

**Proposed Extension of Public Golf Course  
at Kau Sai Chau Island, Sai Kung**

**Quarterly Environmental Monitoring & Audit (EM&A) Report  
for October to December 2007**

**(Report No. 382210/Q\_008)**

Report Authorized For  
Issue By:



For and on Behalf of  
Black & Veatch Hong Kong Limited

**Black & Veatch Hong Kong Limited**  
Room 1201-09, Millennium City 5,  
418 Kwun Tong Road,  
Kowloon, Hong Kong

**The Hong Kong Jockey Club**  
One Sports Road  
Happy Valley  
Hong Kong

**January 2008**

## Table of Content

### Executive Summary

#### 1. Introduction

##### 1.1 Background of the Project

#### 2. Project Information

##### 2.1 Background

##### 2.2 Site Description

##### 2.3 Project Organization

##### 2.4 Construction Programme

##### 2.5 Summary of EM&A Requirements

#### 3. Monitoring Result & Site Audit

##### 3.1 Air Quality

##### 3.2 Water Quality

##### 3.3 Ecology

##### 3.4 Landscape and Visual

#### 4. Environmental Audit

##### 4.1 Implementation Status of Environmental Mitigation Measures

##### 4.2 Status of Environmental Licensing and Permitting

##### 4.3 Advice on Solid and Liquid Waste Management Status

#### 5. Non-compliance (Exceedances) of the Environmental Quality Performance Limits (Action and Limit Levels)

##### 5.1 Air Quality

##### 5.2 Water Quality

##### 5.3 Ecology



##### 5.4 Summary of Environmental Complaint

##### 5.5 Summary of Environmental Summons

#### 6. Recommendations and Conclusions

#### List of Annex

Annex A	Tentative Construction Programme
Annex B	Monitoring Locations
Annex C	Event Action Plan
Annex D	Monitoring results
Annex E	Implementation status on Environmental Protection Requirements
Annex F	Status of Licensing & Permitting

	Name	Signature	Date
Prepared	Esther Tong		Jan 2008
Checked	Manuel Chua		Jan 2008
Reviewed	P K Lee		Jan 2008

[illegible]

Your ref : 40040032/CERT/02\_08.doc  
Our ref :

**Proposed Extension of Public Golf Course at Kau Sai Chau Island, Sai Kung  
(Independent Environmental Checker)**

**CHECK CERTIFICATE**

1. We certify that professional skill and care have been used in checking of the Environmental Team's (ET) **Quarterly Environmental Monitoring & Audit (EM&A) Report for October to December 2007** for the construction of Proposed Extension of Public Golf Course at Kau Sai Chau Island, Sai Kung.
2. We certify that the ET's EM&A programme for the reporting period has been satisfactorily executed and the **Quarterly Environmental Monitoring & Audit (EM&A) Report for October to December 2007** has been verified.
3. We would comment that our evaluation of the ET's EM&A is based on a random audit process which cannot be guaranteed to have all non-conformities identified.

Signed



---

Independent Environmental Checker

Name Gary Tam

of Hong Kong Productivity Council  
3/F., HKPC Building,  
78 Tat Chee Avenue,  
Kowloon

Date 17 January 2008

## Executive Summary

This is the eighth quarterly Environmental Monitoring and Audit (EM&A) report prepared by Black & Veatch, the designated Environmental Team (ET), for the Project ‘Proposed Extension of Public Golf Course at Kau Sai Chau Island, Sai Kung’. The construction works of golf course was commenced on 16<sup>th</sup> January 2006. This report presents the results of the EM&A works conducted in the fourth quarter of 2007 from December 2008.

In the reporting quarter, the following activities took place for the Project:

Major works carried out at the construction site were as follows:

1. Site formation - **Completed**: Holes 1-18
2. Drainage system installation – **Completed**: Holes 1-18
3. Irrigation installation – **Completed**: 1-18
4. Sub-soil drainage installation – **Completed**: 1-18
5. Sand capping – **Completed**: 1-18
6. Turf establishment: **Completed (green)**: 1-18
7. Sand Bunkers: **Completed**: Holes 1-18
8. Reinstatement work for gravity drain: **Completed**
9. Construction of Lake 1D, other pumping stations, underground water tanks and lakes: **Completed**
10. Slope restoration works: **Completed**
11. Removal of Silt Fence and Fencing: **Completed**: Stream C near Holes 15 and 16, Stream B near Hole 11 **In-progress**: Stream B near Hole 10, Hole 12
12. Removal of Silt Curtain: **Not yet commenced**
13. Removal of Temporary Barging Point and connecting haul road: **Not yet commenced**

### Construction of permanent bridges:

- (i) Construction of permanent bridge at Stream A – decking /finishing work (**Completed**). Temporary bridge was demolished on 27 March 07.
- (ii) Pipe culvert construction at Stream B2 – **Completed**
- (iii) In-situ culvert bridge at Stream B1 – decking /finishing work (**Completed**). Temporary bridge was demolished on 30 March 07.
- (iv) Construction of permanent bridge at Stream C – decking /finishing work (bridge wall finishing – **Completed**). Temporary bridge was demolished on 16 March 07.
- (v) Construction of permanent bridge at the fresh water inland marsh – decking /finishing work (**Completed**). Temporary bridge was demolished on 6 March 07.

Other construction activities:

- Operation of sewage treatment work (site office) [**Removed at early December 07**]
- Operation of temporary barging point at EP location [**Tentative removal at mid Jan 08**]

No dredging of the permanent intake and outfall pipelines for the desalination plant has been carried out. Hong Kong Jockey Club (HKJC) submitted supplementary information to EPD in Dec 2007 regarding the discharge licence. As there is no discharge licence for the desalination plant, the plant will not be operated until successful application from EPD.

The 89 transplanted corals survey was completed in September 2007 after one year quarterly monitoring. No coral monitoring is required according to the EM&A manual.

Marine ecology monitoring was conducted in December 2007 at Site B2, Site C, Control Site. A seawall had constructed at Site B2 as the landing point of the temporary barging point. In the present survey, recovery on some corals, on which mortality had been reported previously, were found. New or further mortality on B-55 were found in the present survey. The Control Site still remained similar conditions as

during the Baseline Survey (no mortality, sedimentation or bleaching was found), except the missing of X-05 colony.

The floating pontoon was located and operated at the designated location according to Environmental Permit (EP). No further improper berthing at the temporary barging point was observed.

According to the site observation, turfing was completed in December 2007. Some hydroseeding areas were not fully covered with hydroseed and re-hydroseeding was required. It will be carried out during the Spring time in 2008. Applications of fertilizers and pesticides at all holes with turfing were recorded. Chemical applications (Chlorpyrifos, Chlorothalonil, Fipronil, Glyphosate and Iprodione) were recorded.

All of the closed low flow drainage system was completed to collect surface runoff and covered with turf during reporting month. No significant runoff was observed. For the Temporary Drainage Management Plan (TMDP), no revised plan was submitted to RE for approval during the two years construction phase. ET and the Engineer repeatedly reminded the Contractor to prevent silty/nutrient/pesticides runoff to the streams and marine water since the start of this year wet season.

Hydroseedlings were re-planted in the rock-filled slope area within the buffer zone during the quarterly monitoring. Aquatic life including Atyid shrimps and freshwater snails were recorded in extreme low density at Stream B. Sedimentation was still observed in the Stream C, and the abundance of aquatic fauna, in particular caridean shrimps, was also found in low density. The Stream D was in natural conditions similar to the condition during the Baseline Survey, and the aquatic fauna abundance was found resuming.

Water was actively pumping from Stream C to Hole 15 in December 2007. ET requested CHEC to stop immediately to prevent further dehydrating the sensitive stream. ET considered that this activity is a violation of the Environmental Permit. The situation was rectified within one week time.

The temporary Sewage Treatment Plant (STP), sewage effluent was stored temporarily in a temporary storage tank since early May 2007 and discharge off-site by licenced Contractor. Both CHEC's site office and STP were removed in early December 2007 during daytime through temporary barging point. No information was submitted by CHEC regarding the STP performance during the quarterly monitoring. Nutrient exceedances at the Fresh Water Inland Marsh, in particular ammonia nitrogen, were recorded but in much lower frequency than in February to July 2007. The water quality was resumed to the baseline condition.

Improper temporary stockpiles of construction wastes were observed and located at the edge of the temporary barging point in October 2007 which could cause potential pollution problem or coral damage. The situation was rectified in November 2007.

The latest programme for the removal of the rock filled pier at the temporary barging point will be in mid-January 2008. CHEC prepared the method statement for HKJC, RE and ET for comments. ET provided comments in order to minimize the silty runoff and potential damage from unstable rocks during some critical removal stages to the nearby coral communities. In addition, ET recommended that CHEC should submit immediate actions, remedial actions and mitigation measures proposal when there is any coral damage occurred during the temporary barging point removal for AFCD and EPD approval before removal of the temporary barging point.

Due to the coral damage occurred in March 2006 during the construction of the temporary barging point, additional coral monitoring are recommended during the period of removal. The proposed temporary barging point removal programme is around one month. ET proposed to carry out the coral monitoring during the first, third and fifth weeks of the temporary barging point removal in order to cover the whole removal period. AFCD agreed the coral monitoring frequency in principal. If there is an extension of the

removal programme due to any coral damage, further review on the coral monitoring frequency is required and will be submitted for AFCD and EPD approval.

### **Environmental Monitoring Works**

A summary of the monitoring activities in this quarter is listed below:

24-hour Total Suspended Particulates (TSP) monitoring at GCA B1	15 times
Water quality monitoring (marine + freshwater)	14 times
Terrestrial Ecology	3 times
Marine Ecology	1 time
Landscaping & Visual	6 times

### ***Air Quality***

No exceedance of 24-hour TSP was recorded at GCA B1 in the reporting quarter.

### ***Water Quality***

For marine water quality, all exceedances (SS, turbidity, NH<sub>3</sub>-N, NO<sub>3</sub>-N, Chl a and TIN) measured at KLW, M\_Marsh, TTC, M\_BP, M\_Coral and KS were considered not project-related. For freshwater monitoring stations, exceedances recorded on 29<sup>th</sup> October and 5<sup>th</sup> November 2007 at Stream B were considered project-related. All other exceedances recorded at Stream A, Stream B, Stream C and Fresh Water Inland Marsh were considered not project-related.

### ***Ecology***

#### **Terrestrial**

Heavy sedimentation to the Stream C leading to extreme low population aquatic fauna, in particular caridean shrimps, was found.

#### **Marine**

No non-compliance was recorded during the reporting quarter.

### ***Environmental Audit***

Site audit was carried out on a weekly basis to monitor environmental issues on the construction sites. The Contractor generally implemented the mitigation measures recommended in the EIA report to minimize the environmental impacts due to the construction works. Weekly site inspection and *ad hoc* site inspection were carried out to identify the potential source of dust, silty runoff and waste management. The monitoring results revealed that the hydroseeding, shrubs and trees planting were in progress during reporting quarter. Waste management was unsatisfactory. In addition, dust generation from the golf course was observed and affected the golfers playing in existing golf course.

The Contractor was reminded the following issues and to take actions if necessary:

#### **Air Quality**

- Provide sufficient watering at the remaining haul road before temporary baring point and Hole 2 during removal; and
- Cover all soil and waste stockpiles with tarpaulin or other measures to reduce the dust emission before remove offsite;

### Waste Management

- Properly dispose the construction waste off-site;
- Properly stockpile and regularly dispose the construction waste;

### Ecology

- Enhancement of the newly hydroseeding areas located within the buffer zone area at downstream of the Stream A;
- Maintain the reinstated conditions (planting shrub) at Stream B2 buffer zone since March 2007 and Stream C buffer zone since May 2007; and
- Provide effective mitigation measures to prevent damage to the nearby corals during the removal of the temporary barging point.

### Water Quality

- Desilting settled silt within the silt curtain which have been installed outside the fresh water inland marsh, near Hole 2, near Hole 4, inactive culture zone and Stream A before removal;
- Desilting of silt fence before removal; and
- Provide effective mitigation measures at the temporary barging point during removal of the temporary barging point.

### Landscape & Visual

- Protect the retain trees with sufficient watering mainly located at the administration building;
- Provide sufficient water to the retain trees, transplanted trees, hydroseeding areas; and
- Provide incident report for the death of the retain trees.

### **Environmental Complaints and Prosecution**

One environmental complaint was received from the golfers regarding dust blowing from the works area to the existing golf course by the end of September 2007 during the reporting quarter. Complaints related to i.) Dust blowing from Hole South 10 works onto the existing South Course and ii.) Sand / Dust blowing from the sand stockpile behind Hole East 1 green to Hole South 6. It was concluded that the Contractor had not provided sufficient mitigation measures to avoid dust nuisance from the works area. Three times (3<sup>rd</sup>, 9<sup>th</sup> and 12<sup>th</sup> October 2007) on-site investigation was carried out by ET against the incident. Additional mitigation measures (eg. watering sand stockpile and operation of irrigation system) were observed. The Contractor was reminded to provide sufficient watering or other equivalent measures to minimize dust nuisance from haul roads, stockpiles and other activities that may generate dust. Furthermore, the Contractor was reminded to comply with Air Pollution Control Ordinance and its subsidiary regulations.

No prosecution was received during the reporting quarter. The prosecution regarding the dust generation under the APCO (Construction Dust) Regulation (Schedule no. 14) in January and May 2007 were in progress.

### **Environmental Licensing and Permitting**

License/Permits granted to the Project include the Environmental Permit (EP), construction noise permit (CNP), exemption account for the construction waste charging scheme and chemical waste producer. The construction noise permit was expired in November 2007. The waste exemption account was expired in August 2007 and renewed in October 2007. Further renewal was recorded in December 2007.



### **Future Key Issues**

The whole golf course was planted with turf in December 2007 and construction of golf course was completed. No major environmental impact is expected. The tentative programme for the removal of temporary barging point will commence in mid-January 2008. Additional coral monitoring will be carried out during the removal. Operation phase will commence in February 2008. The future key issues will be the potential water quality impact due to the use of nutrients and pesticides for the established turf and marine ecology impacts to corals and seagrass during the operation phase of the East Course.

## **1. Introduction**

### **1.1 Background of the Project**

- 1.1.1 Black & Veatch (hereinafter called the “ET”) was appointed by Hong Kong Jockey Club (hereinafter called the “Project Proponent”) to undertake Environmental Monitoring and Audit (EM&A) for “Proposed Extension of Public Golf Course at Kau Sai Chau Island, Sai Kung” (hereinafter called the “Project”). Under the requirements of Section 4 of Environmental Permit EP-224/2005/A, EM&A programme as set out in the EM&A Manual is required to be implemented. In accordance with the EM&A Manual, environmental monitoring of air quality, water quality, terrestrial and marine ecology, landscape and visual, archaeology (watching brief) and land contamination are required for the Project.
- 1.1.2 This is the eighth quarterly EM&A report which summarises the environmental monitoring and audit works for the Project in the fourth quarter of 2007 from October to September 2007.

## **2. Project Information**

### **2.1 Background**

2.1.1 The Project comprises the following major components:

- Construction of a third 18-hole public golf course on the east side of the island, south of the existing golfing area;
- A new irrigation lake to collect surface runoff from new 18-hole golf course. Water stored at the new irrigation lake can also be diverted to existing reservoir for tertiary treatment and recycling;
- A new desalination plant adjacent to the existing pier to serve as an additional irrigation water supply for the new golf course during dry season; and
- Expansion of existing administration and maintenance buildings.

2.1.2 The potential environmental impacts of the Project have been studied in the Environmental Impact Assessment (EIA) report (EIAO Register No. AEIAR- 091/2005). The EIA was approved on 14<sup>th</sup> November 2005 under the EIAO. An Environmental Permit (EP-224/2005) was granted on 28<sup>th</sup> November 2005. A Variation of Environmental Permit (EP-224/2005/A) was issued on 17 August 2006.

### **2.2 Site Description**

2.2.1 A layout plan of the Project is provided in **Figure 1.1**.

### **2.3 Project Organization**

2.3.1 Project organization and lines of communication are shown in **Figure 1.2**.

### **2.4 Construction Programme**

2.4.1 The tentative construction programme for the Project is presented in **Annex A**. The construction works were commenced on 16<sup>th</sup> January 2006 and was scheduled to be completed by end of June 2007. According to the Contractor's latest programme, construction works is schedule to be completed by December 2007.

### **2.5 Summary of EM&A Requirements**

2.5.1 The EM&A programme requires environmental monitoring for air quality, water quality, terrestrial and marine ecology, landscape and visual, archaeology (watching brief) and land contamination. The EM&A requirements for each parameter are described in subsequent sections, including:

- All monitoring parameters;
- Action and Limit Levels for all environmental parameters;
- Event and Action Plans; and
- Environmental mitigation measures, as recommended in the project EIA final report.

### ***Monitoring Parameters and Locations***

- 2.5.2 24-hour TSP was the monitoring parameter for dust monitoring. One location for monitoring air quality was identified.
- 2.5.3 The water quality parameters which need to be monitored are as follows:
- Marine water quality (9 monitoring locations) - dissolved oxygen (DO), temperature, turbidity, suspended solids (SS), pH and salinity
  - Freshwater water quality (7 monitoring locations) - dissolved oxygen (DO), temperature, turbidity, suspended solids (SS), pH and salinity
- 2.5.4 Additional marine and freshwater water quality monitoring parameters for the impact monitoring during construction include nitrate nitrogen (NO<sub>3</sub>-N), nitrite nitrogen (NO<sub>2</sub>-N), ammonia nitrogen (NH<sub>3</sub>-N), total phosphate (TP) and selected pesticides.
- 2.5.5 Additional water quality monitoring at Tai Tau Chau FCZ (TTC), Kai Lung Wan FCZ (KLW), Kau Sai FCZ (KS), downstream of the existing marsh (M\_Marsh), marine water of Port Shelter (M\_Coral), existing reservoir (F\_Inland M) and Control stations (M\_A and M\_B) shall be carried out after heavy rain storm or when there is an overflow event from the reservoir, irrigation buffer lake or detention ponds/tanks. The heavy rain storm shall be defined when there is an amber/red/black rainstorm warning signal issued by the Hong Kong Observatory.
- 2.5.6 Aquatic fauna and integrity of stream buffer zone at Streams A, B and C were identified to monitor the potential land formation impact on terrestrial ecology especially stream courses. For coral monitoring, there were one control and three impact monitoring locations were identified to monitor the marine construction activities.
- 2.5.7 Watching Brief (archaeology) monitoring locations are identified at the cut areas of Holes 2, 11, 12, 14, 15 & 16.
- 2.5.8 The monitoring locations for air, water, ecology and watching brief (archaeology) are depicted in **Annex B**.

### ***Monitoring Methodology and Calibration Details***

- 2.5.9 All monitoring works were conducted and monitoring equipment was regularly calibrated in accordance with the EM&A Manual. Calibration records were shown in the monthly EM&A reports for October to December 2007.

### ***Environmental Quality Performance Limits (Action and Limit Levels)***

- 2.5.10 The environmental quality performance limits, i.e. Action and Limit Levels (AL Levels) were derived from the baseline monitoring results and make reference to EIA report and latest EPD monitoring data. If the measured environmental quality parameters exceed the AL Levels, the respective action plan would be implemented. The AL Levels for each environmental parameter are given in **Annex C**.

### **3. Monitoring Result & Site Audit**

#### **3.1 Air Quality**

- 3.1.1 Graphical presentation of the trend of the monitoring results of 24-hour TSP is provided in **Annex D**.

#### **3.2 Water Quality**

- 3.2.1 Graphical presentations of the trends of the monitoring results of marine water and freshwater quality are provided in **Annex D**.

#### **3.3 Ecology**

- 3.3.1 Monitoring results of the terrestrial and marine ecology are provided in **Annex D**.

#### **3.4 Landscape and Visual**

- 3.4.1 No provision of surgery to all damaged trees due to the construction activities.
- 3.4.2 No tree compensation proposal was submitted by the CHEC for those death trees located next to the administration building due to the construction activities.
- 3.4.3 Mal-pruning of transplanted trees had not been rectified since July 2006.
- 3.4.4 A statement on the cause of death of tree T925 recorded was still outstanding.
- 3.4.5 Soil around the transplanted trees was dry and more frequent watering is required.
- 3.4.6 Compensatory tree planting within the golf course is in progress.
- 3.4.7 Health condition of hydroseeding, shrub planting and tree planting are considered poor and more frequent watering is required.

#### **4. Environmental Audit**

##### **4.1 Implementation Status of Environmental Mitigation Measures**

- 4.1.1 Major construction work of the third golf course were (i) sand capping at Holes 2 and 9, (ii) turfing at Holes 2, 9 & 17 (iii) permanent drainage / irrigation system / sub-soil drainage installation at central part (Holes 2 and 17) of East Course, (iv) hydroseeding at the permanent slope/bare grounds and (v) furnishing work at permanent bridges.
- 4.1.2 Routine site inspection was carried out on 11<sup>th</sup> December 2007. A water pump was observed located at the streambed of Stream C underneath bridge no. 15 in operation and pumping water to a nearby catchhole located at Hole 15. This activity will cause potential dehydration of Stream C resulting in violation of the Environmental Permit requirements.
- 4.1.3 The Contractor was reminded to provide sufficient dust suppression measures for loading/unloading activities and haul road (truck traffic).
- 4.1.4 No revised submission was received from the Contractor regarding the temporary drainage during the 2 years construction phase, in particular wet seasons.
- 4.1.5 The Contractor was reminded to dispose the construction waste regularly and properly off-site. The Contractor was reminded to provide proper container to prevent the waste accidentally dropping into the marine water. The Contractor was reminded to dispose more off-site regularly and to submit the chit tickets for our record.
- 4.1.6 Hydroseeding at scar areas within the East Course was completed before March 2007. However, some areas were required re-hydroseeding (due to soil erosion after rain and died out) and will be planted with native shrub. The Contractor proposed to carry out re-planting work in early spring 2008 before the next wet season come.
- 4.1.7 The removal of Contractor's site office and temporary sewage treatment plant (STP) was carried out in early December 2007 through the temporary barging point during daytime. Regarding the STP, no water quality report was submitted by CHEC regarding the performance of the sewage treatment plant since failure. Therefore, no discharge of sewage effluent from the sewage treatment plant to fresh water inland marsh is allowed.
- 4.1.8 No dredging work has been carried out near to the existing pier for the desalination plant pipelines. Summary of implementation status is provided in **Annex E**.

##### **4.2 Status of Environmental Licensing and Permitting**

- 4.2.1 Valid environmental licenses and permits for the project during the reporting quarter are summarised in **Annex F**.

##### **4.3 Advice on Solid and Liquid Waste Management Status**

- 4.3.1 According to the site observation, vegetation stockpiles, construction wastes stockpiles and general refuse were removed regularly offsite with disposal records prepared by the Contractor. For the mobile chemical toilets, all of them were removed but no disposal record was submitted by the Contractor during the whole construction phase. Silt fences and orange fencing except silt curtain were removed during the reporting quarter. Disposal records for the construction wastes were received during the reporting quarter.

## 5. Non-compliance (Exceedances) of the Environmental Quality Performance Limits (Action and Limit Levels)

### 5.1 Air Quality

5.1.1 No exceedance of 24-hour TSP was recorded at GCA B1 in the reporting quarter.

### 5.2 Water Quality

5.2.1 No rainstorm events were occurred during the reporting quarter. The marine water exceedances were summarized in **Table 5.2-1**.

**Table 5.2-1 Marine Water Exceedance Summary October to December 2007**

Monitoring Station	Exceedance Level	Date	Parameters	Project-related
KLW	Action Level	8 <sup>th</sup> Oct 07	SS	No
	Action Level	22 <sup>nd</sup> Oct 07	SS	No
	Action Level	29 <sup>th</sup> Oct 07	SS	No
M_Marsh	Action Level	19 <sup>th</sup> Nov 07	Turbidity	No
	Action Level	27 <sup>th</sup> Sep 07	Chl a	No
	Limit Level	27 <sup>th</sup> Sept 07	NH <sub>3</sub> -N	No
	Action Level	15 <sup>th</sup> Oct 07	Turbidity	No
	Limit Level	15 <sup>th</sup> Oct 07	NH <sub>3</sub> -N	No
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N	No
	Action Level	26 <sup>th</sup> Nov 07	Chl a	No
	Action Level	10 <sup>th</sup> Dec 07	TIN	No
	Limit Level	10 <sup>th</sup> Dec 07	NH <sub>3</sub> -N	No
	Action Level	27 <sup>th</sup> Sep 07	Turbidity	No
TTC	Limit Level	27 <sup>th</sup> Sep 07	NH <sub>3</sub> -N, Chl a	No
	Action Level	5 <sup>th</sup> Oct 07	SS	No
	Action Level	15 <sup>th</sup> Oct 07	SS	No
	Limit Level	15 <sup>th</sup> Oct 07	NH <sub>3</sub> -N, Chl a	No
	Action Level	22 <sup>nd</sup> Oct 07	Chl a	No
	Limit Level	22 <sup>nd</sup> Oct 07	SS	No
	Action Level	29 <sup>th</sup> Oct 07	NH <sub>3</sub> -N, Chl a	No
	Limit Level	5 <sup>th</sup> Nov 07	Chl a	No
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, TIN	No
	Limit Level	26 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, Chl a	No
	Action Level	3 <sup>rd</sup> Dec 07	NO <sub>3</sub> -N	No
	Limit Level	3 <sup>rd</sup> Dec 07	Chl a	No
	Action Level	10 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	10 <sup>th</sup> Dec 07	NH <sub>3</sub> -N	No
	Action Level	17 <sup>th</sup> Dec 07	Chl a	No
M_BP	Limit Level	24 <sup>th</sup> Dec 07	NH <sub>3</sub> -N	No
	Action Level	27 <sup>th</sup> Sep 07	Chl a	No
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N	No
	Action Level	26 <sup>th</sup> Nov 07	Chl a	No
M_Coral	Limit Level	24 <sup>th</sup> Dec 07	NH <sub>3</sub> -N	No
	Action Level	15 <sup>th</sup> Oct 07	SS	No
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N	No
	Action Level	26 <sup>th</sup> Nov 07	Chl a	No
KS	Limit Level	24 <sup>th</sup> Dec 07	NH <sub>3</sub> -N	No
	Action Level	27 <sup>th</sup> Sep 07	NH <sub>3</sub> -N	No
	Limit Level	27 <sup>th</sup> Sep 07	Chl a	No
	Limit Level	5 <sup>th</sup> Oct 07	SS	No

Monitoring Station	Exceedance Level	Date	Parameters	Project-related
	Action Level	8 <sup>th</sup> Oct 07	SS	No
	Action Level	15 <sup>th</sup> Oct 07	NH <sub>3</sub> -N	No
	Limit Level	15 <sup>th</sup> Oct 07	Chl a	No
	Action Level	22 <sup>nd</sup> Oct 07	SS	No
	Limit Level	22 <sup>nd</sup> Oct 07	Chl a	No
	Action Level	29 <sup>th</sup> Oct 07	SS	No
	Limit Level	29 <sup>th</sup> Oct 07	Chl a	No
	Limit Level	5 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, Chl a	No
	Action Level	12 <sup>th</sup> Nov 07	TIN	No
	Action Level	26 <sup>th</sup> Nov 07	SS	No
	Limit Level	26 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, Chl a	No
	Limit Level	3 <sup>rd</sup> Dec 07	Chl a	No
	Action Level	10 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	10 <sup>th</sup> Dec 07	NH <sub>3</sub> -N	No
	Action Level	17 <sup>th</sup> Dec 07	Chl a	No
	Action Level	24 <sup>th</sup> Dec 07	SS	No
	Limit Level	24 <sup>th</sup> Dec 07	NH <sub>3</sub> -N	No

### Freshwater

5.2.2 The freshwater water exceedances were summarised in **Table 5.2-2**.

**Table 5.2-2 Freshwater Exceedance Summary October to December 2007**

Monitoring Station	Exceedance Level	Date	Parameters	Project-related
F_DA	Action Level	27 <sup>th</sup> Sep 07	Turbidity, NO <sub>3</sub> -N, TIN	No
	Action Level	5 <sup>th</sup> Oct 07	Turbidity, SS	No
	Limit Level	5 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Action Level	8 <sup>th</sup> Oct 07	SS	No
	Limit Level	8 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	15 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN, Chl a	No
	Action Level	22 <sup>nd</sup> Oct 07	SS	No
	Limit Level	22 <sup>nd</sup> Oct 07	NO <sub>3</sub> -N, TIN, Chl a	No
	Action Level	29 <sup>th</sup> Oct 07	SS	No
	Limit Level	29 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN, Chl a	No
	Action Level	5 <sup>th</sup> Nov 07	SS	No
	Limit Level	5 <sup>th</sup> Nov 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	12 <sup>th</sup> Nov 07	Chl a	No
	Action Level	26 <sup>th</sup> Nov 07	TIN	No
	Limit Level	26 <sup>th</sup> Nov 07	NH <sub>3</sub> -N	No
	Action Level	10 <sup>th</sup> Dec 07	Chl a	No
	Limit Level	17 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Action Level	24 <sup>th</sup> Dec 07	SS	No
F_UB	Limit Level	27 <sup>th</sup> Sep 07	Turbidity, NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No
	Action Level	5 <sup>th</sup> Oct 07	SS	No
	Limit Level	5 <sup>th</sup> Oct 07	Turbidity, NO <sub>3</sub> -N, TIN	No
	Action Level	8 <sup>th</sup> Oct 07	SS	No
	Limit Level	8 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Action Level	15 <sup>th</sup> Oct 07	Turbidity	No
	Limit Level	15 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN, Chl a	No
	Action Level	22 <sup>nd</sup> Oct 07	Turbidity, SS	No
	Limit Level	22 <sup>nd</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Action Level	29 <sup>th</sup> Oct 07	SS	No
	Limit Level	29 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	Yes
	Limit Level	5 <sup>th</sup> Nov 07	NO <sub>3</sub> -N, TIN	Yes
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No



Monitoring Station	Exceedance Level	Date	Parameters	Project-related
	Limit Level	19 <sup>th</sup> Nov 07	NO <sub>3</sub> -N, TIN	No
	Action Level	26 <sup>th</sup> Nov 07	SS	No
	Limit Level	26 <sup>th</sup> Nov 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	3 <sup>rd</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Action Level	10 <sup>th</sup> Dec 07	SS	No
	Limit Level	10 <sup>th</sup> Dec 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No
	Action Level	17 <sup>th</sup> Dec 07	Turbidity, Chl a	No
	Limit Level	17 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Action Level	24 <sup>th</sup> Dec 07	SS	No
F_DB	Action Level	27 <sup>th</sup> Sep 07	SS	No
	Limit Level	27 <sup>th</sup> Sep 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	5 <sup>th</sup> Oct 07	SS, NO <sub>3</sub> -N, TIN	No
	Action Level	8 <sup>th</sup> Oct 07	SS	No
	Limit Level	8 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	15 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN, Chl a	No
	Limit Level	22 <sup>nd</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Action Level	29 <sup>th</sup> Oct 07	SS	No
	Limit Level	29 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	Yes
	Limit Level	5 <sup>th</sup> Nov 07	NO <sub>3</sub> -N, TIN	Yes
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, TP	No
	Limit Level	19 <sup>th</sup> Nov 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	26 <sup>th</sup> Nov 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	3 <sup>rd</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Action Level	10 <sup>th</sup> Dec 07	SS	No
	Limit Level	10 <sup>th</sup> Dec 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No
	Limit Level	17 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Action Level	24 <sup>th</sup> Dec 07	SS	No
	Limit Level	24 <sup>th</sup> Dec 07	NH <sub>3</sub> -N, TIN	No
F_UC	Limit Level	27 <sup>th</sup> Sep 07	Turbidity	No
	Action Level	5 <sup>th</sup> Oct 07	SS	No
	Limit Level	5 <sup>th</sup> Oct 07	Turbidity, NO <sub>3</sub> -N, TIN, Chl a	No
	Action Level	8 <sup>th</sup> Oct 07	SS	No
	Limit Level	8 <sup>th</sup> Oct 07	Turbidity, NO <sub>3</sub> -N, TIN, Chl a	No
	Limit Level	15 <sup>th</sup> Oct 07	Turbidity, NO <sub>3</sub> -N, TIN, Chl a	No
	Action Level	22 <sup>nd</sup> Oct 07	SS	No
	Limit Level	22 <sup>nd</sup> Oct 07	Turbidity, Chl a	No
	Limit Level	29 <sup>th</sup> Oct 07	Chl a	No
	Limit Level	5 <sup>th</sup> Nov 07	Chl a	No
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, TIN, TP	No
	Action Level	3 <sup>rd</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	17 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Action Level	24 <sup>th</sup> Dec 07	SS	No
F_DC	Limit Level	27 <sup>th</sup> Sep 07	NO <sub>3</sub> -N, TIN	No
	Action Level	5 <sup>th</sup> Oct 07	SS	No
	Limit Level	5 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Action Level	8 <sup>th</sup> Oct 07	SS	No
	Limit Level	8 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	15 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN, Chl a	No
	Limit Level	22 <sup>nd</sup> Oct 07	SS, Chl a	No
	Action Level	29 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	5 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, TIN	No
	Action Level	19 <sup>th</sup> Nov 07	Chl a	No
	Limit Level	26 <sup>th</sup> Nov 07	Chl a	No
	Limit Level	3 <sup>rd</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	10 <sup>th</sup> Dec 07	NH <sub>3</sub> -N, Chl a	No

Monitoring Station	Exceedance Level	Date	Parameters	Project-related
	Limit Level	17 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Action Level	24 <sup>th</sup> Dec 07	SS	No
F_Inland M	Limit Level	27 <sup>th</sup> Sep 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No
	Action Level	5 <sup>th</sup> Oct 07	SS	No
	Limit Level	5 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Action Level	8 <sup>th</sup> Oct 07	SS	No
	Limit Level	8 <sup>th</sup> Oct 07	NO <sub>3</sub> -N, TIN	No
	Action Level	15 <sup>th</sup> Oct 07	TIN	No
	Limit Level	15 <sup>th</sup> Oct 07	NH <sub>3</sub> -N	No
	Action Level	22 <sup>nd</sup> Oct 07	SS	No
	Limit Level	29 <sup>th</sup> Oct 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No
	Limit Level	5 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No
	Limit Level	12 <sup>th</sup> Nov 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No
	Action Level	3 <sup>rd</sup> Dec 07	SS	No
	Limit Level	10 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	17 <sup>th</sup> Dec 07	NO <sub>3</sub> -N, TIN	No
	Limit Level	24 <sup>th</sup> Dec 07	NH <sub>3</sub> -N, NO <sub>3</sub> -N, TIN	No

5.2.3 Exceedances of ammonia nitrogen, nitrate nitrogen and total inorganic nitrogen were recorded at downstream of fresh water inland marsh but in very low frequency when it compared to the directly discharge of sewage from the Contractor's STP. All exceedances were considered not project-related.

5.2.1 Chemical applications (Chlorpyrifos, Chlorothalonil, Fipronil, Glyphosate and Iprodione) were recorded in the reporting quarter. In the reporting quarter, 10 days (7 days in October 2007, 2 days in November 2007 and 1 day in December 2007) of water sampling due to the chemical application were carried out. All water samples were required to send to overseas laboratory for analysis and testing. All chemicals were found below the detection limit during the reporting quarter.

5.2.2 For the upstream monitoring location (F\_UB), it is located downstream to the construction area near Hole 10 and the monitoring location cannot be relocated further upstream (temporary bridges located at Streams B1 and B2) as no water was observed and available for sampling. For Stream C, exceedances were recorded at both upstream and downstream monitoring locations. For the upstream monitoring location (F\_UC), it is located downstream to the construction area near Hole 16 and the monitoring location cannot be relocated further upstream as no water was observed and available for sampling. Therefore, the F\_UC is considered the most upstream location of Stream C. Same as Stream B, it is considered that F\_UC is also the impact monitoring location and F\_UA was used as the representative control monitoring station.

### 5.3 Ecology

6.1.1 The hydroseeding areas at the downstream of Stream A within the buffer zone area were found not in good condition. The Contractor was required to reinstate the buffer zone back to baseline condition.

6.1.2 Water was actively pumping from Stream C to Hole 15 was recorded during the reporting quarter. ET requested CHEC to stop immediately to prevent further dehydrating the sensitive stream. ET considered that this activity is a violation of the Environmental Permit.

6.1.3 No illegal berthing was observed during the site audit. Floating pontoon was berthed at EP location at the temporary barging point. The barges were mainly delivering turf and construction wastes during the reporting quarter.

- 6.1.4 Regarding to the vegetation clearance of Streams B & C buffer zone due to the permanent drainage construction work, the area was planting with shrubs. The Contractor was reminded to keep the reinstated area in good and healthy condition for the newly plants.
- 6.1.5 The proposed removal programme of the temporary barging point will commence in mid-January 2008 and require one month. ET commented on the submitted method statement prepared by the Contractor to ensure the nearby coral communities are well-protected and avoid damage (in particular, silt and physical) during the removal period. The Contractor is required to submit the immediate and remedial action plans and mitigation measures proposal to AFCD for approval before commencement.

#### Marine Ecology

- 5.3.1 The fourth quarterly coral monitoring at Site B2, Site C and Control Site was carried out in December 2007. At Site C and the Control Site, the 20 colonies of natural corals selected during the Baseline Survey were recovered.
- 5.3.2 Mortality had been found on some tagged corals in Site B during the previous reporting quarter. In the present monitoring, the majority of the coral colonies were in conditions similar as recorded in previous monitoring, but recoveries on some of the coral colonies were found, including B-11 (recovered from 50 to zero %), B-54 (recovered from 50% to zero%). There were also some minor increases on mortality in some other colonies (e.g. B-55, increased from 60% to 70%), but these mortality records were still below the Action Level for the coral monitoring, i.e. “a 15% increase in the percentage of partial mortality of corals occurs at more than 20% of the tagged coral colonies at one or more monitoring sites”. The remaining tagged corals were still similar with the baseline conditions during the Baseline Survey in December 2005 or in April 2006.
- 5.3.3 All 20 tagged corals in Site C were recovered except C-04 (which had been destroyed by adverse weather and reported during the reporting quarter), no mortality or sedimentation was found on other tagged corals. Coral X-05 was lost in June 2006, the remaining 19 tagged corals were recovered at the Control Site. No mortality, sedimentation or bleaching was found on any of the tagged corals.

#### Transplanted Coral

- 5.3.4 One year transplanted corals monitoring were completed in the previous reporting month.

### **5.4 Summary of Environmental Complaint**

- 5.4.1 One environmental complaint from the construction site was received during the reporting quarter.

### **5.5 Summary of Environmental Summons**

- 5.5.1 No summon was received from the construction site during the reporting quarter.

## **6. Recommendations and Conclusions**

- 6.1.1 This Quarterly Environmental Monitoring and Audit (EM&A) Report presents the EM&A works undertaken during the period from October to December 2007 in accordance with EM&A Manual and the requirement under EP-224/2005/A.
- 6.1.2 No exceedance was recorded for 24-hour TSP in the reporting quarter.
- 6.1.3 The Contractor was reminded to provide sufficient dust suppression mitigation measures especially during haul road and temporary barging point removal and large soils stockpiles.
- 6.1.4 The Contractor was reminded to dispose stockpiles of the construction waste off-site properly.
- 6.1.5 The Contractor was reminded to provide sufficient mitigation measures and proposed remedial action plan to AFCD approval before commencement in order to avoid coral damage during the temporary barging point removal.
- 6.1.6 The abundance of aquatic fauna, in particular caridian shrimps, was still found extreme low in Streams B & C during the reporting quarter.
- 6.1.7 Intrusion at Stream C within the buffer zone area due to operation of water pump was recorded during the reporting quarter.
- 6.1.8 Regarding the retained trees, the Contractor shall take the following measures:
- Carry out surgery to damaged trees;
  - Report the cause of death of tree T925;
  - Re-fix the label of retained tree for easy identification;
  - Maintain the tree protection zone required and remove all construction material / debris from the tree protection zone;
  - More frequent watering for transplanted trees, planted vegetation and hydroseeded grass; and
  - Rectify the mal-pruning practice of the transplanted trees.
- 6.1.9 One environmental complaint was received during the reporting quarter. No summon was received during the reporting quarter.
- 6.1.10 The ET will keep track of the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.