

Installation of Submarine Gas Pipelines  
and Associated Facilities from  
To Kwa Wan to North Point for Former Kai Tak Airport Development  
Consultancy Services for Feasibility Study and Detailed Design  
Environmental Impact Assessment Report



**Appendix D1**  
**Marine Ecological Data**

## Appendix D1 Marine Ecological Data

**Table D-1 Abstract of Intertidal Communities recorded in Kowloon Bay and Victoria Harbour in vicinity to the Proposed Submarine Gas Pipelines Alignment and Summary of Recent Field Survey Records in June 2009. (Source: ENSR, 2008; Maunsell, 2007; and Morton, B. and Morton, J. 1983)**

Group	Species	(1)ENSR (2008)	(2)Maunsell (2007)	(3)Morton <i>et al.</i> (1983)	Mott (2009)
<b>Periwinkle</b>	<i>Echinolittorina radiata</i>		√		√
	<i>Echinolittorina trochoides</i>		√		
	<i>Echinolittorina vidina</i>				√
	<i>Littoraria articulata</i>		√		√
<b>Planaxid Snail</b>	<i>Planaxis sulcatus</i>		√		√
<b>Topshell</b>	<i>Monodonta labio</i>		√		
<b>Whelk</b>	<i>Thais clavigera</i>		√		√
<b>Limpet/ False Limpet</b>	<i>Collisella dorsuosa</i>		√		
	<i>Cellana grata</i>		√		√
	<i>Cellana toreuma</i>		√		√
	<i>Nipponacmea concinna</i>		√		
	<i>Patelloida pygmaea</i>		√		
	<i>Patelloida saccharina</i>		√		√
	<i>Siphonaria japonica</i>		√		√
	<i>Siphonaria laciniosa</i>		√		
<b>Chiton</b>	<i>Acanthopleura japonica</i>		√		√
<b>Nerites</b>	<i>Nerita sp.</i>				√
<b>Bivalve</b>	<i>Perna viridis</i>			√	√
	<i>Barbatia virescens</i>			√	
	<i>Trapezium liratum</i>			√	
	<i>Musculista senhausia</i>			√	
	<i>Modiolus agripetus</i>			√	
	<i>Ryenella cuprea</i>			√	
	<i>Electroma japonica</i>			√	
	<i>Saccostrea cucullata</i>		√	√	√
	<i>Chama spp.</i>			√	
	<i>Striarca afra</i>			√	
	<i>Claudiconcha japonica</i>			√	
	<i>Septifer virgatus</i>	√	√	√	
	<b>Bryozoans</b>	<i>Bugula neritina</i>			√
<i>Schizoporella errata</i>		√			
<b>Barnacles</b>	<i>Balanus amphitrite</i>		√	√	√
	<i>Modiolus agripetus</i>			√	
	<i>Ryenella cuprea</i>			√	
	<i>Electroma japonica</i>			√	
	<i>Balanus amphitrite</i>			√	
	<i>Balanus reticulatus</i>			√	

Group	Species	(1)ENSR (2008)	(2)Maunsell (2007)	(3)Morton <i>et al.</i> (1983)	Mott (2009)
	<i>Balanus variegates</i>			√	
	<i>Balanus trigonus</i>			√	
	<i>Tetraclita japonica</i>		√		
	<i>Tetraclita squamosa</i>		√	√	
	<i>Capitelum mitella</i>		√	√	√
	<i>Chthamalus malayensis</i>				√
<b>Crabs</b>	<i>Giaetice depressus</i>				√
	<i>Namosesarina minutum</i>				√
	<i>Unidentified crab</i>				√
<b>Worms</b>	<i>Hydroides</i> sp.		√		
<b>Sea Slater</b>	<i>Ligia exotica</i>		√		√
<b>Striped Anemone</b>	<i>Haliplanella luciae</i>				√
<b>Algae</b>	<i>Enteromorpha prolifera</i>			√	
	<i>Rhizoclonium riparium</i>			√	
	<i>Codium cylindricum</i>			√	
	<i>Colpomenia sinuosa</i>			√	
	<i>Ulva conglobata</i>			√	
	<i>Ulva fasciata</i>			√	
<b>Erect Algae</b>	<i>Hinckesia mitchelliae</i>		√		
	<i>Gelidium pussillum</i>		√		
	<i>Corallina pilulifera</i>		√		
	<i>Ulva lactuca</i>		√		
<b>Cyanobacteria</b>	<i>Kyrtuthrix maculans</i>		√		
<b>Encrusting Algae</b>	<i>Hildenbrandia rubra</i>		√		
	<i>Chrysothrix candelaris</i>		√		
	<i>Pseudulvella applanata</i>		√		
	Encrusting coralline alga		√		
<b>Ascidians</b>	<i>Ascidia sydneyensis</i>			√	
	<i>Ciona intestinalis</i>			√	
	<i>Styela plicata</i>			√	√
	<i>Styela canopus</i>			√	
	<i>Herdmania momus</i>			√	
<b>Polychaete</b>	<i>Pomatoceros triqueter</i>			√	
	<i>Hydroides elegans</i>			√	
	<i>Spirorbis foraminosus</i>			√	
<b>Polyzoa</b>	<i>Pedicellina</i> (Genera)			√	
	<i>Barentsia</i> (Genera)			√	
	<i>Loxosomella</i> (Genera)			√	

References:

- (1) ENSR (2008). Agreement No. CE43/2005(EP) Harbour Area Treatment Scheme (HATS) Stage 2A EIA Study – Investigation. Drainage Services Department, Hong Kong.
- (2) Maunsell Environmental Management Consultants Ltd. (2007). Agreement No. CE 35/2006(CE) Kai Tak Development Engineering Study cum Design and Construction of Advance Works – Investigation,

*Design and Construction. Decommissioning of the Former Kai Tak Airport other than the North Apron Environmental Impact Assessment Report.* Civil Engineering and Development Department, Hong Kong.

- (3) Morton, B.S. and Morton, J. (1983). *The Sea Shore Ecology of Hong Kong*, Hong Kong University Press, Hong Kong.

**Table D-2 Intertidal Communities Recorded in Walk Through Survey within the Assessment Area (8<sup>th</sup> June 2009)**

Survey Date	08/06/2009											
Survey Location	Site 1		Site 2		Site 3		Site 4		Site 5		Site 6	
Intertidal Type	Rocky Shore		Vertical Seawall		Vertical Seawall		Vertical Seawall		Vertical Seawall		Vertical Seawall	
Tidal Level	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
<i>Acanthopleura japonica</i>							+		++	++	+	++++
<i>Balanus amphitrite</i>	+++++	+++++	+++	++++	+++						+++++	++
<i>Capitulum mitella</i>									+		++++	
<i>Cellana grata</i>			++	++				+	+		+	++
<i>Cellana toreuma</i>		+										
<i>Chthamalus malayensis</i>	++++											
<i>Echinolittorina radiata</i>	+++		+++				+				++++	
<i>Echinolittorina trochoides</i>											+	
<i>Echinolittorina vidua</i>	++											
<i>Gaetice depressus</i>						+						
<i>Haliplanelle luciae</i>								++		+		+
<i>Ligia exotica</i>		+		++	+	+	+	++			+	++++
<i>Littoraria articulata</i>	+++		+++		+++		+				+	
<i>Namosesarma minutum</i>												+++
<i>Nerita</i> sp.			+									
<i>Patelloida saccharina</i>			+	+								+
<i>Perna viridis</i>		++		++		+		+			++++	++
<i>Saccostrea cucullata</i>		+++		+	++	++	++		+++++		+	+++
<i>Siphonaria japonica</i>			++			+						
<i>Styela plicata</i>						+						
<i>Thais clavigera</i>				+++				+	+	++	+	+++
Unidentified crab		+										
<b>Total No. of species recorded:</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>4</b>	<b>6</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>11</b>	<b>10</b>

Code for Relative Abundance / Density

+++++ : Abundant

++++ : Common

+++ : Uncommon

++ : Rare

+ : Scarce

**Table D-3 Intertidal Communities Recorded in Walk Through Survey within the Assessment Area (12<sup>th</sup> October 2009)**

Survey Date	12/10/2009											
Survey Location	Site 1		Site 2		Site 3		Site 4		Site 5		Site 6	
Intertidal Type	Rocky Shore		Vertical Seawall		Vertical Seawall		Vertical Seawall		Vertical Seawall		Vertical Seawall	
Tidal Level	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
<i>Acanthopleura japonica</i>							++	+	+	++	+++	+++
<i>Balanus Amphitrite</i>		+++++	+++	+++++	++++	+++++						
<i>Capitulum mitella</i>											+	
<i>Cellana grata</i>		+						++	+	++	++	
<i>Cellana toreuma</i>											+++	
<i>Chthamalus malayensis</i>											+++	
<i>Echinolittorina radiata</i>							+					
<i>Echinolittorina trochoides</i>	+		++				+					
<i>Echinolittorina vidua</i>	+++		+									
<i>Gaetice depressus</i>					+							
<i>Ligia exotica</i>							++	+	+		+	
<i>Littoraria articulate</i>	++		+++									
<i>Patelloida saccharina</i>											+	
<i>Perna viridis</i>				+++								+
<i>Saccostrea cucullata</i>		+++	+	+			+++	++++	+	++++	++++	++++
<i>Serpulorbis imbricatus</i>								+		+		+
<i>Tetraclita squamosa</i>											+++	+++
<i>Thais clavigera</i>								++	+	+		+
<b>Total No. of species recorded:</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>5</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>9</b>	<b>6</b>

Code for Relative Abundance / Density

+++++ : Abundant

++++ : Common

+++ : Uncommon

++ : Rare

+ : Scarce

**Table D-4 Abstract of Intertidal Communities recorded in Green Island, Little Green Island and a reference site in Hong Kong Island. (Source: ERM, 1998)**

Zonation Recorded	Group	Species
Low Shore	Herbivorous Molluscs	Chiton ( <i>Acanthopleura japonica</i> ) Limpets ( <i>Cellana grata</i> , <i>C. toreuma</i> , <i>Patelloida pygmaea</i> and <i>P. saccharina</i> )
High Shore	Herbivorous Gastropods	Periwinkles ( <i>Echinolittorina trochoides</i> , <i>E. radiata</i> and <i>E. vidua</i> )
Low Shore	Herbivorous Gastropods	Periwinkles ( <i>Echinolittorina trochoides</i> , <i>E. radiata</i> and <i>E. vidua</i> )
Not Mentioned	Cyanobacteria	Stalked Barnacles ( <i>Capitulum mitella</i> ) Acorn Barnacles ( <i>Tetraclita</i> sp.)
Not Mentioned		<i>Pseudoulvella</i> spp.

References:

Environmental Resources Management (1998). *Environmental Impact Assessment: Dredging an Area of Kellett Bank for Re-provisioning of Six Government Mooring Buoys*. Civil Engineering Department Port Works Division.

Nomenclature follows Lai et al. (2006). *Hard Shore Organisms: Rocky Shore and Boulder Shore*. Photographic Guide Series to Hong Kong Nature 9. HK Discovery Limited. Hong Kong.

**Table D-5 Intertidal Communities Recorded in Quadrat Survey at Hoi Sham Park Rocky Shore (June 2009)**

Tide Level Quadrat	High					Middle					Low				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<i>Balanus amphitrite</i> (%)	10%	15%	15%	40%	25%	60%	70%	75%	35%	40%	50%	50%	40%	50%	60%
<i>Cellana grata</i> (%)						3%	1%								
<i>Chthamalus malayensis</i> (%)	20%	20%													
<i>Echinolittorina radiata</i> (%)	10%	3%													
<i>Echinolittorina vidua</i> (%)			3%	2%	2%										
<i>Ligia exotica</i>															1
<i>Littoraria articulata</i> (%)	10%														
<i>Perna viridis</i> (%)							1%				10%			1%	
<i>Saccostrea cucullata</i> (%)						2%	5%	4%	2%	3%		2%	5%		5%
<i>Siphonaria japonica</i>							1	2							

Note: Percentage (%) cover was used for quantifying sessile and less mobile species.

Nomenclature: Lai, V.C.S., Lui, H.T.H., and Tong, T.C.W. (2006). *Hard Shore Organisms: Rocky Shore and Boulder Shore. Photographic Guide Series to Hong Kong Nature 9*. HK Discovery Limited. Hong Kong.



**Table D-6 Intertidal Communities Recorded in Quadrat Survey at Hoi Sham Park Rocky Shore (October 2009)**

Tide Level	High					Middle					Low				
Quadrat	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<i>Balanus amphitrite</i> (%)											30%	70%	60%	80%	30%
<i>Cellana grata</i> (%)											1%			1%	
<i>Chthamalus malayensis</i> (%)							60%	60%	70%	40%					
<i>Echinolittorina trichoides</i> (%)				1%	1%										
<i>Echinolittorina vidua</i> (%)	5%		1%	5%	2%	1%									
<i>Ligia exotica</i>															
<i>Littoraria articulata</i> (%)	3%	1%	1%	1%						1%					
<i>Saccostrea cucullata</i> (%)									2%		1%	5%	5%	2%	5%

Note: Percentage (%) cover was used for quantifying sessile and less mobile species.

Nomenclature: Lai, V.C.S., Lui, H.T.H., and Tong, T.C.W. (2006). *Hard Shore Organisms: Rocky Shore and Boulder Shore. Photographic Guide Series to Hong Kong Nature 9*. HK Discovery Limited. Hong Kong.

**Table D-7 Abstract of Marine Benthos recorded in Kowloon Bay and Victoria Harbour in vicinity to the Proposed Submarine Gas Pipelines Alignment. (Source: Maunsell, 2007; CityU, 2002; and Ove Arup, 2001)**

Group	Species	(4) Maunsell (2007)	(5) CityU (2002)	(6) Ove Arup (2001)
<b>Polychaeta</b>	<i>Ampharete acutifrons</i>	√		
	<i>Schistocomus</i> sp.	√		
	<i>Mediomastus</i> sp.	√	√	
	<i>Cirriformia</i> sp.	√		
	<i>Schistomeringos rudolphi</i>	√		
	<i>Eunice indica</i>	√		
	<i>Lysidice ninetta</i>	√		
	<i>Glycera chirori</i>	√		
	<i>Glycera subaenea</i>	√		
	<i>Glycinder gurjanovae</i>	√		
	<i>Ophiodromus angustifrons</i>	√	√	
	<i>Lumbrinereis shiinoi</i>	√		
	<i>Aglaophamus dibranchis</i>	√	√	
	<i>Aglaophamus sinensis</i>	√		
	<i>Ophelina acuminata</i>	√		
	<i>Phyllodoce</i> sp.	√		
	<i>Poecilochaetus hystricosus</i>	√		
	<i>Harmothoe minuta</i>	√		
	<i>Branchiomma cingulata</i>	√		
	<i>Scalibregma inflatum</i>	√		
	<i>Ehlersileanira hwanghaiensis</i>	√		
	<i>Prionospio malmgreni</i>	√	√	
	<i>Laonice cirrata</i>	√		
	<i>Amaeana</i> sp.	√		
	<i>Terebellidae</i> sp.	√		
	<i>Paralacydonia paradox</i>	√		
	<i>Nemertea</i>	√		
	<i>Notomastus</i> sp.	√		
	<i>Bhawania brevis</i>	√		
	<i>Tharyx</i> sp.	√		
	<i>Lumbrinereis nagae</i>	√		
	<i>Nectoneanthes oxypoda</i>	√		
	<i>Naineris</i> sp.	√		
	<i>Lepidasthenia</i> sp.	√		
	<i>Hydroides elegans</i>	√		
	<i>Minuspio cirrifera</i>	√		
<i>Loimia bandera</i>	√			
<i>Capitella capitata</i>			√	
<i>Sigambra hanaokai</i>		√		
<i>Sigambra</i> sp.		√		
<i>Paraprionospio pinnata</i>		√		
<i>Otopsis</i> sp.		√		
<b>Nemertea</b>	<i>Nemertea</i>	√		

Group	Species	(4) Maunsell (2007)	(5) CityU (2002)	(6) Ove Arup (2001)
<b>Crustacea</b>	<i>Charybdis variegata</i>	√		
	<i>Thalamita sima</i>	√		
	<i>Typhlocarcinops canaliculata</i>	√		
	<i>Xenophthalmus pinnotheroides</i>	√		
	<i>Alpheus japonicas</i>	√		
	<i>Clorida latreillei</i>	√		
	<i>Amphipoda</i>	√		
	<i>Copepoda</i>	√		
	<i>Eucrate costata</i>	√		
	<i>Porcellanella triloba</i>	√		
	<i>Solenocera crassicornis</i>	√		
	<i>Austinogebia edulis</i>	√		
	<i>Amphipoda</i>	√		
	<i>Macrophthalmus sp.</i>			√
<b>Mollusca</b>	<i>Calyptrea morbid</i>	√		
	<i>Rhodopetala rosea</i>	√		
	<i>Lepidozona nipponica</i>	√		
<b>Fish</b>	<i>Tridentiger obscurus</i>	√		

References:

- (4) Maunsell Environmental Management Consultants Ltd. (2007). *Agreement No. CE 35/2006(CE) Kai Tak Development Engineering Study cum Design and Construction of Advance Works – Investigation, Design and Construction. Decommissioning of the Former Kai Tak Airport other than the North Apron Environmental Impact Assessment Report*. Civil Engineering and Development Department, Hong Kong.
- (5) CityU Professional Services Limited (2002). *Agreement No. CE 69/2000 Consultancy Study on Marine Benthic Communities in Hong Kong*. Agriculture, Fisheries and Conservation Department, Hong Kong.
- (6) Ove Arup & Partners Hong Kong Ltd. (2001). *Agreement No. CE32/99 Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development*. Kowloon Development Office, Territory Development Department, Hong Kong.

**Table D-8 Benthic Epifauna Recorded around Green Island (Source: ERM, 1995)**

<b>Group</b>	<b>Species</b>	<b>Abundance</b>
<b>Sponge</b>	<i>Sclerobelemmon burgeri</i>	6
	<i>Pteroides esperi</i>	2
	<i>Virgularia gustaviana</i>	2
	<i>Gorgonacea sp.</i>	1
<b>Anemones</b>	Unidentified anemones	16
<b>Hydrozoa</b>	Unidentified hydroids	1
<b>Bryozoan</b>	Unidentified bryozoan	2
<b>Molluscs</b>	<i>Callanailis hirascana</i>	1
<b>Shrimps &amp;</b>	<i>Alpheus bisincisus</i>	5
<b>Mantis shrimp</b>	<i>Oratosquilla oratoria</i>	3
<b>Crabs</b>	<i>Portunus hastatoides</i>	1
	<i>Thalamita picta</i>	1
<b>Fish</b>	<i>Paralichthys olivaceus</i>	1
	<i>Oxyurichthys tentacularis</i>	1
	Unidentified Clupeidae	1
<b>Total no. of species</b>		15
<b>Total no. of individuals</b>		44

References:

ERM Hong Kong Ltd (1995). *Backfilling of South Tsing Yi and North of Lantau MBAs: Final Environmental Impact Assessment*. Civil Engineering Department.

**Table D-9 Frequency of Soft Coral and Gorgonian Colonies Recorded around Green Island (Source: ERM, 1998)**

Survey Area and Transect No.	Level (-mPD)	Species			
		Dendronephthya sp.	Echinogorgia complexa	Euplexaura curvata	Ellisella gracilis
<b>Little Green Island</b>					
T1.1	5	20	10	11	0
T1.2	10	18	9	15	0
T1.3	15	11	10	24	0
T2.1	5	17	4	5	2
T2.2	10	2	0	9	0
T2.3	15	11	2	8	0
<b>Green Island</b>					
T3.1	5	8	1	20	0
T3.2	10	3	0	57	0
T3.3	15	0	0	17	0
T4.1	5	20	0	0	0
T4.2	10	4	0	2	0
T4.3	15	18	0	13	0
<b>Hong Kong Island</b>					
T5.1	5	0	0	0	0
T5.2	10	0	0	0	0
T5.3	15	0	0	0	0
T6.1	5	0	0	0	0
T6.2	10	0	0	0	0
T6.3	15	0	0	0	0

References:

Environmental Resources Management (1998). *Environmental Impact Assessment: Dredging an Area of Kellett Bank for Re-provisioning of Six Government Mooring Buoys*. Civil Engineering Department Port Works Division