

## **Appendix 4**

### **Details of Ecological Impact Assessment**

- Appendix 4.1 Works Programme
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- Appendix 4.4 Herpetofauna and Mammal recorded within the Study Area
- Appendix 4.5 Butterfly Species recorded within the Study Area
- Appendix 4.6 Dragonfly recorded within the Study Area
- Appendix 4.7 Marine Ecological Survey Results

**APPENDIX 4.1  
 WORKS PROGRAMME**

Year	2009				
Calendar month	May	Jun	Jul	Aug	Sep
Project month	1	2	3	4	5
<i>Desk-top review</i>					
<i>Terrestrial survey</i>					
Habitat mapping					
Vegetation survey					
Terrestrial fauna (bird, mammal, herpetofauna, butterfly, and dragonfly) survey					
Night survey for bird, mammal and herpetofauna					
<i>Marine survey</i>					
Site visit					
Cheung Chau - Soft shore survey					
Cheung Chau - Rocky shore survey					
South Lantau - Soft shore survey					
South Lantau – Rocky shore survey					
Walk-through survey					
Benthic grab survey					
Dive survey					

**APPENDIX 4.2**  
**PLANT SPECIES RECORDED WITHIN THE STUDY AREA**

Species	Habit	Native	Relative Abundance					
			Plantation	Shrubland	Developed Area	Rocky Shore	Sandy Shore	Works Area
<i>Acacia confusa</i>	tree	no	A	O	C	S		Y
<i>Achyranthes aspera</i>	shrub	yes	C		C			Y
<i>Aglaia odorata</i>	shrub	no			S			
<i>Ageratum conyzoides</i>	herb	yes	O					
<i>Aleurites moluccana</i>	tree	no			O			
<i>Allamanda schottii</i>	shrub	no			O			
<i>Alocasia macrorrhiza</i>	herb	yes	C		O			
<i>Alpinia ap.</i>	herb	yes	O					
<i>Alpinia zerumbet</i>	herb	yes	O					
<i>Amaranthus viridus</i>	herb	yes					O	Y
<i>Ananas comosus</i>	herb	no	S					
<i>Antidesma ghaesembilla</i>	tree	yes		O				
<i>Archidendron lucidum</i>	tree	yes	O		S			
<i>Ardisia crenata</i>	shrub	yes	C	O				
<i>Artemisia sp.</i>	herb	-	O					
<i>Averrhoa carambola</i>	tree	no	S					
<i>Asparagus cochinchinensis</i>	climber	yes	C	C		S		Y
<i>Aster baccharoides</i>	herb	yes		C				
<i>Bamboo</i>	herb	no	C					
<i>Bambusa ventricosa</i>	herb	no			S			
<i>Bauhinia blakeana</i>	tree	yes			O			
<i>Berchemia racemosa</i>	shrub	yes		O				
<i>Bidens pilosa</i>	herb	yes			C			Y
<i>Blechnum orientale</i>	fern	yes	C					
<i>Bombax ceiba</i>	tree	no			O			
<i>Bougainvillea spectabilis</i>	climber	no			O			
<i>Breynia fruticosa</i>	shrub	yes	O	O				Y
<i>Bridelia tomentosa</i>	shrub	yes	C	C	C	S		Y
<i>Bryophyllum pinnatum</i>	herb	no	O					
<i>Cairica papaya</i>	tree	no	S		O			
<i>Canavalia maritima</i>	climber	yes					O	
<i>Casuarina equisetifolia</i>	tree	no	A		C			Y
<i>Celtis biondii</i>	tree	yes		O				
<i>Celtis sinensis</i>	tree	yes	C	C	O		S	

Species	Habit	Native	Relative Abundance					
			Plantation	Shrubland	Developed Area	Rocky Shore	Sandy Shore	Works Area
<i>Cerbera manghas</i>	tree	yes	O					
<i>Chrysalidocarpus lutescens</i>	tree	no			O			
<i>Cinnamomum burmanii</i>	tree	yes		S				
<i>Citrus maxima</i>	tree	no			S			
<i>Clausena lansium</i>	tree	no	O		S			
<i>Cocos nucifera</i>	tree	no			S			
<i>Conyza canadensis</i>	herb	no			C			Y
<i>Codiaeum variegata</i>	shrub	no			O			
<i>Colocasia esculenta</i>	herb	no	O					
<i>Cratoxylum cochinchinensis</i>	tree	yes	C	C				
<i>Cycas revoluta</i>	tree	no			S			
<i>Cynodon dactylon</i>	grass	yes			C			Y
<i>Cyperus spp.</i>	herb	yes	O					
<i>Cyrtococcum patens</i>	grass	yes	C					
<i>Dactyloctenium aegyptium</i>	grass	yes	O		O		S	
<i>Delonix regia</i>	tree	no	O					
<i>Dendrotrophe frutescens</i>	climber	yes	O					
<i>Desmodium heterocarpon</i>	herb	yes		S			S	
<i>Desmodium sp.</i>	herb	yes	S					
<i>Desmos chinensis</i>	shrub	yes		O				
<i>Dianella ensifolia</i>	herb	yes	O					
<i>Dicranopteris pedata</i>	fern	yes	C	A				
<i>Digitaria sp.</i>	grass	yes		S				
<i>Dimocarpus longan</i>	tree	no	C	O	O			
<i>Diospyros vaccinioides</i>	shrub	yes	S					
<i>Dracaena sp.</i>	shrub	no	O		S			
<i>Elephantopus tomentosus</i>	herb	yes	O					
<i>Embelia laeta</i>	climber	yes		S				
<i>Emilia sonchifolia</i>	herb	yes	S					
<i>Eucalyptus tereticornis</i>	tree	no						
<i>Eupatorium catarium</i>	herb	no	O	O				
<i>Euphorbia thymifolia</i>	herb	yes					S	
<i>Euphorbia antiquorum</i>	shrub	no			S			
<i>Euphorbia pulcherrima</i>	shrub	no			S			
<i>Eurya nitida</i>	shrub	yes	O					
<b><i>Ficus tinctoria subsp. gibbosa</i></b>	tree	yes	S					
<i>Ficus elastica</i>	tree	no			O			
<i>Ficus hispida</i>	tree	yes		C			S	Y

Species	Habit	Native	Relative Abundance					
			Plantation	Shrubland	Developed Area	Rocky Shore	Sandy Shore	Works Area
<i>Ficus microcarpa</i>	tree	yes	C		O			
<i>Ficus superba</i>	tree	yes	C		O	S		Y
<i>Ficus variolosa</i>	shrub	yes	C					
<i>Ficus variegata</i>	tree	yes	O					
<i>Gordonia axillaris</i>	tree	yes	O					
<i>Hedyotis acutangula</i>	herb	yes		C				
<i>Euphorbia hirta</i>	herb	yes					S	
<i>Hedyotis corymbosa</i>	herb	yes					S	
<i>Helicteres angustifolia</i>	shrub	yes		C				
<i>Hibiscus rosa-sinensis</i>	shrub	no			O			
<i>Hibiscus tiliaceus</i>	tree	yes			O		C	
<i>Homalium cochinchinensis</i>	tree	yes	O					
<i>Ilex asprella</i>	shrub	yes	C	C				
<i>Ilex pubescens</i>	shrub	yes	O					Y
<i>Inula cappa</i>	herb	yes	C	C				
<i>Ipomoea cairica</i>	climber	yes	C					
<i>Ipomoea pes-caprae</i>	climber	yes					O	Y
<i>Ischaemum sp.</i>	grass	yes		O				
<i>Itea chinensis</i>	tree	yes	O					
<i>Lagerstroemia indica</i>	tree	no			S			
<i>Lantana camara</i>	shrub	no	O			S		
<i>Leucaena leucocephala</i>	tree	no	C		C		C	Y
<i>Ligustrum sinensis</i>	shrub	yes	C					
<i>Litsea glutinosa</i>	tree	yes	C	C		S		Y
<i>Litsea rotundifolia</i>	shrub	yes	C	C				
<i>Livistona chinensis</i>	tree	no						
<i>Lophatherum gracile</i>	grass	yes	O					
<i>Lophostemon conferta</i>	tree	no	C					
<i>Lygodium japonicum</i>	fern	yes	C	C				
<i>Macaranga tanarius</i>	tree	yes	C	C	C		S	Y
<i>Mallotus paniculatus</i>	tree	yes	C					
<i>Manihot esculenta</i>	shrub	no	S					
<i>Melastoma sanguineum</i>	shrub	yes	C	C				
<i>Melia azedarach</i>	tree	no	C		S			Y
<i>Michelia alba</i>	tree	no			O			
<i>Microcos paniculata</i>	tree	yes	C					
<i>Mikania micrantha</i>	climber	yes	C		C		O	Y

Species	Habit	Native	Relative Abundance					
			Plantation	Shrubland	Developed Area	Rocky Shore	Sandy Shore	Works Area
<i>Millettia nitida</i>	climber	yes	S					
<i>Mimosa pudica</i>	shrub	no	O					
<i>Miscanthus sinensis</i>	grass	yes	C	C			C	
<i>Morinda umbellata</i>	climber	yes	O					
<i>Murraya paniculata</i>	shrub	no			S			
<i>Musa paradisiaca</i>	tree	no	O		O			
<i>Mussaenda pubescens</i>	shrub	yes	O				S	
<i>Neolitsea hongkongensis</i>	shrub	yes		S				
<i>Neyraudia reynaudiana</i>	grass	yes		C	O			
<i>Oxalis reticulata</i>	herb	yes					S	Y
<i>Paedaria scandens</i>	climber	yes	O	O				
<i>Pandanus tectorius</i>	shrub	yes	O	O			C	
<i>Panicum maximum</i>	grass	no			O			Y
<i>Parthenocissus dalzielii</i>	climber	no			O			
<i>Passiflora foetida</i>	climber	no	S				S	
<i>Paspalum conjugatum</i>	grass	no						
<i>Pentaphragma eurycoides</i>	tree	yes	O					
<i>Phoenix hanceana</i>	shrub	yes	O	C				
<i>Phyllanthus cochinchinensis</i>	shrub	yes	C	C		S		Y
<i>Phyllanthus emblica</i>	tree	yes		C				
<i>Phyllanthus urinaria</i>	herb	yes	S		S			
<i>Pinus massoniana</i>	tree	yes	A	O				
<i>Plumeria rubra</i>	tree	no			O			
<i>Psidium guajava</i>	tree	no			O			
<i>Psychotria asiatica</i>	shrub	yes	C	C				
<i>Psychotria serpens</i>	climber	yes		S				
<i>Pteridium aquilinum</i>	fern	yes		C				
<i>Pteris ensiformis</i>	fern	yes	O		S			
<i>Pteris semipinnata</i>	fern	yes	O					
<i>Pueraria lobata</i>	climber	yes			C			
<i>Quercus myrsinifolia</i>	tree	yes	O					
<i>Ravenala madagascariensis</i>	tree	no			S			
<i>Rhaphiolepis indica</i>	shrub	yes	C					
<i>Rhodomyrtus tomentosa</i>	shrub	yes	C	C		S		

Species	Habit	Native	Relative Abundance					
			Plantation	Shrubland	Developed Area	Rocky Shore	Sandy Shore	Works Area
<i>Rhus chinensis</i>	tree	yes	C	C				
<i>Rhus hypoleuca</i>	tree	yes				S		Y
<i>Rhus succedanea</i>	tree	yes		C				
<i>Rhynchelytrum repens</i>	grass	yes		O	C			
<i>Rubus parvifolius</i>	climber	yes	O					
<i>Saccharum officinarum</i>	grass	no			S			
<i>Sageretia thea</i>	climber	yes	O		S			
<i>Sansevieria trifasciata</i>	herb	no			O			
<i>Sapium discolor</i>	tree	yes	C	C				
<i>Sapium sebiferum</i>	tree	yes	C					
<i>Scaevola sericea</i>	shrub	yes					O	
<i>Schefflera heptaphylla</i>	tree	yes	C	C				Y
<i>Scleria sp.</i>	herb	yes	O	C				
<i>Setaria sp.</i>	grass	yes					S	Y
<i>Severinia buxifolia</i>	tree	yes	C					Y
<i>Smilax china</i>	climber	yes		C				
<i>Sporobolus fertilis</i>	grass	yes	S					
<i>Solanum nigrum</i>	herb	no			O			
<i>Solena amplexicaulis</i>	climber	yes	S					
<i>Stachytarpheta jamaicensis</i>	herb	yes	O			S		Y
<i>Stephania sp.</i>	climber	yes	S					
<i>Sterculia lanceolata</i>	tree	yes	C	C	S			
<i>Strophanthus divaricatus</i>	climber	yes		O				
<i>Syngonium sp.</i>	climber	no	O					
<i>Syzygium jambos</i>	tree	no			O			
<i>Tadehagi triquetrum</i>	shrub	yes	O	O				
<i>Thevetia peruviana</i>	tree	no						
<b><i>Thespesia populnea</i></b>	tree	yes					S	
<i>Tylophora ovata</i>	climber	yes	S					
<i>Tylophora ovata</i>	climber	yes	S					
<i>Uraria crinita</i>	herb	yes	S					
<i>Wedelia chinensis</i>	herb	yes					O	
<i>Wedelia triloba</i>	tree	no					O	Y

Species	Habit	Native	Relative Abundance					
			Plantation	Shrubland	Developed Area	Rocky Shore	Sandy Shore	Works Area
<i>Wikstroemia indica</i>	shrub	yes	O	C				
<i>Zanthoxylum nitida</i>	climber	yes		O				
<i>Zanthoxylum avicennae</i>	tree	yes	C	C				

Relative abundance: A = abundant, C = common, O = occasional, S = scarce, Y = present  
 Species in boldface = species of conservation concern



**APPENDIX 4.3  
 BIRD SPECIES RECORDED WITHIN THE STUDY AREA**

Common name	Latin name	S	R	P	SG	DA	Commonness
Pacific Reef Egret	<i>Egretta sacra</i>	2	2				CL
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>					1	CL
White-bellied Sea Eagle	<i>Haliaeetus leucogaster</i>		1				CL
Black Kite	<i>Milvus lineatus</i>	1		1	3	1	CW
Indian Cuckoo	<i>Cuculus micropterus</i>					1	CL
Common Koel	<i>Eudynamis scolopacea</i>					1	CW
Greater Coucal	<i>Centropus sinensis</i>			1	5	1	CW
Feral Pigeon *	<i>Columbia livia</i>					2	-
Spotted Dove	<i>Streptopelia chinensis</i>			2			CW
Budgerigar *	<i>Melopsittacus undulatus</i>					1	-
House Swift	<i>Apus nipalensis</i>					8	CW
Barn Swallow	<i>Hirundo rustica</i>				1	4	CW
Chinese Bulbul	<i>Pycnonotus sinensis</i>			10	27	8	CW
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>			4	7	8	CW
Magpie Robin	<i>Copsychus saularis</i>			1	1	1	CW
Blue Whistling Thrush	<i>Myiophonus caeruleus</i>				1		CW
Common Tailorbird	<i>Orthotomus sutorius</i>				12	3	CW
Yellow-bellied Prinia	<i>Prinia flaviventris</i>				4	2	CW
Great Tit	<i>Parus major</i>			2	9		CW
Japanese White-eye	<i>Zosterops japonica</i>			7			CW
Masked Laughingthrush	<i>Garrulax perspicillatus</i>			2	7	3	CW
Hwamei	<i>Garrulax canorus</i>				1		CL
Crested Myna	<i>Acridotheres cristatellus</i>				3		CW
Black-necked Starling	<i>Sturnus nigricollis</i>					6	CW
Common Magpie	<i>Pica pica</i>					2	CW
Blue Magpie	<i>Urocissa erythrorhyncha</i>			2			CW
Black Drongo	<i>Dicrurus macrocercus</i>			1			CW
Hair-crested Drongo	<i>Dicrurus hottentottus</i>			3			CL
Large-billed Crow	<i>Corvus macrorhynchos</i>			1	2		CW
Eurasian Tree Sparrow	<i>Passer montanus</i>					36	CW
<b>Total Birds</b>		<b>3</b>	<b>3</b>	<b>37</b>	<b>83</b>	<b>89</b>	
<b>Total Species</b>		<b>2</b>	<b>2</b>	<b>14</b>	<b>14</b>	<b>18</b>	

**Habitats:** S = sandy shore, R = rocky shore, P = plantation, SG = shrubland-grassland, DA = developed area

**Commonness:** CW = common and widespread, CL = common/uncommon and localized, R = uncommon/rare and localized

\* = introduced species

**APPENDIX 4.4**  
**HERPETOFAUNA AND MAMMAL RECORDED WITHIN THE STUDY AREA**

Common Name	Latin Name	S	R	G	P	SG	DA	Commonness
Asian Common Toad	<i>Bufo melanostictus</i>			+				C
Gunther's Frog	<i>Rana guentheri</i>			+	+	+		C
Asiatic Painted Frog	<i>Kaloula pulchra</i>			+				C
Brown Tree Frog	<i>Polypedates megacephalus</i>			+				C
Marbled Pigmy Frog	<i>Microhyla pulchra</i>			+				C
<b>Reptiles</b>								
Chinese Gecko	<i>Gekko chinensis</i>				+	++	+	VC
Tokay Gecko	<i>Gekko gekko</i>				+			R
Reeves's Smooth Skink	<i>Scincella reevesii</i>					+		C
Changeable Lizard	<i>Calotes versicolor</i>	+						C
<b>Mammals</b>								
Japanese Pipistrelle	<i>Pipistrellus abramus</i>				+		+	C
Short-nosed Fruit Bat	<i>Cynopterus sphinx</i>				+			C

**Habitats:** S = sandy shore, R = rocky shore, G = gullies & ditches in developed areas, P = plantation, SG = shrubland-grassland, DA = developed area

**Abundance:** + = < 5 individuals, ++ = 5 – 20 individuals

**APPENDIX 4.5**  
**BUTTERFLY SPECIES RECORDED WITHIN THE STUDY AREA**

Common name	Latin name	S	R	P	SG	DA	Commonness
Forest Hopper	<i>Astictopterus jama</i>	1		1	1		C
Indian Palm Bob	<i>Suastus gremius</i>				1		UC
Common Redeye	<i>Matapa aria</i>			1			UC
Lime Butterfly	<i>Papilio demoleus</i>	2		6			C
Spangle	<i>Papilio protenor</i>			1			VC
Red Helen	<i>Papilio helenus</i>			4	1		VC
Great Mormon	<i>Papilio memnon</i>			3			C
Red Helen	<i>Papilio helenus</i>					1	VC
Paris Peacock	<i>Papilio paris</i>				3		VC
Common Mormon	<i>Papilio polytes</i>			8			VC
Great Orange Tip	<i>Hebomoia glaucippe</i>			2		2	C
Indian Cabbage White	<i>Pieris canidia</i>			2	1		VC
Common Grass Yellow	<i>Eurema hecabe</i>	2		20	4		VC
Red-base Jezebel	<i>Delias pasithoe</i>			2			VC
Slate Flash	<i>Rapala manea</i>			1			C
Lime Blue	<i>Chilades lajus</i>		2	1	1		VC
Pale Grass Blue	<i>Zizeeria maha</i>		3	2			VC
Lesser Grass Blue	<i>Zinia otis</i>		1	1			C
Plum Judy	<i>Abisara echerius</i>		1	1			VC
Punchinello	<i>Zemeros flegyas</i>		1	1	1		C
Common Palmfly	<i>Elymnias hypermnestra</i>			2			C
Dark-band Bush Brown	<i>Mycalesis mineus</i>			2	3		VC
Common Evening Brown	<i>Melanitis leda</i>			1			C
Common Five-ring	<i>Ypthima baldus</i>			2			VC
Straight Five-ring	<i>Ypthima lisandra</i>			1			C
Large Faun	<i>Faunis eumeus</i>			44	5	5	VC
Angled Castor	<i>Ariadne ariadne</i>		1				C
Rustic	<i>Cupha erymanthis</i>			1	1		VC
Common Mapwing	<i>Cyrestis thyodamas</i>			2			C
Common Sailor	<i>Neptis hylas</i>				1	1	VC
Five-dot Sergeant	<i>Limenitis sulphita</i>			1			C
Red Lacewing	<i>Cethosia biblis</i>				2		R
Great Eggfly	<i>Hypolimnas bolina</i>			2	2		C

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Common name	Latin name	S	R	P	SG	DA	Commonness
Ceylon Blue Tiger	<i>Ideopsis similis</i>			1			VC
Glassy Tiger	<i>Parantica aglea</i>			1			VC
<b>Total Butterflies</b>		<b>5</b>	<b>9</b>	<b>117</b>	<b>27</b>	<b>9</b>	
<b>Total Species</b>		<b>3</b>	<b>6</b>	<b>29</b>	<b>14</b>	<b>4</b>	

**Habitats:** S = sandy shore, R = rocky shore, G = gullies & ditches in developed areas, P = plantation, SG = shrubland-grassland, DA = developed area

**Commonness:** VC = very common, C = common, UC = uncommon, R = rare

**APPENDIX 4.6  
 DRAGONFLY RECORDED WITHIN THE STUDY AREA**

Common Name	Latin Name	S	R	G	P	SG	DA	Commonness
Orange-tailed Midget	<i>Agriocnemis femina</i>				20			A
Wandering Midget	<i>Agriocnemis pygmaea</i>				15			C
Orange-tailed Sprite	<i>Ceriagrion auranticum</i>				8			A
Common Bluetail	<i>Ischnura senegalensis</i>				10			A
Fiery Emperor	<i>Anax immaculifrons</i>				1			C
Red-faced Skimmer	<i>Orthetrum chrysis</i>			3				C
Common Blue Skimmer	<i>Orthetrum glaucum</i>				1			A
Greater Blue Skimmer	<i>Orthetrum melania</i>				1			UC
Marsh Skimmer	<i>Orthetrum luzonicum</i>					1		A
Green Skimmer	<i>Orthetrum sabina</i>	1	1	1		1		C
Wandering Glider	<i>Pantala flavescens</i>	2	3	2	1	12	45	A
Variegated Flutterer	<i>Rhyothemis variegata</i>			2				C
Saddlebag Glider	<i>Tramea virginia</i>	1						C
Crimson Dropwing	<i>Trithemis aurora</i>			5				A
<b>Total dragonflies</b>		<b>4</b>	<b>3</b>	<b>13</b>	<b>57</b>	<b>14</b>	<b>45</b>	
<b>Total species</b>		<b>3</b>	<b>2</b>	<b>5</b>	<b>8</b>	<b>3</b>	<b>1</b>	

**Habitats:** S = sandy shore, R = rocky shore, G = gullies & ditches in developed areas, P = plantation, SG = shrubland-grassland, DA = developed area

**Commonness:** A = abundant, C = common, UC = uncommon

## **APPENDIX 4.7 MARINE ECOLOGICAL SURVEY RESULTS**

### **1. INTRODUCTION**

#### **1.1 Background**

Water Services Department (hereafter the Client) is planning a project namely “Agreement No. CE 1/2008 (WS) Improvement of Fresh Water Supply to Cheung Chau – Investigation” (hereafter the Project).

An EIA Study Brief (ref: ESB-187/2008) was issued by EPD to Water Services Department to carry out an EIA study for the Project. The Project involves submarine pipeline between Chi Ma Wan and Cheung Chau. In Accordance with the EIA Study Brief, marine ecological assessment is a component of the EIA study, and an ecological field survey programme covering intertidal survey, coral dive survey and marine benthic survey, is required.

This Appendix presents the results of the marine ecological survey programme for the EIA study.

### **2. SCOPES**

#### **2.1 Scopes of the Study**

In accordance with the EIA Study Brief, an ecological field survey programme covering intertidal survey, coral dive survey and marine benthic survey, is required.

### 3. SURVEY METHODOLOGY

#### 3.1 Intertidal Survey

Intertidal survey is to investigate the intertidal habitats and communities. Intertidal surveys for epifauna communities were conducted on both natural and artificial coastlines at Chi Ma Wan and Tai Kwai Wan, for two times during wet season (June to September 2009).

The survey includes an active search survey within the 500m Study Area, as well as quantitative survey on rocky shores, artificial seawall and sandy shores within the Study Area, to record the species and abundance of intertidal fauna, and to evaluate the ecological values of different habitat types.

Before the quantitative surveys, a walk-through survey was conducted within the Study Area to collect information to facilitate the determination of representative sites for conducting the quantitative surveys. Walk-through surveys were also conducted at each quantitative site during the quantitative sampling (two surveyors for 30 minutes).

Horizontal transects of 50m in length were established at three tidal levels (High, Middle and Low) on each of the survey locations, covering the two landfall locations on both Chi Ma Wan and Tai Kwai Wan shores, as well as other locations within the Study Area (8 samplings sites at and in the vicinity of each of the landfall locations).

The locations of the intertidal transects are shown in *Figure 4.1*. All intertidal surveys were conducted during suitable ebb tide (< 1m CD). There were Five 0.5m x 0.5m quadrats on each transect. The epifauna within each quadrat were identified and their numbers/coverage percentages were recorded. Species diversity and abundance were reported for evaluating and ranking the ecological values.

#### 3.2 Marine Grab Survey

Marine grab samplings for benthic infauna communities were conducted at 6 stations covering both the pipeline alignment and its vicinity (see *Figure 4.1*) in August 2009. Three grab sample replicates of 0.1m<sup>2</sup> were collected in each of the sampling stations by van Veen Grab. Collected samples were sieved by 0.5mm mesh sieve and then preserved in 5% buffered seawater formalin. Organisms inside the samples were sorted from the sediments by staining with Rose Bengal and then identified to the lowest practicable taxonomic level. Species diversity, abundance and biomass were reported for evaluating and ranking the ecological values.

### 3.3 Dive Survey

Dive surveys for corals and other hard substrate marine organisms were conducted in August 2009. The dive surveys concentrated on shallow coastal waters those covered by hard substrate (bedrock or boulders), including both natural and artificial coastlines at both Chi Ma Wan shore and Tai Kwai Wan shore.

The methodology used in the present survey followed those adopted in the AFCD territory-wide dive survey conducted in 2001-2002 (AFCD 2004). It consisted of spot-check reconnaissance dives, and Rapid Ecological Assessment (REA). The spot-check and REA methods were used and were found sufficient for establishing the ecological profile of the Study Area.

#### Spot Reconnaissance Survey

Spot-check dives were conducted along the coastlines of Chi Ma Wan (7 locations), as well as the coastline of Tai Kwai Wan (7 locations), with focus concentrated on the alignment landing points. The locations for spot reconnaissance dives are shown in **Figure 4.1**. Visual reconnaissance was made of the area of each dive point.

The purposes of the spot reconnaissance dives are to verify whether corals (including all hard corals, octocorals and black corals) and other marine organisms with conservation importance are present within the areas potentially subject to indirect impacts (it is confirmed that the Project would not involve reclamation or dredging, and thus no direct impact is anticipated.).

Besides the biota, the habitat types present within the areas and their distributions were also recorded. Underwater photographs were taken.

#### REA Survey

Semi-quantitative Rapid Ecological Assessment (REA) surveys were conducted at two locations at each shore where with hard substrates identified during the spot reconnaissance dives (including the alignment landing points). The REA transect locations are shown in **Figure 4.1**. The starting points of the REA transects were determined on site in accordance with the site conditions and underwater visibility.

The REA surveys were performed along 100m underwater transects horizontal to the coastlines. The benthic cover, taxon abundance, and ecological attributes of the transects were recorded in a swathe of 2m wide, 1m either side of the transects, following the Rapid Ecological Assessment (REA) technique. Photos were taken during the surveys.



The purposes of the REA survey are to semi-quantitatively record the habitat types and ecological values of the area by SCUBA diving and the application of Rapid Ecological Assessment (REA) approach. The REA approach (see *Annex A* for details) aims at collecting data on the type of substrate and the abundance of marine organisms in particular the occurrence of corals and the extent of the coral distribution from the coastline, for ranking the ecological values. Other parameters to be recorded during the surveys include site condition (e.g. observations regarding the degree of exposure of the sites to wave action), species list of corals and other marine organisms, coral sizes, coral health status, and translocation feasibility of corals.

## **4. RESULTS**

### **4.1 Intertidal Survey Results**

Intertidal survey is to investigate the intertidal habitats and communities. Three types of intertidal habitats were present and surveyed i.e. artificial seawalls on Tai Kwai Wan shore (i.e. the refuse transfer station and the sewage treatment works. But there was no artificial seawall on Chi Ma Wan shore), and rocky shores and sandy shores on both Tai Kwai Wan and Chi Ma Wan shores.

A total of 28 taxa were recorded during the surveys (see *Table 1* below). All were common intertidal organisms in Hong Kong. The survey data were shown in *Annex B*.

**Table 1**  
**List of Intertidal Fauna Recorded during the Survey**

Common name	Scientific name	Commonness in Hong Kong
Sea anemone	-	Common
Rock oyster	<i>Saccostrea cucullata</i>	Very Common
Green mussel	<i>Perna viridis</i>	Very Common
Black mussel	<i>Septifer virgatus</i>	Common
Ark shell	<i>Barbatia virescens</i>	Very Common
Clam	<i>Donax</i> sp.	Common
Chiton	<i>Acanthopleura japonica</i>	Common
Limpet	<i>Cellana grata</i>	Very Common
False Limpet	<i>Siphonaria</i> sp.	Common
Littorid snail	<i>Echinolittorina trochoides</i>	Very Common
Littorid snail	<i>Echinolittorina radiata</i>	Very Common
Snail	<i>Nerita</i> sp.	Very Common
Snail	<i>Chlorostoma argyrostomum</i>	Very Common
Snail	<i>Lunella coronata</i>	Very Common
Snail	<i>Monodonta labio</i>	Very Common
Snail	<i>Planaxis sulcatus</i>	Very Common
Dog whelk	<i>Thais clavigera</i>	Common
Dog whelk	<i>Thais</i> sp.	Common
Stalked barnacle	<i>Capitulum mitella</i>	Common
Barnacle	<i>Tetraclita squamosa</i>	Common
Barnacle	<i>Chthamalus malayensis</i>	Common
Isopod	<i>Ligia exotica</i>	Common
Hermit crab	<i>Clibanarius infraspinus</i>	Common
Crab	<i>Gaetice depressus</i>	Common
Crab	<i>Ocypode ceratophora</i>	Common
Crab	<i>Ocypode cordimana</i>	Common
Crab	<i>Parasesarma pictum</i>	Common
Crab	<i>Grapsus albalineatus</i>	Common

All the intertidal fauna recorded during the survey were very common to intertidal habitats in Hong Kong. The abundance and diversity of intertidal fauna were low on both the artificial seawalls and sandy shores, and relatively higher on the rocky shores.

## 4.2 Benthic Survey Results

A total of 268 benthic organisms were recorded in the survey. 59 taxa were recorded, including 8 phyla (Annelida, Arthropoda, Chordata, Coelenterate, Echinodermata, Mollusca, Nemertea and Phoronida), (**Table 2**). Detailed results of the benthic survey are presented in **Annex C**. No species of conservation importance was found and none of the species are listed in the IUCN Red List.

**Table 2**  
**Summary of the Macrofauna collected in Benthic Grab Survey**

Phylum	Total number of individuals	Total biomass (g)
Annelida	163	2.35
Arthropoda	25	9.37
Chordata	7	14.07
Coelenterata	1	0.04
Echinodermata	5	0.31
Mollusca	53	2.21
Nemertea	8	0.38
Phoronida	6	0.06
<b>Total</b>	<b>268</b>	<b>28.79</b>

**Table 3**  
**Species Diversity Index and Species Evenness Index of the 6 Stations**

Station	1	2	3	4	5	6
Individual number	62	38	39	30	69	29
Species diversity H'	3.15	3.10	3.00	1.75	3.30	2.61
Species evenness J	0.92	0.96	0.96	0.76	0.94	0.92

Shannon-Wiener Diversity Index ranged from 1.75 to 3.30, while Pielou's Evenness index ranged from 0.76 to 0.96 (**Table 3**).

Infauna diversity in the Study Area is relatively low when compared to other areas in Hong Kong. All the species recorded occur frequently in Hong Kong and no rare species were observed (CCPC 2002).

### 4.3 Dive Survey Results

#### Spot Dive Survey

Spot dive surveys were conducted at 14 locations, including stations at the two landing points and the vicinity within 500m distance. All surveyed areas/sites were of turbid waters and thus low visibility. The coordinates of these spot dive sites are shown in the table below.

**Table 4**  
**Coordinates of Spot Dive Sites**

Point	Latitude(N)	Longitude(E)
S1	22°13'27.85"	114°00'47.79"
S2	22°13'27.53"	114°00'53.01"
S3	22°13'31.15"	114°01'01.37"
S4	22°13'32.33"	114°01'03.75"
S5	22°13'33.98"	114°01'04.00"
S6	22°13'39.19"	114°01'06.27"
S7	22°13'46.98"	114°01'10.59"
S8	22°12'50.99"	114°01'21.48"
S9	22°12'51.22"	114°01'28.95"
S10	22°12'57.83"	114°01'31.65"
S11	22°12'58.45"	114°01'32.43"
S12	22°12'58.59"	114°01'33.38"
S13	22°13'09.67"	114°01'31.81"
S14	22°13'17.98"	114°01'36.77"

Spot Dive Sites S1 to S7 were located on the coastline of Chi Ma Wan, from the southwest of the shore (S1), to the Northeast of the shore (S7). All these 7 sites were natural rocky shores. Despite of the natural conditions of these sites and the hard substrate surfaces (bedrock or large boulders), only isolated colonies of a few common coral species (*Plesiastrea versipora*, *Favia speciosa*, *Oulastrea crispate*, and *Goniopora stutchburyi*) with very low coverage (< 1%) were found on the surface of the boulders/bedrock along the shore.

**Table 5**  
**Coral Species recorded in the Study Area (Chi Ma Wan)**

Coral species	Conservation status in Hong Kong (following Chan <i>et al.</i> 2005)	Abundance within the Study Area
<i>Plesiastrea versipora</i>	Abundant	Very low
<i>Favia speciosa</i>	Abundant	Very low
<i>Oulastrea crispate</i>	Common	Very low
<i>Goniopora stutchburyi</i>	Common	Very low

Spot Dive Sites S8 to S14 were located on the coastline of Tai Kwai Wan, from the southwest of the shore (S8), to the Northeast of the shore (S14).

Spot Dive Sites S8, S10, S11, S12, and S13 were artificial shores, either sloping seawall (S8 and S13) or the shoreline made of fill materials (S10, S11, and S12). While Spot Dive Sites S9 and S14 were natural rocky shore.

Sloping seawalls are composed of irregular boulders and maintained the same gradient till they reached the seabed.

No hard or soft coral was recorded on the artificial shores, neither the sloping seawalls nor the fill material shore.

S9 and S14 were natural coastlines. Boulders/bedrock covered the seabed in the nearshore, and scattered on sandy/muddy substrate further offshore. But no hard or soft coral was found on S9, while a low coverage (<1%) of *Plesiastrea versipora* and *Oulastrea crispate* were found at S14.

A total of 13 species of other epifauna were recorded in the area included Green Mussel *Perna viridis* and Snail *Thais* sp.. Beyond the hard substrate in shallow water (rocky shore, rock fill shore, seawalls), the seabed turned into sandy/muddy substrates, and no epifauna or any coral was found.

The epifauna on vertical seawalls were of a even lower percentages/abundance than that on sloping seawalls.

Photos of the coral species were shown in **Figure 4.6**. All the species recorded are common to dominant in Hong Kong, of no special conservation importance.

**Table 6**  
**List of other Epifauna Species recorded within the Study Area**

Common name	Scientific name	Commonness in Hong Kong
Sponge	-	Very common
Bryozoans	-	Very common
Rock oyster	<i>Crassostrea cucullata</i>	Very common
Green mussel	<i>Perna viridis</i>	Very common
Snail	<i>Thais</i> sp.	Very common
Acorn barnacle	<i>Tetraclita squamosa</i>	Very common
Swimming crab	<i>Charybdis</i> sp.	Very common
Xanthid crab	-	Common
Long-spine Sea urchin	<i>Diadema setosum</i>	Very common
Purple sea urchin	<i>Anthocidaris crassipina</i>	Common
Sand sea urchin	-	Common
Sea cucumber	-	Common
Sea squirt	-	Very common

### **Dive REA Survey**

REA dive survey was conducted at S4 (landing point at Chi ma Wan) S6 (natural shore), S9 (natural shore) and S11 (landing point at Tai Kwai Wan), which were either the landing points of the alignment or natural shores.

The results of the REA survey are shown in the table below. The seabed substrates at all REA sties were mainly bedrock and boulders. But there were some rubble and cobbles at S11, probably from the fill materials of the headland. No coral was recorded on the two REA transect on Tai Kwai Wan shore (S9 and S11), while only very low coverage of hard corals were found on the two REA transects on Chi Ma Wan shore (S4 and S6).

**Table 7**  
**List of Marine Species Recorded by the REA Survey within the Project Area**

REA Criteria	S4	S6	S9	S11
<i>Substratum</i>				
Bedrock/Continuous pavement	4	4	2	0
boulders	2	2	4	4
Rubble	0	0	0	1
Cobbles	0	0	0	1
Sand with gravel	0	0	0	1
Mud	0	0	0	0
<i>Ecological attributes</i>				
Hard coral	1	1	0	0
Dead standing corals	0	0	0	0
Soft corals	0	0	0	0
Sea anemone beds	0	0	0	0
Macroalgae	0	0	0	0

## References

AFCD 2004. Ecological Status and Revised Species Records of Hong Kong's Scleractinian Corals.

Chan, A.L.K., Choi, C.L.S., McCorry, D., Chan, K.K., Lee, M.W., and Ang Put Jr. (2005). Field Guide to Hard Corals of Hong Kong. 1st Edition (Eds. W.C. Chan and Edward Stokes). Friends of the Country Parks and Cosmos Books Ltd, Hong Kong.

CCPC 2002. Marine Benthic Communities in Hong Kong. Centre for Coastal Pollution and Conservation, City University of Hong Kong. Prepared for Agriculture, Fisheries and Conservation Department.

## **Annexes**



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## ANNEX A RAPID ECOLOGICAL ASSESSMENT METHODOLOGY

Rapid Ecological Assessment involves ‘semi-quantitative’ swim-surveys allowing for assessment and classification of survey areas. The field data are collected by divers experienced in the underwater identification of sessile benthic taxa, swimming along coral communities or identified sections of coastline on SCUBA.

REA surveys provide information on the assessment of relative cover of coral and other major benthic groups, as well as an inventory of sessile benthic taxa used to define community types.

Five ecological and six substratum attributes shall be assessed on site and/or by reviewing video footages. Each of the attributes (*Table A1-1*) should be assigned to one of the seven standard ranked categories (from zero to six, representing percentage cover from none to over 76%) (*Table A1-2*).

An inventory of benthic taxa shall be compiled for transect. 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 A1-3*) in terms of abundance (from 0 to 5, representing from absent to dominant) in the community.

**Table A1-1  
Ecological and Substratum Attributes used in REA**

<b>Ecological Attributes</b>
Hard coral
Dead standing corals
Soft corals
Sea anemone beds
Macroalgae
<b>Substratum</b>
Bedrock/Continuous pavement
Boulders

Rubble
Cobbles
Sand with gravel
Mud

**Table A1-2**  
**Ranking of Ecological and Substratum Attributes**

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

**Table A1-3**  
**Ranking of Benthos Abundance**

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

**End of Annex A**

**ANNEX B**  
**INTERTIDAL SURVEY RESULTS**

Taxa	Chi Ma Wan								Tai Kwai Wan							
	IC-1	IC-2	IC-3	IC-4	IC-5	IC-6	IC-7	IC-8	IT-1	IT-2	IT-3	IT-4	IT-5	IT-6	IT-7	IT-8
<b>High tidal level</b>																
<i>Echinolittorina radiata</i>	98.4	85.6	101.3	83.2	193.3	63.5		75.3	26.5		31.2	46.2	31.1		31.2	53.6
<i>Echinolittorina trochoides</i>	27.2	38.4	32.1	40.1	66.7	25.3		29.2	15.2		20.1	27.1	16.5		21.3	23.2
<i>Saccostrea cucullata</i>																
<i>Thais clavigera</i>																
<i>Septifer virgatus</i>																
<i>Capitulum mitella</i>	15.3	135.2	21.3	32.3	106.2			42.1	10.2			16.8	28.7			22.3
<i>Cellana grata</i>																
<i>Acanthopleura japonica</i>																
<i>Teraclita squamosa</i>																
<i>Chthamalus malayensis</i>		13.6		9.6	16.2											
<i>Planaxis sulcatus</i>																
<b>Middle tidal level</b>																
<i>Echinolittorina radiata</i>		8	21.3	15.3	18.4			6								
<i>Echinolittorina trochoides</i>			25.3	16.2	26.5			12								

Taxa	Chi Ma Wan								Tai Kwai Wan							
	IC-1	IC-2	IC-3	IC-4	IC-5	IC-6	IC-7	IC-8	IT-1	IT-2	IT-3	IT-4	IT-5	IT-6	IT-7	IT-8
<i>Saccostrea cucullata</i>	82.4%	34.4%	52%	16.8%	15%	20%		25%	16.1%		6.5%	11.2%			12.3%	26%
<i>Thais clavigera</i>		1.6			3.2											
<i>Septifer virgatus</i>	3.3				4.8											
<i>Capitulum mitella</i>		40	31.2	64.3	53.2	35.1		65.6			19.2	42.6	61.2		97.1	56.8
<i>Cellana grata</i>	16	15.2		48	46.4						6.5	13.1	8.8		9.7	
<i>Acanthopleura japonica</i>	4	12		0.8	2.4											
<i>Teraclita squamosa</i>		37.6%						12%							43.2	
<i>Chthamalus malayensis</i>																
<i>Planaxis sulcatus</i>	0.8							3.9								6.5
<i>Monodonta labio</i>	4.1							8.7								12.4
<b>Low tidal level</b>																
<i>Echinolittorina radiata</i>																
<i>Echinolittorina trochoides</i>																
<i>Saccostrea cucullata</i>	24%	11%		10%		13%		25%	15.5%		23.6%	34.3%	42.3%		31.2%	18%
<i>Thais clavigera</i>	1.3														7.6	
<i>Septifer virgatus</i>	5%	23%		55%	65.6%	45.4%										16.6%
<i>Capitulum mitella</i>																
<i>Cellana grata</i>	2.4	3.6	36.5	9.5	12.3	21.2		6.6	12.6		13.5	15.4	23.3		46.7	36.5
<i>Acanthopleura japonica</i>	3.2			6.5	3.5	4.9		3.1								2.3

Taxa	Chi Ma Wan								Tai Kwai Wan							
	IC-1	IC-2	IC-3	IC-4	IC-5	IC-6	IC-7	IC-8	IT-1	IT-2	IT-3	IT-4	IT-5	IT-6	IT-7	IT-8
<i>Teraclita squamosa</i>		41%		35%	30%	26%		21.3%							15.5%	21.2%
<i>Chthamalus malayensis</i>																
<i>Planaxis sulcatus</i>																
<i>Donax sp.</i>							75.3			66.9				41.1		

\* The data are in Individuals/m<sup>2</sup> or coverage percentage



Stations	1						2						3						4						5						6							
	1A		1B		1C		2A		2B		2C		3A		3B		3C		4A		4B		4C		5A		5B		5C		6A		6B		6C			
Replicates	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass				
Taxa																																						
<i>Heteromastus filiformis</i>							2	0.01																	2	0.02												
<i>Laonice cirrata</i>	2	0.06																	1	0.01																		
<i>Leocrates chinensis</i>					1	0.03							1	0.01	1	0.01							1	0.01														
<i>Linopherus hirsuta</i>			1	0.01																																		
<i>Loimia medusa</i>			1	0.01	1	0.02																			1	0.02					2	0.03						
<i>Lumbrineris latreilli</i>			1	0.02	1	0.01							1	0.01	1	0.01																						
<i>Lumbrineris nagae</i>	1	0.01	1	0.02	1	0.02	1	0.02	1	0.02																	1	0.03										
<i>Mediomastus californiensis</i>	1	0.01	2	0.05									4	0.03	1	0.01	3	0.02			1	0.01							5	0.02			1	0.02				
<i>Nectoneanthes oxypoda</i>	1	0.01																																				
<i>Nephtys polybranchia</i>					1	0.01																																
<i>Nerinides sp.</i>																																					1	0.01
<i>Notomastus latericeus</i>					1	0.01							1	0.01																								
<i>Owenia fusiformis</i>							1	0.01																														
<i>Paraprionospio pinnata</i>	1	0.01					2	0.02	1	0.01			1	0.03							1	0.01	2	0.02	2	0.01			3	0.01					1	0.01		
<i>Phyllodoce malmgreni</i>																													1	0.01								
<i>Pilargis sp.</i>													1	0.01									1	0.01														
<i>Poecilochaetus serpens</i>																													1	0.01								
<i>Polydora sp.</i>													1	0.01																								
Polynoidae sp.									1	0.01																												

Stations	1						2						3						4						5						6					
Replicates	1A	1B	1C				2A	2B	2C				3A	3B	3C				4A	4B	4C				5A	5B	5C				6A	6B	6C			
Taxa	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass
<i>Prionospio malmgreni</i>							2	0.01																					2	0.01						
<i>Samytha</i> sp.	1	0.01																											1	0.03						
<i>Sigambra hanaokai</i>									1	0.01			2	0.01											1	0.01			2	0.01						
<i>Spiochaetopterus vitrarius</i>																									1	0.03										
<i>Sternaspis scutata</i>							2	0.02														1	0.31		1	0.01			1	0.02						
<i>Tharyx marioni</i>	1	0.01	1	0.01	1	0.01																							1	0.01			1	0.01		
MOLLUSCA																																				
Bivalvia																																				
<i>Corbula</i> sp.							1	0.07																	2	0.13										
<i>Gafrarium</i> sp.			1	0.05					1	0.03				1	0.03										1	0.03										
<i>Gari</i> sp.							1	0.02																												
<i>Laternula anatina</i>	1	0.04	1	0.29									1	0.01												1	0.02	1	0.02				1	0.02		
<i>Paphia undulata</i>			1	0.13																						1	0.02									
<i>Solen corneus</i>	5	0.12	1	0.03										1	0.04												1	0.02					1	0.11		
<i>Tellina</i> sp.																									1	0.02										
<i>Yoldia</i> sp.	2	0.07			4	0.13									2	0.09	3	0.11			2	0.1	2	0.07	5	0.16					5	0.18			1	0.03
ARTHROPODA																																				
Crustacea																																				
Amphipoda																																				
<i>Ampelisca</i> sp.													3	0.02																						
Decapoda																																				
<i>Alpheus</i> sp.					1	0.04							1	0.02	2	0.08										2	0.32				1	0.8	2	0.25	1	0.01



Stations	1						2						3						4						5						6						
Replicates	1A	1B	1C				2A	2B	2C				3A	3B	3C				4A	4B	4C				5A	5B	5C				6A	6B	6C				
Taxa	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	Number	Biomass	
<i>Callianassa</i> sp.									1	0.02				1	0.01					1	0.01																
<i>Carybdis anisodon</i>																													1	4.5							
<i>Eucrate costata</i>																											1	0.02									
<i>Neoxenophthalmus obscurus</i>	1	0.6													1	0.13										1	0.9										
<i>Oratosquilla oratoria?</i>																																			1	0.27	
<i>Typhlocarcinus nudus</i>									1	0.51																	2	0.86									
PHORONIDA																																					
<i>Phoronis australis</i>			1	0.01	1	0.01																					2	0.03							2	0.01	
ECHINODERMATA																																					
Ophiuroidea																																					
Amphiuridae									1	0.14																1	0.02	2	0.09							1	0.06
Vertebrata																																					
Osteichthyes																																					
					1	3.0	2	5.0							1	2.5	1	3.5																			
Osteichthian (Fish)									1	0.05																									1	0.02	
<b>Sub-total</b>	<b>21</b>	<b>1.07</b>	<b>19</b>	<b>1.07</b>	<b>22</b>	<b>3.44</b>	<b>15</b>	<b>5.19</b>	<b>13</b>	<b>0.33</b>	<b>10</b>	<b>0.63</b>	<b>20</b>	<b>2.73</b>	<b>9</b>	<b>3.62</b>	<b>10</b>	<b>0.31</b>	<b>8</b>	<b>0.15</b>	<b>8</b>	<b>0.14</b>	<b>14</b>	<b>0.48</b>	<b>17</b>	<b>0.42</b>	<b>15</b>	<b>1.5</b>	<b>37</b>	<b>1.25</b>	<b>8</b>	<b>5.52</b>	<b>8</b>	<b>0.44</b>	<b>14</b>	<b>0.5</b>	
<b>Total for each sampling site</b>					<b>62</b>	<b>5.58</b>					<b>38</b>	<b>6.15</b>					<b>39</b>	<b>6.66</b>					<b>30</b>	<b>0.77</b>			<b>69</b>	<b>3.17</b>					<b>30</b>	<b>6.46</b>			