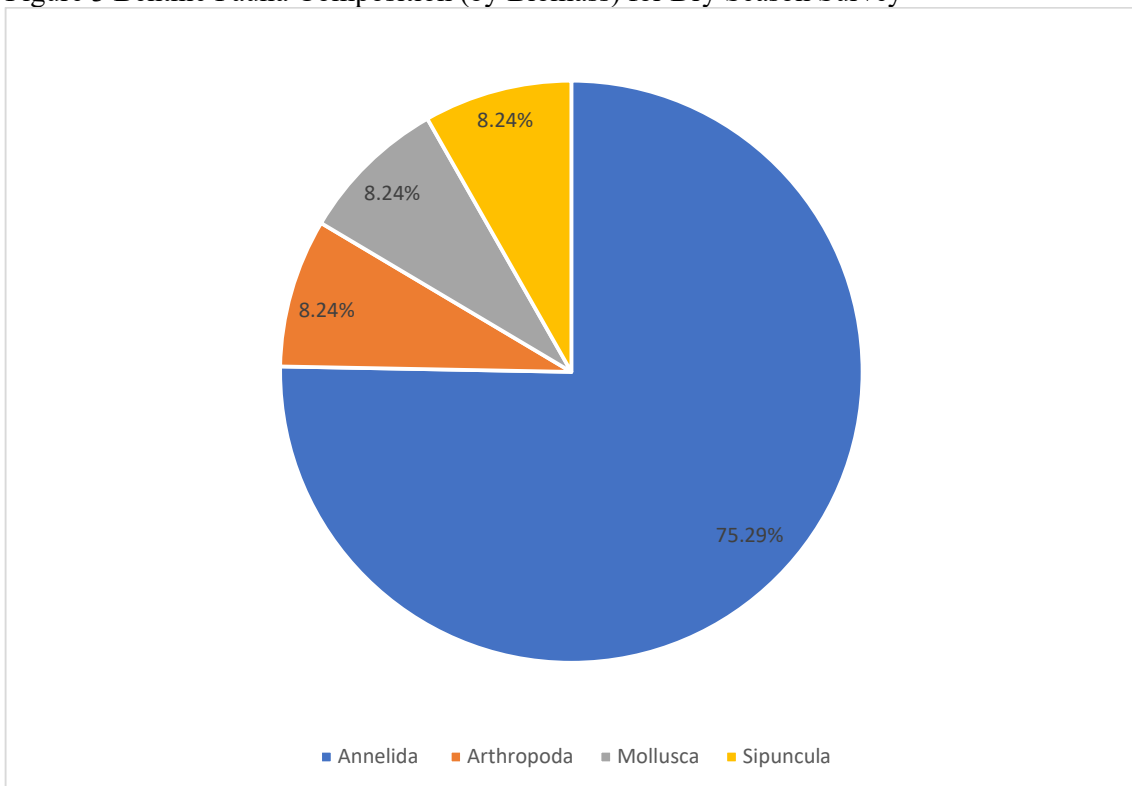


Figure 3 Benthic Fauna Composition (by Biomass) for Dry Season Survey





Appendix 7C-4 Report of Coral Survey Conducted in 2023


EIA for I-Park2 at Tsang Tsui

REPORT ON
SPOT-CHECK RECONNAISSANCE DIVES
AND RAPID ECOLOGICAL ASSESSMENT
SURVEY



ECO-ENVIRO CONSULTANTS COMPANY

September 2023

Faunal /floral group under study	Key surveyor				
	Full Name	Brief description of relevant experience	No. of years of relevant experience	Signature	Date
Subtidal Coral	Keith Kei	Major project including: - Central water ecological study for 28 sites subtidal coral survey	More than 20 years		8/Sept/23

Summary

- Spot-check dives surveys were carried out along coastline of Tsang Shui Ash Lagoon
- The substrate of the survey area was mainly composed of artificial sloping boulder along the coastline
- No hard coral was found during spot check dives. Only one species of gorgonian *Guaiagorgia* sp. with sizes from 4 cm to 15 cm in height was found at the spot check site. It is a common octocoral species widely distributed across Hong Kong waters and known to withstand harsh marine environment.
- REA surveys were carried out along the coastline of the survey area. Two 100 meter transects were laid parallel to the shore at the area where corals were found during spot-check dives.
- A total of 25 *Guaiagorgia* sp. colonies were recorded along the 2 REA transects. Owing to the sparse cover, small size, low species richness and commonness of the coral species found, when compared with other healthy octocoral communities in Hong Kong (such as Nine Pins), the survey area is considered as having low ecological value. No rare species or species of conservation interest were recorded during the surveys.

Table of Contents

SUMMARY.....I

TABLE OF CONTENTS.....II

TABLES, FIGURES AND APPENDIXES.....III

1. INTRODUCTION.....1

2. METHODOLOGY.....1

SPOT CHECK DIVES.....1

REA SURVEYS.....1

3. RESULT.....2

SPOT CHECK DIVES.....2

REA SURVEYS.....3

4. DISCUSSION.....5

SPOT CHECK DIVES.....5

REA SURVEYS.....6

5. REFERENCES.....6

Tables, Figures and Appendixes

Table 1 Weather Condition for the Spot-Check Dives on 28th and 29th April 2023.....2

Table 2 GPS Location, Survey Distance, Maximum Depth and Minimum Depth Bottom Substrate and Bottom Visibility of Spot-Check Dive Sites SC1 and SC2.....2

Table 3 Species, Coverage and Size of Corals Found at Spot-Check Site SC1.....3

Table 4 GPS of Transect Start and End Points, Maximum Depth and Minimum Depth, Bottom Substrate and Bottom Visibility of the Two REA Transects.....3

Table 5 REA Ecological and Substratum Attributes of Transect 1.....3

Table 6 Size and Health Condition of Coral Colonies found at Transect 1.....4

Table 7 REA Ecological and Substratum Attributes of Transect 2.....5

Table 8 Size and Health Condition of Coral Colonies found at Transect 2.....5

Figure 1 Spot-Check Dive Sites.....8

Figure 2 REA Transects at Site SC1.....8

Photo Plate 1.....9

Appendix A Rapid Ecological Assessment.....10

Appendix B Dominated Animals and Corals at Spot-Check Sites.....11

Appendix C Sample of Data Sheet Using at Spot-Check Dive Survey.....12

Appendix D Sample of Data Sheet Using at REA Survey.....13

1. Introduction

- 1.1 Coral community survey along the coastline of Tsang Tsui Ash Lagoon under the I-Park 2 project.
- 1.2 Spot-check dive survey and REA survey were conducted along the coastline of Tsang Tsui Ash Lagoon in order to provide a quick assessment about the seabed environment and subtidal habitats, such as coral assemblage at the area. The size, type, species and condition of corals, if found, were also recorded during the field surveys.

2. Methodology

Spot-check Reconnaissance Dives

- 2.1 Spot-check dive routes were selected along the coastline of Tsang Tsui Ash Lagoon at Site SC1 (**Figure 1**).
- 2.2 For each dive route, the following information was recorded:
- start time;
 - maximum and minimum depth;
 - GPS positions of dive locations;
 - substrata;
 - survey distance; and
 - visibility.
- 2.3 Subtidal substrata along the proposed spot-check dive routes were surveyed for the presence of coral communities. The corals to be examined covered hard corals (order Scleractinia), octocorals (sub-class Octocorallia) and black corals (order Antipatharia), and were identified to the lowest practical levels. Number of colonies, size and type of coral species, their coverage, abundance, health condition and the conservation status of coral species in Hong Kong waters were recorded.
- 2.4 Photos of each spot-check dive locations, representative photographs of any important ecological habitat and coral species were taken.
- 2.5 Areas with corals were located and suitable locations to carry out the REA surveys were determined.

Rapid Ecological Assessment Survey

- 2.6 100 m horizontal transects were laid following the contour of the seabed at area where corals were recorded during the spot-check dives. Detailed REA was carried out for each transect with reference to DeVantier *et al.* (1998) (see Appendix A for details)
- 2.7 For each transect, the locations (GPS) of dive routes, distance surveyed, site condition (i.e. the degree of exposure to wave action), species list of corals and

other marine organisms, number of colonies, sizes and types of corals., their coverage, abundance, condition and the conservation status of coral species in Hong Kong waters were recorded. The benthic cover, taxon abundance, and ecological attributes of the transect above were recorded in a swathe 2 m wide, 1 m either side of the transects, following the Rapid Ecological Assessment (REA) technique (**Appendix A**).

2.8 Representative photographs of any important ecological features and corals were taken.

3. Result

Spot-check Reconnaissance Dives

3.1 The spot-check dives were carried out on 28th April 2023 and the weather conditions were summarized in **Table 1**.

Table 1 Weather Condition for the Spot-Check Dives on 28th April 2023

Date	Condition	Average Underwater Visibility
28 th April 2023	<ul style="list-style-type: none"> - Wind direction: southeast - Beaufort: 3 to 4 - Sunny intervals during the day 	Less than 0.5 m

3.2 Spot-check dives were carried out at Site SC1 (**Figure 1**). The GPS location, survey distance, maximum and minimum depth, bottom substrate and bottom visibility of each surveyed sites were summarized in **Table 2**.

Table 2 GPS Location, Survey Distance, Maximum and Minimum Depth, Bottom Substrate, and Bottom Visibility of Spot-Check Dive Sites SC1 and SC2

Site	Location (GPS) (Starting Point)	Survey Distance (m)	Min. Depth (m)	Max. Depth (m)	Bottom Substrate	Visibility (m)
SC1	E 113°54'56.12"	450	1.5	3.0	Artificial Sloping Boulder	< 0.5
	N 22°25'17.74"					
	N 22°25'25.03"					

3.3 The survey site was mainly composed of artificial sloping boulder with small rocks scattered at the bottom (SC1) (**Photo Plate 1**). Thick sediment was found on boulder surfaces found at SC1. The maximum depth was about 3 m along the survey area at SC1. Site SC1 only supported limited marine life. Common green mussel *Perna viridis* and common rock oyster *Saccostrea cucullata* were found at boulders in the shallow water region in SC1 (**Photo Plate 1**). No hard coral was found in this site. One species of gorgonian *Guaiaogorgia* sp. (**Photo Plate 1**) was found scattered on the boulder surfaces along the survey site SC1. This species is commonly found in Hong Kong water especially in turbid water. Size range of the gorgonian found was summarized in **Table 3**. The overall percentage cover of the gorgonians found is less than 1. The mortality within each gorgonian colony was

relatively high and ranged from 50% to 80%. All animals found occurred in low abundance and were sparsely distributed in the survey area (**Appendix B**). No rare species or species of conservation value were recorded. All of them are common in Hong Kong

Table 3 Species, Coverage and Size of Corals Found at Spot-Check Site SC1

Site	Coral species	Coverage	Size (Height)
SC1	<i>Guaiaigorgia</i> sp.	<1%	4 cm to 15 cm

Rapid Ecological Assessment Survey

3.4 The survey was performed in the afternoon of 29th April 2023. The weather was sunny. The sea was wavy, and the visibility was relatively low less than 0.5 m. Two 100m transects were laid parallel to the coastline at Site SC1, (**Figure 2**).

Table 4 GPS Coordinate of Start and End Points, Maximum and Minimum Depth, Bottom Substrate and Underwater Visibility of the Two REA Transects

Transect	GPS Start Point	GPS End Point	Min. Depth (m)	Max. Depth (m)	Bottom Substrate	Visibility (m)
1	E 113°54'54.93"	E 113°55'51.66"	1.5	3	Artificial Sloping Boulder	<0.5
	N 22°25'17.94"	N 22°25'16.72"				
2	E 113°54'49.53"	E 113°54'49.54"	1.5	3	Artificial Sloping Boulder	<0.5
	N 22°25'11.82"	N 22°25'08.30"				

Transect 1

3.5 A 100m transect was laid down along the coastline spot check site SC1 (**Figure 2**). The start point and end point were laid at 3 m deep along the slopping boulders.

3.6 This site is mainly composed of artificial sloping boulders and the maximum depth is 3 m (**Table 4**). Seabed stretching outward offshore is muddy scattered with small size boulders and rocks (**Table 5**). The underwater visibility is about 0.5 m. This site supports limited marine life and is dominated by green mussel *Perna viridis* (**Photo Plate 1**),

Table 5 REA Ecological and Substratum Attributes of Transect 1

Ecological attributes	Rank
Hard coral	0
Octocoral (soft corals and gorgonians)	0.5
Black Corals	0
Dead standing corals	0
Substratum Attributes	
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	5
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

3.7 The site supported a sparse and patchy cover (<1%) of gorgonian coral. No hard corals were found. Only one species of gorgonian coral *Guaiagorgia* sp. was found. Only fifteen *Guaiagorgia* sp. colonies were found along the REA transect (**Table 6**). Their size was small (about 5 to 15 cm height) and the coverage was low. Colonies found at this site showed a mortality rate from 20% to 80% in each coral colony.

3.8 All the fifteen gorgonian corals are attached to the sloping boulders. All the corals found along the REA transect are in unhealthy condition and common gorgonian species in Hong Kong water.

Table 6 Size and Health Condition of Coral Colonies found at Transect 1

Coral Number	Coral Species	Size (height/cm)	Health Condition	Distance along the REA Transect (m)	Rarity in Hong Kong
1	<i>Guaiagorgia</i> sp.	5	Unhealthy	1.2	Common
2	<i>Guaiagorgia</i> sp.	10	Unhealthy	10.5	Common
3	<i>Guaiagorgia</i> sp.	9	Unhealthy	11.6	Common
4	<i>Guaiagorgia</i> sp.	11	Unhealthy	21.5	Common
5	<i>Guaiagorgia</i> sp.	7	Unhealthy	22	Common
6	<i>Guaiagorgia</i> sp.	5	Unhealthy	35.5	Common
7	<i>Guaiagorgia</i> sp.	15	Unhealthy	36.5	Common
8	<i>Guaiagorgia</i> sp.	6	Unhealthy	42.5	Common
9	<i>Guaiagorgia</i> sp.	10	Unhealthy	65.5	Common
10	<i>Guaiagorgia</i> sp.	9	Unhealthy	70.8	Common
11	<i>Guaiagorgia</i> sp.	7	Unhealthy	78.5	Common
12	<i>Guaiagorgia</i> sp.	7	Unhealthy	79.8	Common
13	<i>Guaiagorgia</i> sp.	13	Unhealthy	85.2	Common
14	<i>Guaiagorgia</i> sp.	5	Unhealthy	88.5	Common
15	<i>Guaiagorgia</i> sp.	8	Unhealthy	94.1	Common

Transect 2

- 3.9 A 100m transect was laid down along the coastline of site SC1 (**Figure 2**). The start point and end point were laid at 3 m deep along the sloping boulders.
- 3.10 Similar to Transect 1, this site is mainly composed of artificial sloping boulders and the maximum depth is 3 m (**Table 4**). Seabed stretching outward offshore is muddy scattered with small size boulders and rocks (**Table 7**). The underwater visibility is about 0.5 m. This site supports limited marine life and is dominated by green mussel *Perna viridis* (**Photo Plate 1**).
- 3.11 The site supported a sparse and patchy cover (<1%) of gorgonian coral. No hard corals were found at this site. Only one species of gorgonian coral *Guaiaigorgia* sp. was found. Ten coral *Guaiaigorgia* sp. colonies were found along the REA transect (**Table 8**). Their size was small (about 4 to 14 cm height) and the coverage was low. Colonies found at this site showed a mortality rate from 20% to 70% in each coral colony.
- 3.12 All the ten gorgonian corals are attached to the sloping boulders. All the corals found along the REA transect are in unhealthy condition and common gorgonian species in Hong Kong water.

Table 7 REA Ecological and Substratum Attributes of Transect 2

Ecological attributes	Rank
Hard coral	0
Octocoral (soft corals and gorgonians)	0.5
Black Corals	0
Dead standing corals	0
Substratum Attributes	
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	5
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

Table 8 Size and Health Condition of Coral Colonies found at Transect 2

Coral Number	Coral Species	Size (height/cm)	Health Condition	Distance along the REA Transect (m)	Rarity in Hong Kong
1	<i>Guaiaigorgia</i> sp.	10	Unhealthy		Common
2	<i>Guaiaigorgia</i> sp.	12	Unhealthy		Common
3	<i>Guaiaigorgia</i> sp.	9	Unhealthy		Common
4	<i>Guaiaigorgia</i> sp.	4	Unhealthy		Common
5	<i>Guaiaigorgia</i> sp.	9	Unhealthy		Common
6	<i>Guaiaigorgia</i> sp.	12	Unhealthy		Common
7	<i>Guaiaigorgia</i> sp.	10	Unhealthy		Common
8	<i>Guaiaigorgia</i> sp.	7	Unhealthy		Common
9	<i>Guaiaigorgia</i> sp.	14	Unhealthy		Common
10	<i>Guaiaigorgia</i> sp.	9	Unhealthy		Common

4. Discussion

Spot-check Reconnaissance Dives

4.1 The bottom substrates of the area (Site SC1) are many composed of artificial sloping boulders .

4.2 During the spot-check survey, only limited marine life were found in SC1. Some common organisms, such bryozoans, rock oyster and green mussels were found on the hard substrates of SC1. They are all common species in Hong Kong and found in very low abundance and diversity.

4.3 No hard coral was found during the spot check dive. Only one common gorgonian species coral *Guaiaigorgia* sp. was record at Site SC1. Two REA transects were laid along the coastline of Site SC1.

Rapid Ecological Assessment Survey

4.4 The survey area showed similar bottom substrate. All transects were laid on the sloping boulders and parallel to the shore of the five spot check sites. The average depth is around 2 m to 3 m. A total of twenty-five colonies of gorgonian coral *Guaiaigorgia* sp. (Transect 1: 15 and Transect 2:10) were recorded along the two REA transect. All of them grow on the sloping boulder surfaces. All the colonies are in small size ranging from 4 cm to 15 cm in height.

4.5 All the 25 gorgonian colonies were attached to the slopping boulder. All the colonies recorded showed unhealthy condition and mortality rate of 20% to 80% in each coral colony was recorded.

4.6 Other than isolated patches of small gorgonian colonies, common marine invertebrate such as Green Mussel, *Perna viridis* and rock oyster *Saccostrea cucullata* were found along the transects.

4.7 The abundance and species diversity of invertebrates found along the transect are relatively low when compared with other areas. No hard corals were found at these five sites. Only gorgonian coral was found with low coverage (less than 1%). This species is common across Hong Kong waters and tolerant to more turbid and

harsh environment. The survey area is considered as having low ecological value given the low abundance and species diversity of marine fauna found in the area.

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END

Figure 1 Spot-Check Dive Sites

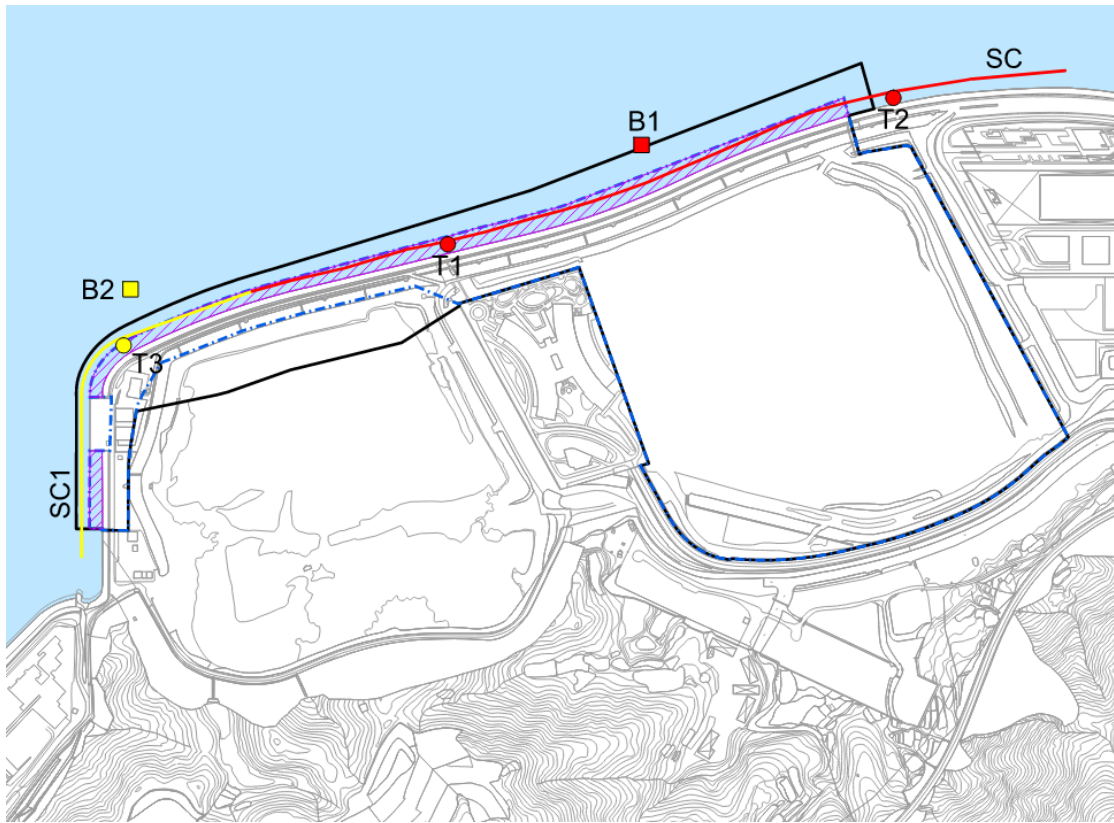


Figure 2 REA Transects at Site SC1

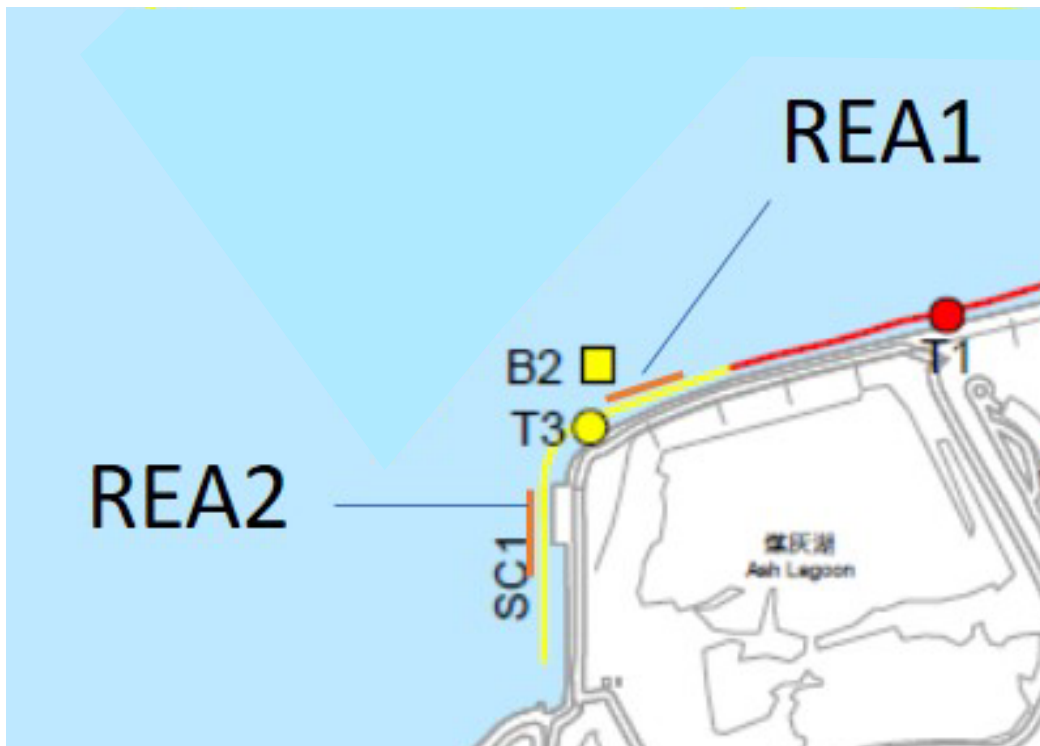
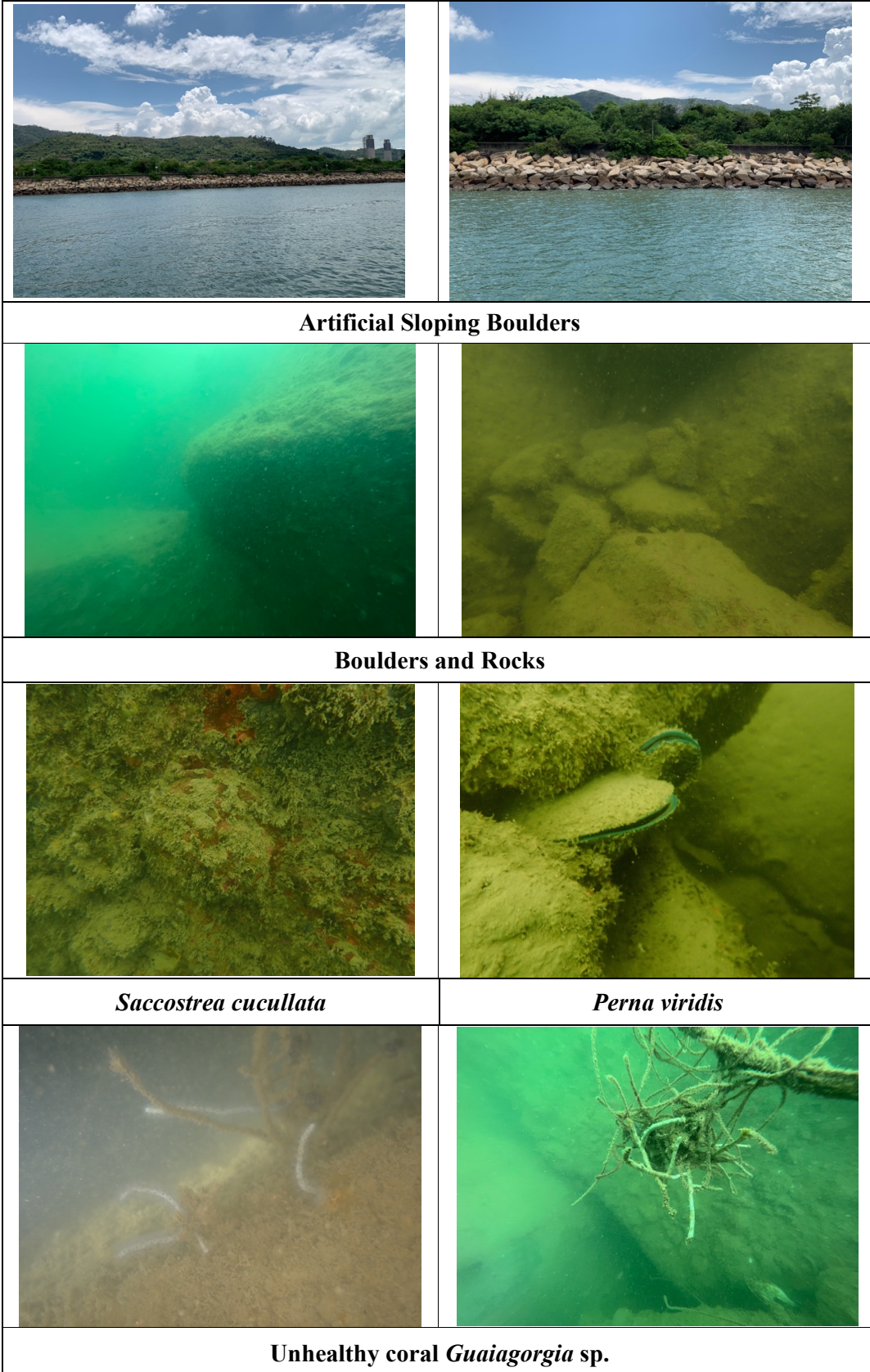


PHOTO PLATE 1



Appendix A Rapid Ecological Assessment

Five ecological and seven substratum attributes shall be assessed on site and by reviewing video footages. Each of the attributes (Table 1) should be assigned to one of the seven standard ranked categories (from zero to six, representing percentage cover from none to over 76%)(Table 2).

An inventory of benthic taxa should also be compiled for the P transect and bounce five points. Taxa shall be identified in situ to the following levels: 1) Hard corals to species level where possible; 2) Soft corals, anemones and macroalgae to genus level where possible; and 3) Other benthos to genus level where possible or phylum with growth form. Each taxon in the inventory shall also be ranked to one of the six categories (Table 3) in terms of abundance (from 0 to 5, representing from absent to dominant) in the community.

Table 1 Ecological and Substratum attributes used in REA

Ecological attributes
Hard coral
Octocoral (soft corals and gorgonians)
Black Corals
Dead standing corals
Substratum
Bedrock/continuous pavement
Boulder Blocks (diam.>50cm)
Boulder Blocks (diam.<50cm)
Rubble
Other
Soft Substrata
Sand
Mud

Table 2 Ranking of Ecological and substratum attributes

Rank	Percentage cover (%)
0	None recorded
0.5	1-5
1	6-10
2	11-30
3	31-50
4	51-75
5	76-100

Table 3 Ranking of Benthos abundance

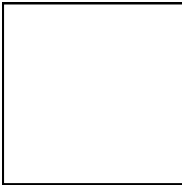
Rank	Abundance
0	Absent
1	Sparse
2	Uncommon
3	Common
4	Abundant
5	Dominant

Appendix B Dominated Animals and Corals at Spot-Check Sites

Site	Dominated Animals	Coral Species	Coral Rarity
SC1	<i>Perna viridis</i> , <i>Saccostrea cucullata</i>	<i>Echinomuricea</i> sp.	common
SC2	N.A.	N.A.	N.A.

Appendix C Sample of Data Sheet Using at Spot-Check Dive Survey

Site #	GPS	Substrate	Max. Depth	Invertebrates	Visibility



Appendix D Sample of Data Sheet Using at REA Survey

Site Name:			Date:
GPS Location:			Max. Depth:
Starting Point:			Visibility:
			Substrate:
Ending Point:	Dominated Animals:		
Coral sp.	Size	Distance Transect	on Health Condition



Appendix 7C-5 Report of Coral Survey Conducted in 2024

EIA for I-Park2 at Tsang Tsui


REPORT

**SPOT-CHECK RECONNAISSANCE DIVES
AND RAPID ECOLOGICAL ASSESSMENT
SURVEY**



ECO-ENVIRO CONSULTANTS COMPANY

July 2024

Faunal /floral group under study	Key surveyor				
	Full Name	Brief description of relevant experience	No. of years of relevant experience	Signature	Date
Subtidal Coral	Keith Kei	Major project including: - Central water ecological study for 28 sites subtidal coral survey	More than 20 years		17/July/24

Summary

- Spot-check dives surveys were carried out along coastline of Tsang Shui Ash Lagoon
- The substrate of the survey area was mainly composed of artificial sloping boulder along the coastline
- No hard coral was found during spot check dives. Only one species of gorgonian *Guaigorgia* sp. with sizes from 6 cm to 16 cm in height was found at the spot site. It is a common octocoral species widely distributed across Hong Kong waters and known to withstand harsh marine environment.
- REA surveys were carried out along the coastline of the survey area. Two 100 meter transects were laid parallel to the shore at the area where corals were found during spot-check dives.
- A total of 31 *Guaigorgia* sp. colonies were recorded along the 2 REA transects. Owing to the sparse cover, small size, low species richness and commonness of the coral species found, when compared with other healthy octocoral communities in Hong Kong (such as Nine Pins), the survey area is considered as having low ecological value. No other rare species or species of conservation interest were recorded during the surveys.

Table of Contents

SUMMARY.....	I
TABLE OF CONTENTS.....	II
TABLES, FIGURES AND APPENDIXES.....	III
1. INTRODUCTION.....	1
2. METHODOLOGY.....	1
SPOT CHECK DIVES.....	1
REA SURVEYS.....	1
3. RESULT.....	2
SPOT CHECK DIVES.....	2
REA SURVEYS.....	3
4. DISCUSSION.....	5
SPOT CHECK DIVES.....	5
REA SURVEYS.....	6
5. REFERENCES.....	7

Tables, Figures and Appendixes

Table 1 Weather Condition for the Spot-Check Dives on 20th and 21st July 2024.....	2
Table 2 GPS Location, Survey Distance, Maximum Depth and Minimum Depth Bottom Substrate and Bottom Visibility of Spot-Check Dive Sites SC1	2
Table 3 Species, Coverage and Size of Corals Found at Spot-Check Site SC1.....	3
Table 4 GPS of Transect Start and End Points, Maximum Depth and Minimum Depth, Bottom Substrate and Bottom Visibility of the Two REA Transects.....	3
Table 5 REA Ecological and Substratum Attributes of Transect 1.....	3
Table 6 Size, Health Condition and Translocation Feasibility of Coral Colonies found at Transect 1.....	4
Table 7 REA Ecological and Substratum Attributes of Transect 2.....	5
Table 8 Size, Health Condition and Translocation Feasibility of Coral Colonies found at Transect 2.....	5
Figure 1 Spot-Check Dive Sites.....	8
Figure 3 REA Transects at Site SC1.....	8
Photo Plate 1.....	9
Appendix A Rapid Ecological Assessment.....	10
Appendix B Dominated Animals and Corals at Spot-Check Sites.....	11
Appendix C Sample of Data Sheet Using at Spot-Check Dive Survey.....	12
Appendix D Sample of Data Sheet Using at REA Survey.....	13

1. Introduction

- 1.1 Coral community survey along the coastline of Tsang Tsui Ash Lagoon under the IPark 2 project.
- 1.2 Spot-check dive survey and REA survey was conducted along the coastline of Tsang Tsui Ash Lagoon in order to provide a quick assessment about the seabed environment and subtidal habitats, such as coral assemblage at the area. The size, type, species and condition of corals, if found, were also recorded during the field surveys.

2. Methodology

Spot-check Reconnaissance Dives

- 2.1 Spot-check dive routes were selected along the coastline of Tsang Tsui Ash Lagoon at Site SC (**Figure 1**).
- 2.2 For each dive route, the following information was recorded:
- start time;
 - maximum and minimum depth;
 - GPS positions of dive locations;
 - substrata;
 - survey distance; and
 - visibility.
- 2.3 Subtidal substrata along the proposed spot-check dive routes were surveyed for the presence of coral communities. The corals to be examined covered hard corals (order Scleractinia), octocorals (sub-class Octocorallia) and black corals (order Antipatharia), and were identified to the lowest practical levels. Number of colonies, size and type of coral species, their coverage, abundance, health condition, translocation feasibility and the conservation status of coral species in Hong Kong waters were recorded.
- 2.4 Photos of each spot-check dive locations, representative photographs of any important ecological habitat and coral species were taken.
- 2.5 Areas with corals were located and suitable locations to carry out the REA surveys were determined.

Rapid Ecological Assessment Survey

- 2.6 100 m horizontal transects were laid following the contour of the seabed at area where corals were recorded during the spot-check dives. Detailed REA was carried out for each transect with reference to DeVantier *et al.* (1998) (see Appendix A for details)
- 2.7 For each transect, the locations (GPS) of dive routes, distance surveyed, site condition (i.e. the degree of exposure to wave action), species list of corals and

other marine organisms, number of colonies, sizes and types of corals., their coverage, abundance, condition, translocation feasibility and the conservation status of coral species in Hong Kong waters were recorded. The benthic cover, taxon abundance, and ecological attributes of the transect above were recorded in a swathe 2 m wide, 1 m either side of the transects, following the Rapid Ecological Assessment (REA) technique (**Appendix A**).

2.8 Representative photographs of any important ecological features and corals were taken.

3. Result

Spot-check Reconnaissance Dives

3.1 The spot-check dives were carried out on 20th and 21st June 2024 and the weather conditions were summarized in **Table 1**.

Table 1 Weather Condition for the Spot-Check Dives on 20th and 21st June 2024

Date	Condition	Average Underwater Visibility
20 th June 2024	- Wind direction: southwest - Beaufort: 3 to 4 - Sunny intervals during the day	Less than 0.3 m
21 st June 2024	- Wind direction: southwest - Beaufort: 4 to 5 - Sunny intervals during the day	Less than 0.3 m

3.2 Spot-check dives were carried out at Site SC (**Figure 1**). The GPS location, survey distance, maximum and minimum depth, bottom substrate and bottom visibility of each surveyed sites were summarized in **Table 2**.

Table 2 GPS Location, Survey Distance, Maximum and Minimum Depth, Bottom Substrate, and Bottom Visibility of Spot-Check Dive Sites SC

Site	Location (GPS) (Starting Point)	Survey Distance (m)	Min. Depth (m)	Max. Depth (m)	Bottom Substrate	Visibility (m)
SC	E 113°55'31.87" N 22°25'25.31"	1100	1.5	4	Artificial Sloping Boulder	< 0.3

3.3 The survey site was mainly composed of artificial sloping boulder with small rocks scattered at the bottom and muddy bottom (SC) (**Photo Plate 1**). Thick sediment was found on boulder surfaces found at SC. The maximum depth was about 4 m along the survey area. Substrates further offshore were all muddy and the visibility was very low (less than 0.3 m). Site SC only supported limited marine life. Common green mussel *Perna viridis* and common rock oyster *Saccostrea cucullata* were found at boulders in the shallow water region (**Photo Plate 1**). Only one species of gorgonian *Guaiaogorgia* sp. (**Photo Plate 1**) was found scattered on the boulder surfaces along the survey site SC. This species is

commonly found in Hong Kong water especially in turbid water. Size range of the gorgonian found was summarized in **Table 3**. The overall percentage cover of the gorgonians found is less than 1. The mortality within each gorgonian colony was relatively high and ranged from 50% to 80%. All animals found occurred in low abundance and were sparsely distributed in the survey area (**Appendix B**). No rare species or species of conservation value were recorded. All of them are common in Hong Kong

Table 3 Species, Coverage and Size of Corals Found at Spot-Check Site SC1

Site	Coral species	Coverage	Size (Height)
SC	<i>Guaiaigorgia</i> sp.	<1%	6 cm to 16 cm

Rapid Ecological Assessment Survey

3.4 The survey was performed in the afternoon of 20th and 21st June 2024. The weather was sunny. The sea was wavy, and the visibility was relatively low less than 0.3 m). Two 100m transects were laid parallel to the coastline at Site SC, (**Figure 2**).

Table 4 GPS Coordinate of Start and End Points, Maximum and Minimum Depth, Bottom Substrate and Underwater Visibility of the Two REA Transects

Transect	GPS Start Point	GPS End Point	Min. Depth (m)	Max. Depth (m)	Bottom Substrate	Visibility (m)
1	E 113°55'21.85"	E 113°55'18.85"	1.5	3	Artificial Sloping Boulder	<0.3
	N 22°25'25.43"	N 22°25'24.46"				
2	E 113°55'02.49"	E 113°54'59.05"	1.5	3	Artificial Sloping Boulder	<0.3
	N 22°25'19.11"	N 22°25'18.50"				

Transect 1

3.5 A 100m transect was laid down along the coastline spot check site SC (**Figure 2**). The start point and end point were laid at 3 m deep along the sloping boulders.

3.6 This site is mainly composed of artificial sloping boulders and the maximum depth is 3 m (**Table 4**). Seabed stretching outward offshore is muddy scattered with small size boulders and rocks (**Table 5**). The underwater visibility is about 0.5 m. This site supports limited marine life and is dominated by green mussel *Perna viridis* (**Photo Plate 1**),

Table 5 REA Ecological and Substratum Attributes of Transect 1

Ecological attributes	Rank
Hard coral	0
Octocoral (soft corals and gorgonians)	0.5
Black Corals	0
Dead standing corals	0
Substratum Attributes	
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	5
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

3.7 The site supported a sparse and patchy cover (<1%) of gorgonian coral. No hard corals were found. Only one species of gorgonian coral *Guaiaigorgia* sp. was found. Only thirteen *Guaiaigorgia* sp. colonies were found along the REA transect (**Table 6**). Their size was small (about 6 to 15 cm height) and the coverage was low. Colonies found at this site showed a mortality rate from 20% to 80% in each coral colony.

3.8 All the thirteen gorgonian corals are attached to the sloping boulders and being translocatable. All the corals found along the REA transect are in unhealthy condition and common gorgonian species in Hong Kong water.

Table 6 Size, Health Condition and Translocation Feasibility of Coral Colonies found at Transect 1

Coral Number	Coral Species	Size (height/cm)	Health Condition	Distance along the REA Transect (m)	Rarity in Hong Kong
1	<i>Guaiaigorgia</i> sp.	10	Unhealthy	15.6	Common
2	<i>Guaiaigorgia</i> sp.	12	Unhealthy	15.9	Common
3	<i>Guaiaigorgia</i> sp.	6	Unhealthy	23.6	Common
4	<i>Guaiaigorgia</i> sp.	10	Unhealthy	43.5	Common
5	<i>Guaiaigorgia</i> sp.	8	Unhealthy	46.9	Common
6	<i>Guaiaigorgia</i> sp.	6	Unhealthy	52.6	Common
7	<i>Guaiaigorgia</i> sp.	15	Unhealthy	74.2	Common
8	<i>Guaiaigorgia</i> sp.	14	Unhealthy	75.6	Common
9	<i>Guaiaigorgia</i> sp.	11	Unhealthy	77.9	Common
10	<i>Guaiaigorgia</i> sp.	6	Unhealthy	80.9	Common
11	<i>Guaiaigorgia</i> sp.	9	Unhealthy	94.5	Common
12	<i>Guaiaigorgia</i> sp.	12	Unhealthy	94.6	Common
13	<i>Guaiaigorgia</i> sp.	7	Unhealthy	95.1	Common

Transect 2

- 3.9 A 100m transect was laid down along the coastline of site SC1 (**Figure 2**). The start point and end point were laid at 3 m deep along the sloping boulders.
- 3.10 Similar to Transect 1, this site is mainly composed of artificial sloping boulders and the maximum depth is 3 m (**Table 4**). Seabed stretching outward offshore is muddy scattered with small size boulders and rocks (**Table 7**). The underwater visibility is about 0.5 m. This site supports limited marine life and is dominated by green mussel *Perna viridis* (**Photo Plate 1**).
- 3.11 The site supported a sparse and patchy cover (<1%) of gorgonian coral. No hard corals were found at this site. Only one species of gorgonian coral *Guaiaigorgia* sp. was found. Eighteen coral *Guaiaigorgia* sp. colonies were found along the REA transect (**Table 8**). Their size was small (about 8 to 16 cm height) and the coverage was low. Colonies found at this site showed a mortality rate from 20% to 80% in each coral colony.
- 3.12 All the eighteen gorgonian corals are attached to the sloping boulders and being translocatable. All the corals found along the REA transect are in unhealthy condition and common gorgonian species in Hong Kong water.

Table 7 REA Ecological and Substratum Attributes of Transect 2

Ecological attributes	Rank
Hard coral	0
Octocoral (soft corals and gorgonians)	0.5
Black Corals	0
Dead standing corals	0
Substratum Attributes	
Bedrock/continuous pavement	0
Boulder Blocks (diam.>50cm)	5
Boulder Blocks (diam.<50cm)	1
Rubble	0
Other	0
Soft Substrata	0
Sand	0
Mud/Silt	1

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

Table 8 Size, Health Condition and Translocation Feasibility of Coral Colonies found at Transect 2

Coral Number	Coral Species	Size (height/cm)	Health Condition	Distance along the REA Transect (m)	Rarity in Hong Kong
1	<i>Guaiaigorgia</i> sp.	9	Unhealthy	9.5	Common
2	<i>Guaiaigorgia</i> sp.	10	Unhealthy	12.4	Common
3	<i>Guaiaigorgia</i> sp.	11	Unhealthy	28.9	Common
4	<i>Guaiaigorgia</i> sp.	8	Unhealthy	32.5	Common
5	<i>Guaiaigorgia</i> sp.	16	Unhealthy	33.5	Common
6	<i>Guaiaigorgia</i> sp.	12	Unhealthy	39.4	Common

Coral Number	Coral Species	Size (height/cm)	Health Condition	Distance along the REA Transect (m)	Rarity in Hong Kong
7	<i>Guaiaigorgia</i> sp.	14	Unhealthy	45.9	Common
8	<i>Guaiaigorgia</i> sp.	8	Unhealthy	65.2	Common
9	<i>Guaiaigorgia</i> sp.	11	Unhealthy	65.3	Common
10	<i>Guaiaigorgia</i> sp.	15	Unhealthy	65.5	Common
11	<i>Guaiaigorgia</i> sp.	12	Unhealthy	82.5	Common
12	<i>Guaiaigorgia</i> sp.	9	Unhealthy	82.6	Common
13	<i>Guaiaigorgia</i> sp.	10	Unhealthy	89.5	Common
14	<i>Guaiaigorgia</i> sp.	11	Unhealthy	92.5	Common
15	<i>Guaiaigorgia</i> sp.	16	Unhealthy	95.5	Common
16	<i>Guaiaigorgia</i> sp.	15	Unhealthy	96.6	Common
17	<i>Guaiaigorgia</i> sp.	13	Unhealthy	97.8	Common
18	<i>Guaiaigorgia</i> sp.	8	Unhealthy	97.9	Common

4. Discussion

Spot-check Reconnaissance Dives

- 4.1 The bottom substrates of the area are many composed of artificial sloping boulders (Site SC). Seabed stretching outward offshore is all muddy with scattered small boulder and rocks.
- 4.2 During the spot-check survey, only limited marine life were found in SC. Some common organisms, such bryozoans, rock oyster and green mussels were found on the hard substrates of SC. They are all common species in Hong Kong and found in very low abundance and diversity.
- 4.3 No hard coral was found during the spot check dive. Only one common gorgonian species coral *Guaiaigorgia* sp. was record in the spot check site. Two REA transects were laid along the coastline of Site SC.

Rapid Ecological Assessment Survey

- 4.4 The survey area showed similar bottom substrate. All transects were laid on the sloping boulders and parallel to the shore of the spot check site. The average depth is around 2 m to 3 m. A total of thirty-one colonies of gorgonian coral *Guaiaigorgia* sp. (Transect 1: 13 and Transect 2:18) were recorded along the two REA transect. All of them grow on the sloping boulder surfaces. All the colonies are in small size ranging from 6 cm to 16 cm in height.
- 4.5 All the colonies recorded showed unhealthy condition and mortality rate of 20% to 80% in each coral colony was recorded.
- 4.6 Other than isolated patches of small gorgonian colonies, common marine invertebrate such as Green Mussel, *Perna viridis* and rock oyster *Saccostrea cucullata* were found along the transects.
- 4.7 The abundance and species diversity of invertebrates found along the transect are relatively low when compared with other areas. No hard corals were found. Only gorgonian coral was found with low coverage (less than 1%). This species is

common across Hong Kong waters and tolerant to more turbid and harsh environment. The survey area is considered as having low ecological value given the low abundance and species diversity of marine fauna found in the area.

5. References

- Brian Morton and John Morton. 1983. *The Sea Shore Ecology of Hong Kong*. Hong Kong University Press.
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- Chan A.L.K., Choi, C.L.S., McCorry D., Chan K.K., Lee, M.W., and Put, A. Jr. 2005. *Field Guide to Hard Corals of Hong Kong*. AFCD.

END

Figure 1 Spot-Check Dive Sites



Figure 2 REA Transects at Site SC1

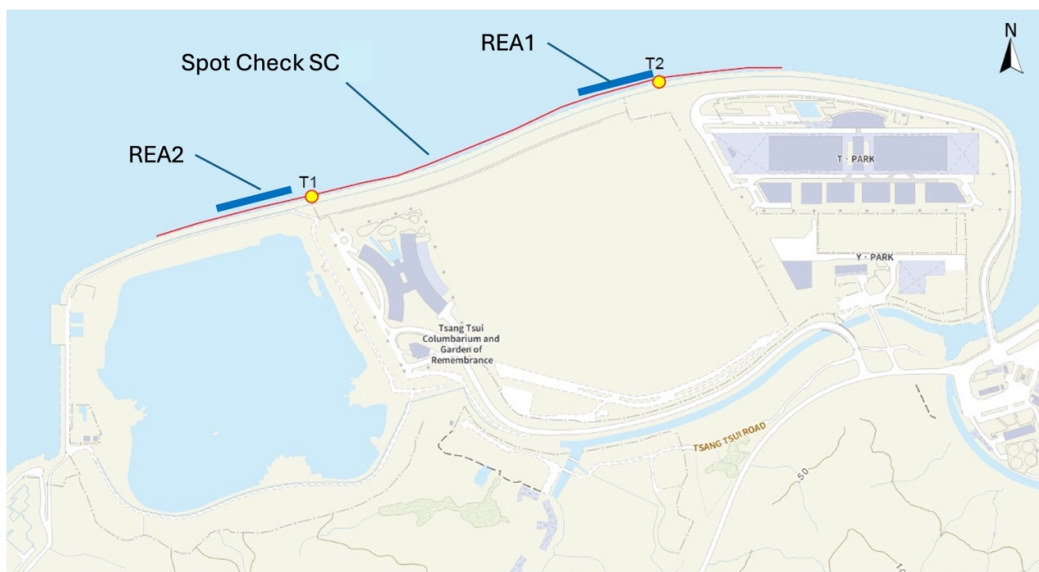
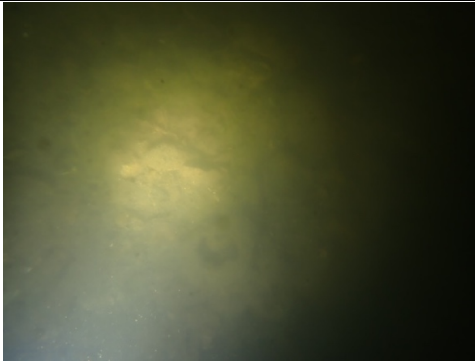


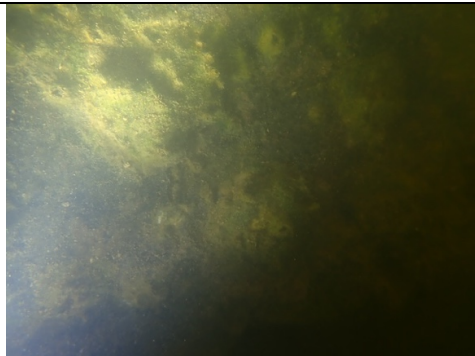
PHOTO PLATE 1



Artificial Sloping Boulders

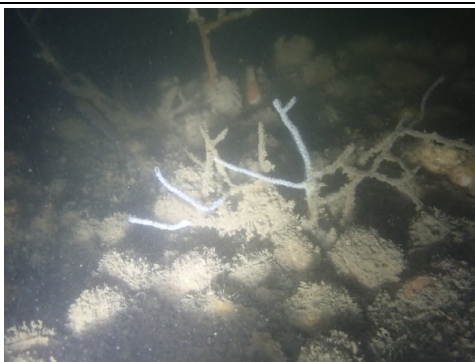


Boulders and Rocks



Saccostrea cucullata

Perna viridis



Unhealthy coral *Guaiagorgia* sp.

Appendix A Rapid Ecological Assessment

Five ecological and seven substratum attributes shall be assessed on site and by reviewing video footages. Each of the attributes (Table 1) should be assigned to one of the seven standard ranked categories (from zero to six, representing percentage cover from none to over 76%)(Table 2).

An inventory of benthic taxa should also be compiled for the P transect and bounce five points. Taxa shall be identified in situ to the following levels: 1) Hard corals to species level where possible; 2) Soft corals, anemones and macroalgae to genus level where possible; and 3) Other benthos to genus level where possible or phylum with growth form. Each taxon in the inventory shall also be ranked to one of the six categories (Table 3) in terms of abundance (from 0 to 5, representing from absent to dominant) in the community.

Table 1 Ecological and Substratum attributes used in REA

Ecological attributes
Hard coral
Octocoral (soft corals and gorgonians)
Black Corals
Dead standing corals
Substratum
Bedrock/continuous pavement
Boulder Blocks (diam.>50cm)
Boulder Blocks (diam.<50cm)
Rubble
Other
Soft Substrata
Sand
Mud

Table 2 Ranking of Ecological and substratum attributes

Rank	Percentage cover (%)
0	None recorded
0.5	1-5
1	6-10
2	11-30
3	31-50
4	51-75
5	76-100

Table 3 Ranking of Benthos abundance

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

Appendix B Dominated Animals and Corals at Spot-Check Sites

Site	Dominated Animals	Coral Species	Coral Rarity
SC1	<i>Perna viridis</i> , <i>Saccostrea cucullata</i>	<i>Guaigorgia</i> sp.	common

Appendix C Sample of Data Sheet Using at Spot-Check Dive Survey

Site #	GPS	Substrate	Max. Depth	Invertebrates	Visibility

Appendix D Sample of Data Sheet Using at REA Survey

Site Name:			Date:		
GPS Location:			Max. Depth:		
Starting Point:			Visibility:		
			Substrate:		
Ending Point:	Dominated Animals:				
Coral sp.	Size	Distance Transect	on	Health Condition	Translocation Feasibility