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

Quarterly Environmental Monitoring & Audit (EM&A) Report for January to March 2007

(Report No. 382210/Q_005)

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

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	Name	Signature	Date
Prepared	**Esther Tong**		Apr 2007
Checked	**Manuel Chua**		Apr 2007
Reviewed	**P K Lee**		Apr 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 January to March 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 January to March 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 April 2007

Executive Summary

This is the fifth 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 first quarter of 2007 from January to March 2007.

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

Major construction works carried out at the construction site were as follows:
1. Site formation - **Completed**: Holes 3-8, 10-15; **In progress**: Holes 1-2, 9-10,17-18
2. Drainage system installation - **Completed**: Holes 4-8; **In progress**: Holes 1-3, 9-18
3. Irrigation installation - **Completed**: 4,8; **In progress**: 1-3, 5-7, 9-18
4. Sub-soil drainage installation - **Completed**: 4-6, 8; **In progress**: 1-2, 7, 9-18
5. Turf establishment - **Completed**: Hole 8; **In progress**: 5 (other holes were not yet commenced)
6. Low level intake and gravity drain - 96% (reinstatement and low level intake pumping station)
7. Construction of irrigation lakes, pumping stations, underground water tanks - **In progress**
   i. Lake 1D - 97% (placing the miracell)
   ii. Lake 4 - 90% (lining construction)
   iii.Lake 10 - 50% (lining construction)
8. Slope Restoration works - 75%

Construction of permanent bridges:
(i) Deck construction of bridge no. 9 (Stream A) - **In progress**
(ii) Pipe culvert construction at Stream B2 – **Completed**
(iii) Deck construction of in-situ bridge no. 10 (Stream B1) - **In progress**
(iv) Deck construction of bridge no. 15 (Stream A) - **In progres**s
(v) Deck construction of bridge no. 5 (fresh water inland marsh) - **In progress**

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
- Operation of temporary bridges at Streams A (no. 9), B (no. 10) & C (no. 15) and fresh water inland marsh (no. 5): All demolished by the end of March 2007

No dredging of the permanent intake and outfall pipelines for the desalination plant has been carried out. Hong Kong Jockey Club (HKJC) is still gathering supplementary information to EPD. Construction work of Irrigation Lake 1D and associated pipelines for the desalination plant were still in progress (storage of the product water from the desalination plant for East Course irrigation in future) and expected to complete in mid-April 2007. 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 were checked in March 2007 for the first time after the transplantation survey. The site was the bedrock near Site D2, to the south of the existing ferry pier. All 89 transplanted corals were recovered and no mortality, sedimentation or bleaching was found on any of the transplanted corals. The corals remained similar with the baseline conditions during the transplantation survey.

Marine ecology was conducted in March 2007 at Site B2, Site C and Control Site. In the survey, most of these tagged corals at Site B2, Site C and Control Site were in similar conditions as in December 2006.

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). Major water source for both golf holes was from existing reservoir. Due to the sand supply and quality of the turf issues, the turf establishment at the East Course was delayed. Most of the golf holes will be exposed during the wet season.

Archaeology watching brief was completed in February 2007. No archaeological material or deposits was identified. The fourth quarterly report was submitted to AMO for comment. The draft final report was under preparation.

The floating pontoon was located and operated at the designated location according to Environmental Permit (EP). Concrete batching plant has been in operation.

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. The Contractor was agreed to remove the rock during the temporary bridge demolition. Regarding the vegetation clearance of Stream B2 buffer zone happened in November 2006, the reinstatement work was carried out in March 2007 by planting native shrubs. Significant silty runoff and silt were deposited at the steam bed of Stream C were recorded after the rainstorm in November 2006. The strengthening of the temporary drainage system on site was in progress.

Temporary drainage management plan (TDMP) prepared by the Contractor was submitted to the Engineer for approval in March 2007. The TDMP was designed to deal with the silty runoff only. It was not included the temporary drainage system to deal with nutrient/pesticide runoff during turf establishment. Regarding the latest submission of TDMP, silt fence, which was installed along the construction site boundary/inlet of catch basins (make use of the permanent drainage system) was the major component of the temporary drainage system. No wastewater treatment facility was proposed before silty water discharge. ET was commented on the TDMP and waiting for the revised TDMP to prevent the contaminated runoff from the construction site to nearby water sensitive receivers in the coming wet season.

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	17 times
Water quality monitoring (marine + freshwater)	17 times
Terrestrial Ecology	3 times
Marine Ecology	1 time
Landscaping & Visual	7 times

Air Quality

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

Water Quality

For marine water quality, all exceedances (chlorophyll a and ammonia nitrogen) recorded at M_Marsh and TTC were considered not project-related (turf establishment was only at Holes 5 & 8 and the increase of measured concentrations at impact stations were similar to the control stations) during the reporting quarter.

For freshwater monitoring stations, exceedances were recorded, mainly suspended solids and turbidity, at all monitoring locations (Streams A, B & C). Since turf establishment was commenced in Hole 5, nutrient monitoring was carried out at the downstream of fresh water inland marsh. Continuous exceedances of ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total inorganic nitrogen and chlorophyll a were recorded at downstream of fresh water inland marsh. Possible reasons could be due to (i) continuous wastewater discharge from temporary sewage treatment plant at the Contractor's site office, (ii) the change of physical condition of fresh water inland marsh which may decrease the secondary treatment removal capacity (heavily silt after rainstorms occurred in wet season 2006) and (iii) reinstatement work at upstream of fresh water inland marsh (desilting). 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 (only two applications of nutrients was recorded in February and March 2007 at Hole 8).

Ecology

Terrestrial

No non-compliance was recorded during the reporting quarter.

Marine

No non-compliance was recorded during the reporting quarter.

Transplanted coral

As agreed with AFCD, transplanted coral survey will required to be monitored for one year on quarterly basis. The first and second quarterly transplanted coral surveys were conducted on December 2006 and March 2007 respectively. For the second quarterly survey, all 89 transplanted corals were recovered and their conditions were similar with the baseline conditions in December 2006. The next (third) quarterly coral monitoring for the transplanted corals will be conducted in June 2007.

Environmental, Landscape and Visual Audit, Watching Brief, Land Contamination

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, silt 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; and
- Provide sufficient mobile toilets at remote site areas;

Ecology

- Remove remaining rubbles at downstream of Stream A after temporary bridge dismantling;
- Maintain the reinstated (planting shrub) at Stream B2 buffer zone since March 2007; and
- Rectify and remediate the silt deposit at Stream C after the rainstorm occurred in November 2006.

Water Quality

- Submit the revised and implement temporary drains according to Temporary Drainage Management Plan (TDMP) to ER for approval for the coming wet season in 2007 to avoid silty/nutrient/pesticide runoff;
- Provide sufficient mitigation measure for the permanent bridges 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 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 WPCO requirements;
- Provide sufficient treatment facilities especially at water sensitive areas 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 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 trees.

Watching Brief

Watching Brief was carried out at Holes 2, 11, 12, 14, 15 & 16. Archaeological watching brief was completed in February 2007. No archaeological material was identified in all four quarterly reports (February 2006 to March 2007).

Land Contamination

All related work for land contamination work was completed in the last reporting quarter.

Environmental Complaints and Prosecution

For the construction dust generated from the construction site to nearby sensitive receivers (public/golfers), EPD formally issued "Yellow Form" to CHEC on 30 March 2006 after the site inspection on 10 March 2006. EPD carried out routine site inspections and gave verbal warnings to CHEC on (i) dust generation from dusty stockpiles and vehicles at major haul roads and (ii) insufficient installation of hoarding at the main exit/entrance according to the Air Pollution Control Ordinance (APCO) after the site inspection. However, the progress of the dust suppression mitigation measures provided on site was slow. EPD did the site investigation on 15 January 2007 and issued "Pink Form" to CHEC on 17 January 2007. The suspected non-compliance is due to carrying out notifiable work not in accordance with the Schedule of the APCO (Construction Dust) Regulation (Schedule no.14).

According to the EPD latest record, CHEC was convicted for breaching the Water Pollution Control Ordinance (WPCO) and fined $50,000 in November 2006. The main reason for the prosecution was due to the active pumping/discharge of silty water from the construction site of desalination plant directly into Port Shelter Water Control Zone (WCZ) without provision of proper water treatment facilities on site for treatment to ensure that the water quality complied with Water Quality Objectives (WQO) of Port Shelter before discharge on 12 June 2006.

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

Key issues to be considered in the coming reporting quarter include:

- Potential dust generation from activities on-site : permanent drainage/irrigation system construction, concrete batching plant operation and soil/sand/aggregates stockpiles;
- Provide sufficient temporary drainage system and mitigation measures for construction temporary/permanent crossings at Streams A, B1, B2 and C;
- Turf establishment at northern East Course (Holes 4, 5, 6 & 8);
- 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 before the coming wet season 2007;
- 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:

- Submit the revised 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;
- Carry out coral monitoring when desalination plant operates in dry season and
- ADS filter system (nutrients and pesticides removal) at Hole 5 has already implemented on 12 February 2006 (3 units). There were 3 out of 5 units of ADS filter systems had been implemented at Hole 6. The remaining 2 units will be installed during the next reporting month.

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 fifth quarterly EM&A report which summarises the environmental monitoring and audit works for the Project in the first quarter of 2007 from January to March 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.

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 January to March 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 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.

3.5 Archaeology (Watching Brief)

3.5.1 Watching brief at Holes 2, 11, 12, 14, 15 & 16 was completed during the reporting quarter.

3.6 Land Contamination

3.6.1 All land contaminated related work was completed during the last reporting quarter.

4. Environmental Audit

4.1 Implementation Status of Environmental Mitigation Measures

4.1.1 Major construction work of the third golf course were (i) site formation at south holes and Hole 17, (ii) permanent closed low flow drainage system installation including lake/pumping station construction and gravity drain from Lake 1D to existing reservoir, (iii) irrigation system installation, (iv) sub-soil drains installation and (v) hydroseeding at the permanent slope/bare grounds, (vi) partial turfing at Hole 5.

4.1.2 The huge soil stockpiles located at Holes 1 and 16 were planted with hydroseed to reduce the dust generation. 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.

4.1.3 The water source for dust suppression was mainly pumped from the downstream of the fresh water inland marsh and underground water generated near Lake 1D. Downstream of Streams A & C were relatively dry during the dry season, only small quantity was extracted from Stream A.

4.1.4 Temporary Drainage Management Plan (TDMP) was submitted by the Contractor for ER's approval in mid-March 2007. ET and the Engineer were provided the comments to the Contractor. The Contractor had to revise the TDMP and implement on site before the wet season.

4.1.5 Silt fence was implemented along the site boundary (major component of the temporary drainage system) for most of the exposed areas. According to the site observation, most of the temporary drains (silt fence) were removed along the site boundary of the golf hole and considered unsatisfactory (in particular at Northern and centre section of East Course). In addition, layers of silt fence were installed by surrounding the catch basins to prevent the silty runoff directly into the permanent drains. The Contractor was reminded to maintain the silt fence more frequently to prevent silty runoff to the water sensitive areas and critically review the temporary drainage provided on site. Silty runoff was recorded at all streams and freshwater inland marsh on 12 March 2007 after scattered showers. Potential heavy rain(s) could still occur during the dry season.

4.1.6 Hydroseeding at scar areas within the East Course was completed before March 2007. However, some areas were required re-hydroseeding. Vegetation stockpiles, general refuse and construction waste stockpiles were temporary stored at Hole 2 and disposed off-site after accumulation for four weeks during this reporting month. The Contractor was reminded to dispose all other remaining construction wastes gradually off-site and submitted the trip tickets record for our reference.

4.1.7 Reinstatement work at Stream B2 buffer zone was carried out during the reporting month by planting native shrub (including *Gordonia axillaries*, *Melastoma candidum*, *Melastoma sanguineum*, *Rhaphiolepis indica*, *Rhodomyrtus tomentosa*) with approximate 400mm height at four plots per metre square density.

4.1.8 Chemical waste storage area was available starting from this reporting month and located at the concrete batching plant. Insufficient mobile toilets were available on site at remote areas, only few units were located at the southern portion of construction site.

4.1.9 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**. The construction noise permit (GW-RE0157-06) was expired. The Contractor was reminded to renew the permit.

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.

4.3.2 Chemical waste storage area near to the concrete batching plant was available on site during the reporting quarter. Some oil tanks were required as the standby fuel. However, drip trays were not provided underneath the oil tanks to prevent leakage on the bare ground.

4.3.3 No trip ticket record was submitted by the Contractor since the last submission in January 2007. The Contractor was reminded to submit for our record and reference.

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

5.1 Air Quality

5.1.1 Two non-compliance of 24-TSP were recorded at GCA B1 during the reporting quarter.

5.2 Water Quality

5.2.1 No rainstorm event was occurred during the reporting quarter. The marine water exceedances were summarised in **Table 5.2-2.**

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

Monitoring Station	Exceedance Level	Date	Parameters	Project-related
TTC	Limit Level	12/Feb/07	Chl a	No
M_Marsh	Action Level	14/Feb/07	Chl a	No
TTC	Limit Level	14/Feb/07	NH3-N, Chl a	No
TTC	Limit Level	16/Feb/07	Chl a	No
TTC	Limit Level	21/Feb/07	Chl a	No
TTC	Limit Level	23/Feb/07	Chl a	No
TTC	Limit Level	26/Feb/07	Chl a	No
TTC	Action Level	26/Feb/07	NH_3-N	No
M_Marsh	Limit Level	28/Feb/07	NH_3-N	No
TTC	Limit Level	28/Feb/07	NH_3-N	No
TTC	Limit Level	05/Mar/07	Chl a	No
TTC	Action Level	07/Mar/07	NH_3-N	No
TTC	Action Level	12/Mar/07	NH_3-N	No
TTC	Action Level	14/Mar/07	NH_3-N	No
TTC	Action Level	19/Mar/07	Chl a	No
TTC	Action Level	21/Mar/07	NH_3-N	No
TTC	Action Level	23/Mar/07	NH_3-N	No
TTC	Limit Level	12/Feb/07	Chl a	No
M_Marsh	Action Level	14/Feb/07	Chl a	No
TTC	Limit Level	14/Feb/07	NH3-N, Chl a	No
TTC	Limit Level	16/Feb/07	Chl a	No
TTC	Limit Level	21/Feb/07	Chl a	No
TTC	Limit Level	23/Feb/07	Chl a	No

Freshwater

5.2.1 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_DB	Limit Level	28/Dec/07	Turbidity	Yes
F_DC	Limit Level	28/Dec/07	Turbidity	Yes
F_Inland M	Limit Level	28/Dec/07	Turbidity	Yes
F_UB	Limit Level	28/Dec/07	SS, Turbidity	Yes
F_UC	Limit Level	28/Dec/07	Turbidity	Yes
F_DA	Action Level	03/Jan/07	SS	Yes
F_Inland M	Limit Level	03/Jan/07	Turbidity	Yes
F_DB	Action Level	08/Jan/07	Turbidity	Yes
F_Inland M	Limit Level	08/Jan/07	Turbidity	Yes
F_UB	Action Level	08/Jan/07	Turbidity	Yes
F_DA	Limit Level	15/Jan/07	Turbidity	Yes
F_DB	Limit Level	15/Jan/07	Turbidity	Yes
F_DC	Limit Level	15/Jan/07	Turbidity	Yes
F_Inland M	Limit Level	15/Jan/07	Turbidity	Yes
F_UB	Limit Level	15/Jan/07	Turbidity	Yes
F_UC	Limit Level	15/Jan/07	Turbidity	Yes
F_DA	Action Level	20/Jan/07	SS	Yes
F_DA	Action Level	22/Jan/07	SS, Turbidity	Yes
F_Inland M	Action Level	22/Jan/07	Turbidity	Yes
F_UB	Limit Level	22/Jan/07	SS, Turbidity	Yes
F_DA	Limit Level	05/Feb/07	SS, turbidity	Yes
F_DB	Limit Level	05/Feb/07	SS, turbidity	Yes
F_UB	Limit Level	05/Feb/07	SS, turbidity	Yes
F_DA	Limit Level	12/Feb/07	SS, turbidity	Yes
F_DB	Action Level	12/Feb/07	SS, turbidity	Yes
F_Inland M	Limit Level	12/Feb/07	NO3-N, TIN, Chl a	Yes
F_UB	Action Level	12/Feb/07	SS, turbidity	Yes
F_Inland M	Limit Level	14/Feb/07	NH3-N, NO3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	16/Feb/07	NH3-N, NO3-N, TIN, Chl a	Yes
F_DA	Action Level	21/Feb/07	SS	Yes
F_DA	Limit Level	21/Feb/07	Turbidity	Yes
F_Inland M	Limit Level	21/Feb/07	NH3-N, NO3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	23/Feb/07	NH3-N, NO3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	26/Feb/07	NH_3-N, NO_3-N, TIN, Chl a	Yes
F_DA	Limit Level	28/Feb/07	SS	Yes
F_Inland M	Limit Level	28/Feb/07	NH_3-N, NO_3-N, TIN	Yes
F_Inland M	Limit Level	02/Mar/07	NH_3-N, NO_3-N, TIN	Yes
F_Inland M	Limit Level	05/Mar/07	NH_3-N, NO_3-N, TIN, Chl a, SS, turbidity	Yes
F_Inland M	Limit Level	07/Mar/07	NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	09/Mar/07	NH_3-N, NO_3-N, TIN	Yes

Monitoring Station	Exceedance Level	Date	Parameters	Project-related
F_DA	Limit Level	12/Mar/07	SS, turbidity	Yes
F_DB	Limit Level	12/Mar/07	SS, turbidity	Yes
F_DC	Limit Level	12/Mar/07	SS, turbidity	Yes
F_Inland M	Limit Level	12/Mar/07	NH_3-N, NO_3-N, TIN, Chl a	Yes
F_UB	Action Level	12/Mar/07	SS, turbidity	Yes
F_UC	Limit Level	12/Mar/07	SS, turbidity	Yes
F_Inland M	Limit Level	14/Mar/07	NH_3-N, NO_3-N, TIN	Yes
F_Inland M	Limit Level	16/Mar/07	NO_3-N, TIN	Yes
F_Inland M	Limit Level	19/Mar/07	NH_3-N, NO_3-N, TIN, Chl a, SS, turbidity	Yes
F_Inland M	Limit Level	21/Mar/07	NH_3-N, NO_3-N, TIN, Chl a	Yes
F_Inland M	Limit Level	23/Mar/07	NH_3-N, NO_3-N, NO_2-N, TIN, Chl a	Yes

Remarks: Exceedances recorded at Streams A, B & C were mainly due to insufficient temporary drainage provided on site. Exceedances recorded at F_Inland Marsh could be due to discharge from temporary sewage treatment plant and decrease of removal effectiveness within fresh water inland marsh and insufficient temporary drainage provided on site.

5.2.2 Exceedances of ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total inorganic nitrogen and chlorophyll a were recorded at downstream of fresh water inland marsh. Possible reasons could be due to (i) continuous wastewater discharge from temporary sewage treatment plant at the contractor's site office, (ii) the change of physical condition of fresh water inland marsh which may decrease the secondary treatment removal capacity (heavily silt after rainstorms occurred in wet season 2006) and (iii) reinstatement work at upstream of fresh water inland marsh (desilting). 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 (only two applications of nutrients was recorded in February and March 2007 at Hole 8).

5.2.3 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.

5.2.4 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

5.4.1 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.

6.1.1 For the Stream B2 buffer zone incident (vegetation clearance at part of the buffer zone area), reinstatement work was completed in March 2007. The Contractor was reminded to maintain the reinstated buffer zone during the construction phase of this project.

6.1.2 Significant silty runoff and silt were deposited at the steam bed of Stream C were recorded after the rainstorm on 22nd November 2006. The incident report, proposed remediation work and mitigation measures prepared by the Contractor were outstanding in this reporting quarter.

Marine Ecology

5.4.2 No exceedance or incident during the additional monitoring period at Site B2, Site C and Control Site during the third quarterly coral monitoring for the construction phase.

Transplanted Coral

5.4.3 No exceedance or incident during the additional monitoring period at the recipient site during the second quarterly coral monitoring for a year.

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 There was one notification of summons with respect to dust generation from the construction site registered in this 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 January to March 2007 in accordance with EM&A Manual and the requirement under EP-224/2005.

6.1.2 Two 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.

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 Stream B (reinstated in March 2007) & Stream C (silt of settled at the stream bed), the riparian vegetation was in natural conditions similar to the condition during the Baseline Survey.

6.1.5 No exceedance or incident was recorded at the Site B2 during the third quarterly coral monitoring in Dec 2006. For Site C and the Control Site, the tagged corals still remained similar conditions as during the Baseline Survey. No mortality, sedimentation or bleaching was found on the tagged corals in these two sites.

6.1.6 Tree protection is satisfactory. Stockpiles of cleared vegetation were found stored on site and required removal. 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 and no environmental summons/prosecutions were received during the reporting period since the commencement of the Project.

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.