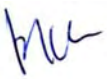
Proposed Extension of Public Golf Course at Kau Sai Chau Island, Sai Kung

Quarterly Environmental Monitoring & Audit (EM&A) Report for April to June 2007

(Report No. 382210/Q_006)

Report Authorized For Issue By:	
	For and on Behalf of Black & Veatch Hong Kong Limited

Black & Veatch Hong Kong Limited
Room 1201-11, Millennium City 5,
418 Kwun Tong Road,
Kowloon, Hong Kong

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

July 2007

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	Name	Signature	Date
Prepared	**Esther Tong**		Jul 2007
Checked	**Manuel Chua**		Jul 2007
Reviewed	**P K Lee**		Jul 2007

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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 April to June 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 April to June 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 25 July 2007

Executive Summary

This is the sixth 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 16th January 2006. This report presents the results of the EM&A works conducted in the second quarter of 2007 from April to June 2007.

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 3-16, 18
2. Drainage system installation – **Completed**: Holes 3-8, 10-15
3. Irrigation installation – **Completed**: 3-8, 11
4. Sub-soil drainage installation – **Completed**: 3-8
5. Sand capping – **Completed**: 3-8
6. Turf establishment: **Completed (green)**: Hole 5 (6 Mar 07), Hole 4 (19 Apr 07) & Hole 6 (7 May 07); **Completed (except green)**: Hole 8 (12 Feb 07) & Hole 7 (1 Jun 07); **In progress**: Hole 3 (18 Jun 07), Holes 11 (25 Jun 07); **Proposed turf**: Hole 18 (proposed 3 Jul 07).
7. Reinstatement work for gravity drain: 98%
8. Construction of Lake 1D, other pumping stations, underground water tanks and lakes: **Completed**
9. Slope restoration works: 95% (hydroseeding completed, planting of shrub next week)

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

Other construction activities:
- Operation of concrete batching plant (located at Hole 2)
- Operation of sewage treatment work (site office)
- Operation of temporary barging point at EP location

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 June 2007 regarding the discharge licence. Construction work of Irrigation Lake 1D and associated pipelines for the desalination plant were completed. As there is no discharge licence for the desalination plant, the plant will not be operated until successful application from EPD.

Marine ecology surveys at Site B2, Site C, Control site and transplanted corals near existing pier were originally scheduled in June 2007. The monitoring had however postponed due to the shark sighting within Port Shelter.

The floating pontoon was located and operated at the designated location according to Environmental Permit (EP). Improper berthing at the temporary barging point was observed which could lead to coral damage (coral damage incident at the temporary barging point had been occurred in March 2006). EPD was informed regarding this incident occurred on 2 April 2007.

Archaeology watching brief was completed in February 2007. No archaeological material or deposits was identified. The final report was approved by AMO in June 2007.

In the submitted programme proposed by Contractor, golf holes located at Northern portion (in particular Holes 3, 4, 5, 6 & 8) of the East Course will be the target golf holes for earliest turfing and expected to be completed in dry season. However, only Holes 5 & 8 was planted with turf in March 2007 (not yet completed). Turf planting (tees and fairways) was completed at Holes 3, 4, 6 & 7 except green areas progressively from April to June 2007. All of them were located at Northern section of East Course. For southern portion of the East Course, construction of permanent drainage/irrigation systems was in progress. Hole 11 will be planted with turf during the next reporting month. Central portion (Holes 1, 2, 9 & 17) will be the last portion to be planted with turf. Applications of fertilizers at Holes 3 to 8 were recorded. Biological pesticide (Bactospeine) was applied to Holes 3 to 8 to suppress the growth of the army worms but golf course superintendent considered ineffective. Chemical application (Chlorpyrifos) was required.

Regarding the high exceedances of suspended solids and turbidity recorded from April to June 2007 continuously at all identified streams, the temporary drainage installed on site was considered insufficient and ineffective. ET and the Engineer repeatedly reminded the Contractor to prevent silty/nutrient/pesticides runoff to the streams and marine water. The Contractor was reminded to critically review and revise the TDMP according to the actual site progress, install sufficient temporary drains and provide sufficient desilting facilities in order to prevent/divert/collect the silty runoff and discharge to marine/streams according to the discharge licence and Water Quality Objectives (WQO) of Port Shelter.

Terrestrial ecological monitoring was carried out in June 2007. Heavy sedimentation, as compared with the stream condition reported in previous monitoring, was found on the stream bed of both Streams B & C. The abundance of aquatic fauna, in particular caridian shrimps, was very low, though some other aquatic fauna such as crab juveniles were recorded. Preventive mitigation measures should be taken by the Contractor immediately to prevent any further sedimentation incidents to all identified streams.

The reinstatement of the Stream A (removal of remaining artificial rocks from Hole 17 due to the heavy rainstorm occurred in June 2006) was still outstanding. However, additional rubbles filled up the downstream portion of Stream A again after rains occurred in June 2007.

Regarding Stream B2 buffer zone intrusion which causes vegetation clearance in Nov 2006, buffer zone intrusion at Stream C near Hole 16 tee was recorded in May 2007. Stream C buffer zone was reinstated by planting native shrub which is similar to Stream B2 in June 2007.

Long-term nutrient exceedances are recorded at the downstream of fresh water inland marsh since February 2007. High level of ammonia nitrogen was recorded at 287 mg/L (exceeds the required standard of the discharge licence, 20 mg/L) at the effluent discharge outlet of the temporary sewage treatment plant near to the Contractor's site office on 16 April 2006. An additional sampling was taken on 12 May 2007 due to the overflow incident of the sewage discharge from the temporary storage tank which was installed on 5 May 2007 in order to prevent contamination of the fresh water inland marsh as the interim mitigation measure until CHEC repair and resume the sewage treatment plant. However, high concentrations of ammonia nitrogen (286 mg/L), biochemical oxygen demand (134 mg/L) and *E. coli* (9,600,000 cfu/100mL) were recorded and all concentrations exceeded the EPD's discharge licence requirement.

For the temporary Sewage Treatment Plant (STP), sewage effluent was stored temporarily in a temporary storage tank since early May 2007. Jockey Club requested CHEC to provide evidence to proof the performance of the STP and comply with the discharge licence before directly discharge to fresh water inland marsh. The temporarily stored sewage effluent was disposed off-site by licenced Contractor on bi-weekly basis. No information was submitted by CHEC regarding the STW performance during reporting quarter.

No sewage effluent was stored in the temporary storage tank since 17 June 2007 while the sewage treatment plant was still in operation. Algal blooms were recorded at the fresh water inland marsh in June and July 2007. Significant increase of ammonia nitrogen and chlorophyll a were recorded on 28 June 2007 at the fresh water inland marsh. It coincided with the potential leakage of effluent from the sewage treatment plant to fresh water inland marsh. The water quality was also considered poor due to the significant increase of nutrient concentrations at the downstream end of the fresh water inland marsh.

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	19 times
Water quality monitoring (marine + freshwater)	29 times
Terrestrial Ecology	3 times
Marine Ecology	0 time
Landscaping & Visual	6 times

Air Quality

Two and One measured 24-hour TSP concentrations in the reporting quarter were exceeded the Action Level (AL) and Limit Level (LL) at GCA B1 respectively.

Water Quality

For marine water quality, all exceedances recorded were considered not project-related except during the rainstorms. Exceedances measured at TTC, KS, M_BP, M_Marsh and M_Coral were mainly due to rainstorm events occurred on 19th and 20th May 2007 and 10th June 2007 and considered project-related.

For freshwater monitoring stations, exceedances were recorded, mainly suspended solids and turbidity, at all monitoring locations (Streams A, B & C) during the reporting quarter and all considered project-related due to the silty runoff.

Continuous exceedances of ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total inorganic nitrogen and chlorophyll a were recorded at downstream of fresh water inland marsh during the reporting quarter. The nutrient concentrations were started to decrease since the sewage effluent was diverted into a temporary storage tank in early May 2007 instead of discharging to the fresh water inland marsh. Poor effluent water quality results (high ammonia nitrogen and *E. coli*) taken in April and May 2007 were recorded from the Contractor's sewage treatment plant. All evidence has proven that CHEC's sewage treatment plant is the major source for the fresh water inland contamination.

Ecology

Terrestrial

One non-compliance was recorded during the reporting quarter due to the Stream C buffer zone vegetation clearance occurred in May 2007. In addition, heavy sedimentation to Streams B & C leading to extreme low population aquatic fauna, in particular caridian shrimps, was found.

Marine

No non-compliance was recorded during the reporting quarter (coral monitoring survey was postponed to next reporting quarter due to the shark sighting within Port Shelter in June 2007).

Transplanted coral

The third quarterly coral monitoring for the transplanted corals will be postponed in July 2007.

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 minimise 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. However, the monitoring results revealed that the temporary drainage system implemented and dust suppression measures were insufficient during reporting quarter. Waste management was satisfactory and in improvement progress during the reporting quarter.

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

Air Quality

- Increase frequency of watering at main haul roads and rock breaking areas;
- Pave major haul roads with gravels/concrete to minimize the dust emission due to the heavy traffic;
- Cover all soil/sand/aggregates stockpiles with tarpaulin or other measures to reduce the dust emission; and
- Install hoarding at the main exit/entrance of the construction site;

Waste Management

- Properly dispose of the vegetation stockpiles, general refuse and construction waste off-site;
- Provide construction waste sorting area;
- Provide sufficient mobile toilets at remote site areas; and
- Properly maintain the temporary sewage treatment plant

Ecology

- Remove remaining rubbles at downstream of Stream A after temporary bridge dismantling;
- Maintain the reinstated conditions (planting shrub) at Stream B2 buffer zone since March 2007 and Stream C buffer zone since May 2007; and
- Rectify and remediate the silt deposit at Streams A, B and C after rainstorm events.

Water Quality

- Implement temporary drains according to Temporary Drainage Management Plan (TDMP) to avoid silty/nutrient/pesticide runoff;
- Provide sufficient preventing and/or mitigation measures at all open cut areas to avoid silty runoff;
- Minimize the water quality impact when undertaking cut-and-fill works and turfing. It is important to provide sufficient temporary drainage system at critical areas to confine, collect and provide proper treatment before discharging to marine water and stream courses to ensure that the water quality is complied with WQO requirements;
- Provide sufficient treatment facilities before water discharges from construction site;
- Maintain the integrity of silt curtains and remove settled silt within the silt curtain which have been installed outside the fresh water inland marsh, near Hole 2, near Hole 4, inactive fish culture zone and Stream A;
- Strengthen the preventive/interim measures for avoiding silty runoff from the exposed areas to the low lying areas. More frequent maintenance of the silt fence is necessary; and
- Provide sufficient temporary drainage system at all temporary bridges.

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;
- Provide tree protection zone for all retain tree at the administration building; and
- Provide incident report for the death of the retain trees.

Environmental Complaints and Prosecution

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

Environmental Licensing and Permitting

License/Permits granted to the Project include the Environmental Permit (EP), construction noise permit (CNP) and chemical waste producer. The water discharge licence for the construction site was available during this reporting quarter.

Future Key Issues

General issues to be considered in the coming month include:

- Potential dust generation from activities on-site : permanent drainage/irrigation system construction, concrete batching plant operation and soil/sand/aggregates stockpiles;
- Turf establishment at southern East Course;
- Implement sufficient and improve the temporary drainage system (and make use of the permanent drainage system) on site to prevent silty/nutrients/pesticides runoff discharging to marine and stream courses;
- Apply the discharge licence for the desalination plant near to the existing KSC pier before operation;
- Dispose of construction wastes, vegetation and general refuse off-site; and
- Hydroseed the bare ground/temporary/permanent slopes according to the golf course design.

Key issues at particular areas:

- Review and revise the Temporary Drainage Master Plan (TDMP) for the silty runoff and turf establishment period prepared by the Contractor for Engineer and Jockey Club's approval;
- Carry out water quality monitoring for nutrients/pesticides due to turf establishment;
- Carry out coral monitoring for the transplanted corals on quarterly basis; and
- Carry out coral monitoring when desalination plant operates in dry season

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, 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 sixth quarterly EM&A report which summarises the environmental monitoring and audit works for the Project in the second quarter of 2007 from April to June 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 14th November 2005 under the EIAO. An Environmental Permit (EP-224/2005) was granted on 28th 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 16th January 2006 and are scheduled to be completed by end of July 2007. According to the Contractor's latest programme, construction works is schedule to be completed by March 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_3-N), nitrite nitrogen (NO_2-N), ammonia nitrogen (NH_3-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 April to June 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 Results & 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 Damaged trees next to the administration building were still unprotected after being damaged by the adjacent construction activities.

3.4.2 Mal-pruning of transplanted trees had not been rectified since July 2006. Construction material was still stockpiled within tree protection zones since July 2006.

3.4.3 A statement on the cause of death of tree T925 recorded in the last report was still outstanding.

3.4.4 All transplanted trees were in fair condition except Tree T848 transplanted in last reporting month.

3.4.5 Soil around the transplanted trees was dry 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) permanent drainage/irrigation system installation work at southern part (Holes 11-16) and cut-and-fill work central part (Holes 1, 2 and 17) of East Course, (ii) permanent closed low flow drainage system installation, (iii) irrigation system installation, (iv) sub-soil drains installation, (v) hydroseeding at the permanent slope/bare grounds, (vi) furnishing work at permanent bridges and (vi) turfing at Holes 3, 6 and 7 during the reporting month.

4.1.2 No dust suppression mitigation measure was provided for all rock breaking areas. Dust suppression measures for loading/unloading activities, rough shaping and haul road (truck traffic) were insufficient. The water source for dust suppression was mainly pumped from downstream of Stream A only.

4.1.3 Implementation of temporary drains on site was not according to the general principles of TDMP. In addition, the water quality results at all identified streams and fresh water inland marsh revealed that improvement and strengthen of temporary drainage system installed on site is required.

4.1.4 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. Vegetation stockpiles, general refuse and construction waste stockpiles were temporary stored at Hole 1 and disposed off-site during this reporting month. The Contractor was reminded to dispose all other remaining construction wastes gradually off-site and to submit the trip tickets record (construction/general waste, disposal record for chemical toilets and chemical waste) for our reference.

4.1.5 Disposal of temporary stored wastewater (third time) from the CHEC's temporary sewage treatment plant was carried out on 17 June 2007 by licenced Contractor. However, no water quality report was submitted by CHEC regarding the performance of the sewage treatment plant. Therefore, no discharge of sewage effluent from the sewage treatment plant to fresh water inland marsh is allowed.

4.1.6 Insufficient mobile toilets were available on site at remote areas, only few units were located at the southern portion of construction site.

4.1.7 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. The stockpiles location for the construction waste was considered inappropriate because it was sitting on a steep slope adjacent to concrete batching plant.

4.3.2 Chemical waste storage area near to the concrete batching plant was available on site 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 Three non-compliance of 24-TSP were recorded at GCA B1 during the reporting quarter.

5.2 Water Quality

5.2.1 Rainstorm events were occurred on 24 April, 19 May, 20 May, 27 May and 10 June 2007 during the reporting quarter. The marine water exceedances were summarised in **Table 5.2-1.**

Table 5.2-1 Marine Water Exceedance Summary January to March 2007

Monitoring Station	Exceedance Level	Date	Parameters	Project-related
KLW	Action Level	14th May 07	SS	No
KLW	Action Level	28th May 07	SS	No
KLW	Limit Level	18th Jun 07	SS	No
KS	Action Level	2nd Apr 07	SS	No
KS	Limit Level	20th May 07	SS	No
KS	Action Level	21st May 07	SS	No
M_BP	Limit Level	20th May 07	SS, Turbidity	Yes
M_BP	Action Level	21st May 07	SS	Yes
M_BP	Limit Level	21st May 07	NH_3-N	No
M_BP	Limit Level	30th May 07	NH_3-N	No
M_BP	Limit Level	10th Jun 07	NH_3-N	No
M_BP	Limit Level	11th Jun 07	NH_3-N	No
M_BP	Action Level	18th Jun 07	Chl a	No
M_Coral	Action Level	30th Apr 07	Turbidity	No
M_Coral	Action Level	20th May 07	SS	Yes
M_Marsh	Limit Level	28th Mar 07	NH_3-N	No
M_Marsh	Limit Level	4th Apr 07	NH_3-N	No
M_Marsh	Action Level	14th May 07	Turbidity	No
M_Marsh	Limit Level	20th May 07	SS, Turbidity, NO_3-N, TIN	Yes
M_Marsh	Action Level	21st May 07	SS, TIN	Yes
M_Marsh	Limit Level	21st May 07	Turbidity, NO_3-N	Yes
M_Marsh	Limit Level	30th May 07	NH_3-N	No
M_Marsh	Action Level	10th Jun 07	SS	Yes
M_Marsh	Action Level	10th Jun 07	TIN	No
M_Marsh	Limit Level	10th Jun 07	Turbidity	Yes
M_Marsh	Limit Level	10th Jun 07	NH_3-N	No
M_Marsh	Limit Level	11th Jun 07	NH_3-N	No
M_Marsh	Action Level	18th Jun 07	SS	Yes
M_Marsh	Limit Level	18th Jun 07	Chl a	No
M_RO1	Limit Level	10th Jun 07	Turbidity, SS	No
M_RO1	Limit Level	11th Jun 07	Turbidity	No
TTC	Action Level	26th Mar 07	Chl a	No

Monitoring Station	Exceedance Level	Date	Parameters	Project-related
TTC	Limit Level	28th Mar 07	NH_3-N	No
TTC	Action Level	2nd Apr 07	Chl a	No
TTC	Limit Level	4th Apr 07	NH_3-N	No
TTC	Limit Level	10th Apr 07	Chl a	No
TTC	Limit Level	12th Apr 07	Chl a	No
TTC	Action Level	18th Apr 07	Chl a	No
TTC	Limit Level	18th Apr 07	NH_3-N	No
TTC	Limit Level	20th Apr 07	NH_3-N	No
TTC	Action Level	23rd Apr 07	Chl a, SS	No
TTC	Action Level	25th Apr 07	NH_3-N	No
TTC	Limit Level	11th May 07	NH_3-N	No
TTC	Limit Level	16th May 07	NH_3-N	No
TTC	Limit Level	20th May 07	SS	Yes
TTC	Limit Level	20th May 07	NH_3-N	No
TTC	Limit Level	21st May 07	SS	Yes
TTC	Limit Level	21st May 07	NH_3-N	No
TTC	Limit Level	28th May 07	NH_3-N, Chl a	No
TTC	Limit Level	30th May 07	NH_3-N, Chl a	No
TTC	Limit Level	4th Jun 07	NH_3-N	No
TTC	Action Level	10th Jun 07	SS, TIN	No
TTC	Limit Level	10th Jun 07	NH_3-N	No
TTC	Limit Level	11th Jun 07	NH_3-N, TIN	No
TTC	Action Level	18th Jun 07	NH_3-N	No
TTC	Limit Level	18th Jun 07	SS, Chl a	No

Freshwater

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

Table 5.2-2 Freshwater Exceedance Summary January to March 2007

Monitoring Station	Exceedance Level	Date	Parameters	Project -related
F_DA	Limit Level	26th Mar 07	SS, Turbidity	Yes
F_DA	Limit Level	27th Mar 07	SS, Turbidity	Yes
F_DA	Limit Level	2nd Apr 07	SS	Yes
F_DA	Action Level	23rd Apr 07	SS	Yes
F_DA	Limit Level	25th Apr 07	SS, Turbidity	Yes
F_DA	Limit Level	30th Apr 07	SS, Turbidity	Yes
F_DA	Action Level	14th May 07	SS	Yes
F_DA	Limit Level	14th May 07	Turbidity	Yes
F_DA	Limit Level	20th May 07	SS, Turbidity	Yes
F_DA	Limit Level	21st May 07	SS, Turbidity	Yes
F_DA	Limit Level	28th May 07	Turbidity, SS	Yes
F_DA	Limit Level	30th May 07	Turbidity, SS	Yes
F_DA	Action Level	4th Jun 07	SS	Yes

Monitoring Station	Exceedance Level	Date	Parameters	Project -related
F_DA	Limit Level	4th Jun 07	Turbidity	Yes
F_DA	Limit Level	10th Jun 07	Turbidity, SS	Yes
F_DA	Limit Level	11th Jun 07	Turbidity, SS	Yes
F_DA	Limit Level	18th Jun 07	Turbidity, SS	Yes
F_UB	Limit Level	26th Mar 07	SS, Turbidity	Yes
F_UB	Limit Level	27th Mar 07	SS, Turbidity	Yes
F_UB	Action Level	2nd Apr 07	SS	Yes
F_UB	Action Level	10th Apr 07	SS	Yes
F_UB	Limit Level	23rd Apr 07	SS, Turbidity	Yes
F_UB	Limit Level	25th Apr 07	SS, Turbidity	Yes
F_UB	Action Level	30th Apr 07	SS	Yes
F_UB	Limit Level	30th Apr 07	Turbidity	Yes
F_UB	Limit Level	20th May 07	SS, Turbidity	Yes
F_UB	Limit Level	21st May 07	SS, Turbidity	Yes
F_UB	Limit Level	28th May 07	Turbidity, SS	Yes
F_UB	Action Level	30th May 07	Turbidity, SS	Yes
F_UB	Limit Level	4th Jun 07	Turbidity, SS	Yes
F_UB	Limit Level	10th Jun 07	Turbidity, SS	Yes
F_UB	Limit Level	11th Jun 07	Turbidity, SS	Yes
F_UB	Limit Level	18th Jun 07	Turbidity, SS	Yes
F_DB	Limit Level	26th Mar 07	SS, Turbidity	Yes
F_DB	Limit Level	27th Mar 07	SS, Turbidity	Yes
F_DB	Limit Level	2nd Apr 07	SS, Turbidity	Yes
F_DB	Action Level	10th Apr 07	SS	Yes
F_DB	Limit Level	16th Apr 07	SS, Turbidity	Yes
F_DB	Limit Level	23rd Apr 07	SS, Turbidity	Yes
F_DB	Limit Level	25th Apr 07	SS, Turbidity	Yes
F_DB	Limit Level	30th Apr 07	Turbidity	Yes
F_DB	Action Level	7th May 07	SS	Yes
F_DB	Limit Level	20th May 07	SS, Turbidity	Yes
F_DB	Limit Level	21st May 07	SS, Turbidity	Yes
F_DB	Limit Level	28th May 07	Turbidity, SS	Yes
F_DB	Action Level	30th May 07	SS	Yes
F_DB	Limit Level	30th May 07	Turbidity	Yes
F_DB	Limit Level	4th Jun 07	Turbidity, SS	Yes
F_DB	Limit Level	10th Jun 07	Turbidity, SS	Yes
F_DB	Limit Level	11th Jun 07	Turbidity, SS	Yes
F_DB	Limit Level	18th Jun 07	Turbidity, SS	Yes
F_UC	Limit Level	26th Mar 07	SS, Turbidity	Yes
F_UC	Limit Level	27th Mar 07	SS, Turbidity	Yes
F_UC	Action Level	10th Apr 07	SS, Turbidity	Yes
F_UC	Limit Level	23rd Apr 07	SS, Turbidity	Yes
F_UC	Limit Level	25th Apr 07	SS, Turbidity	Yes
F_UC	Limit Level	30th Apr 07	Turbidity	Yes
F_UC	Limit Level	20th May 07	SS, Turbidity	Yes

Monitoring Station	Exceedance Level	Date	Parameters	Project -related
F_UC	Limit Level	21st May 07	SS, Turbidity	Yes
F_UC	Action Level	28th May 07	SS	Yes
F_UC	Limit Level	4th Jun 07	Turbidity, SS	Yes
F_UC	Limit Level	10th Jun 07	Turbidity, SS	Yes
F_UC	Limit Level	11th Jun 07	Turbidity, SS	Yes
F_UC	Limit Level	18th Jun 07	Turbidity, SS	Yes
F_DC	Limit Level	26th Mar 07	SS, Turbidity	Yes
F_DC	Limit Level	27th Mar 07	SS, Turbidity	Yes
F_DC	Action Level	2nd Apr 07	SS	Yes
F_DC	Limit Level	23rd Apr 07	SS, Turbidity	Yes
F_DC	Limit Level	25th Apr 07	SS, Turbidity	Yes
F_DC	Limit Level	30th Apr 07	Turbidity	Yes
F_DC	Action Level	7th May 07	SS	Yes
F_DC	Limit Level	20th May 07	SS, Turbidity	Yes
F_DC	Limit Level	21st May 07	SS, Turbidity	Yes
F_DC	Limit Level	28th May 07	Turbidity, SS	Yes
F_DC	Limit Level	30th May 07	Turbidity, SS	Yes
F_DC	Limit Level	4th Jun 07	Turbidity, SS	Yes
F_DC	Limit Level	10th Jun 07	Turbidity, SS	Yes
F_DC	Limit Level	11th Jun 07	Turbidity, SS	Yes
F_DC	Limit Level	18th Jun 07	Turbidity, SS	Yes
F_Inland M	Limit Level	26th Mar 07	NH_3-N, NO_3-N, TIN, Chl a, SS, Turbidity	Yes
F_Inland M	Limit Level	27th Mar 07	SS, Turbidity	Yes
F_Inland M	Limit Level	28th Mar 07	NH_3-N, NO_3-N, NO_2-N, TIN, Chl a	Yes
F_Inland M	Limit Level	30th Mar 07	NH_3-N, NO_3-N, NO_2-N, TIN, Chl a	Yes
F_Inland M	Limit Level	2nd Apr 07	NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	4th Apr 07	NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Action Level	10th Apr 07	SS	Yes
F_Inland M	Limit Level	10th Apr 07	NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	12th Apr 07	NH_3-N, NO_3-N, NO_2-N, TIN, Chl a	Yes
F_Inland M	Limit Level	16th Apr 07	NO_3-N, TIN	Yes
F_Inland M	Action Level	16th Apr 07	Chl a	Yes
F_Inland M	Limit Level	18th Apr 07	NO_3-N, TIN	Yes
F_Inland M	Limit Level	20th Apr 07	NO_3-N, TIN	Yes
F_Inland M	Limit Level	23rd Apr 07	NO_3-N, NO_2-N, TIN, Chl a, SS, Turbidity	Yes
F_Inland M	Limit Level	25th Apr 07	SS, Turbidity, NH_3-N, NO_3-N, NO_2-N, TIN, Chl a	Yes
F_Inland M	Limit Level	27th Apr 07	NH_3-N, NO_3-N, NO_2-N, TIN, Chl a	Yes
F_Inland M	Action Level	30th Apr 07	SS	Yes
F_Inland M	Limit Level	30th Apr 07	Turbidity, NH_3-N, NO_3-N, NO_2-N, TIN	Yes
F_Inland M	Limit Level	2nd May 07	NH_3-N, NO_3-N, NO_2-N, TIN, Chl a	Yes
F_Inland M	Limit Level	4th May 07	NH_3-N, NO_3-N, NO_2-N, TIN	Yes
F_Inland M	Action Level	7th May 07	SS	Yes
F_Inland M	Limit Level	7th May 07	NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	9th May 07	NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	11th May 07	NO_3-N, TIN, Chl a	Yes

Monitoring Station	Exceedance Level	Date	Parameters	Project -related
F_Inland M	Limit Level	14th May 07	Turbidity, NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	16th May 07	NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	20th May 07	SS, Turbidity, NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	21st May 07	SS, Turbidity, NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Action Level	28th May 07	Turbidity, SS	Yes
F_Inland M	Limit Level	28th May 07	NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Action Level	30th May 07	SS	Yes
F_Inland M	Limit Level	30th May 07	NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	4th Jun 07	NO_3-N, TIN	Yes
F_Inland M	Limit Level	10th Jun 07	Turbidity, SS, NH_3-N, NO_3-N, NO_2-N, TIN, Chl a	Yes
F_Inland M	Action Level	11th Jun 07	SS	Yes
F_Inland M	Limit Level	11th Jun 07	Turbidity, NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	18th Jun 07	NH_3-N, NO_3-N, TIN	Yes

Remarks: Exceedances recorded at Streams A, B & C were mainly due to insufficient temporary drainage provided on site, in particular during and after rain. Exceedances recorded at F_Inland Marsh were due to remaining accumulation of nutrient discharge from the temporary sewage treatment plant and insufficient temporary drainage provided on site.

5.2.3 Exceedances of ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total inorganic nitrogen and chlorophyll a were recorded at downstream of fresh water inland marsh. Further review of action and limit levels of ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total inorganic nitrogen and chlorophyll is recommended. All exceedances were considered project-related but not due to the turf establishment.

5.2.4 Biological pesticide was applied to suppress the insect growth at the first priority. However, it could be effectively kill the insects and leading to turf damage. Chemical application (Chlorpyrifos) was, therefore, applied at Holes 3-8 during the reporting month. It is one of the approved insecticides listed in the turfgrass management plan in the final EIA report. All water samples were required to send to overseas laboratory for analysis and testing. The monitoring results are not available during the reporting month.

5.2.1 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.

5.2.2 The Contractor was reminded to improve and provide sufficient temporary drainage system and treatment facilities on site before water discharge to marine and stream water.

5.3 Ecology

5.3.1 The Contractor was reminded to remove the boulders within the stream buffer zone area at the downstream end of Stream A by hand. No equipment was allowed entering to the stream buffer zone area to rectify the situation.

5.3.2 Stream C buffer zone incident (vegetation clearance at part of the buffer zone area) was occurred in May 2007 and reinstated in June 2007. The Contractor was reminded to maintain the reinstated buffer zone (Streams B & C) during the construction phase of this project.

5.3.3 Significant silty runoff and silt were deposited at the steam bed of Streams B & C after heavy rainstorms. We consider that the preventative measures provided on site is insufficient and many of the silt fence were collapsed at various low points along the buffer zone areas leading to silty runoff. We have also repeatedly reminded the Contractor to strengthen and implement sufficient preventive measures to avoid silty runoff to all streams and marine water during site audit. The incident report, proposed remediation work and mitigation measures prepared by the Contractor were outstanding in this reporting quarter.

Marine Ecology

5.3.4 The third quarterly coral monitoring at Site B2, Site C and Control Site was postponed due to the shark sighting within Port Shelter in June 2007.

Transplanted Coral

5.3.5 The second quarterly coral monitoring at the transplanted corals was postponed due to the shark sighting within Port Shelter in June 2007.

5.4 Summary of Environmental Complaint

5.4.1 No environmental complaint was received from the construction site 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 April to June 2007 in accordance with EM&A Manual and the requirement under EP-224/2005.

6.1.2 Three exceedances of the Action Level were recorded for 24-hour TSP.

6.1.3 Water quality exceedances, chlorophyll a and ammonia nitrogen, at marine and stream monitoring locations were mainly due to the natural variation of the marine water. However, suspended solids and turbidity exceedances were recorded were considered project-related after rainstorms occurred during Apr to June 2007.

6.1.4 The Contractor was reminded to rectify the Stream A (rock fill at downstream portion) as soon as possible without using any equipment/machinery within the buffer zone. For Streams B & C (silt of settled at the stream bed) during the wet season, the Contractor was reminded to protect the buffer zone and streams throughout the construction phase.

6.1.5 The third quarterly coral monitoring at the Site B2, Site C and the Control Site and second quarterly transplanted corals were postponed due to the shark slighting within Port Shelter.

6.1.6 The Contractor was reminded to proper dispose the vegetation stockpiles and construction waste. The Contractor was also reminded to rectify the mal-pruning practice of the transplanted trees and maintain all transplanted trees in good health condition in particular provision of tree buffer zone and sufficient watering.

6.1.7 No environmental complaint was received but one pink form was received regarding on dust generation during the reporting quarter.

6.1.8 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.