Highways Department

Contract No. HY/2007/13

Environmental Team for Deep Bay Link (Operational Phase)

Quarterly EM&A Summary Report No. 8 (for the months of July – September 2009)

10/2009

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Our Ref.: HYDDBLWCEM00/2/11339

Date: 16 November 2009

Highways Department
Major Works Project Management Office
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88 Chung Hau Street, Homantin, Kwoloon

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 – July – September 2009

Reference is made to ET's e-mail correspondences enclosed with a copy of the Operational Phase Quarterly EM&A Summary Report for July to September 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	MCAL (ET Leader)	By Fax: 2891 0305
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EXECUTIVE SUMMARY

This is the eighth 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 July and 30 September 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. Supplementary operation noise monitoring was completed on 19 May 2009. Another supplementary operation noise monitoring was carried out for OP3, OP4 and OP7A in September 2009.

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
Monitoring on water level, water quality and avifauna at Pond 15 was carried out in the reporting quarter.

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 July and 30 September 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). Table 2.1 describes these monitoring stations.

Table 2.1 Noise Monitoring Locations (Sensitive Receivers)

Monitoring Station	Location
OP1	2/F, Village house north to Tsing Chuen Wai
OP2	G/F, Village House near Tsing Chuen Wai
OP3	11/F, Block 1, Botania Villa
OP4	G/F, Village House at Ngau Hom Shek
OP5A	G/F, Village House at San Sang San Tsuen
OP6	G/F, Poultry Farm with residential house
OP7A	19/F, Block 1, The Sherwood
E1	2/F, Home of Elderly near To Yuen Wai
E1A	2/F, Village House at To Yuen Wai
E2A	1/F, Village House near Tan Kwai Tsuen

Results and Observations

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.

2.8 For monitoring stations of Botania Villa and the Sherwood, naming OP3 and OP7A respectively, as the traffic flow was low during the course of measurement in September 2008, another supplementary operational noise monitoring was carried out at these two locations in September 2009, with a view that the traffic flow reaches comparable levels with the EIA prediction. Operational Noise Monitoring at OP4

was also carried out as insect disturbance was not significant during our on-site visits in September 2009.

2.9 Since the operational noise monitoring had not been completed for OP7A towards the end of the September 2009, the results, observations and discussions will be reported in a separate Operational Noise Monitoring Report (Rev.3).

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 Maintenance for the Pond 15 complex is required to be carried out for 1 year (12 months) after the completion of construction of the pond. Maintenance works at Pond 15 include the removal of colonizing *Mikania micrantha* and *Urochloa mutica*, replanting bamboos and aquatic vegetation (at the end of 12-month) and the removal of refuse.

4.3 Ecological monitoring is 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. The trigger and action levels set by the EM&A Manual for Deep Bay Link Pond 15 Complex (Section 7.3 in HY/2002/23) are provided in Appendix B.

4.4 The construction of Pond 15 complex completed in October 2007 and was handed over to MCAL on 1 November 2007. The maintenance work and monitoring programme commenced on 1 November 2007.

4.5 While the ecological monitoring programme continued in the reporting quarter, maintenance of Pond 15 complex was not carried out in the reporting quarter, since 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.

Hydrology

Monitoring Locations

4.6 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.

4.7 For water quality, all water samples were collected at mid-depth at all ponds.

Monitoring Equipment

4.8 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.

4.9 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 $4^{o}C$ without being frozen.

Monitoring Methodology

4.10 Readings of water level at each pond were observed and recorded onsite.

4.11 Parameters used for water quality monitoring included Dissolved Oxygen (DO) and 5-day Biological

Oxygen Demand (BOD_5). 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.

4.12 For DO monitoring, water samples were collected and measured by a Dissolved Oxygen Measuring Meter on site. For BOD_5, 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

4.13 Monitoring on water level and water quality was carried out on 22 September 2009.

Water Level

4.14 The water levels recorded during the monitoring survey are presented as follows:

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

Pond	Water Level (m)
15X	1.2
15ABD	1.1
15Y	1.1
15C1	1.2

4.15 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 1.1m to 1.2m, which is within the required level.

Water Quality

4.16 The following table presents the water quality at Pond 15 Complex during the monitoring survey:

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

Location	DO (%)	DO (mg/L)	BOD_5 (mg/L)
15X	56.5	3.54	<2
15ABD (1)	58.0	3.81	2
15ABD (2)	55.3	3.49	<2
15Y	51.2	3.13	<2
15C1	52.0	3.22	2

4.17 The highest DO level was recorded at Pond 15ABD and the lowest at Pond 15Y.

4.18 The BOD_5 concentration was the highest in Pond 15C1 and the lowest concentration was recorded at Pond and 15X and 15Y.

Fauna

Avifauna

Monitoring Location

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

Monitoring Equipment

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

Monitoring Methodology

4.21 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

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

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

Species		**21/9/2009**	**22/9/2009**
Common Name	**Scientific Name**	**Abundance**	
Little Egret	*Egretta garzetta*	-	1
Cattle Egret	*Bubulcus ibis*	3	-
Chinese Pond Heron	*Ardeola bacchus*	2	-
Spotted Dove	*Streptopelia chinensis*	2	-
Common Koel	*Eudynamys scolopacea*	1	-
Barn Swallow	*Hirundo rustica*	1	-
White Wagtail	*Motacilla alba*	1	7
Red-whiskered Bulbul	*Pycnonotus jocosus*	2	4
Chinese Bulbul	*Pycnonotus sinensis*	2	2
Long-tailed Shrike	*Lanius schach*	-	1
Oriental Magpie Robin	*Copsychus saularis*	2	3
Masked Laughingthrush	*Garrulax perspicillatus*	4	11
Yellow-bellied Prinia	*Prinia flaviventris*	2	2
Common Tailorbird	*Orthotomus sutorius*	3	2
Yellow-browed Warbler	*Phylloscopus inornatus*	-	2
Fork-tailed Sunbird	*Aethopyga christinae*	1	-
Japanese White-eye	*Zosterops japonica*	4	2
Eurasian Tree Sparrow	*Passer montanus*	14	9
Black-collared Starling	*Sturnus nigricollis*	3	1
Crested Myna	*Acridotheres cristatellus*	2	-
Total no. of Species Recorded		**17**	**13**
Total no. of Birds Recorded		**49**	**47**

4.23 The following table presents the species abundance and richness recorded at each pond in September 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	**25**	**25**	**24**	**22**
Total No. of Bird Species	**10**	**10**	**12**	**12**

4.24 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.

4.25 A total of 20 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* (23 individuals) followed by Masked Laughingthrush *Garrulax perspicillatus* (15 individuals).

4.26 Over the 2 consecutive monitoring days, Pond 15Y and 15C1 recorded the greatest species richness (12 species), followed by Pond 15X and 15ABD (10 species). For species abundance, Pond 15X and 15ABD recorded the highest number of individuals (25 individuals), followed by Pond 15Y (24 individuals) and Pond 15C1 (22 individuals).

4.27 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 is often found near wetland area (White Wagtail *Motacilla alba*) was also recorded. This is an indication that the wetland compensation area is attractive to the nearby wetland-dependant species

4.28 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 target species were recorded during the recent monitoring surveys, this indicates that the Pond 15 Complex was utilized by the target wetland species.

4.29 The relationships of avifauna to water levels and vegetation cover/species could not be determined during this monitoring survey. During the survey, two individuals of Cattle Egret (*Bubulcus ibis*), two individuals of Chinese Bulbul (*Pycnonotus sinensis*) and two individuals of Japanese White-eye (*Zosterops japonica*) were recorded standing among Cuban Bast (*Hibiscus tiliaceus*) in Pond 15ABD. One individual of Yellow-bellied Prinia (*Prinia flaviventris*) 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.

4.30 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 ardeids was recorded in recent surveys, no immediate adaptive measure to the management plan was required.

Benthos

4.31 Benthos monitoring was not required during this monitoring quarter.

Pelagic Fauna

4.32 Pelagic fauna monitoring was not required during this monitoring quarter.

Amphibian

4.33 Amphibian monitoring was not required during this monitoring quarter.

Vegetation

Monitoring Locations

4.34 The monitoring of floral communities was conducted on a fixed belt transect on the bank of each of the ponds. Each transect began on dry bank and ended in open water.

Monitoring Equipment

4.35 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 $1m^2$ quadrats).

Monitoring Methodology

4.36 Flora monitoring was conducted at a fixed belt transect on the bank of each of the ponds, and each transect was divided up into $1m^2$ 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

4.37 Flora monitoring was not required during this monitoring quarter.

Invasive Floral Species

4.38 The monitoring of invasive floral species within all pond areas and the bamboo planting sites was carried out during the weekly site visits. The climber, Mile-a-minute Weed (*Mikania micrantha*), was the species most frequently found on the body of bamboo plants. Any climbers found on the bamboo were removed immediately as much as possible during the visits.

4.39 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 July and 30 September 2009. All monitoring results in the reporting period were checked and reviewed.

6.2 Supplementary operational noise monitoring was carried out for OP3, OP4 and OP7A in September 2009. The results will be presented in a separate Operational Noise Monitoring Report (Rev.3).

6.3 Water level, water quality and avifauna monitoring at Pond 15 were carried out in September 2009. Four species (Little Egret *Egretta garzetta*, Cattle Egret *Bubulcus ibis,* Chinese Pond Heron *Ardeola bacchus* and White Wagtail *Motacilla alba*) 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.