

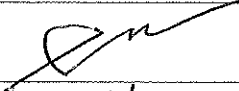

Highways Department

Contract No. HY/2007/13

Environmental Team for Deep Bay Link (Operational Phase)

Quarterly EM&A Summary Report No. 7 (for the months of April – June 2009)

07/2009

	Name	Signature
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Reviewed & Approved:	Y T Tang	

Version:	0	Date:	30 July 2009
<p>The information contained in this report is, to the best of our knowledge, correct at the time of printing. The interpretation and recommendations in the report are based on our experience, using reasonable professional skill and judgment, and based upon the information that was available to us. These interpretations and recommendations are not necessarily relevant to any aspect outside the restricted requirements of our brief. This report has been prepared for the sole and specific use of our client and Maunsell Consultants Asia Ltd. accepts no responsibility for its use by others.</p> <p>This report is copyright and may not be reproduced in whole or in part without prior written permission.</p>			

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Date: 11 August 2009

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By Fax (2761 4864) & Post

Attention: Mr. Robert Chan / Mr. Stephen Chan

Dear Sirs,

**Re: Contract No. HY/2007/13
Deep Bay Link (Operational Phase)
Quarterly EM&A Summary Report for Operational Phase – April – June 2009**

Reference is made to ET's e-mail correspondences enclosed with a copy of the Operational Phase Quarterly EM&A Summary Report for April to June 2009 for the captioned Project. We are pleased to inform that we have no further comment on the captioned Report.

We are pleased to inform you that the captioned Report, which had been certified by the ET Leader, is verified by IEC in compliance with Condition 1.9 of the Environmental Permit No. EP-163/2003/G of the Project.

Thank you very much for your kind attention and please do not hesitate to contact the undersigned or our Ms. Vivian Chan if you have any queries.

Yours sincerely,

K.S. Lee
Independent Environmental Checker

c.c. Mr. Y T Tang
Mr. Eric Chan

MCAL (ET Leader)
Arup (HY/2002/21)

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EXECUTIVE SUMMARY

This is the seventh quarterly Environmental Monitoring and Audit (EM&A) summary report prepared by Maunsell Consultants Asia Ltd., the designated Environmental Team (ET), for the operational phase of the Project "Deep Bay Link". Operation of Deep Bay Link commenced on 1 July 2007 and the operational phase EM&A programme started on 1 October 2007. This report presents the summary of EM&A works conducted between 1 April and 30 June 2009.

Monitoring on operational noise, amphibian, water level, water quality, avifauna, pelagic fauna, benthos and flora were carried out in the reporting quarter. Monitoring of road surface runoff from carriageway was not carried out in the reporting quarter. Environmental mitigation measures and environmental complaint handling procedures were implemented.

Environmental Monitoring Works

Noise

The first operation noise monitoring had been completed in October 2008. A supplementary operation noise monitoring was carried out in the reporting month.

Water Quality

All the road surface runoff from carriageway monitoring had been completed in January 2008. No such monitoring was carried out in the reporting quarter.

Ecology

Water level, water quality, avifauna, pelagic fauna, benthos, amphibian and flora monitoring at Pond 15 were carried out in the reporting period.

Environmental Complaints and Prosecution

No complaint, summons or prosecution related to environmental issues was received or made against the Project in the reporting period.

1. INTRODUCTION

Background

- 1.1 Maunsell Consultants Asia Ltd. (MCAL) (hereinafter called the "ET") was appointed by Highways Department (hereinafter called the "Client") to undertake Environmental Monitoring and Audit for "Deep Bay Link" (hereinafter called the "Project") during operational phase. Under the requirements of Section 6 of Environmental Permit EP-163/2003/G, EM&A programme as set out in the EM&A Manual is required to be implemented. In accordance with the Environmental Permit and the EM&A Manual, environmental monitoring of operational noise, water quality and ecology are required for the Project.
- 1.2 Operation of Deep Bay Link commenced on 1 July 2007 and the operational phase EM&A programme commenced on 1 October 2007. This report summarises the environmental monitoring and audit works for the Project between 1 April and 30 June 2009.

Project Organization

- 1.3 The structure of the environmental management team is shown in Figure 1.1. Contacts of key environmental staff of the Project are shown in Appendix A.
- 1.4 A layout plan of the Project is provided in Figure 1.2.

Summary of the EM&A Requirements

- 1.5 The EM&A programme requires environmental monitoring for operational noise, water quality and ecology. The EM&A requirements for each item are described in subsequent sections, including:
- Monitoring parameters;
 - Environmental quality performance limits (Action and Limit levels);
 - Environmental mitigation measures, as recommended in the project EIA final report; and
 - Environmental requirements specified in EM&A manual and in the contract documents.
- 1.6 Status of Environmental License, advice on the implementation status of environmental protection and pollution control/mitigation measures are summarised in Section 5 of the Report.

2. OPERATIONAL NOISE MONITORING

Monitoring Requirements

- 2.1 Noise monitoring is required to monitor the operational noise level at the nearby noise sensitive receivers (NSR) during peak traffic hour.
- 2.2 The measured noise level will be compared to the predicted traffic noise levels in the EIA under full provision of the mitigation measures.

Monitoring Parameters, Frequency and Duration

- 2.3 The traffic noise level should be measured twice within the first year of the road opening. Measurements should be made in terms of the A-weighted L_{10} over three 30-mins periods during the peak traffic hour. Other parameters L_{90} and L_{eq} would be included for reference purpose.

Monitoring Locations

- 2.4 Noise measurements were conducted at ten monitoring locations according to the approved Traffic Noise Monitoring Plan (rev. 2). The monitoring locations are shown in Figure 2.1. Table 2.1 describes these monitoring stations.

Table 2.1 Noise Monitoring Locations (Sensitive Receivers)

Monitoring Station	Location	Predicted Noise Level, L_{10} dB(A) in Year 2021		Noise Standard L_{10} (peak hour) (dB(A))
		Unmitigated	Mitigated	
OP1	2/F, Village house north to Tsing Chuen Wai	73.0	66.0	70
OP2	G/F, Village House near Tsing Chuen Wai	72.0	67.0	
OP3	11/F, Block 1, Botania Villa	71.0	69.0	
OP4	G/F, Village House at Ngau Hom Shek	67.0	67.0	
OP5A	G/F, Village House at San Sang San Tsuen	N/A	N/A	
OP6	G/F, Poultry Farm with residential house	70.0	66.0	
OP7A	19/F, Block 1, The Sherwood	68.7	69.0	
E1	2/F, Home of Elderly near To Yuen Wai	80.0	76.0	
E1A	2/F, Village House at To Yuen Wai	79.0	69.0	
E2A	1/F, Village House near Tan Kwai Tsuen	83.0	69.0	

Supplementary Operational Noise Monitoring

- 2.5 The first operational noise monitoring had been completed on 8 October 2008.
- 2.6 However, for monitoring stations of Village House at Ngau Hom Shek (OP4) and Village House at To Yuen Wai (E1A), as the measured noise levels were interfered by insects and background noise, a supplementary operational noise monitoring was carried out at these two locations in May 2009, in the consent of HyD.
- 2.7 Supplementary operational noise monitoring was carried out in 19 May 2009 at Village House of To Yuen Wai (E1A) in lieu of the monitoring conducted in October 2008. For monitoring station OP4, insect disturbance was still significant upon arrival of the location for noise measurement on 6 and 14 May

2009. Considering that it is not meaningful to conduct noise measurement with interference by insects, the supplementary noise measurement at this monitoring station was aborted.

Measurement Time

2.8 Supplementary traffic noise measurements were conducted on 19 May 2009 (normal weekdays) during the AM peak traffic hour from 08:00 to 9:30 and during the PM peak traffic hour from 17:00 to 18:30 for the monitoring location E1A, Village House at To Yuen Wai.

Noise Monitoring Equipment

2.9 The Sound Level Meters used for the monitoring comply with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). Any other noise measuring and analysis instrument used will be of comparable professional quality. The instrumentation to be used for the noise monitoring is given Table 2.2.

Table 2.2 Traffic Noise Monitoring Equipment

Manufacturer	Description
Integrating Sound Level Meter	Briel & Kjaer 2238
Calibrator	Briel & Kjaer 4231

Noise Measurement Methodology

- 2.10 The noise measurements were conducted to obtain two sets of A-weighted $L_{10(1\text{ hour})}$ sound pressure level during the AM and PM peak traffic hours over 3 half hours periods at each designated sensitive receiver.
- 2.11 The noise measurement point was at a point 1m from the exterior of the sensitive receiver building facades and was at a position at least 1.2m above ground of the sensitive receiver level.
- 2.12 Noise measurements were made in accordance with Section III of the "Calculation of Road Traffic Noise (CRTN), 1998"^[4].
- 2.13 All monitoring were carried out at 1m from the façade of the building. No monitoring was carried out in a free-field condition.
- 2.14 Statistical results such as L_{max} , L_{min} , L_{eq} and L_{90} were also obtained for reference purpose.
- 2.15 Observations were recorded when intrusive noise was unavoidable.
- 2.16 The wind speed was frequently checked with a portable wind meter. Noise monitoring was cancelled in the presence of fog, rain, wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.

Traffic Survey

- 2.17 Traffic survey was conducted concurrently with the noise measurement for the sections Yuen Long Highways between Lam Tei and Tan Kwai Tsuen (YLH) near the representative sensitive receiver.
- 2.18 Background information, including weather conditions and noise sources other than traffic along YLH, was recorded for the sensitive receiver. The traffic survey included monitoring of traffic flow, percentage of heavy and light vehicles and average traffic speed.

Traffic Noise Level Monitoring Results

- 2.19 Supplementary traffic noise measurements were conducted on 19 May 2009 (normal weekdays) during the AM peak traffic hour from 08:00 to 9:30 and during the PM peak traffic hour from 17:00 to 18:30 for the monitoring location E1A, Village House at To Yuen Wai.
- 2.20 Random check of wind speed at the monitoring station showed that it was below 5 m/s.
- 2.21 There were some activities, which generated extraneous noises, and these activities were recorded during the monitoring events. The extraneous noise data was neglected based on the site records, in order to indicate the traffic noise level of YLH. The summaries of traffic noise levels recorded are provided in Table 2.3.

Table 2.3 Traffic Noise Measurement Results

Monitoring Date	Monitoring Station	Monitoring Period	Noise Level, L ₁₀ , 1-hour dB(A)	Predicted Noise Level in EIA, L ₁₀ dB(A)	Noise Standard L ₁₀ (1 hour) dB(A)
19 May 2009	E1A	08:00 – 09:30	68.7	69.0	70
	E1A	17:00 – 18:30	68.8	69.0	70

Road Condition and Traffic Survey

- 2.22 The road surface of Yuen Long Highway is asphalt paved. No obstruction or damage was noted from the road surfaces during the monitoring.
- 2.23 The traffic conditions along YLH were normal and there was no traffic congestion during the monitoring periods.
- 2.24 The percentage of heavy vehicle (HV) was generally similar to that of light vehicle (LV). Details of the measured and EIA predicted traffic flow and the percentage of heavy vehicle are provided in Table 2.4.

Table 2.4 Traffic Flow

Monitoring Location	Monitoring Period	Measured Value				EIA prediction	
		LV	HV	Total Flow	Percentage of HV	Traffic Flow	Percentage of HV
E1A (YLH)	AM	2232	3078	5310	58.0%	7,200	42.5%
	PM	2444	2692	5136	52.4%	7,200	42.5%

Notes: HV represents Heavy Vehicle
 LV represents Light Vehicle

- 2.25 The traffic speeds along YLH were estimated concurrently with the noise measurement. Table 2.5 provides a summary of averaged traffic speed monitoring results and EIA prediction.

Table 2.5 Traffic Speed Measurement

Monitoring Date	Monitoring Period	Road	Measured Speed (km/hr)	EIA Predicted Speed (km/hr)
19 May 09	AM Peak	YLH (E1A)	77.4	80.0
	PM Peak	YLH (E1A)	78.9	80.0

Predicted Noise Levels under the Traffic Flow Condition in 2021

2.26 The predicted noise level under the traffic flow condition in 2021 was in accordance with Section III of the "Calculation of Road Traffic Noise (CRTN), 1988" [4] for adjustment to the measured traffic noise level by adding a correction factor and for comparison with prediction from the CRTN. This will include the traffic flow, percentage of heavy vehicles, and an average vehicle speed. The following equation extracted from the CRTN was adopted to correct the measured noise level in consideration of the differences between the measured traffic flow and the predicted traffic flow in the EIA Report.

$$* \text{ Correction Factor} = 10\text{Log}\left(\frac{Q'}{Q}\right) + 33\text{Log}\left(\frac{V' + 40 + 500/V'}{V + 40 + 500/V}\right) + 10\text{Log}\left(\frac{1 + 5p'/V'}{1 + 5p/V}\right)$$

Where Q' is predicted traffic flow by using the CRTN noise model,
 V' is predicted traffic speed by using the CRTN noise model,
 p' is predicted percentage heavy vehicle by using the CRTN noise model,
 Q is measured traffic flow during the traffic noise monitoring event,
 V is measured traffic speed during the traffic noise monitoring event,
 p is measured percentage heavy vehicle during the traffic noise monitoring event.

2.27 The predicted noise levels at the sensitive receiver are estimated based on the equation from CRTN. Detailed traffic conditions in year 2021 are summarized in the Table 2.6.

Table 2.6 EIA Predicted 2021 Peak Hour Traffic Data

Noise Monitoring Location	Traffic Flow (Nr/hr)	% of HV	Traffic Speed (km/hr)
E1A	7,200	42.5%	80

2.28 The correction factors for each monitoring period were evaluated and summarized in Table 2.7.

Table 2.7 Correction Factor for Different Monitoring Period

Monitoring Station	Monitoring Period	Correction Factor dB(A)
E1A	AM Peak	0.4
	PM Peak	0.9

2.29 Under the designed traffic condition in Year 2021, the projected noise levels as received at the sensitive receiver are estimated and shown in Table 2.8.

Table 2.8 Projected and EIA Predicted Noise Level

Monitoring Station		Noise Level, L ₁₀ (1 hour) dB(A)		
		Correction Factor*	Projected Noise Level	EIA Predicted Noise Level
E1A	AM Peak	0.4	69.1	69.0
	PM Peak	0.9	69.7	69.0

* Corrected by traffic flow, speed and percentage of heavy vehicles.

2.30 For the supplementary operational noise monitoring at E1A, although the projected noise level exceeded the EIA prediction, it was within the traffic noise standard of 70dB(A).

2.31 Detailed monitoring methodology, results, calculations, observations and discussions can be referred to the Operation Noise Monitoring Report (Rev.2).

3. WATER QUALITY

Monitoring Requirements

- 3.1 The monitoring is to determine the characteristics of bridge runoff in particular the first flush from the Deep Bay Link bridge during rain-storm events and to review the frequency of road cleaning.
- 3.2 An alternative proposal on the monitoring method using a water tanker to simulate an artificial rainfall by spraying water onto the catchment area of the monitoring gully during bridge closure at night was prepared. The alternative proposal was approved by EPD. A procedural guide was also prepared. The guide was vetted by the IEC and the Engineer and was reviewed by EPD.
- 3.3 The proposed criteria, action level and actions required as stipulated in the EM&A Manual are included in Appendix B.

Monitoring Parameters, Frequency and Duration

- 3.4 The monitoring should include in total 12 sampling / rainstorm events (12 sets of data). A total of 6 sets of sampling data should be collected during the first 3 months after the opening of the Deep Bay Link (1st monitoring period). The other 6 sets of sampling data should be collected in month 4 to month 6 after opening of the Deep Bay Link (2nd monitoring period). The minimum interval between two sampling events shall not be less than 4 days.
- 3.5 All samples were cooled to 4°C without being frozen and delivered to a HOKLAS laboratory within 24 hours for analysis for the following pollutants in highway runoff:
 - Total suspended solids
 - Total organic carbon
 - Chemical oxygen demand
 - Nitrate
 - Nitrite
 - Total Kjeldahl Nitrogen
 - Total phosphorus
 - Copper
 - Lead
 - Zinc
- 3.6 All the road surface runoff from carriageway monitoring has been completed in January 2008.

Monitoring Locations

- 3.7 Water samples were collected from six different road gullies, three on each side of the carriageways.
- 3.8 The exact monitoring locations were recorded in terms of nearby lighting pole / highways chainage.

Results and Observations

- 3.9 The 12 road surface runoff from carriageway monitoring had been completed. In the reporting quarter, no monitoring of road surface runoff from carriageway was carried out.

4. ECOLOGY

Monitoring Requirements

- 4.1 As required under Clause 3.3 of the Environmental Permit, the approved Habitat Creation and Management Plan and Section 7.2 of the EM&A Manual, 1 year maintenance / establishment programme at the Wetland Compensation Area (Pond 15) include the removal of colonizing *Mikania* and *Urochloa*, replanting bamboos and aquatic vegetation and 2 years monitoring of habitat conditions at Pond 15 during operational phase were required. The trigger and action level of avifauna monitoring was included in Appendix B.

Monitoring Parameters, Frequency and Duration

- 4.2 Ecological monitoring was also required to be carried out for 2 years after the completion of construction of the pond. Monitoring of water level and water quality (Dissolved Oxygen and 5-day Biological Oxygen Demand) should be carried out quarterly. Monitoring of flora, pelagic fauna and benthic species are required to be carried out twice a year (covering both dry and wet seasons), while monitoring of avifauna and amphibian are required to be carried out 4 times a year (covering all 4 seasons) and once a year (between April and May) respectively.
- 4.3 The construction of Pond 15 complex completed in October 2007 and was handed over to ET on 1 November 2007. The 1-year maintenance programme during the early establishment period of Pond 15 complex had been completed in October 2008, and had been handed over to Agriculture, Fisheries and Conservation Department (AFCD) in November 2008, while the completion date of the monitoring programme at Pond 15 complex is tentative scheduled to 31 October 2009.

Hydrology

Monitoring Locations

- 4.4 The Pond 15 Complex comprises of four ponds, including Pond 15X, 15ABD, 15Y and 15C1. Water level at the centres of each pond was monitored.
- 4.5 For water quality, all water samples were collected at mid-depth at all ponds.

Monitoring Equipment

- 4.6 Equipment used for monitoring water level included the metal measuring stakes that were pre-installed into each of the ponds during the construction of ponds.
- 4.7 Equipment used for water quality monitoring included a water sampler, a Dissolved Oxygen Measuring Meter (model number YSI-85), pre-treated containers, as well as a cooler box with ice cubes to keep the samples at 4°C without being frozen.

Monitoring Methodology

- 4.8 Readings of water level at each pond were observed and recorded on site.
- 4.9 Parameters used for water quality monitoring included Dissolved Oxygen (DO) and 5-day Biological Oxygen Demand (BOD₅). While Pond 15ABD is much bigger than the other ponds and is partially divided by the bamboo planting site in the middle, two water samples were collected from Pond 15ABD, and one sample was collected at each of the Pond 15X, 15Y and 15C1.
- 4.10 For DO monitoring, water samples were collected and measured by a Dissolved Oxygen Measuring Meter on site. For BOD₅, the collected samples were kept separately in sealed containers and placed in a cooler, kept away from sunlight and submitted to an accredited laboratory for analysis within 24 hours.

Results and Discussions

Water level

4.11 The water levels recorded during the monitoring survey on 18 June 2009 are presented as follows:

Table 4.1 Water Levels at Pond 15X, 15ABD, 15Y and 15C1

Pond	Water Level (m)
15X	1.2
15ABD	1.3
15Y	1.2
15C1	1.2

4.12 As set in the HCMP, water levels should be maintained between 1m to 1.5m at all four ponds. The water levels recorded at all ponds ranged from 1.2m to 1.3m, which is within the required level.

Water Quality

4.13 The following table presents the water quality at Pond 15 Complex during the monitoring survey on 18 June 2009:

Table 4.2 Water Quality at Pond 15X, 15ABD, 15Y and 15C1

Location	DO (%)	DO (mg/l)	BOD ₅ (mg/L)
15X	43.6	3.36	<2
15ABD (1)	57.5	4.39	<2
15ABD (2)	55.3	4.20	5
15Y	46.4	3.65	3
15C1	27.1	2.11	<2

4.14 The highest DO level was recorded at Pond 15ABD and the lowest at Pond 15C1.

4.15 The BOD₅ concentration was the highest in Pond 15ABD and the lowest concentration was recorded at Pond 15X and 15C1.

Fauna

Avifauna

Monitoring Location

4.16 The monitoring of avifauna was conducted at a fixed sampling point pre-established at each of the four ponds (Figure 4.1)

Monitoring Equipment

4.17 A pair of 10x42 binoculars, a camera and a stopwatch were required during the monitoring.

Monitoring Methodology

4.18 Bird monitoring surveys were carried out at dawn on two consecutive days. Upon arrival at each fixed sampling point, monitoring was commenced after a 5-minutes settling period. Within the subsequent 10-minutes, any bird species observed or heard within and outside the pond were recorded.

Results and Observations

4.19 A detailed list of birds recorded in the recent surveys is shown in Appendix D. The following table summarizes the species richness and abundance recorded at Pond 15 Complex during the two-consecutive-days surveys in June 2009:

Table 4.3 Summary of Abundance and Richness of Bird Species at Pond 15 Complex

Species		17/06/2009	18/06/2009
Common Name	Scientific Name	Abundance	
Little Egret	<i>Egretta garzetta</i>	2	-
Cattle Egret	<i>Bubulcus ibis</i>	-	1
Chinese Pond Heron	<i>Ardeola bacchus</i>	1	-
Crested Serpent Eagle	<i>Spilornis cheela</i>	1	1
Spotted Dove	<i>Streptopelia chinensis</i>	3	-
Greater Coucal	<i>Centropus sinensis</i>	1	-
Barn Swallow	<i>Hirundo rustica</i>	8	6
White Wagtail	<i>Motacilla alba</i>	1	-
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	6	9
Chinese Bulbul	<i>Pycnonotus sinensis</i>	2	5
Long-tailed Shrike	<i>Lanius schach</i>	-	1
Oriental Magpie Robin	<i>Copsychus saularis</i>	4	1
Masked Laughingthrush	<i>Garrulax perspicillatus</i>	3	4
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	3	4
Common Tailorbird	<i>Orthotomus sutorius</i>	1	1
Japanese White-eye	<i>Zosterops japonica</i>	0	3
Eurasian Tree Sparrow	<i>Passer montanus</i>	8	9
Black-collared Starling	<i>Sturnus nigricollis</i>	1	-
Crested Myna	<i>Acridotheres cristatellus</i>	5	1
Total no. of Species Recorded		16	13
Total no. of Birds Recorded		50	46

4.20 The following table presents the species abundance and richness recorded at each pond in June 2009:

Table 4.4 Abundance and Richness of Bird Species Recorded at Pond 15X, 15ABD, 15Y and 15C1 over the 2-Consecutive-Days Survey

	15X	15ABD	15Y	15C1
Total No. of Bird Individuals	17	27	29	23
Total No. of Bird Species	8	9	13	10

- 4.21 The HCMP suggested to statistically compare the recorded species richness and population density, with the baseline quantitative data obtained from the EIA study. However, the only bird data recorded closest to Pond 15 Complex during EIA was collected from 'Transect 3' at Ling To Monastery Road. While the survey location, methodology and timescale during the EIA study and this monitoring survey are different (EIA: transect survey [between 100m and 1km] over 45 minutes at Ling To Monastery Road; this monitoring survey: point-count for 10 minutes at Pond 15 Complex), fair and meaningful conclusion cannot be drawn from the suggested statistical comparison and therefore no statistical analysis will be included in this report.
- 4.22 A total of 19 species of 96 individuals were recorded during the 2 consecutive monitoring days at Pond 15 Complex. The most common species recorded was Eurasian Tree Sparrow *Passer montanus* (17 individuals) followed by Red-whiskered Bulbul *Pycnonotus jocosus* (15 individuals).
- 4.23 Over the 2 consecutive monitoring days, Pond 15Y recorded the greatest species richness (13 species), followed by Pond 15C1 (10 species), Pond 15ABD (9 species) and Pond 15X (8 species). For species abundance, Pond 15Y recorded the highest number of individuals (29 individuals), followed by Pond 15ABD (27 individuals), Pond 15C1 (23 individuals) and Pond 15X (17 individuals).
- 4.24 Three recorded species (Little Egret *Egretta garzetta*, Cattle Egret *Bubulcus ibis* and Chinese Pond Heron *Ardeola bacchus*) are considered as wetland-dependant birds. Species that are often found near wetland area, including White Wagtail (*Motacilla alba*), was also recorded. This is an indication that the wetland compensation area is attractive to the nearby wetland-dependant species.
- 4.25 The main objective of the proposed wetland compensation area is to provide feeding opportunities for wildlife (mainly ardeids). As stated in the HCMP, Little Egret (*Egretta garzetta*) and Chinese Pond Heron (*Ardeola bacchus*) were selected as the target species for the compensation wetland, as they were both recorded in small numbers near Pond 15 Complex during the EIA study. As both of the two target species were recorded during the recent monitoring surveys, this indicates that the Pond 15 Complex was utilized by the target wetland species.
- 4.26 The relationships of avifauna to water levels and vegetation cover/species could not be determined during this monitoring survey. During the survey, three individuals of Oriental Magpie Robin (*Copsychus saularis*) and an individual of Chinese Bulbul (*Pycnonotus sinensis*) were recorded standing among Cuban Bast (*Hibiscus tiliaceus*) in Pond 15ABD. One individual of Red-whiskered Bulbul (*Pycnonotus jocosus*) was also found standing among Bamboo plantation (*Bambusa textilis*) at Pond 15ABD. However, these limited data is not conclusive enough to suggest any relationship between avifauna and water levels or vegetation cover/species.
- 4.27 According to the trigger and action levels (Appendix B), no specific trigger levels for ardeid's use are recommended due to the low level of use expected, and that immediate action is not appropriate for the long term process of wetland creation and management. As few ardeids were recorded in recent surveys, no immediate adaptive measure to the management plan was required.

Benthos

Monitoring Locations

4.28 Benthos sampling was conducted at five random locations around each pond, as presented in Figure 4.2.

Monitoring Equipment

4.29 A 50mm (diameter) core sampler to a depth of 100mm, sealable bags, a cooler, a 500µm sieve, sealable containers/bottles, alcohol, a stereo-microscope, an oven and an electronic balance were required for the monitoring survey.

Monitoring Methodology

4.30 Five replicates of benthos samples were collected by core sampler at each pond. Collected contents were bagged and stored in coolers for subsequent sorting. To obtain the benthos specimen, the collected contents were rinsed through a 500 µm sieve. Species that were over 500 µm in size were left in the sieve and preserved in alcohol. A stereo-microscope was used to identify the sorted specimen, which were then dried in an oven at 80°C. The total dry weight/biomass for each taxa group was then weighed by an electronic balance.

Results and Observations

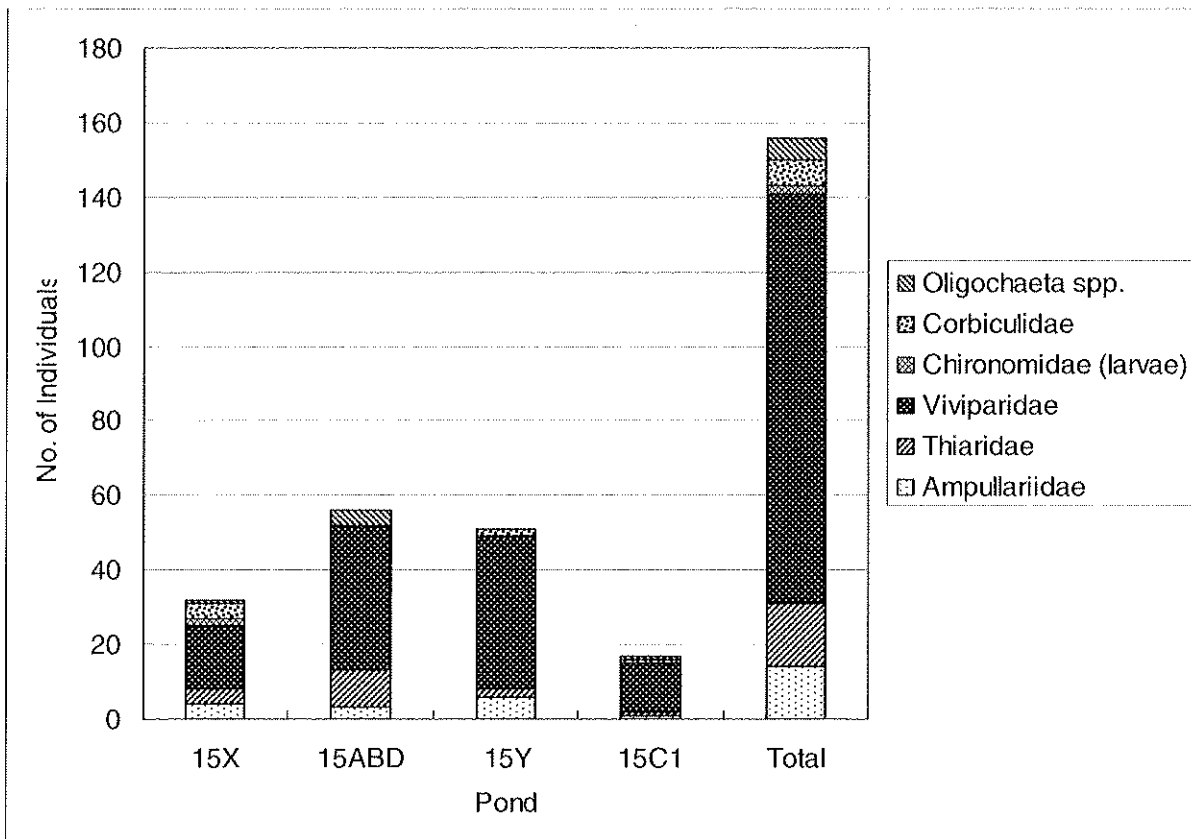
4.31 Detailed list of results for benthos monitoring is provided in Appendix E. The following table summarizes the species richness and dry biomass of benthos recorded at each of the ponds on 17 June 2009:

Table 4.5 Summary of Benthos Recorded at Pond 15X, 15ABD, 15Y and 15C1

	15X	15ABD	15Y	15C1
No. of species recorded at each pond	6	4	4	5
Total biomass (g) at each pond	34.56	29.93	29.56	14.09
Total no. of species recorded at Pond 15 Complex	6			
Total biomass (g) at Pond 15 Complex	108.14			

4.32 Graph 4.1 presents the number of benthos individuals recorded at each pond:

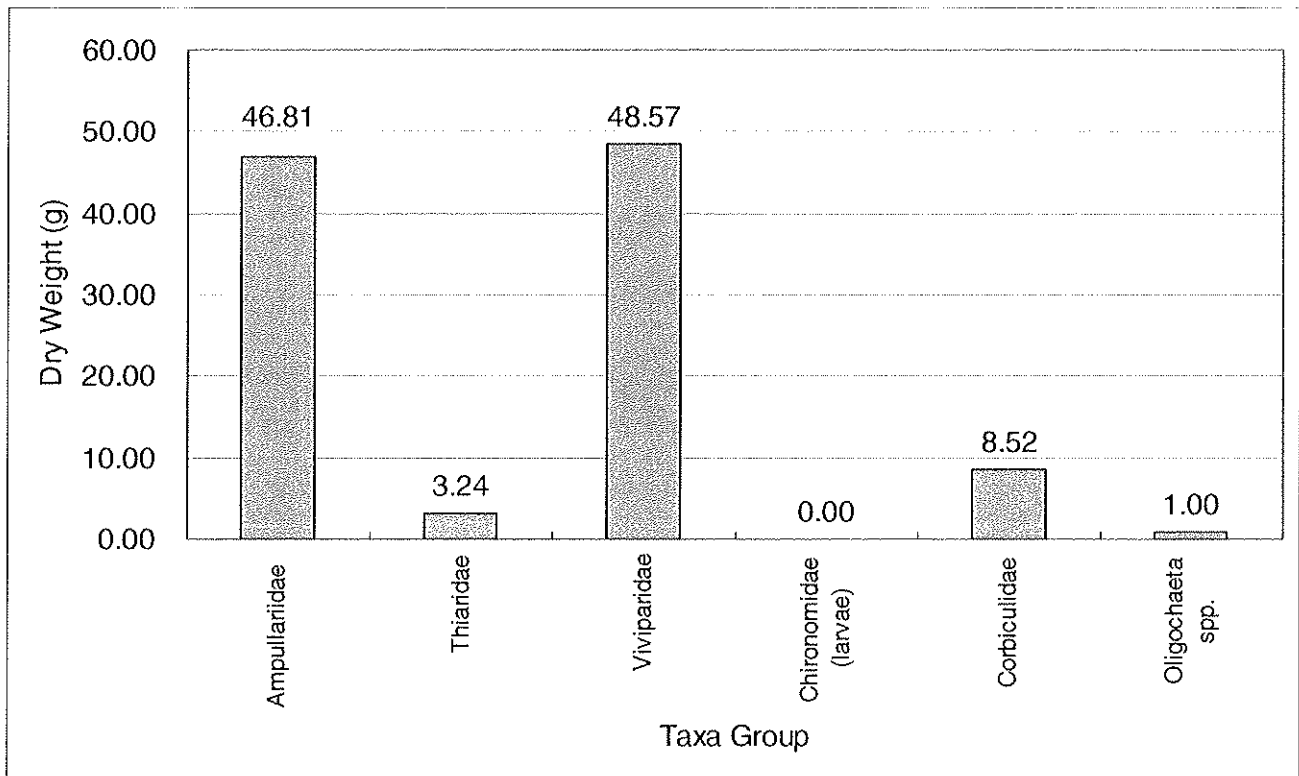
Graph 4.1 Number of Benthos Individuals Recorded at Pond 15 Complex



4.33 A total of 6 families of 156 benthos individuals were recorded at Pond 15 Complex. In terms of abundance, Viviparidae was the dominant family (one species of 110 individuals) in Pond 15 Complex during the monitoring survey, followed by Thiaridae (one species of 17 individuals). Pond 15ABD recorded the highest number of benthos individuals (56 individuals), followed by Pond 15Y (51 individuals), Pond 15X (32 individuals) and Pond 15C1 (17 individuals). Pond 15X recorded the highest number of species (6 species), followed by Pond 15C1 (5 species), and Pond 15ABD and 15Y (4 species).

4.34 Graph 4.2 presents the dry biomass of each benthos species at Pond 15 Complex:

Graph 4.2 Dry Biomass of Each Taxa Recorded at Pond 15 Complex



4.35 A total of about 108 g of benthos fauna was recorded during the monitoring survey at Pond 15 Complex. Among the recorded taxa, Viviparidae showed the highest dry biomass (~ 49 g), followed by Ampullariidae (~47 g).

Pelagic Fauna

Monitoring Locations

4.36 Pelagic fauna sampling was conducted at three random locations at each pond.

Monitoring Equipment

4.37 A 1.5m diameter fishing throw-net of 100mm mesh size, a bucket and a scale balance were required during the monitoring survey.

Monitoring Methodology

4.38 Pelagic fauna monitoring was undertaken by deploying a fishing throw-net to collect three replicated samples at each pond by random sampling. After each catch, each of the caught contents was counted, identified to the lowest taxonomic level on-site, weighed (biomass in terms of wet weight) and released back to the pond.

Results and Discussions

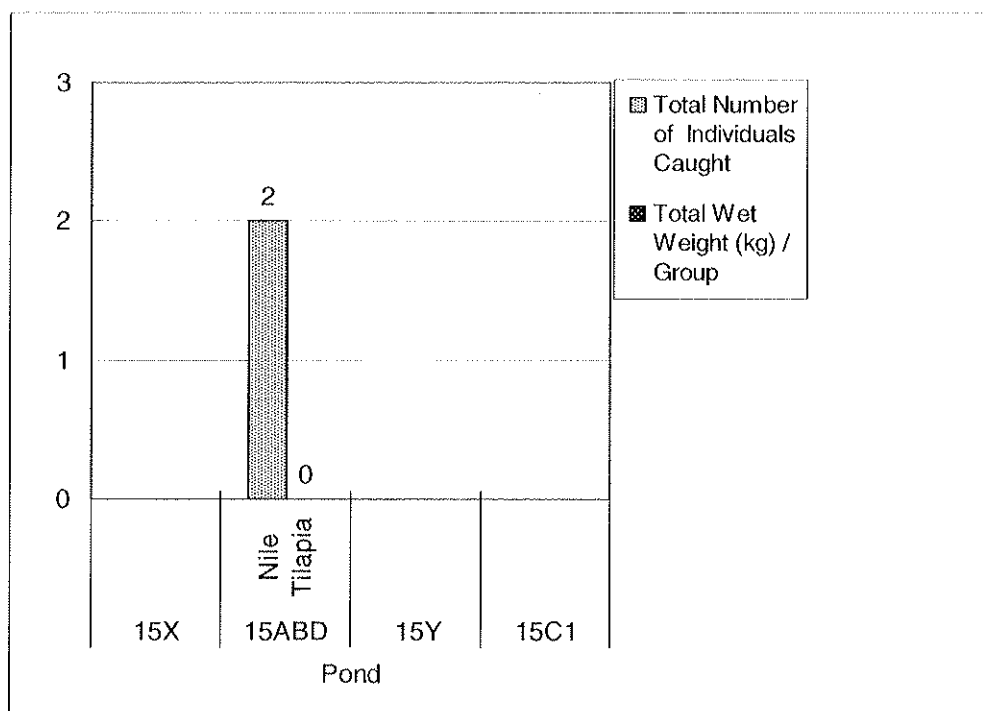
4.39 Detailed list of results of pelagic fauna monitoring is presented in Appendix F. The following table summarizes the results of pelagic fauna monitoring recorded at Pond 15 Complex on 17 June 2009:

Table 4.6 Summary of Pelagic Fauna Monitoring Results at Pond 15 Complex

Pond	Common Name	Scientific Name	Total Number of Individuals Caught	Total Wet Weight (kg) / Group
Pond 15ABD	Nile Tilapia	<i>Oreochromis niloticus</i>	2	<0.1

4.40 Graph 4.3 presents the recorded number of pelagic fauna and their total biomass at all ponds on 17 June 2009:

Graph 4.3 Abundance and Biomass of Pelagic Fauna at Pond 15X, 15ABD, 15Y and 15C1



4.41 A total of one species (two individuals of *Oreochromis niloticus*) was recorded during the monitoring survey at Pond 15 Complex.

4.42 Only two individuals of *Oreochromis niloticus* were recorded in Pond 15ABD. No pelagic fauna was recorded at Pond 15X, Pond 15Y and Pond 15C1.

4.43 The biomass for the individuals of *Oreochromis niloticus* was less than 0.1kg.

Amphibian

4.44 Amphibian monitoring was conducted on 18 May 2009, starting from 7:30 pm, along the path around each of the four ponds.

Monitoring Equipment

4.45 A torch and a vocal recorder were required during the survey.

Monitoring Methodology

- 4.46 Amphibian monitoring was conducted by walking around the ponds at night and recording encountered amphibians by active searching with torch and vocal identification. Species and categorical abundance of amphibians encountered were recorded.

Results and Observations

- 4.47 Only one individual of Brown Tree Frog *Polypedates megacephalus* was seen on the path of Pond 15ABD. Vocal calls from different species were also heard within the pond areas. These included Gunther's Frog *Rana guentheri* (in all the four ponds), Paddy Frog *Rana limnocharis* and Brown Tree Frog *Polypedates megacephalus* (in Pond 15Y and 15X), and Ornate Pigmy Frog *Microhyla ornata* (in Pond 15X). All the recorded species are considered to be widely distributed in Hong Kong and are not protected species.

Vegetation

Monitoring Locations

- 4.48 The monitoring of floral communities was conducted on a fixed belt transect on the bank of each of the ponds (Figure 4.3). Each transect began on dry bank and ended in open water.

Monitoring Equipment

- 4.49 Equipment required for flora monitoring included a retractable metallic measuring tape (for measuring plant height) and a flexible plastic measuring tape (over 4m in length for marking 1m² quadrats).

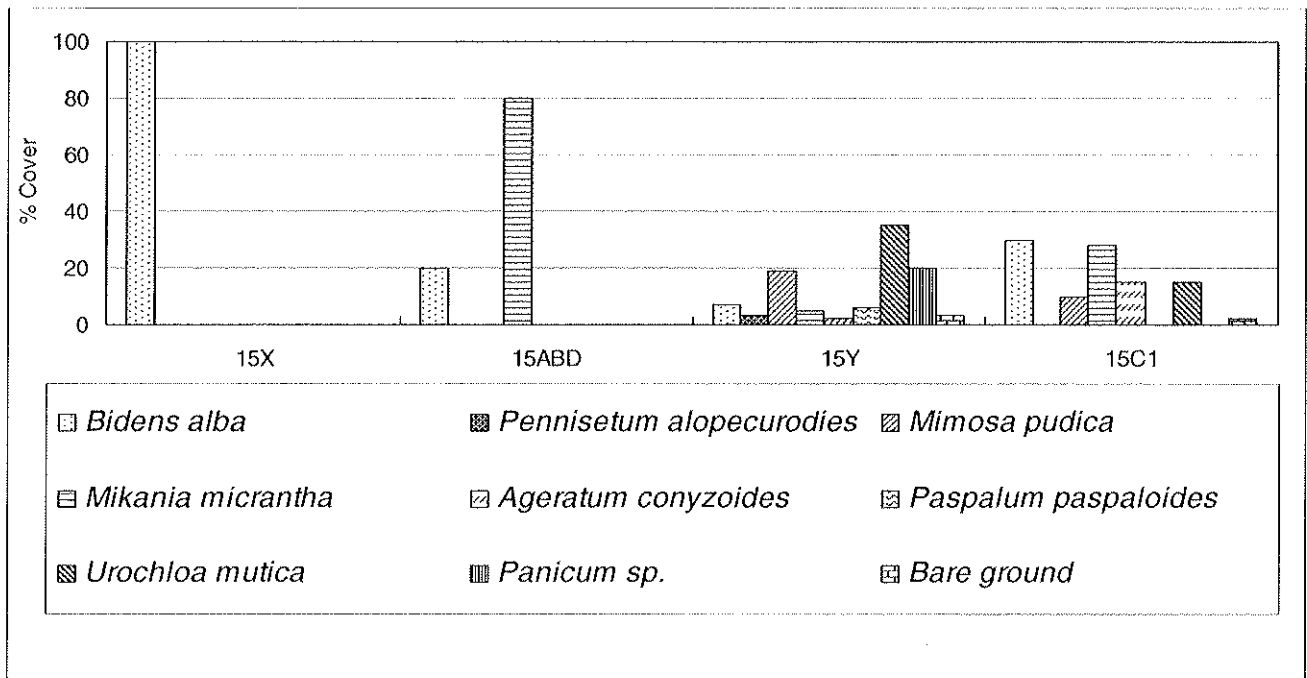
Monitoring Methodology

- 4.50 Flora monitoring was conducted at a fixed belt transect on the bank of each of the ponds, and each transect was divided up into 1m² quadrats. Within each quadrat, percentage cover of each species and its height were recorded. Representative photos of each quadrat surveyed were taken.

Results and Discussions

- 4.51 Graph 4.4 shows the averaged percentage cover of each floral species and bare ground in the fixed transects at each pond:

Graph 4.4 Average Floral Composition in the Fixed Transects at Pond 15X, 15ABD, 15Y and 15C1



- 4.52 Detailed results on species richness, percentage cover and vegetation height of each recorded species within each quadrats are shown in Appendix G.
- 4.53 A total of 9 species were recorded during the monitoring survey. In general, *Bidens alba* showed the highest total percentage cover (39%) in all ponds, followed by Mile-a-minute Weed *Mikania micrantha* (28%) and Para Grass *Urochloa mutica* (13%).
- 4.54 The highest species richness was recorded in Pond 15Y (8 species), followed by Pond 15C1 (5 species).
- 4.55 The average vegetation height was the tallest at Pond 15ABD (73cm), followed by Pond 15C1 (60cm), Pond 15Y (50cm) and Pond 15X (40cm).

Invasive Floral Species

- 4.56 Invasive floral species monitoring was not required during this month.
- 4.57 As the ponds were handed over to Agriculture, Fisheries and Conservation Department (AFCD) in November 2008, subsequent invasive species removal / trimming is to be programmed by AFCD.

5. LICENCING AND IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

Status of Environmental Licensing and Permitting

5.1 All permits/licences/notifications obtained as of the reporting period are summarised in Table 5.1

Table 5.1 Summary of Environmental Notification, Licensing and Permit Status

Permit No.	Valid Period		Description	Status
	From	To		
Environmental Permit				
EP-163/2003/G	27 Oct. 06	-	1. Construction and operation of a dual three-lane carriageway (Deep Bay Link) with bridge structures linking the Shenzhen Western Corridor at Ngau Hom Shek with the Yuen Long Highway at Lam Tei; 2. Construction and operation of an interchange between Deep Bay Link and Yuen Long Highway at Lam Tei.	Valid

Implementation Status of Environmental Mitigation Measures

5.2 The mitigation measures had been implemented properly in the reporting quarter.

Environmental Mitigation Implementation Schedule (EMIS)

5.3 According to the Environmental Permit, the mitigation measures detailed in the permits are required to be implemented. An updated summary of the EMIS is presented in Appendix D.

Summary of Exceedances of Environmental Quality Performance Limit

5.4 No action / limit level exceedance was recorded in the reporting period.

Implementation Status of Environmental Complaint Handling Procedures

5.5 Appendix E presents the environmental complaint flow diagram of the Project.

5.6 No complaint, summon or prosecution related to environmental issues was received or made against the Project in the reporting period.

6. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

- 6.1 Environmental impact monitoring was performed between 1 April and 30 June 2009. All monitoring results in the reporting period were checked and reviewed.
- 6.2 Supplementary operational noise monitoring was carried out for E1A on 19 May 2009. Although the projected noise level at E1A exceeded the EIA prediction, it was within the traffic noise standard of 70dB(A).
- 6.3 Water level, water quality, avifauna, pelagic fauna, benthos, amphibians and flora monitoring at Pond 15 were carried out in the reporting month. One individual of Brown Tree Frog *Polypedates megacephalus* was observed on the path of Pond 15ABD. Three species (Little Egret *Egretta garzetta*, Cattle Egret *Bubulcus ibis* and Chinese Pond Heron *Ardeola bacchus*) considered as wetland-dependant birds were recorded during the survey. This shows that Pond 15 Complex was utilized by the target wetland species.
- 6.4 Maintenance of Pond 15 complex was not carried out in the reporting quarter as the maintenance programme had been completed and the ponds had been handed over to AFCD in November 2008. Subsequent invasive species removal / trimming is to be programmed by AFCD.
- 6.5 All road surface runoff monitoring were completed in January 2008. No such monitoring was carried out in the reporting quarter.
- 6.6 No complaint, notification of summons or prosecution related to environmental issues was made against the Project in the reporting period.
- 6.7 Assessment and analysis of water quality and ecology monitoring results of the Project recorded had demonstrated the environmental acceptability of the Project. This concluded that the EIA recommended mitigation measures were effectively implemented.

Recommendations

- 6.8 The following recommendations were made:

Water Quality Impact

- Maintain sufficient cleaning works for the carriageway by vacuum air sweeper(s) to remove grits and pollutants;
- Implementation of the Emergency Response Plan for Spillage of Chemicals.

Noise

- Properly maintain the noise barriers during operation of the Project.