Ocean Park Master Redevelopment Project

Monthly Environmental Monitoring & Audit Report – February 2010

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Part 2 CI-07 EM&A Monthly Report

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Part 1 Project Overview

Executive Summary

This is the combined monthly EM&A Report for Ocean Park Master Redevelopment Project, which includes CI07 “Entry Plaza, Aqua City and Grand Aquarium”, ”CS02 “Rainforest” and CS03 “Trill Mountain and Polar Adventure”. This report presents the results of EM&A works conducted in the reporting month of February 2010 (from 26 January 2010 to 25 February 2010).

A summary of monitoring and audit activities conducted in the reporting period is listed below:

1-hour TSP monitoring	15 sessions for all air quality monitoring stations,
24-hour TSP monitoring	5 sessions for air quality monitoring stations,
Daytime noise monitoring	5 sessions for all noise monitoring stations,
Evening or night time noise monitoring	0 sessions for all noise monitoring stations,
Holiday time noise monitoring	0 session,
Coral monitoring	1 session, and
Environmental Site Inspection	4 sessions (including IEC audit)

No exceedance was recorded on the 1-hour TSP monitoring, 24-hour TSP monitoring, Day-time noise monitoring and coral monitoring.

No complaint, non-compliance from IEC, summons or prosecution related to environmental issues was made against the Ocean Park Master Redevelopment Project in the reporting period of February 2010.

1. Introduction

The "Master Redevelopment Project of Ocean Park" (hereinafter known as the "Project") is implemented by the Ocean Park Corporation at its existing site of Ocean Park and Nam Long Shan, Aberdeen. The Project involves both reconstruction/modification of existing facilities and expansion of the Park, and therefore under Environmental Permit, EP-249/2006/A.

The construction works of the project consists of various contracts. Details of the contracts, which are required to perform the EM&A programme, are shown below.

Contract No.	Contract Title	Contractor	Construction Commencement
CI-05	Site Formation, Funicular Tunnel and Miscellaneous Works	Dragages-Bouygues JV	12 March 2007 and Construction phase has ceased in early June 2009
CS-01	Back of House for Marine Mammal Veterinary Hospital	Kaden – ATAL JV	26 March 2007 and Construction phase has ceased in mid-October 2008
CW-02	Astounding Asia	W. Hing Construction Co. Ltd.	1 August 2007 and Construction phase has ceased in mid-February 2010
CI-07	Entry Plaza, Aqua City and Grand Aquarium	Leighton Contractors (Asia) Ltd.	15 August 2008
CS-02	Rainforest	W. Hing Construction Co. Ltd.	11 May 2009
CS-03	Trill Mountain and Polar Adventure	Kaden – ATAL JV	2 November 2009

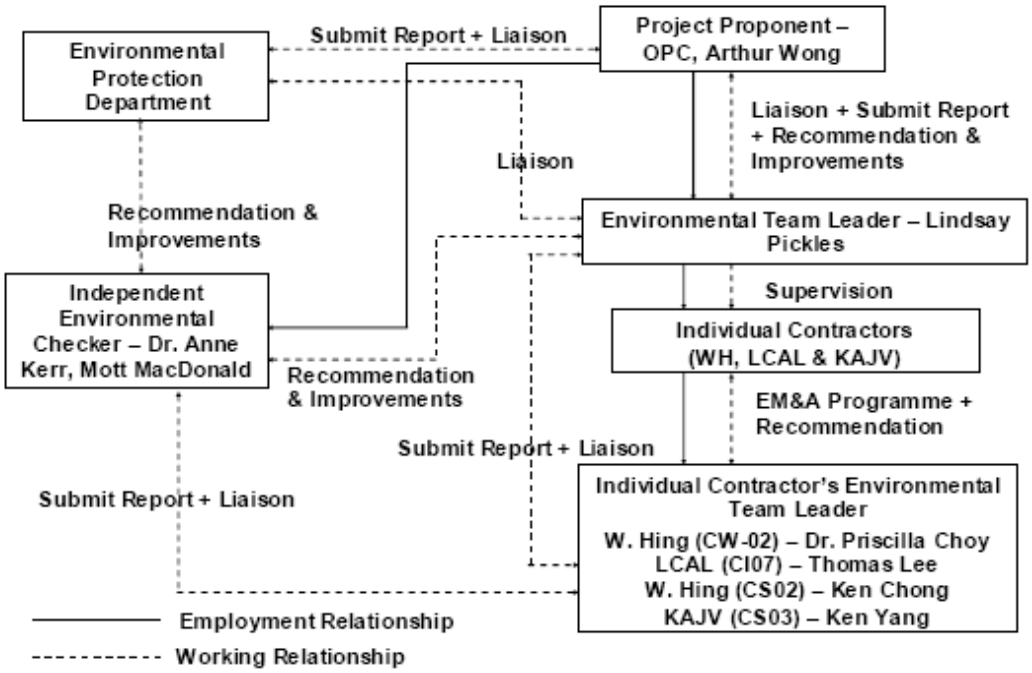
The Contractors will conduct environmental monitoring and audits during the construction stage and produce contract specific monthly EM&A reports. The RSS will prepare a combined monthly EM&A report for the project. This is the combined monthly EM&A Report including the IEC audit findings, CI07, CS02 and CS03 Monthly EM&A Report.

This report presents the results of EM&A works conducted in the reporting month of February 2010 (from 26 January 2010 to 25 February 2010).

2. Project Organisation

The structure of the environmental management team is shown in below figure.

Figure 1.1 Management Organization



3. Construction Works Undertaken during the Reporting Month

In the reporting month, the construction activities summarise as follows.

CI-05

- Construction phase has ceased in early June 2009.

CW-02

- Finishing Works for the Plant Room & Bridge at Main (Emerald) Aviary; and
- E&M Works for the Plant Room & Bridge at Main (Emerald) Aviary.

CS-02

- Block-wall construction, conduit works, wiring, plastering works at Exhibition House.
- Control Tower demolition, retaining wall works, Rapid Ride Through construction, Ancillary Building construction, Rapid Ride Equipment installation, road works & steelworks for Ancillary Building at the external area.

CS-01

- Construction phase has ceased in mid-October 2008.

CI-07

- Podium paving, blockworks, tiling and plastering at Entry Plaza;
- Staircase construction and pipe work at Aqua City;
- Water feature construction extension and screeding at Carousel Plaza.
- T20 tank sumilining, painting and Life Support System installation at Grand Aquarium;
- External wall finishing, plastering, painting and E&M works at Entry Plaza, Aqua City and Grand Aquarium; and
- Switch room and gen-set installation at Transformer Room (AAA).

CS-03

- Concrete casting for footings of Polar Adventure;
- Construction works for Fence wall and backfill for Retaining wall;
- Construction of South Pole Penguin Pool;
- Backfilling and construct North Pole on grade slab;
- Cast base slab and wall for Summit Reservoir;
- Rock dowel installations for Polar Adventure and Summit Reservoir;
- Pilling works and footing works for Floorless Coaster Station;
- Construction of column for Summit Reservoir;
- Constructions of utilities draw pit and underground drainage manhole.
- Existing stockpile disposal.

4. Permits and License Status

4.1. Environmental Permit

The Environmental Impact Assessment (EIA) Report of the Project has been approved by the Environmental Protection Department (EPD) (Register No.: AEIAR-101/2006) on 12 July 2006. Subsequently, EPD issued Environmental Permit (EP) for the construction and operation of the project. Table below is a full list of the EPs.

EP No.	Issue Date	Key Variation
EP-249/2006	28 July 2006	First EP
EP-249/2006/A	25 September 2006	• Enhance the roosting habitat for freshwater birds by enlarging Pond 35 and its surrounds with a total area of no less than 120 squares meters and no construction works and discharge from construction sites shall be allowed within Pond 35 after enhancement. • Filling of Pond 37 at the Lowland Area. • Submission of the as-built drawings showing the enhancement works of Pond 35.

4.2. CNP

Table below shows a list of CNP within the reporting month.

Permit No.	Starting Date	Expired Date	Valid Time	Location	Contract No.	Status
CI-07 (Leighton)						
GW-RS0764-09	14-Oct-09	13-Apr-10	*For water pumps, generator and wastewater treatment plant operation from 19:00-23:00 (general holiday including Sunday*	Ocean Park Road	CI-07	Valid
GW-RS0816-09	6-Nov-09	5-May-10	*For grout mixer and grout pump operation from 19:00 to 23:00 (any day not being a general holiday) and 07:00 to 23:00 (general holiday including Sunday)*	Ocean Park Road	CI-07	Valid
GW-RS0978-09	28-Dec-09	24-May-10	*For scissor platform, hand-held drill; grout mixer and grout pump or diesel mobile crane operation from 19:00 to 23:00 (any day not being a general holiday) and 07:00 to 23:00 (general holiday including Sunday)*	Ocean Park Road	CI-07	Valid
GW-RS0967-09	23-Dec-09	22-May-10	*For water pump and wastewater treatment plant operation for any day 23:00 to 07:00 on next day.*	Ocean Park Road	CI-07	Valid
CW-02 (W. Hing)						
N/A	N/A	N/A	N/A	N/A	N/A	N/A
CS-02 (W. Hing)						
GW-RS0925-09	14-Dec-09	8-Jun-10	*Crane, tower (electric), Crane, mobile (diesel) and Excavator, tracked*	Top of Nam Long Shan Road	CS02	Valid
CS-03 (KAJV)						
GW-RS0893-09	1-Dec-09	31-May-10	*Generator, super silenced, 70 dB(A) at 7m, concrete pump, lorry mounted, concrete lorry mixer, tower crane (electric), air compressor, with noise emission label showing a sound power level of < 99dB(A)*	Top of Nam Long Shan Road	CS03	Valid
GW-RS0893-10	1-Mar-10	31-Jul-10	*Bar bender and cutter (electric), Crane, tower (electric), Generator, super silenced, 70 dB(A) at 7m and water pump (electric)*	Top of Nam Long Shan Road	CS03	Valid

4.3. Other Permits & Licenses

Tables below show lists of other permits & license for individual contracts.

CI-07

Permit/Ref/No	Valid Period		Section	Status
Notification of Construction Work under APCO				
001032366	15-Aug-08	-	Entry Plaza, Aqua City & Grand Aquarium	Notified
Effluent Discharge License				
EP820/W2/XW246	05-Sep-2008	30-Sep-13	Entry Plaza, Aqua City & Grand Aquarium	Valid
Registration as Chemical Waste Producer				
5213-199-L2174-28	22-Sep-09	N/A	Entry Plaza, Aqua City & Grand Aquarium	Registered
Construction Waste Disposal Charging Scheme				
7007576	-	-	Entry Plaza, Aqua City & Grand Aquarium	Issued

CW-02

Permit/Ref/No	Valid Period		Section	Status
Notification of Construction Work under APCO				
001022480	11-July-07	-	Astounding Asia	Notified
Effluent Discharge License				
EP820/W9/XW240	12-Oct-07	31-Oct-12	Astounding Asia	Valid
Registration as Chemical Waste Producer				
5213-199-W2894-18	20-Aug-07	-	Astounding Asia	Registered
Construction Waste Disposal Charging Scheme				
7005864	-	-	Astounding Asia	Issued

CS-02

Permit/Ref/No	Valid Period		Section	Status
Notification of Construction Work under APCO				
305349	N/A	N/A	Rainforest	Notified
Water Discharge License				
WT00004136-2009	19-Jun-09	30-Jun-14	Rainforest	Valid
Registration as Chemical Waste Producer				
WPN5214-176-W1150-03	13-May-09	N/A	Rainforest	Registered
Construction Waste Disposal Billing Account with EPD				
WFG07578	N/A	N/A	Rainforest	Issued

CS-03

Permit/Ref/No	Valid Period		Section	Status
Notification of Construction Work under APCO				
N/A	N/A	N/A	Thrill Mountain and Polar Adventure	Application in progress
Water Discharge License				
WT00005926-2010	12-Feb-10	28-Feb-15	Thrill Mountain and Polar Adventure	Valid
Registration as Chemical Waste Producer				
WPN5213-176-K2880-02	25-Nov-09	N/A	Thrill Mountain and Polar Adventure	Registered
Construction Waste Disposal Billing Account with EPD				
7009695	N/A	N/A	Thrill Mountain and Polar Adventure	Issued

5. EP Submissions Status

Environmental submissions to EPD since the commencement of construction works at Ocean Park, i.e. from 12 March 2007 to 25 February 2010 are as below.

Contract	Submissions
CI-05	• Notification of Commencement Date • Management Organisation Chart • Construction Programme • Drainage Proposal • Silt Curtain Proposal • Waste Management Plan • Baseline Air Quality and Noise Monitoring Report • Transplantation Proposal for Uncommon Species • Baseline Coral Survey Report • As-built Drawings of Pond 35 • Detailed Compensatory Planting As-built Drawing
CW02, CI07, CS02 and CS03	• Combined Monthly EM&A Report (January 2010)
City Bus Limited	• Written Notice on Completion of TPH Contaminated Soil Disposal • Written Notice on Completion of Solidification Treatment of Heavy Metals Contaminated • As-built Remediation Plan
Hong Kong School of Motoring Ltd.	• Confirmation Letter to confirm that Land Contamination remediation Works within HKSM has been completed

6. Materials Management

Section 6.17 in the EIA report specified the disposal of materials to the public fill reception facilities should be considered as last resorts with the preferred approach to reuse the material within the project and/or other projects.

The amounts of different types of materials generated by the activities of the Project in the month are shown in following table. The total materials quantities of the project showed that the reuse of materials was maximized and the disposal to the public filling facilities was minimized. Mitigation measures under the Waste Management Plan (WMP) revision D have been implemented during the reporting period.

Materials Type	Disposal Locations	CW-02	CI-07	CS-02	CS-03	Total
C&D Waste	SENT	--	513.00 tonnes	21.44 tonnes	10.20 tonnes	544.64 tonnes
	TKOSF	3.42 tonnes	--	--	--	3.42 tonnes
	TMSF	--	--	--	--	0.00 tonne
C&D Material	QBBP/ CWPFBP	5.39 tonnes	1,815.00 tonnes	437.81 tonnes	2,538.00 tonnes	4,796.20 tonnes
	TKOFB	--	--	--	--	0.00 tonne
Chemical Waste	Collected by licensed collector	--	220.00 kg	--	--	220.00 kg
General Waste	Collected by licensed collector	--	--	--	--	0.00 tonne

7. Environmental Monitoring and Results

7.1. Requirements

Under EP-249/2006/A condition 3.2, impact environmental monitoring including sampling, measurements and necessary remedial action should be conducted in accordance with the requirements of the EM&A Manual. The environmental monitoring including air quality and noise were conducted by the Contract of CI-07 within the reporting period.

The items below would not be described in Part 1 report and would be described in CI-07 monthly EM&A report.

- Methodology and Criteria
- Action and Limit Levels
- Event and Action Plan

7.2. Monitoring Locations

Air Quality (TSP)

The locations of the air monitoring stations are presented in the table below. The figure was shown in the CI-07 Monthly EM&A Report.

Air Quality Monitoring Stations	Identity/Description
AM1	Whisker's Theatre, Ocean Park
AM2	San Wai Village, Wong Chuk Hang
AM3A	Open Area of PMR & OPC temporary Site Offices (from 14 September 2007)

Construction Noise

The locations of the noise monitoring stations are presented in the table below. The figure was shown in the CI-07 Monthly EM&A Report.

Noise Monitoring Stations	Identity/Description
CN1	Open Area adjacent to Police Training School
CN2	Project Development Office, Ocean Park
CN3	Rinniped House, Ocean Park
CN4	Manly Villa

Terrestrial Ecology

Monitoring of the health and condition of the transplanted plant species of conservation interest should be conducted at least once a month during the first 12 month after transplantation. Proposed monitoring location would be next to the Contract CI-05 site office.

Coral

The locations of the coral monitoring stations are presented in the table below. The figure was shown in the Coral Survey Report (Part 5 of this report).

Coral Impact Monitoring Stations	Identity/Description
Site 1	Seaside near the Lowland
Site2 to Site 5	Around Headland
Control Station	Between Near Round Island and Chung Hom Kok

7.3. Monitoring Results

Air Quality (TSP)

The monitoring data reported below was provided by the CI-07 Contractor's Environmental Team Coordinator.

Monitoring Period	1-hr TSP (μg/m^3)		
	AM1	AM2	AM3A
26 January 10 to 25 February 10	30-164	47-239	31-280

Monitoring Period	24-hr TSP (μg/m^3)		
	AM1	AM2	AM3A
26 January 10 to 25 February 10	18-55	23-62	39-86

Construction Noise

The monitoring data reported below was provided by the CI-07 Contractor's Environmental Team Coordinator.

Monitoring Period	Daytime Noise Level, Leq (30min), dB(A)			
	CN1	CN2	CN3	CN4
26 January 10 to 25 February 10	68.8-69.5	55.2-60.5	55.4-60.4	53.0-61.2

Monitoring Period	Evening time Noise Level, Leq (15min), dB(A)			
	CN1	CN2	CN3	CN4
N/A	N/A	N/A	N/A	N/A

No evening time noise monitoring due to no night works started from October 2009.

Terrestrial Ecology

According to the requirement in the EM&A Manual, the monitoring of transplanted plants at the receptor has been completed in August 2008. No further monitoring is recommended and regular inspection would be carried out.

Coral

The monitoring data was presented as below. Detailed results will be presented in Part 5 of this report.

Site 1

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
A1	*Platygyra carnosus*	1200	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
A2	*Favites abdita*	400	5, 1	4, 1▼	-	-	0	0	-	-	2	2	-	-
A3	*Plesiastrea versipora*	600	0, 0	1, 1▲	-	-	0	0	-	-	0	0	-	-
A4	*Leptastrea purpurea*	6200	0, 0	2, 1▲	-	-	0	0	-	-	0	0	-	-
A5	*Platygyra carnosus*	3200	1, 1	0, 0▼	-	-	0	0	-	-	0	0	-	-
A6	*Platygyra carnosus*	2600	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
A7	*Favia speciosa*	500	2, 1	2, 1	-	-	0	0	-	-	5	5	-	-
A8	*Platygyra carnosus*	1500	2, 1	1, 1▼	-	-	0	0	-	-	0	0	-	-
A9	*Leptastres purpurea*	700	4, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
A10	*Platygyra carnosus*	2000	0, 0	1, 1▲	-	-	0	0	-	-	0	0	-	-

Site 2

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
B1	*Platygyra carnosus*	1300	2, 1	2, 1	-	-	0	0	-	-	0	0	-	-
B2	*Plesiastrea versipora*	650	4, 1	2, 1▼	-	-	0	0	-	-	0	0	-	-
B3	*Psammocora superficialis*	4400	5, 1	5, 1	-	-	0	0	-	-	3	3	-	-
B4	*Favia speciosa*	800	0, 0	2, 1▲	-	-	0	0	-	-	2	2	-	-
B5	*Plesiastrea versipora*	1000	2, 1	3, 1▲	-	-	0	0	-	-	2	2	-	-
B6	*Platygyra carnosus*	1500	0, 0	2, 1▲	-	-	0	0	-	-	0	0	-	-
B7	*Hydnophora exesa*	1600	1, 1	1, 1	-	-	0	0	-	-	0	0	-	-
B8	*Plesiastrea versipora*	1300	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
B9	*Favia speciosa*	450	1, 1	2, 1▲	-	-	0	0	-	-	2	2	-	-
B10	*Psammocora superficialis*	400	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-

Site 3

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
C1	*Porites sp*	100	2, 1	2, 1	-	-	0	0	-	-	3	3	-	-
C2	*Porites sp*	210	3, 1	4, 1▲	-	-	0	0	-	-	5	5	-	-
C3	*Goniopora stutchburyi*	410	5, 1	3, 1▼	-	-	0	0	-	-	7	7	-	-
C4	*Pavona decussata*	240	4, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
C5	*Pavona decussata*	210	3, 1	3, 1	-	-	0	0	-	-	1	1	-	-
C6	*Pavona decussata*	200	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
C7	*Montipora peltiformis*	960	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
C8	*Goniopora stutchburyi*	140	1, 1	0, 0▼	-	-	0	0	-	-	0	0	-	-
C9	*Porites sp*	300	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
C10	*Cyphastrea serailia*	600	4, 1	4, 1	-	-	0	0	-	-	0	0	-	-

Site 4

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
E1	*Goniopora stutchburyi*	290	5, 1	3, 1▼	-	-	0	0	-	-	0	0	-	-
E2	*Coscinaraea sp.*	620	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
E3	*Goniopora stutchbury*	300	4, 1	4, 1	-	-	0	0	-	-	3	3	-	-
E4	*Goniopora stutchbury*	130	3, 1	6, 1▲	-	-	0	0	-	-	0	0	-	-
E5	*Goniopora stutchbury*	460	6, 1	6, 1	-	-	0	0	-	-	4	4	-	-
E6	*Goniopora stutchbury*	380	10, 1	7, 1▼	-	-	0	0	-	-	8	8	-	-
E7	*Goniopora stutchbury*	120	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
E8	*Goniopora stutchbury*	230	4, 1	4, 1	-	-	0	0	-	-	2	2	-	-
E9	*Goniopora stutchbury*	170	3, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
E10	*Goniopora stutchbury*	540	7, 1	3, 1▼	-	-	0	0	-	-	3	3	-	-

Site 5

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
D1	*Psammocora sp.*	800	6, 1	4, 1▼	-	-	0	0	-	-	3	3	-	-
D2	*Montipora peltiformis*	600	4, 1	4, 1	-	-	0	0	-	-	0	0	-	-
D3	*Goniopora stutchburyi*	450	2, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
D4	*Cyphastera serailia*	100	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
D5	*Montipora cf. turgescens*	320	4, 1	2, 1▼	-	-	0	0	-	-	0	0	-	-
D6	*Montipora peltiformis*	480	10, 1	8, 1▼	-	-	0	0	-	-	20	20	-	-
D7	*Montipora peltiformis*	500	8, 1	8, 1	-	-	0	0	-	-	2	2	-	-
D8	*Montipora peltiformis*	410	6, 1	6, 1	-	-	0	0	-	-	0	0	-	-
D9	*Montipora peltiformis*	200	5, 1	7, 1▲	-	-	0	0	-	-	5	5	-	-
D10	*Goniopora stutchburyi*	510	7, 1	3, 1▼	-	-	0	0	-	-	5	5	-	-

Control Site C

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
F1	*Goniastrea aspera*	450	2, 1	1, 1▼	-	-	0	0	-	-	0	0	-	-
F2	*Favites pentagona*	2100	2, 1	2, 1	-	-	0	0	-	-	2	2	-	-
F3	*Favites pentagona*	1000	0, 0	0, 0	-	-	0	0	-	-	5	5	-	-
F4	*Favites pentagona*	1300	2, 1	4, 1▲	-	-	0	0	-	-	0	0	-	-
F5	*Cyphastrea seraili*	2100	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
F6	*Porites sp*	2100	5, 1	5, 1	-	-	0	0	-	-	2	2	-	-
F7	*Plesiastrea versipora*	3000	2, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
F8a	*Favites pentagona*	680	0, 0	1, 1▲	-	-	0	0	-	-	0	0	-	-
F9	*Favites pentagona*	2600	0, 0	3, 1▲	-	-	0	0	-	-	0	0	-	-
F10	*Favia rotumana*	600	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-

In the monitoring surveys conducted in February 2010, sedimentation on the tagged colonies from all the 5 Monitoring Sites 1 to 5 and the Control Site C increased or decreased by less than 5% when compared with baseline data in November 2009. There was no blenching in all the 5 Monitoring Site and the Control Site C. Partial mortality had no further increased.

In all the 5 Monitoring Sites 1 to 5 and the Control Site C; level of sedimentation on the tagged corals carried within a small range (<5%) without an observable trend. The variation was believed to be resulted from combined environmental factors such as monsoonal wind, tidal current, peripheral transport, substratum type, etc. No increment on partial mortality suggested minor adverse effect was caused by the observed sedimentation.

The data from this monitoring survey showed no signification enhancement in sedimentation, blenching or mortality in all 5 Monitoring Sites 1 to 5 and the Control Site C. Hence, no adverse impact by the construction activity on the coral community was evidenced.

7.4. Exceedances

No exceedance was recorded on the 1-hour TSP monitoring, 24-hour TSP monitoring, Day-time noise monitoring and Coral monitoring.

8. Site Audit

8.1. IEC Site Audit

IEC conducted monthly site audit on CI-07, CS02 and CS-03 on 19 February 2010. Audit checklists are attached in Appendix A of Part 1.

CI-07 Observations:

- Cement mixing is carried out without enclosure on top and 3 sides at least. The enclosure is available but should be improved.
- Stagnant water was accumulated on site due to rain.

CS-02 Observations:

- Chemical waste storage area was not fully provided with door and lock.

CS-03 Observations:

- Stagnant water pound was observed due to rain.
- Chemical waste storage area was accumulated with rainwater.

8.2. Non-Compliance

No non-compliances were recorded in February 2010.

9. Implementation status of Environmental Mitigation Measures

Please see Part 2, Part 3, Part 4 and part 5 of the individual contractual reports for the details of the implementation of environmental mitigation measures.

10. Summary of Complaint, Summon or Prosecution

No complaint, summon or prosecution was recorded in the reporting month.

11. Future Issues

Key Issues to be considered in the coming month include:

CI-05

- Construction phase had ceased in early-June 2009.

CS-01

- Construction phase had ceased in mid-October 2008.

CW-02

- Construction phase had ceased in mid-February 2010.

CI-07

- Dust generating from breaking existing concrete / bitumen paving and excavation work
- Dust generating from temporary stockpile, unpaved areas, loading / unloading dusty materials and haul road
- Noise generating form operation of construction plants and sheet piling by drop hammer
- Water generating from wheel washing, underground water and surface run-off
- Storage of diesel drums on site
- Sorting C&D materials on site.

CS-02

- Dust generation from stockpiles.
- Noise generated from operation equipment and machinery on-site.
- Storage of chemicals / fuel and chemical waste / waste oil on site.
- Sorting of C&D materials at source.
- Ensure proper collection and disposal of rubbish generated on site.
- Larviciding against mosquito breeding in stagnant water should be carried out at least on a weekly basis.
- Treatment of wastewater before discharge.
- Carryout wheel wash for all vehicles leaving the site.

CS-03

- Dust generation from stockpiles.
- Noise generated from operation equipment and machinery on-site.
- Storage of chemicals / fuel and chemical waste / waste oil on site.
- Sorting of C&D materials at source.
- Ensure proper collection and disposal of rubbish generated on site.
- Larviciding against mosquito breeding in stagnant water should be carried out at least on a weekly basis.
- Treatment of wastewater before discharge.
- Carryout wheel wash for all vehicles leaving the site.

12. Conclusion and Recommendation

12.1. Conclusion

Environmental impact monitoring was performed in February 2010. All monitoring results in the reporting month were checked and reviewed.

No exceedance was recorded on the 1-hour TSP monitoring, 24-hour TSP monitoring, Day-time noise monitoring and Coral monitoring.

No complaint non-compliance from IEC, summons or prosecution related to environmental issues was made against the Ocean Park Master Redevelopment Project in the reporting period of February 2010.

12.2. Recommendation

According to the environmental audit performed in the reporting month, the following recommendations are made:

Air Quality Impact

- To prohibit any open burning on site.
- To regular maintain the machinery and vehicles on site.
- To follow up any exceedance caused by the construction works.
- To implement dust suppression measures on dry surfaces.

Noise Impact

- To inspect the noise sources from inside and outside of the site.
- To follow up any exceedance caused by the construction works.
- To space out noisy equipment and position as far away as possible from sensitive receivers.
- To have regular maintenance of vessels and equipment used.

Water Quality Impact

- To minimize water discharge runoff into nearby water body.
- To treat site surface runoffs and wastewater generated from various construction activities with wastewater treatment system (comprised of chemical coagulation, sedimentation and pH control)
- To review and implement temporary site drainage management plan.
- Silt removal facilities, channels, manholes and wastewater treatment system should be frequently cleaned the deposited silt and grit to maintain in proper condition.
- To review the adequacy of the desilting facilities' capacity.

Waste/Chemical Management

- To check for any accumulation of waste materials or rubbish on site.
- To avoid any discharge of chemical waste or oil directly from the site.
- To regularly and properly collect, store and dispose of all waste types, including floating refuses around the silt curtain.

Appendix A

Part 1 Independent Environmental Checker's Site Inspection Records

Ocean Park Master Redevelopment Project
Contract P007
Independent Environmental Checker

MONTHLY SITE INSPECTION CHECKLIST

Inspection Date	19/02/2010	Time	10:00	Inspected By	EM: IEC: Florence Yuen Contractor: CI07: T. Lee CS02: K. Kwok CS03: S. Wong
Site Location	CI07 CS02 CS03				

Weather

Condition	[ ]	Sunny	[ ]	Fine	[✓]	Overcast	[ ]	Drizzle	[ ]	Rain	[ ]	Storm	[ ] Hazy
Temperature	9 °C				Humidity	[✓]	High	[ ]	Moderate	[ ]	Low		
Wind	[✓]	Calm	[ ]	Light	[ ]	Breeze	[ ]	Strong	[ ]	Direction			

		Close-out on last comments Y/N	N/A or not obs	Yes	No	Photo/Remarks
	Construction Noise					
S2.18	Is a valid Construction Noise Permit (CNP) obtained for works during restricted hours?			✓		
S2.26	Good Site Practices: • Are the operating plants well-maintained and serviced regularly?			✓		
	• Are silencers or mufflers utilized on construction equipment? Are they properly maintained?			✓		
	• Is the mobile plant sited far enough from NSRs?			✓		
	• Are intermittently used machines and plants shut down between work periods?			✓		
	• Is the plant known to emit noise strongly in one direction, if any, oriented to direct noise away from the NSRs?		✓			
	• Is the stockpile or other structures utilized effectively, wherever practicable, in screening noise from the works?		✓			
S2.27	Are suitable quiet plants adopted?			✓		
S2.28	Are movable barriers used for both movable PME and stationary PME?		✓			
S2.29	Do the screening materials used achieve the predicted noise reduction?		✓			
S2.30	Are the noisy works avoided during examination period of the nearby school?		✓			
	Blasting Noise					
S2.32	• Are the NSRs informed of the blasting work in advance?		✓			

• Is sufficient time allowed for alerting all the potential NSRs prior to every blasting work?		✓			
• Are proper procedures put in place to alert and minimise any startling effect on the staff working in Ocean Park?		✓			
• Is the optimal amount of charge used evaluated for noise reduction?		✓			
Landscape and Visual					
S3.10 Consideration on existing surrounding vegetation:					
• Are temporary tree nurseries set up?		✓			
• Is "no-intrusion zones" implemented?		✓			
• Is the existing vegetation protected from damage?			✓		
• Are hill fire prevention measures taken?			✓		
• Is dust and erosion controlled for exposed soil?			✓		
• Are the irrigation networks set up throughout the Establishment Period?		✓			
• Is Quarterly Report on existing trees to be retained or transplanted prepared by the Contractor?		✓			
S3.11 Consideration on appearance and view:					
• Is the appearance of hoardings suitable?			✓		
• Is the appearance of construction workers, plants/machines suitable?			✓		
• Are the screening and alignment of the temporary barging point and conveyor system suitable?		✓			
• Are the selected security floodlights suitable		✓			
Ecology					
S4.5 Transplantation:					
• Is the transplantation work supervised by a qualified botanist/horticulturalist in the ET?			✓		
• Are the transplanted plant species of conservation interest monitored during the first 12 months after transplantation?			✓		
S4.7 Construction:					
• Is the runoff entering watercourses avoided by control measure, especially during heavy rain?			✓		
• Is the site runoff directed to regularly cleaned and maintained silt traps (or oil separators)?			✓		
• Are sediment traps included in drainage to collect and control construction run-off?			✓		
• Is suitable size silt traps or oil interceptor used?			✓		
• Is vegetation survey carried out to determine the feasibility and suitability of individual plants for transplantation?			✓		
• Are the trees located within the works area preserved suitably?			✓		
• Are individual plants of conservation interest transplanted prior to the construction phase?			✓		

• Are the equipments and stockpiles placed in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural habitats?			✓		
• Are construction activities restricted to the work areas demarcated?			✓		
• Are waste skips provided to collect general refuse and construction wastes?			✓		
• Are the wastes disposed of timely and properly off-site?			✓		
• Is open burning on works sites prohibited?			✓		
• Are native plant species made use of as far as possible on newly formed land?			✓		
Construction Waste					
S5.4 Good Site Practices					
• Are arrangements made for collection and effective disposal of all wastes generated?			✓		
• Are the waste management and chemical handling procedures followed?			✓		
• Are sufficient waste disposal points provided?			✓		
• Are the wastes disposed of regularly?	✓				
• Are appropriate measures taken to minimise windblown litter and dust during transportation of waste by either covering trucks or transporting wastes in enclosed containers?			✓		
• Are the drainage systems, sumps and oil interceptors regularly cleaned and maintained?			✓		
S5.5 Waste Reduction Measures:					
• Is the C&D waste from demolition and decommissioning of existing facilities sorted to recover recyclable materials?			✓		
• Are different types of wastes segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling and the proper disposal?			✓		
• Are aluminium cans segregated in labelled bins and collected by individual collectors for recycling?			✓		
• Are proper storage and site practices maintained to minimise the potential for damage or contamination of construction material?			✓		
• Are the construction materials planned and stocked carefully to avoid unnecessary generation of waste?			✓		
S5.7 General Refuse					
• Is the general refuse stored in enclosed bins or compaction units separate from C&D material?			✓		
• Is the general refuse removed regularly by a waste collector?			✓		
S5.8 C&D Material					
• Are the excavated materials from site formation of the expansion areas and tunnel construction for the funicular system reused on-site as backfilling material and for landscape works?			✓		
• Are the surplus rock and other inert C&D material disposed of at the public fill sites?			✓		
• Is a waste management plan prepared?					

	• Is a recording system present for the record of amount of wastes generated, recycled and disposed?			✓		
	• Is the trip-ticket system required in ETWB TCW No.31/2004 followed on site?			✓		
	Chemical Wastes					
S5.9	Is chemical wastes generated from the works? And if yes,			✓		
	• Is the Contractor registered as a Chemical Waste Producer?			✓		
	• Are good quality containers used for separating and storing chemical wastes?				✓	CS03② P1080540
	• Are appropriate labels securely attached on each chemical waste container to indicate their corresponding chemical characteristics?				✓	CS02① P1080541
	• Is the Contractor licensed to transport and dispose of the chemical wastes?			✓		
	Land Contamination					
S6.11	• Is the contact of construction workers with contaminated materials minimised by using bulk earth-moving excavator equipment?		✓			
	• Are appropriate cloth, personal protective equipment, hygiene and washing facilities provided to minimise exposure to any contaminated material?		✓			
	• Is stockpiling of contaminated excavated materials avoided?		✓			
	• Is the use of contaminated soil for landscaping without proper treatment prohibited?		✓			
	• Are vehicles containing excavated materials covered properly to limit potential dust emissions or contaminated wastewater runoff?		✓			
	• Is the speed of the trucks carrying contaminated materials controlled?		✓			
	• Are the necessary waste disposal permits obtained from appropriate authorities in according with Waste Disposal (Chemical Waste) (General) Regulation?		✓			
	• Are silt removal facilities provided with retention time for silt/sand traps of 5 minutes under maximum flow conditions?		✓			
	• Are the records maintained for quantity of wastes generated and disposal of?		✓			
	Remediation Process					
S6.12	• Is biopile covered by tarpaulin or low permeable sheet to avoid dust emission?		✓			
	• Is vented air from biopile treated by blower and carbon adsorption system before released to the atmosphere?		✓			
	• Are the materials which may generate airborne dust emissions adequately wetted prior to and during the loading, unloading and handling operations?		✓			
	• Are silencers installed at biopile blower to minimise noise impact?		✓			
	• Are quiet plants such as generator and blower used for biopile?		✓			

• Are the mixing process and other associated material handling activities properly scheduled to minimise potential noise impact?		✓			
• Are impermeable liners placed at the bottom of biopile?		✓			
• Is leachate collection sump construction along the perimeter of biopile?		✓			
• Is the lachate recycled back to the biopile or truck away to Chemical Waste Treatment Centre for disposal?		✓			
• Is the mixing of contaminated soils and cement/water/other additive(s) undertaken at a solidification plant to minimise the potential for leaching?		✓			
• Is a concrete bund construction along the perimeter of the solidification/stabilisation area to prevent runoff?		✓			
• Are the loading, unloading, handling, transfer and storage of cement carried out in an enclose system?		✓			
• Are the contaminated soils transported by roll-off trucks (contrainerisation)?		✓			
• Is temporary hoarding provided around the treatment area to minimise the visual impact?		✓			

Air Quality

S7.23 Good Site Practices

• Is watering carried out regularly with complete coverage to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather?	✓				
• Is watering frequently carried out for particularly dusty construction areas, temporary stockpiles and areas close to ASRs?			✓		
• Are the aggregate or dusty material storage piles covered with their side enclosed to reduce emissions? Or if this is not practicable, is watering applied to aggregate fines?	✓				
• Is open stockpiles avoided or covered and placed far enough from the ASRs?			✓		
• Is the dropping height of material restricted to minimise the fugitive dust from unloading/loading?			✓		
• Is tarpaulin used to cover all dusty vehicle loads transported to, from and within the site?			✓		
• Are vehicle wheel and body washing facilities available at the exit points of the site?			✓		
• Are wind shield and dust extraction units or similar dust mitigation measures provided at the loading points? If dust generation is likely during the process, particularly in dry seasons, is water sprinklers provided at the loading site?	✓			✓	CI07 ① P1080518
• Do the vehicles comply with the recommended speed limit of 10 km/h on unpaved roads?			✓		
• Are dusty activities rescheduled during high-wind conditions?		✓			
• Are the routing of vehicles and positioning of construction plants at maximum possible distance from the ASRs?			✓		
• Is suitable buffer zone provided and work areas fenced off with hoarding (not less than 2.4m from ground level)?			✓		

S7.24 Drilling & Blasting

• Is watering carried out on the exposed area after blasting?		✓			
• Is vacuum extraction drilling method used?		✓			
• Is the blasting process carefully sequenced?		✓			
• Is the firing of explosive carried out in the morning prior to opening of the Park?		✓			
S7.25 Crushing Plant					
• Is water sprayed on the crusher?		✓			
• Are fabric filters installed for the crushing plant?		✓			
• Is chute or dust curtain used for controlling dust when transferring materials from crusher to the conveyors?		✓			
S7.26 Barging Point & Conveyor Belt System					
• Are the conveyors placed within enclosed structures?		✓			
• Is profiled steel cladding provided at two sides of loading point?		✓			
• Are dust suppression sprays installed and operated at the feeding inlet and outlet?		✓			
• Is the barging point placed within an enclosed structure incorporating an enclosed chute for material transfer to the barge?		✓			
• Is a flexible curtain hanged on the enclosed chute to prevent dust emission when excavated materials/rocks transported into the barge?		✓			
Water Quality					
S8.3 Site Run-off and Drainage					
• Are all sewer and drainage connections sealed to prevent debris, soil, sand etc. from entering public sewer before commencing any site formation work?	✓				
• Are temporary ditches provided to facilitate runoff discharge into appropriate watercourses, via appropriate sized silt retention pond?			✓		
• Are cut-off ditches provided for all major site clearance/excavation works where soils would be exposed to control runoff from the areas?			✓		
• Are channels, earth/concrete bunds and sand bags deployed to direct surface runoff?			✓		
• Are catchpits and perimeter channels constructed in advance of relevant site formation works?			✓		
• Are the boundaries of earthworks marked and surrounded by dykes or embankments for flood protection?			✓		
• Are sand/silt traps and sediment basins provided to remove sand/silt particles from runoff?			✓		
• Are silt removal facilities, channels and manholes maintained and deposited silt/grit removed regularly to ensure that these facilities are functioning properly at all times?			✓		
• Are exposed soil surfaces covered?			✓		
• Is the water pumped out from foundation excavations discharged into silt removal facilities?				✓	CS03 ① P1080534 CI07 ② P1080499
• Are exposed soil areas minimised to reduce potential for increased siltation and contamination of runoff?			✓		

	• Are earthwork final surfaces well compacted and is subsequent permanent work or surface protection performed immediately?			✓	
	• Is the rainwater pumped out from trenches or excavation directed to silt removal facilities before discharge?			✓	
	• Are open stockpiles of construction materials or construction wastes of more than $50m^3$ covered with tarpaulin during rainstorm?		✓		
	In case of an excavation in rainy seasons: • Is temporary exposed slope/soil surfaces covered by tarpaulin as far as practicable?		✓		
	• Are intercepting channels provided to prevent storm runoff from washing across exposed soil surfaces?		✓		
	• Are surface protection measures and arrangements implemented to prepare for arrival of a rainstorm?		✓		
	Coral Sites				
S8.4	• Are enhanced (with the use of flocculants added) sand/silt removal facilities employed for treatment of runoff from the major excavation at the Summit?			✓	
	• Is a silt curtain system used to enclose the construction phase discharge point at Tai Shue Wan?			✓	
	• Are debris and refuse collected, handled and disposed of properly to avoid entering any nearby water bodies and public drainage system?			✓	
	• Are stockpiles of cement and other construction materials kept covered when not being used?			✓	
	• Are oils and fuels used and stored in designated areas which have pollution prevention facilities (Fuel tanks and storage areas provided with locks and sited on sealed areas, within bunds of a capacity equality to 110% of the storage capacity of the largest tank)?	✓			
	• Are temporary sanitary facilities, such as portable chemical toilets, employed on-site where necessary to hand sewage from the workforce? Is a licensed contractor employed for disposal of waste matter and maintenance of these facilities?			✓	
	• Is a reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law?			✓	
	• Are aluminium cans recovered from the waste stream and collected separate labelled bins?			✓	
	• Are office wastes reduced through the recycling of paper?			✓	
	• Are training provided to workers on site cleanliness & waste management procedure?			✓	
	Cultural Heritage				
S10.6	If there is any work planned within one metre of the grave, is a one metre buffer zone provided around the grave and is the grave demarcated by temporary fence?			✓	
	Hazard to Life				
S11.3	Good Site Practices:				

• Is the area around the magazine free of vegetation?		✓			
• Is the control of (small) fires planned and provided through the following?					
- Weekly checking of fire fighting equipment and the on-site fire water tank level.		✓			
- Daily checking of all critical safety equipment on vehicle, including the fire extinguishers.		✓			
- Maintaining back-up means of fighting fire on the explosive vehicles.		✓			
- Providing safety training for drivers and other personnel present during explosive delivery with regard to operating fire hydrants and fighting of explosive fires.		✓			
• Is the magazine secured against unauthorised entry and theft of explosive through the following?					
- Maintaining a list of persons authorised to enter the magazine and ensuring the list is available to the magazine security guard.		✓			
- Activating an alarm system that limits times at which explosive can be removed from the magazine and connecting the system to central security station.		✓			
- Incorporating "Duress code" function in the alarm system.		✓			
- Maintaining alarm system in good condition.		✓			
• Is the magazine security guard located separately from the magazine complex?		✓			
• Is the communication maintained in emergency with the following measures?					
- Providing non-hazardous electronic equipment for persons working within 60 m of detonators.		✓			
- Ensuring availability of phone numbers for all key personnel.		✓			
• If there is a typhoon signal no. 3 or above, or black rainstorm signal, are all operations at magazine and transport ceased?		✓			
• Is the risk of detonators explosion on vehicle reduced during transit through the following?					
- Ensuring that magazine within vehicle is lined.		✓			
- Limiting off-site transport to 5 to 6 a.m. each day.		✓			
- Escorting vehicles with separate security vehicle when using the public road.		✓			
- Ensuring that UN 1.4B packaging of detonators remains intact until handed over at blasting site.		✓			
• Is the fuel isolation switch available on vehicle to prevent fire spreading in case a fire breaks out?		✓			
• Is an experienced driver with accident-free record employed for explosive vehicle and security escort?		✓			
• Are the drivers checked for health before employing?		✓			
• Are the vehicles regularly checked to maintain in good condition to reduce chance of accident due to breaking down?		✓			
• Is the truck fuel fire escalating to cause explosion avoided through the following means?					

- Ensuring that the Contractor is aware of the potential hazards to site.		✓			
- Maintaining appropriate fire fighting equipment.		✓			
- Requiring the Contractor to plan and make emergency arrangements.		✓			
• Is spare/redundant fire fighting equipment provided?		✓			
• Can communications be maintained between two vehicles (drivers and security) during the trip to prevent collision of two explosive vehicles in case of an accident?		✓			
• Are the processes of checking of condition of drivers to suspend any driver of concern carried out?		✓			
Project specific measures:					
• Is the speed of vehicle limited along the Ocean Park portion of Nam Long Shan Road within 100 m of the explosives magazine to 25 km/hr?		✓			
• Is other contractors' use of the Ocean Park Internal service road restricted during delivery of explosives, i.e. 6 to 7 a.m?		✓			
• Is the Ocean Park guard required to call to the magazine guard on an hourly basis when explosives are stored in magazines?		✓			
• Is the evacuation of part or all of Ocean Park Headland Area arranged in case of the explosive magazine being engulfed in fire?		✓			
• Is the risk to the public from accidental initation during charging and blasting limited by the following means?					
- Closing the Ocean Park from commencement of charging holes until completion of blasting each day.		✓			
- Arranging for relevant authorities to post notices to mariners – warning them of blasting operations and advising them to stay away from a strip 100m wide immediately to the east of Headland from commencement of charge holes until completion of blasting each day (i.e. 9 a.m).		✓			
- Not operating amusement rides in the event of accidental explosion until confirmed free of critical damage.		✓			
• If unexploded explosives are found in blasthole(s), is the opening of Ocean Park delayed or is part of the Ocean Park delayed when there are unspent explosives?		✓			
• Is the opportunity for arson/deliberate initiation of explosive reduced with the following means?					
- Paying attention to the security alert status from the Government.		✓			
- Developing a security plan to address high alert level.		✓			
• Is an emergency plan developed to address uncontrolled fire in magazine area?		✓			
• Is the transfer of explosives between 5 to 6 a.m agreed by Mines Division?		✓			
• Is the road surface along the explosive transportation route maintained?		✓			
• Are the contractor's driver and security escort tested in respect of safety plan? Is the route driven before the driver undertakes the first delivery of explosives?		✓			

	• Is adequate space provided for the explosive vehicle to manoeuvre without reversing close to the magazine to limit the likelihood of vehicle accident?		✓			
	• Is lighting for explosive vehicles provided on temporary road(s)?		✓			
S11.4	• Is ammonium nitrate emulsion (ANE) delivered outside of Park opening times?		✓			

Observations for this month

① Cement mixing is carried out without enclosures on top and 3 sides. The enclosure is available but should be improved.

② Stagnant water was accumulated on site due to rain.

IEC Representative	Environmental Manager	Contractor's Representative CI07
Florence Yuen		Thomas
(Florence Yuen)	(ANDY LEUNG)	(Thomas Lee - LCAL)

Observations for this month

① Chemical Waste Storage Area was not fully provided with door and lock.

IEC Representative	Environmental Manager	Contractor's Representative CS02
Florence Yuen		
(Florence Yuen)	(ANDY CHEUNG)	(KAN KWOK)

Observations for this month

① Stagnant water pond was observed due to rain.

② Chemical waste storage area was accumulated with rainwater.

IEC Representative	Environmental Manager	Contractor's Representative CS03
Florence Yuen		
(Florence Yuen)	(Andy Chung)	(Sunny Wong)

Part 2 CI-07 EM&A REPORT (February 2010)

OCEAN PARK REDEVELOPMENT PROJECT

CONTRACT NO. CI07

ENTRY PLAZA, AQUA CITY AND GRAND AQUARIUM

Monthly EM&A Report – February 2010

Prepared by:	Reviewed by:	Authorised by:
Thomas Lee Project Environmental Coordinator	Jerry Wong Construction Manager	Darren Beasley Project Director

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EXECUTIVE SUMMARY

Introduction

This is the nineteenth Monthly Environmental Monitoring and Audit (EM&A) Report prepared by Leighton Contractors (Asia) Limited for the Ocean Park Redevelopment Project Contract No. CI07 – Entry Plaza, Aqua City and Grand Aquarium (hereinafter called the Project). The Project was commenced on 15 August 2008. Leighton Contractors (Asia) Limited was instructed by the Project Manager Representative to takeover the contract CI05 noise and air quality monitoring works at the Waterfront effective from 1 March 2009. This document reports the results of the EM&A works conducted in Feb 2010 (26 Jan 2010 to 25 Feb 2010).

The major site activities undertaken in the reporting month included:

- Podium paving, blockworks, tiling and plastering at Entry Plaza;
- Staircase construction, theme works, tiling and plastering at Aqua City;
- Water feature construction extension and screeding at Carousel Plaza;
- T20 tank sumilining, painting and Life Support System installation at Grand Aquarium;
- External wall finishing, plastering, painting and E&M works at Entry Plaza, Aqua City and Grand Aquarium; and
- Switch room and genset installation at Transformer Room (AAA).

Environmental Audit and Monitoring Works

Environmental monitoring and audit works for the Project was performed as stipulated in the Contractor's EM&A Manual. Site audits were conducted once per week. The implementation of the environmental mitigation measures, Event Action Plans and environmental complaint handling procedures were also checked. No non-compliance was observed during the site audits.

Monitoring of 1-hour & 24-hour Total Suspended Particulates (TSP) and noise were performed and the results were checked and reviewed. No exceedance was recorded. Summary of monitoring and audit activities conducted and the events and action taken in the reporting month are tabulated in the below tables.

A summary of monitoring and audit activities conducted in the reporting period

Parameter	Frequency
1-hour TSP monitoring	15 sessions for all air quality monitoring stations
24-hour TSP monitoring	5 sessions for all air quality monitoring stations

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Parameter	Frequency
Daytime noise monitoring	5 sessions for all noise monitoring stations
Evening and night time noise monitoring	0 sessions for all noise monitoring stations
Holiday time noise monitoring	0 session for all noise monitoring stations
Joint environmental site inspection	4 sessions (including IEC audit)

Summary table for events recorded in the reporting period

Parameter	No. of Events		No. of Events Due to the Project	Action Taken
	Action Level	Limit Level		
1-hr TSP	0	0	0	N.A.
24-hr TSP	0	0	0	N.A.
Noise	0	0	0	N.A.

Environmental Licenses and Permits

Construction Waste Disposal Billing Account was opened and total 22,885 Chits were obtained for construction waste disposal.

Site Effluent Discharge Licence was issued for site effluent via sedimentation tank discharged into communal storm water drain.

A notification pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation was made to EPD prior the commencement of the Project.

Chemical Waste Producer Registration was issued for chemical waste disposal by the licenced collector.

Construction Noise Permits for water pump, generator and wastewater treatment plant operation during restricted hours were issued. Construction Noise Permit for grout mixer and grout pump operation during restricted hours was issued. Construction Noise Permit for scissor platform (3), hand-held battery drill (4), grout mixer, grout pump and diesel mobile crane operation during restricted hours was issued.

Complaints and Prosecutions

No complaint or prosecution related to the project was received during the reporting month.

Future Key Issues

Key issues to be considered in March or coming months include:

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- External wall finishing, rockworks and tiling at Entry Plaza;
- Staircase construction and themeworks at Aqua City;
- Carousel ride installation, retaining wall and E&M works at Carousel Plaza;
- Spillway, base waterproofing and artificial rockworks at Lagoon;
- T20 tank overall sealing and theme works, G/F and 2/F tank installation, tiling, plastering and Life Support System pipe installation at Grand Aquarium;
- Roofing, screeding, painting and E&M work at Entry Plaza, Aqua City and Grand Aquarium;
- Excavation and genset installation at Transformer Room (AAA); and
- External wall and ceiling plastering and painting, genset and switch room installation at Grand Aquarium Transformer Room.

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1. INTRODUCTION

1.1 Background

The "Repositioning and Long Term Operation Plan of Ocean Park" is being implemented by the Ocean Park Corporation at the existing site of Ocean Park and Nam Long Shan, Aberdeen. The purpose of this project is to upgrade and expand the existing Ocean Park to meet anticipated visitor demands and to position Ocean Park as a premium tourist attraction and a regional leader in themed recreational and educational park experience. The site layout plan is illustrated in Figure 1.1.

An environmental impact assessment (EIA) report for "Repositioning and Long Term Operation Plan of Ocean Park" (Report No. 121/2006 and Register No. AEIAR-101/2006) has been prepared in 2006 and the Environmental Monitoring and Audit Manual (EM&A Manual) was also included as part of the EIA report in the register. An Environmental Permit (EP) No. EP-249/2006 was issued on 28 July 2006 for the above project to Ocean Park Corporation as Permit Holder and a varied EP No. EP-249/2006/A was subsequently issued on 23 October 2006 for the above project to Ocean Park Corporation as Permit Holder.

Leighton Contractors (Asia) Limited (the Contractor) was commissioned by the Ocean Park Corporation to undertake the construction of the Ocean Park Redevelopment Project Contract No. CI07 – Entry Plaza, Aqua City and Grand Aquarium (hereinafter call the Project).

The works to be executed under Contract CI07 include the following major items:

- **Entry Plaza Phase 1 and Aqua City**
  - demolition of existing structures, site formation and slope works for roadwork new building structures and car park;
  - construction of the Entry Plaza and Aqua City building structures and foundation, and installation of builders' works and architectural finishes;
  - construction of one- to three-storey buildings on the Entry Plaza podium, including animal habitats and back of house, ticketing, turnstiles, guest relations, security, banking and other offices, back of house, food and beverage and retail functions;
  - construction of back-of-house facilities on the ground floor and mezzanine floor of the Entry Plaza;
  - construction of at-grade drop-off and pick-up for cars, taxis, coaches and buses, parking for coaches and private cars, including meter-gate system, shelters, street furniture and amenities;

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- installation of building services, including mechanical ventilation and air-conditioning installation, electrical installation, extra low-voltage installation (such as closed-circuit television, security alarm and public address system), control and monitoring installation, plumbing and drainage installation, fire-services installation, irrigation system installation, gas-supply installation, lift and escalator installation and miscellaneous works;

- construction of a section of Ocean Park Road and associated footpaths; provision of road drainage, utilities, street furniture, street lightings, and soft and hard landscape works;

- light-emitting-diode screen and its support to be integrated with the tensile-membrane long-span metallic structure;

- construction of Aqua City Lagoon and associated site formation, hardscape, waterproofing and water circulation facilities, including pipe works, pump system, filtration and aeration system;

- construction of guest-route paving and railing, utilities and services works and associated civil-engineering works;

- soft and hard landscape works (including water features, fountains, external seating, on-grade as well as podium planter areas, artificial rockworks, street appurtenances, lighting, irrigation, themed elements, including statues, murals and other objects);

- balustrade, skylight, glass wall, window, louver, cladding and canopy, retail/food carts and kiosks, timber trellis and structures; facilitating works for the special features, including power supply, foundation works, civil and structural works, electrical and mechanical works, architectural finishes works and miscellaneous works;

- provision of new and diversion/decommissioning of existing drainage, sewerage, water mains and underground utilities necessary for the operation of Ocean Park;

- provision of temporary toilet facilities and relocation of the Guest Relations Office in Portion EP2, the temporary toilet and Guest Relation Office must be operational prior to removal of the existing facilities;

- construction of all ancillary works, including civil, geotechnical and utilities works;

- installation of the Carousel ride, and

- coordination of the works with the installation of 13 sculptures to be supplied and

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installed by other contractors; provision of all attendance, labour, plant and equipment necessary in relation to the installation of the sculptures;

– maintenance of a fixed number of temporary car-park spaces for guests' use during different construction stages;

– construction of ramp structures connecting from Wong Chuk Hang Road to the Entry Plaza building structure and to the Cable Car Plaza, and

– soft and hard landscape works (including on-grade planter areas, street appurtenances, lighting, irrigation and themed elements).

- **Grand Aquarium:**

  – construction of the Grand Aquarium, including life support systems, building structures and foundation, installation of builders' works and architectural finishes;

  – fitting-out packages, including finishes, fixed furniture, decorations, lighting, audio/visual equipment, artworks and building services;

  – coordination of the works with the installation and joint sealing of the acrylic viewing panels to be supplied and installed by other contractors; provision of all attendance, labour, plant and equipment necessary in relation to the installation of the acrylic viewing panels, and

  – construction of the Transformer Room Building, including coordination works with Hong Kong Electric Company Limited for installation.

- **Entry Plaza Phase 2:**

  – demolition of the temporary entrance, transformer building, existing staff canteen and associated structures and road works within Portion EP3;

  – modification of the existing car park, access road and roundabout to the temporary entrance to form a new coach parking and car park within Portions EP3;

- **General**

  – erection of hoardings with graphics;

  – tree transplanting and felling and protection to remaining trees;

  – management and maintenance of temporary holding nursery;

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– installation of civil provisions for parkwide information-technology systems and all operational equipment, such as background music system, public-address system, closed-circuit television, management information system, building information system, security and turnstiles;

– construction of parkwide irrigation and drainage system for planting area;

– supply and installation of all escalators and elevators;

– design and built all temporary works with necessary statutory submissions, including:
  - temporary support to excavations greater than 2 metres in depth;
  - temporary cut or fill slopes greater than 2 metres high;
  - falsework and temporary platforms, structures and the like required;
  - temporary platforms, structures and the like required for supporting drilling equipment and construction plant; and
  - excavation and lateral supports for all Entry Plaza Phase 2 and Aqua City Phase 2 works; and

– design and built works as specified in Contract CI07, with necessary statutory submissions, including:
  - artificial rockwork, including concrete foundations, internal structural supporting systems and fixing details for the lagoon and Otter Exhibit;
  - glass-reinforced concrete/glass-reinforced gypsum/glass-reinforced plastic/shotcrete works and associated supporting structures;
  - tensile-membrane long-span metallic canopy structure, including the metal frame, marquee supporting light-emitting-diode screen and walkway at the Entry Plaza;
  - Ocean Park super logo and associated support structure over the tensile-membrane canopy and lift L-1 cone structure;
  - themed metalwork, entrance gates and balustrades;
  - exhibit glazing at the River Otter viewing;
  - glass canopy, metal canopy over escalators;
  - vertical green-wall system;
  - water features circulations, filtration, control and water dynamic;
  - lagoon and waterfall filtration and circulation systems;
  - metal modular shelving and associated stairway and platforms;
  - glass curtain wall for the Grand Aquarium shell;
  - Grand Aquarium fibre-glass tank and working platform;
  - Grand Aquarium movable gantry and hoisting system;
  - Grand Aquarium hydraulic platform;
  - queue display indicating system for the Ticketing Office; and
  - other items as specified in the Particular Specification and/or Drawings.

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1.2 Project Organizations

Different parties with different levels of involvement in the project organization include:

- The Project Manager and Project Environmental Team – AECOM Asia Co. Ltd.
- Contractor - Leighton Contractors (Asia) Ltd.
- Contractor's Environmental Team (CET)
- Independent Environmental Checker (IEC) - Mott MacDonald HK Ltd.

The responsibilities of respective parties are provided in the Contractor's EM&A Manual.

The key contacts of the Project are shown in Table 1.1.

Table 1.1 Key Project Contacts

Party	Name	Role	Phone No.	Fax No.
Project ET	Mr. S K Lo	Project Manager Representative (PMR)	2871 5888	2552 1256
	Miss Lindsay Pickles	Project Development Director	2910 3109	2814 0179
Contractor	Darren Beasley	Project Director	3665 2688	2580 6600
	Jerry Wong	Construction Manager	3665 2638	2580 6600
Contractor's ET	Thomas Lee	Project Environmental Coordinator	3665 2609	2580 6600
	Kelven Yip	Environmental Engineer	3665 2620	2580 6600
IEC	Miss Florence Yuen	Independent Environmental Checker (IEC) Representative	2828 5757	2827 1823

1.3 Construction Programme

The site activities undertaken in the reporting month were:

- Podium paving, blockworks, tiling and plastering at Entry Plaza;
- Staircase construction, theme works, tiling and plastering at Aqua City;
- Water feature construction extension and screeding at Carousel Plaza;
- T20 tank sumilining, painting and Life Support System installation at Grand Aquarium;
- External wall finishing, plastering, painting and E&M works at Entry Plaza, Aqua City and Grand Aquarium; and
- Switch room and genset installation at Transformer Room (AAA).

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1.4 Summary of EM&A Requirements

The EM&A programme requires construction phase environmental site audit. The duties and responsibilities comprise the following:

- monitor various environmental parameters, if necessary, as specified in the EM&A Manual;
- analyze the environmental monitoring and audit data;
- review the EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- carry out site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems;
- audit and prepare EM&A reports on the site environmental conditions;
- report the environmental audit results to the Contractor;
- recommend appropriate mitigation measures to the Contractor in case of exceedance of Action and Limit Levels in accordance with the Event and Action Plans; and
- adhere to the procedures for carrying out complaint investigation in accordance with the EM&A Manual.

This report presents the environmental monitoring and audit works for the Project in February 2010.

2. AIR QUALITY MONITORING

2.1 Monitoring Requirements

24-hour & 1-hour TSP monitoring was conducted to monitor the air quality. Appendix A shows

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the established Action/Limit Levels for the air quality monitoring works.

2.2 Monitoring Equipment

High volume samplers (HVS - Model GMWS-2310 Accu-Vol) complete with the appropriate sampling inlets were installed for 24-hour and 1-hour TSP sampling. The HVS composed of a motor, a filter holder, a flow controller and a sampling inlet and its performance specification complies with USEPA Standard Title 40, Code of Federation Regulations Chapter 1 (Part 50 Appendix B). Table 2.1 summarises the equipment that was used in the dust-monitoring programme.

Table 2.1 TSP Monitoring Equipment

Equipment	Model
HVS	GMWS 2310 c/w of TSP sampling inlet
Calibration Kit	Tisch TE-5025 A
Dust Trak	TSI-8250

2.3 Monitoring Parameters, Frequency and Duration

The monitoring parameters and frequency are summarised in Table 2.2. The monitoring schedule for the coming month is shown in Appendix B.

Table 2.2 Air Quality Monitoring Parameters and Frequency

Location	Parameter	Duration	Frequency
AM1	1-hour TSP	1 hour	3 times every 6 days*
	24-hour TSP	24 hours	Once every six days
AM2	1-hour TSP	1 hour	3 times every 6 days*
	24-hour TSP	24 hours	Once every six days
AM3A	1-hour TSP	1 hour	3 times every 6 days*
	24-hour TSP	24 hours	Once every six days

*Notes: * denotes three 1-hr TSP monitoring in three days.*

2.4 Monitoring Locations

In accordance with the EM&A Manual, three air quality monitoring stations, as shown in Figure 1.2, were selected for 1-hour and 24-hour TSP sampling. Table 2.3 describes the location of the air quality monitoring stations.

Table 2.3 Location of Air Quality Monitoring Stations

Air Quality Monitoring Stations	Identity / Description
AM1	Whisker's Theatre, Ocean Park

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AM2	San Wai Village, Wong Chuk Hang
AM3A	Open areas of PMR & OPC temporary site offices

2.5 Monitoring Methodology

24-hour / 1-hour TSP Monitoring

Installation

The HVSs were installed in the vicinity of the air sensitive receivers. The following criteria were considered in the installation of the HVS.

- A horizontal platform with appropriate support to secure the samplers against gusty wind was provided.
- No two HVSs were placed less than 2 meters apart.
- The distance between the HVS and any obstacles, such as buildings, was at least twice the height that the obstacle protrudes above the HVS.
- A minimum of 2 meters separation from walls, parapets and penthouses was required for rooftop samplers.
- No furnace or incinerator flues were nearby.
- Airflow around the sampler was unrestricted.
- Permission was obtained to set up the samplers and to obtain access to the monitoring stations.

Preparation of Filter Papers by ETS-Testconsult Limited.

- Glass fibre filters, G810 were labeled and sufficient filters that were clean and without pinholes were selected.
- All filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ±3 °C; the relative humidity (RH) was < 50% and not variable by more than ±5%. A convenient working RH was 40%.

Field Monitoring

- The power supply was checked to ensure the HVS works properly.
- The filter holder and the area surrounding the filter were cleaned.
- The filter holder was removed by loosening the four bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully.
- The filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter.
- The swing bolts were fastened to hold the filter holder down to the frame. The pressure applied should be sufficient to avoid air leakage at the edges.

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- Then the shelter lid was closed and was secured with the aluminum strip.
- The HVS was warmed-up for about 5 minutes to establish run-temperature conditions.
- A new flow rate record sheet was set into the flow recorder.
- The flow rate of the HVS was checked and adjusted at around 1.1 m^3/min. The range specified in the EM&A Manual was between 0.6-1.7 m^3/min.
- The programmable timer was set for a sampling period of 24 hrs $\pm$ 1 hr or 1 hr + 0.25 hr, and the starting time, weather condition and the filter number were recorded.
- The initial elapsed time was recorded.
- At the end of sampling, the sampled filter was removed carefully and folded in half-length so that only surfaces with collected particulate matter were in contact.
- It was then placed in a clean plastic envelope and sealed.
- All monitoring information was recorded on a standard data sheet.
- Filters were sent to *ETS-Testconsult Ltd.* for analysis.

Maintenance & Calibration

- The HVSs and their accessories are maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply.
- HVSs are calibrated at bi-monthly intervals using GMW-25 Calibration Kit throughout all stages of the air quality monitoring. Calibration details are provided in Appendix E.

2.6 Results and Observations

The air quality monitoring results of 1-hr TSP and 24-hr TSP of the reporting month are summarized in Tables 2.4 and 2.5. All monitoring data and graphical presentation of the monitoring results are provided in Appendix C.

All measured 1-hour & 24-hour TSP concentrations were below the Action and Limit (AL) Levels in the reporting month.

Table 2.4 Monitoring Results of 1-hr TSP

Date of Monitoring	1-hr TSP ($\mu g/m^3$)		
	AM1	AM2	AM3A
27-Jan-10	94	172	194
28-Jan-10	77	125	135

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Date of Monitoring	1-hr TSP (μg/m^3)		
	AM1	AM2	AM3A
29-Jan-10	33	87	74
1-Feb-10	86	135	227
3-Feb-10	164	239	280
5-Feb-10	79	102	110
8-Feb-10	88	115	153
9-Feb-10	31	85	61
10-Feb-10	30	54	31
12-Feb-10	30	60	143
17-Feb-10	34	47	95
19-Feb-10	76	79	84
22-Feb-10	110	175	223
23-Feb-10	60	130	207
24-Feb-10	80	59	93

*Notes: * Exceedance of Limit Level*
 # Exceedance of Action Level
- No Monitoring Due to Power Shortage

Table 2.5 Monitoring Results of 24-hr TSP

Date of Monitoring	24-hr TSP (μg/m^3)		
	AM1	AM2	AM3A
28-Jan-10	55	62	86
3-Feb-10	34	43	46
9-Feb-10	21	24	39
17-Feb-10	18	35	48
23-Feb-10	26	23	44

*Notes: * Exceedance of Limit Level*
 # Exceedance of Action Level
- No Monitoring Due to Power Shortage

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3. NOISE MONITORING

3.1 Monitoring Requirements

Noise monitoring was conducted at four monitoring stations as specified in the EM&A Manual. Appendix A shows the established Action and Limit Levels for noise.

3.2 Monitoring Equipment

Integrating Sound Level Meters were employed for noise monitoring. They were Type 1 sound level meters capable of giving a continuous readout of the noise level readings including equivalent continuous sound pressure level (L_{eq}) and percentile sound pressure level (L_x). They comply with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). Portable electronic wind speed indicator capable of measuring the wind speed in m/s was employed to check the wind speed. Table 3.1 details the noise monitoring equipment used.

Table 3.1 Noise Monitoring Equipment

Equipment	Model
Integrating Sound Level Meter	Rion NL 31
Calibrator	Rion NC-73
Portable Wind Speed Indicator	TSI Model 8340-M Air Velocity Meter

3.3 Monitoring Parameters, Frequency and Duration

Noise monitoring was conducted per monitoring day during the daytime. Monitoring to be conducted in the evening and/or night-time only when construction works is in progress. The monitoring period, duration, parameters and frequency of noise measurement are presented in Table 3.2. The monitoring schedule for the coming month is provided in Appendix B.

Table 3.2 Noise Monitoring Parameters, Period and Frequency

Time Period	Duration (min)	Parameters	Frequency
Daytime (0700 to 1900)	30	L_{eq}	Once a week
*Evening (1900 to 2300)	5		
*Night-time (2300 to 0700 of next day)	5		

Notes: * denotes Noise monitoring to be conducted only when construction work is in progress.

Starting from September 26 2009, no construction activities involving powered mechanical equipment (PME) or prescribed construction works will be expected during evening and/or night-time. The contractor has reached consent with RSS and IEC that no evening noise

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monitoring will be required. Hence evening monitoring will be suspended beginning September 26, 2009.

3.4 Monitoring Locations

In accordance with the EM&A Manual, noise monitoring was conducted at four designated monitoring stations as shown in Figure 1.2. Table 3.3 describes the locations of these monitoring stations.

Table 3.3 Noise Monitoring Locations

Noise Monitoring Stations	Identity / Description
CN1	Open Area adjacent to Police Training School
CN2	Project Development Office, Ocean Park
CN3	Rinniped House, Ocean Park
CN4	Manly Villa

3.5 Monitoring Methodology

Field Monitoring

- The Sound Level Meter was set on a tripod at a height of 1.2 m above the ground.
- For free field measurement, the meter was positioned away from any nearby reflective surfaces. For reference, a correction of +3dB(A) was made to the free field measurements.
- The battery condition was checked to ensure the correct functioning of the meter.
- Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:
  - frequency weighting : A
  - time weighting : Fast
  - time measurement : 30 minutes / 5 minutes
- Prior to and after each noise measurement, the meter was calibrated using a Calibrator for 94 dB at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1 dB(A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- The wind speed was frequently checked with a portable wind meter.
- During the monitoring period, the L_{eq} was recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- Noise measurement was paused during periods of high intrusive noise (e.g. dog barking, helicopter noise) if possible. Observations were recorded when intrusive noise was unavoidable.
- Noise monitoring was cancelled in the presence of fog, rain, wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.

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Maintenance and Calibration

- The microphone head of the sound level meter and calibrator is cleaned with soft cloth at quarterly intervals.
- The meters and calibrators are sent *to Hong Kong Calibration Ltd* to check and calibrate at yearly intervals. Calibration details are provided in Appendix E.

3.6 Results and Observations

Noise monitoring was conducted at the 4 designated monitoring stations during daytime in the reporting month. The monitoring was carried out as scheduled in the reporting month and the monitoring results are summarized in Table 3.4. All monitoring data and graphical presentation of the monitoring results are provided in Appendix D.

No exceedance of limit level during daytime recorded in the reporting month.

Table 3.4 Monitoring Results of Daytime Noise

Date of Monitoring	Noise Level, L_{eq} (30-min), dB(A)			
	CN1	CN2	CN3	CN4
26-Jan-10	^69.3	55.2	56.7	53.0
2-Feb-10	68.9	60.1	60.4	61.2
9-Feb-10	69.2	58.2	55.4	57.4
19-Feb-10	68.8	58.0	59.2	59.3
23-Feb-10	69.5	60.5	59.0	59.8

*Notes: * Exceedance of Limit Level*
 # Exceedance of Action Level
^ Noise level was measured on 29 Jan 10 due to traffic noise during the monitoring on 26 Jan 10

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4 ENVIRONMENTAL AUDIT

4.1 Environmental Site Audit

Environmental site audits were carried out on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.

Site audits for the Project in the reporting month were conducted on 2, 12, 19 & 26 February 2010. No non-compliance was observed during the site audits. The summaries of site audits are attached in Appendix J.

During site inspections in the reporting month, no non-conformance was identified. The observations and recommendations are summarized in Table 4.1.

Table 4.1 Observations and Recommendations of Site Audits

Parameter	Date	Observations/Recommendations	Remediation / Follow up
Air	02/02/10	The saw table located near the hoarding in Carousel Plaza did not have bag provided to collect saw dust.	Provide bag to collect dust and clean up the saw dust on the ground immediately (completed)
	02/02/10	Dust was generated during surface grinding on the roof of Carousel.	Wet the surface to suppress dust (completed)
	19/02/10	Cement mixing is carried out without enclosures on top and 3 sides at the open area on the Entry Plaza Podium.	Provide temporary facilities (enclosed 3 sides with top shelter) for cement mixing on the Podium (completed)
	26/02/10	Dust was generated during surface grinding along the exterior of West Building.	Wet the surface to suppress dust (completed)
Water	19/02/10	Stagnant water was accumulated along the planter wall near Lagoon due to rain.	Clean up immediately or provide larvicide (completed)

4.2 Status of Environmental Licensing and Permitting

All valid permits/licenses obtained for the Project are summarized in Table 4.2.

Table 4.2 Summary of Environmental Licensing and Permit Status

Permit No,	Valid Period		Details	Status
	From	To		
Environmental Permit				

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Permit No,	Valid Period		Details	Status
	From	To		
EP-249/2006/A	23/10/2006	N.A.	Expansion of the existing Ocean Park and reconstruction / modification of its existing facilities.	Valid
Site Effluent Discharge Licence				
EP820/W2/XW246	05/09/2008	30/09/2013	Discharge of site effluent arising from construction site (Contract CI07) at sedimentation tank into communal storm water drain	Valid
Chemical Waste Producer Registration				
5213-199-L2174-28	22/09/2008	N.A.	Waste Disposal (Chemical Waste) (General) Regulation – Registration of Waste Producer	Valid
Construction Noise Permit				
GW-RS0967-09	23/12/2009	22/05/2010	For water pump and wastewater treatment plant operation for any day 23:00 to 07:00 on next day	Valid
GW-RS0764-09	14/10/2009	13/04/2010	For water pumps, generator and wastewater treatment plant operation from 19:00 to 23:00 (any day not being a general holiday) and 07:00 to 23:00 (general holiday including Sunday)	Valid
GW-RS0816-09	06/11/2009	05/05/2010	For grout mixer and grout pump operation from 19:00 to 23:00 (any day not being a general holiday) and 07:00 to 23:00 (general holiday including Sunday)	Valid
GW-RS0978-09	28/12/2009	24/05/2010	For scissor platform (3), hand-held drill (4); grout mixer and grout pump or diesel mobile crane operation from 19:00 to 23:00 (any day not being a general holiday) and 07:00 to 23:00 (general holiday including Sunday)	Valid
Other				
Ref. no. 001032366	N.A.	N.A.	Notification Pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation	Valid
Account No. 7007576	N.A.	N.A.	Construction Waste Disposal Billing Account with EPD	Valid

4.3 Status of Waste Management

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The amount of waste generated by the construction activities of the Project in the reporting month is attached in Appendix K.

The following materials are recycled/reused on site:

- Existing steel parapets at carpark area are modified and reused as safety fencing for excavation work;
- Broken concrete and bitumen are reused for hard paving for temporary access road;
- Reinforcement in the broken concrete are cut and recycled, and
- Treated waste waster/underground/stream water is reused for watering dry area to minimize discharge.

4.4 Implementation Status of Environmental Mitigation Measures

According to the Environmental Permit and the EM&A Manual, the mitigation measures detailed in the documents are required to be implemented. An updated summary of the EMIS is provided in Appendix F.

4.5 Summary of Exceedances

No Action/Limit Level exceedance was reported in the reporting month.

4.6 Implementation Status of Event Action Plans

The Event Action Plans for air quality and construction noise are presented in Appendix G.

4.7 Summary of Complaints and Prosecutions

No complaint or prosecution related to the project was received during the reporting month.

The environmental complaint flow diagram and complaint log of the project are presented in Appendix H.

5 FUTURE KEY ISSUES

5.1 Key Issues for the Coming Month

Key issues to be considered in the coming month include:

- External wall finishing, rockworks and tiling at Entry Plaza;
- Staircase construction and themeworks at Aqua City;

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- Carousel ride installation, retaining wall and E&M works at Carousel Plaza;
- Spillway, base waterproofing and artificial rockworks at Lagoon;
- T20 tank overall sealing and theme works, G/F and 2/F tank installation, tiling, plastering and Life Support System pipe installation at Grand Aquarium;
- Roofing, screeding, painting and E&M work at Entry Plaza, Aqua City and Grand Aquarium;
- Excavation and genset installation at Transformer Room (AAA); and
- External wall and ceiling plastering and painting, genset and switch room installation at Grand Aquarium Transformer Room.

5.2 Construction Programme for the Next Month

The tentative construction programme for the Project is provided in Appendix I.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Four environmental site audits were performed in February 2010. No non-compliance was observed during the site audits.

No exceedance of environmental monitoring was reported in the reporting month.

No complaint or no prosecution related to the project was received in the reporting month.

6.2 Recommendations

According to the environmental audits performed in the reporting month, the following recommendations are made:

- Ensure dust bag would be provided at the saw and the surrounding area would be kept tidy;
- Control dust generation during surface grinding by wetting the surface where applicable;
- Ensure cement mixing would be carried inside temporary facilities with enclosure on top and 3 sides; and
- Remove stagnant water or spray larvacide regularly to avoid mosquito breeding.

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Figure 1.1 – Site Layout Plan

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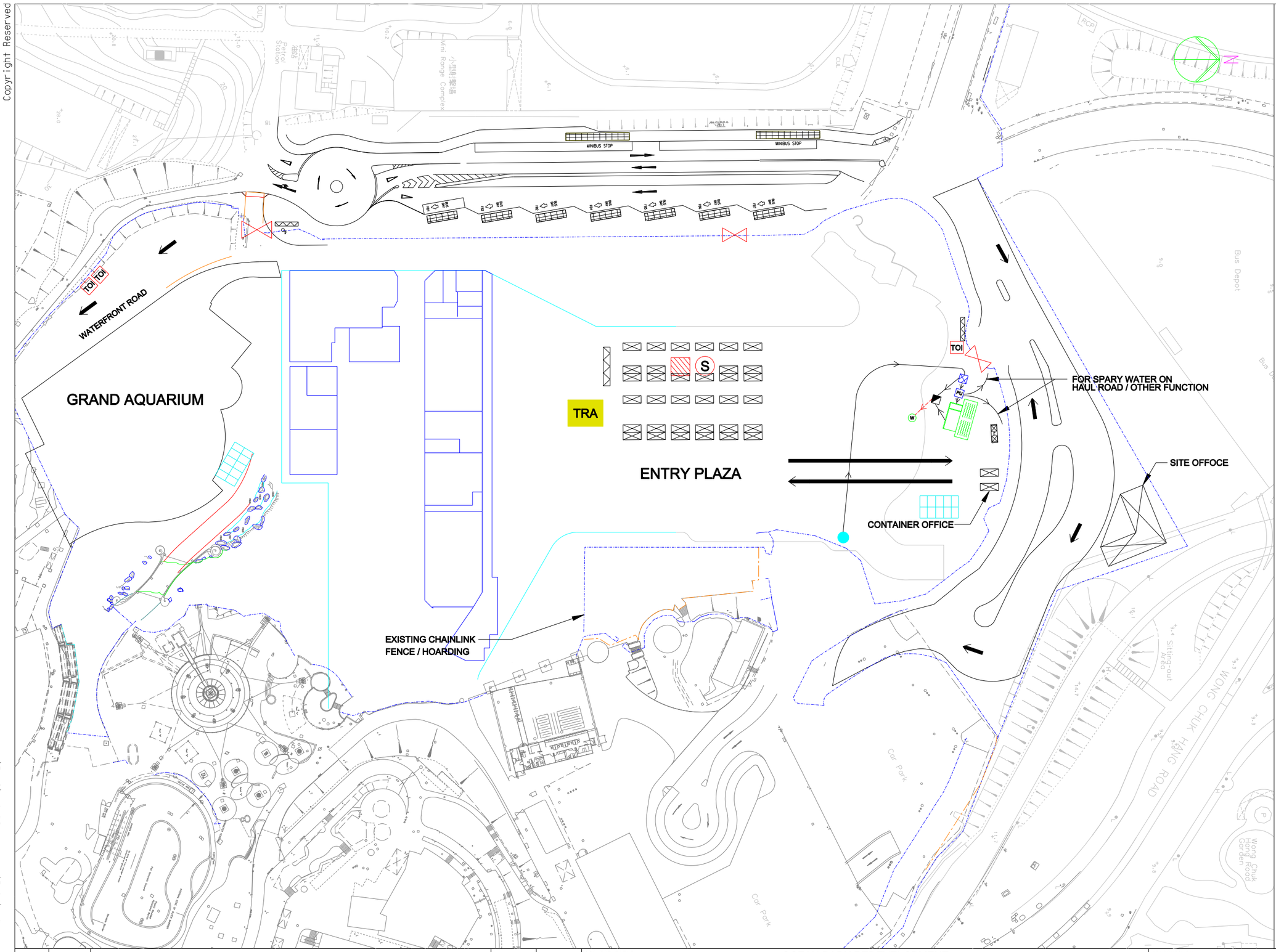

LEGENDS :

- EXISTING CHAINLINK FENCE / HOARDING
- WHEEL WASHING BASIN
- SUMP PIT
- SILT TRAP
- SITE ENTRANCE
- SPILL KIT
- NOTICE BOARD (INCLUDING EMERGENCY TELEPHONE LIST)
- WASTE WATER DISCHARGE POINT
- WASTE WATER TREATMENT POINT (AQUASED)
- TEMPORARY DRAIN FOR WASTE / GROUND WATER
- TEMPORARY DRAIN WITH TREATMENT
- TEMPORARY WATER SUPPLY
- TEMPORARY ELECTRICITY SUPPLY
- FLAGMAN LOCATION
- CHEMICAL TOILET
- ACCESS GIVEN
- ACCESS DENIED
- CHEMICAL WASTE STORE
- TEMPORARY RESTING AREA
- RECYCLE BINS
- WASTE SKIP
- SEDIMENTATION TANK
- GROUND WATER SOURCE
- D.G. STORE
- PUMP TANK
- CONTAINER

UPDATED TO JAN 10

REVISION	DATE	DESCRIPTION	CHK. BY	AUTH. BY
G	14/01/10	MINOR REVISED		
F	02/11/09	MINOR REVISED		
E	23/07/09	MINOR REVISED		
D	03/04/09	MINOR REVISED		
C	18/02/09	MINOR REVISED		

PROJECT TITLE

OCEAN PARK REDEVELOPMENT
CONTRACT No. CI07
ENTRY PLAZA, AQUA CITY & GRAND AQUARIUM

DRAWING TITLE

ENVIRONMENTAL FACILITIES LAYOUT PLAN (G/F)

DESIGNED BY	KELVEN YIP
DRAWN BY	CF.WOO
CHECKED BY	KELVEN YIP
SCALE @ A3	N.T.S.
DRAWING NO.	H2458/E/0020
DATE	01/11/2008
REVISION	G

LEIGHTON 禮頓

A3 420mm x 297mm

Date :$DATE$
Time :$TIME$
Print By :$USER$
Filename :$FILE$

...\E0020\E0020G.dgn 1/14/2010 4:42:12 PM

Figure 1.2 – Locations of Air Quality and Noise Monitoring Stations

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REV.	DESCRIPTION	DATE

香港海洋公園 OCEAN PARK HONG KONG

OCEAN PARK REDEVELOPMENT

CONTRACT NO.C107
ENTRY PLAZA,AQUA CITY & GRAND AQUARIUM

AIR QUALITY AND NOISE
MONITORING STATIONS
LOCATION PLAN

CONSULTANT
MAUNSELL | AECOM
Maunsell Consultants Asia Ltd.
茂盛(亞洲)工程顧問有限公司
In association with :
AEDAS EDAW LEVETT & BAILEY

LEIGHTON CONTRACTORS (ASIA) LTD.

SCALE	DATE
N.T.S.	27/03/2009
DRAWN BY F. LO	CHECKED BY T. LEE
DWG NO. H2458/E/0172	REV. 0

Date : 3/27/2009 Time : 5:33:19 PM

Filename : I:\Engineering Drawing\Submission Drawing\E0172\E0172.dgn

Appendix A – Action and Limit Levels

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Table B.1 Action and Limit Levels for 1-hour average TSP and 24-hour average TSP Monitoring

Monitoring Location	24-hr TSP ($\mu g/m^3$)		1-hr TSP ($\mu g/m^3$)	
	Action Level	Limit Level	Action Level	Limit Level
AM1	183	260	440	500
AM2	181	260	500	500
AM3/AM3A	194	260	500	500

Table B.2 Action and Limit Levels for Daytime, Evening & Night-time Noise Monitoring

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented complaint is received from any one of the sensitive receivers	75 dB(A) *
1900-2300 hrs on normal weekdays; and 0700-1900 hrs on holidays		60/65/70 dB(A) **
2300-0700 hrs of next day		45/50/55 dB(A) **

* reduce to 70dB(A) for school and 65dB(A) during school examination periods, if applicable

** to be selected based on the Area Sensitivity Rating of A/B/C, and the conditions of the CNP(s) must be followed

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Appendix B – Environmental Monitoring Schedules

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東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

Contract No.: C107
Ocean Park Redevelopment Project – Entry Plaza, Aqua City & Grand Aquarium – Environmental Monitoring

Time Schedule for Impact 1-hour TSP Monitoring (1-TSP), Impact 24-hour TSP Monitoring (24-TSP) and Impact Daytime Noise Monitoring (NM-Daytime)

February 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 1-TSP	2 **NM - Daytime**	3 1-TSP 24-TSP	4	5 1-TSP	6
7	8 1-TSP	9 1-TSP 24-TSP **NM - Daytime**	10 1-TSP	11	12 1-TSP	13 **Holiday**
14	15 **Holiday**	16 **Holiday**	17 1-TSP 24-TSP	18	19 1-TSP	20
21	22 1-TSP	23 1-TSP 24-TSP **NM - Daytime**	24 1-TSP	25	26 1-TSP	27
28	29 1-TSP 24-TSP	30 **NM - Daytime**	1-TSP		1-TSP	1-TSP 24-TSP

Appendix C – Air Quality Monitoring Results

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Annex E1 Air Quality Monitoring Data (1-hr TSP)

1-hr TSP Monitoring Results at Station AM1

Monitoring Period				Filter Weight (g)		Flow Rate (m^3/min)		Elapse Time (hour)		Sampling Time (hours)	Concentration (μg/m^3)	Weather Condition	Particulate weight (g)	Average flow (m^3/min)	Total volume (m^3)
From		To													
Date	Time	Date	Time	Initial	Final	Initial	Final	Initial	Final						
27-Jan-10	9:00	27-Jan-10	10:00	2.7867	2.7915	0.8	0.8	14109.62	14110.62	1	94	cloudy	0.0048	0.8	51
28-Jan-10	9:00	28-Jan-10	10:00	2.8250	2.8292	0.9	0.9	14110.62	14111.62	1	77	cloudy	0.0042	0.9	54
29-Jan-10	13:00	29-Jan-10	14:00	2.8638	2.8657	0.9	0.9	14135.62	14136.62	1	33	cloudy	0.0019	1.0	58
1-Feb-10	9:00	1-Feb-10	10:00	2.8466	2.8505	0.9	0.9	14136.62	14137.62	1	86	fine	0.0039	0.8	46
3-Feb-10	9:00	3-Feb-10	10:00	2.7934	2.8038	0.8	0.8	14137.62	14138.62	1	164	cloudy	0.0104	1.1	63
5-Feb-10	13:00	5-Feb-10	14:00	2.7958	2.7997	0.7	0.7	14162.62	14163.62	1	79	cloudy	0.0039	0.8	49
8-Feb-10	9:00	8-Feb-10	10:00	2.8070	2.8113	0.8	0.8	14163.62	14164.62	1	88	cloudy	0.0043	0.8	49
9-Feb-10	11:00	9-Feb-10	12:00	2.8026	2.8044	1.0	1.0	14164.62	14165.62	1	31	cloudy	0.0018	1.0	58
10-Feb-10	14:35	10-Feb-10	15:35	2.8146	2.8163	0.9	0.9	14189.62	14190.62	1	30	cloudy	0.0017	0.9	56
12-Feb-10	9:00	12-Feb-10	10:00	2.8048	2.8066	1.0	1.0	14190.62	14191.62	1	30	cloudy	0.0018	1.0	60
17-Feb-10	9:00	17-Feb-10	10:00	2.8479	2.8499	1.0	1.0	14191.62	14192.62	1	34	cloudy	0.0020	1.0	58
19-Feb-10	13:00	19-Feb-10	14:00	2.8318	2.8362	1.0	1.0	14216.62	14217.62	1	76	cloudy	0.0044	1.0	58
22-Feb-10	9:00	22-Feb-10	10:00	2.8305	2.8371	1.0	1.0	14217.62	14218.62	1	110	cloudy	0.0066	1.0	60
23-Feb-10	9:00	23-Feb-10	10:00	2.8328	2.8364	1.0	1.0	14218.62	14219.62	1	60	fine	0.0036	1.0	60
24-Feb-10	15:03	24-Feb-10	16:03	2.8188	2.8236	1.0	1.0	14243.62	14244.62	1	80	cloudy	0.0048	1.0	60

1-hr TSP Monitoring Results at Station AM2

Monitoring Period				Filter Weight (g)		Flow Rate (m^3/min)		Elapse Time (hour)		Sampling Time (hours)	Concentration (μg/m^3)	Weather Condition	Particulate weight (g)	Average flow (m^3/min)	Total volume (m^3)
From		To													
Date	Time	Date	Time	Initial	Final	Initial	Final	Initial	Final						
27-Jan-10	9:00	27-Jan-10	10:00	2.8449	2.8570	1.2	1.2	13918.89	13919.89	1	172	cloudy	0.0121	1.2	70
28-Jan-10	9:00	28-Jan-10	10:00	2.8038	2.8119	1.1	1.1	13919.89	13920.89	1	125	cloudy	0.0081	1.1	65
29-Jan-10	13:00	29-Jan-10	14:00	2.8338	2.8399	1.2	1.2	13944.89	13945.89	1	87	cloudy	0.0061	1.2	70
1-Feb-10	9:00	1-Feb-10	10:00	2.8087	2.8177	1.1	1.1	13945.89	13946.89	1	135	fine	0.0090	1.1	67
3-Feb-10	9:00	3-Feb-10	10:00	2.7938	2.8102	1.1	1.1	13946.89	13947.89	1	239	cloudy	0.0164	1.1	69
5-Feb-10	13:00	5-Feb-10	14:00	2.8438	2.8512	1.2	1.2	13971.89	13972.89	1	102	cloudy	0.0074	1.2	72
8-Feb-10	9:00	8-Feb-10	10:00	2.8292	2.8375	1.2	1.2	13972.89	13973.89	1	115	cloudy	0.0083	1.2	72
9-Feb-10	10:50	9-Feb-10	11:50	2.8113	2.8171	1.1	1.1	13973.89	13974.89	1	85	cloudy	0.0058	1.1	69
10-Feb-10	14:20	10-Feb-10	15:20	2.8052	2.8091	1.2	1.2	13998.89	13999.89	1	54	cloudy	0.0039	1.2	72
12-Feb-10	9:00	12-Feb-10	10:00	2.8307	2.8349	1.2	1.2	13999.89	14000.89	1	60	cloudy	0.0042	1.2	70

Remarks: 1. Bold value indicated an Action Level exceedance

2. Bold & Italic value indicated an Limit Level exceedance

3. x - denotes no measurement due to power supply failure

4. * - denotes measurement by using Dust Trak

Annex E1 Air Quality Monitoring Data (1-hr TSP)

1-hr TSP Monitoring Results at Station AM2

Monitoring Period				Filter Weight (g)		Flow Rate (m^3/min)		Elapse Time (hour)		Sampling Time (hours)	Concentration (μg/m^3)	Weather Condition	Particulate weight (g)	Average flow (m^3/min)	Total volume (m^3)
From		To													
Date	Time	Date	Time	Initial	Final	Initial	Final	Initial	Final						
17-Feb-10	9:00	17-Feb-10	10:00	2.8133	2.8167	1.2	1.2	14000.89	14001.89	1	47	cloudy	0.0034	1.2	72
19-Feb-10	13:00	19-Feb-10	14:00	2.8408	2.8459	1.1	1.1	14025.89	14026.89	1	79	cloudy	0.0051	1.1	65
22-Feb-10	9:00	22-Feb-10	10:00	2.8466	2.8573	1.0	1.0	14026.89	14027.89	1	175	cloudy	0.0107	1.0	61
23-Feb-10	9:00	23-Feb-10	10:00	2.8396	2.8485	1.1	1.1	14027.89	14028.89	1	130	fine	0.0089	1.1	69
24-Feb-10	15:13	24-Feb-10	16:13	2.8527	2.8566	1.1	1.1	14052.89	14053.89	1	59	cloudy	0.0039	1.1	67

1-hr TSP Monitoring Results at Station AM3A

Monitoring Period				Filter Weight (g)		Flow Rate (m^3/min)		Elapse Time (hour)		Sampling Time (hours)	Concentration (μg/m^3)	Weather Condition	Particulate weight (g)	Average flow (m^3/min)	Total volume (m^3)
From		To													
Date	Time	Date	Time	Initial	Final	Initial	Final	Initial	Final						
27-Jan-10	9:00	27-Jan-10	10:00	2.8366	2.8520	1.3	1.3	16245.26	16246.26	1	194	cloudy	0.0154	1.3	79
28-Jan-10	9:00	28-Jan-10	10:00	2.8084	2.8186	1.3	1.3	16246.26	16247.26	1	135	cloudy	0.0102	1.3	76
29-Jan-10	13:00	29-Jan-10	14:00	2.8382	2.8437	1.2	1.2	16271.26	16272.26	1	74	cloudy	0.0055	1.2	74
1-Feb-10	9:00	1-Feb-10	10:00	2.8026	2.8190	1.2	1.2	16272.26	16273.26	1	227	fine	0.0164	1.2	72
3-Feb-10	9:00	3-Feb-10	10:00	2.8087	2.8289	1.2	1.2	16273.26	16274.26	1	280	cloudy	0.0202	1.2	72
5-Feb-10	13:00	5-Feb-10	14:00	2.8644	2.8723	1.2	1.2	16298.26	16299.26	1	110	cloudy	0.0079	1.2	72
8-Feb-10	9:00	8-Feb-10	10:00	2.8221	2.8331	1.2	1.2	16299.26	16300.26	1	153	cloudy	0.0110	1.2	72
9-Feb-10	10:40	9-Feb-10	11:40	2.8291	2.8335	1.2	1.2	16300.26	16301.26	1	61	cloudy	0.0044	1.2	72
10-Feb-10	14:30	10-Feb-10	15:30	2.8372	2.8395	1.2	1.2	16325.26	16326.26	1	31	cloudy	0.0023	1.2	74
12-Feb-10	9:00	12-Feb-10	10:00	2.8196	2.8299	1.2	1.2	16326.26	16327.26	1	143	cloudy	0.0103	1.2	72
17-Feb-10	9:00	17-Feb-10	10:00	2.8197	2.8264	1.2	1.2	16327.26	16328.26	1	95	cloudy	0.0067	1.2	70
19-Feb-10	13:00	19-Feb-10	14:00	2.8626	2.8691	1.3	1.3	16352.26	16353.26	1	84	cloudy	0.0065	1.3	78
22-Feb-10	9:00	22-Feb-10	10:00	2.8056	2.8225	1.3	1.3	16353.26	16354.26	1	223	cloudy	0.0169	1.3	76
23-Feb-10	9:00	23-Feb-10	10:00	2.7986	2.8135	1.2	1.2	16354.26	16355.26	1	207	fine	0.0149	1.2	72
24-Feb-10	14:37	24-Feb-10	15:37	2.8504	2.8571	1.2	1.2	16379.26	16380.26	1	93	cloudy	0.0067	1.2	72

Remarks: 1. Bold value indicated an Action Level exceedance

2. Bold & Italic value indicated an Limit Level exceedance

3. x - denotes no measurement due to power supply failure

4. * - denotes measurement by using Dust Trak

Figure C.1 1-hr TSP monitoring results of Monitoring Station AM1

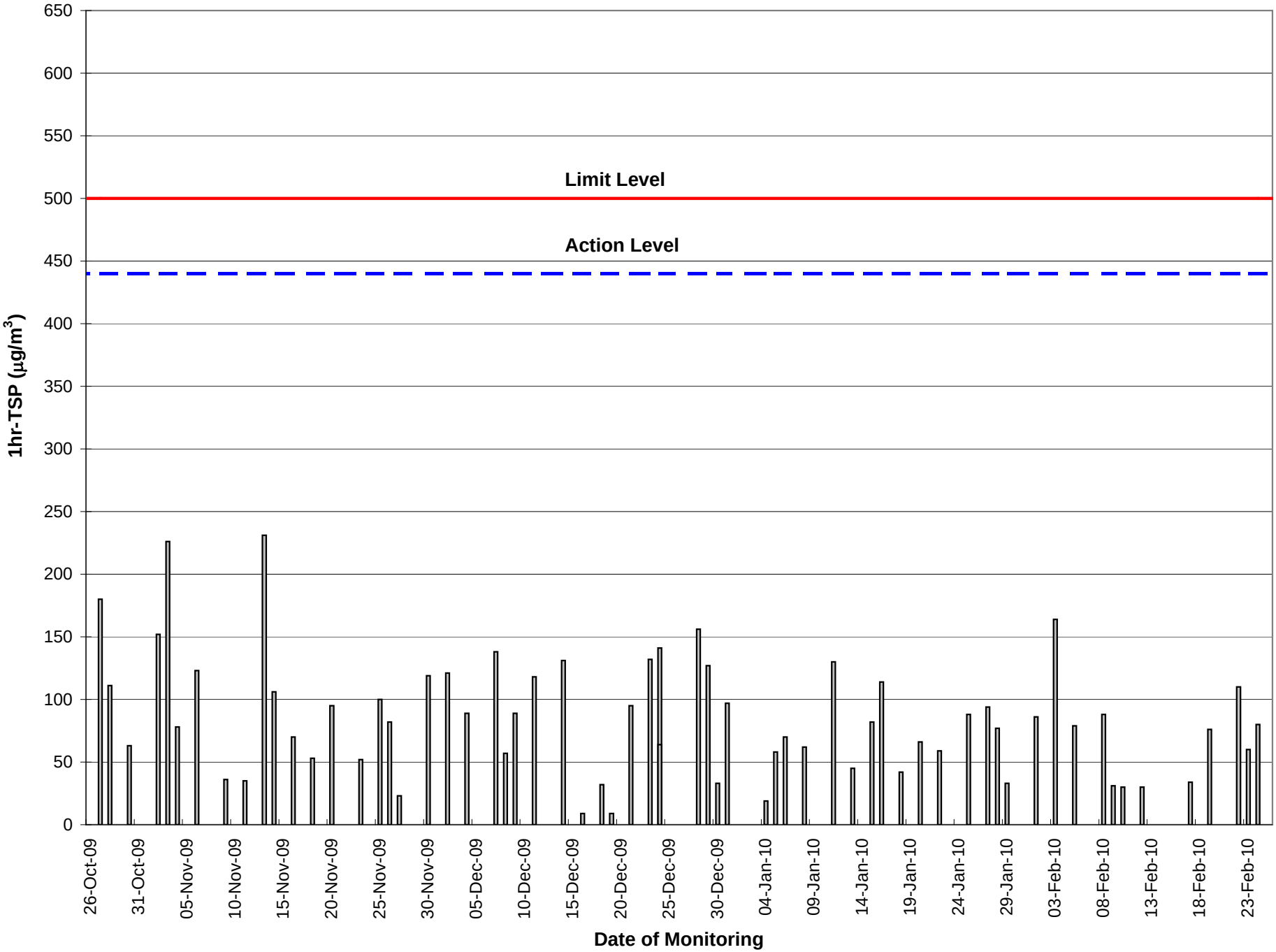


Figure C.2 1-hr TSP monitoring results of Monitoring Station AM2

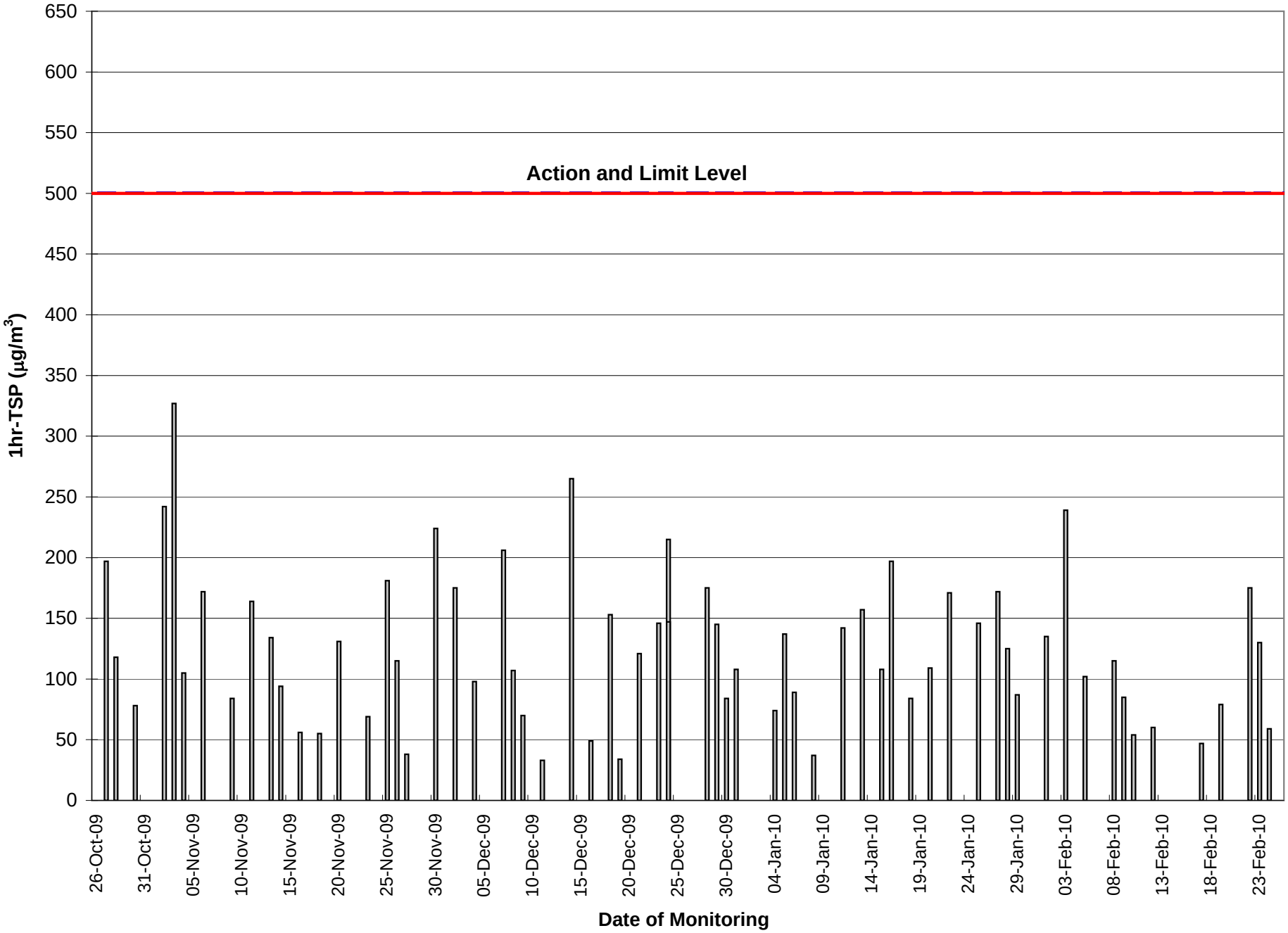
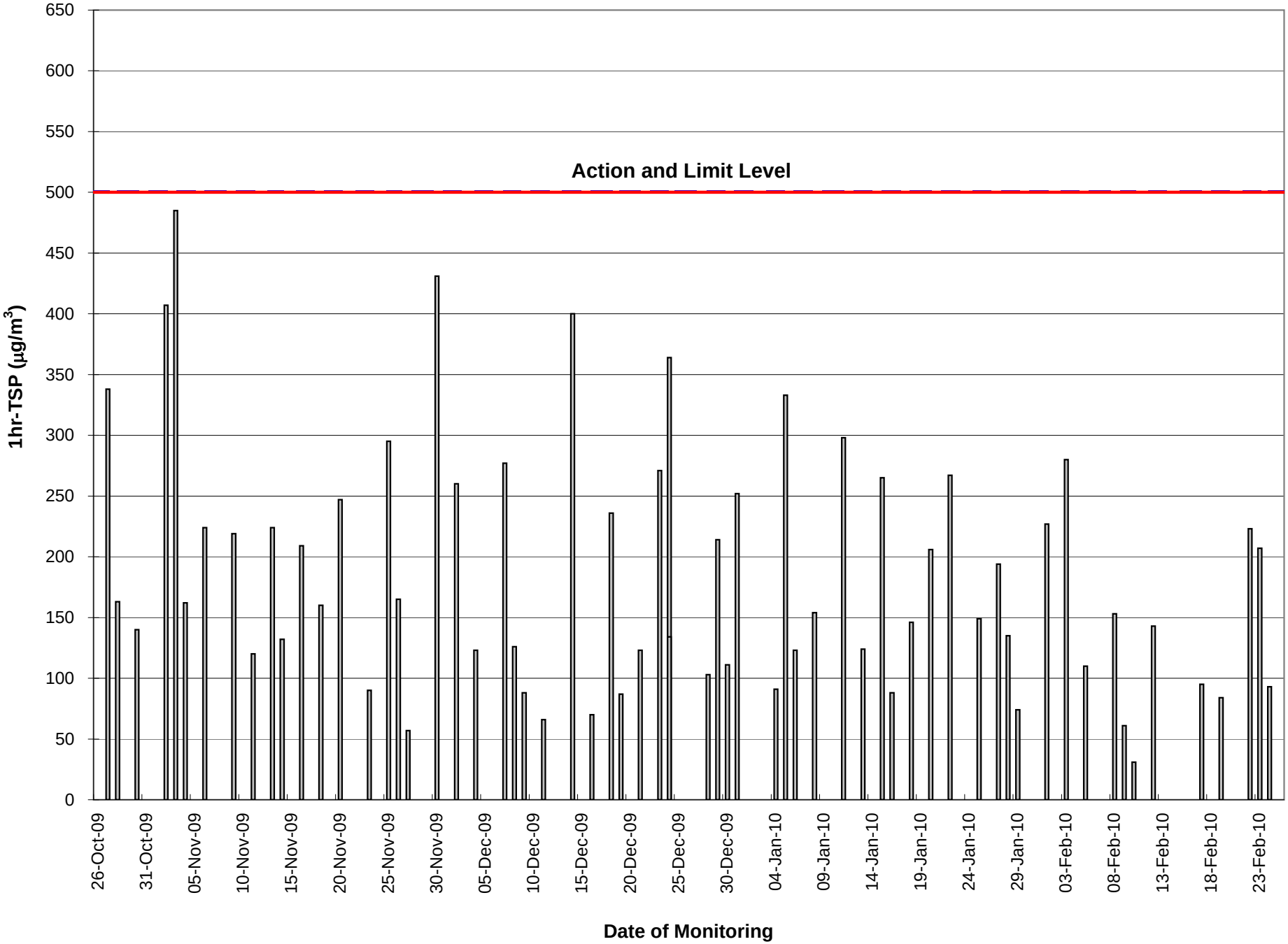


Figure C.3 1-hr TSP monitoring results of Monitoring Station AM3A



Annex D2 Air Quality Monitoring Data (24-hr TSP)

24-hr TSP Monitoring Results at Station AM1

Monitoring Period				Filter Weight (g)		Flow Rate (m^3/min)		Elapse Time (hour)		Sampling Time (hours)	Concentration (µg/m^3)	Weather Condition	Particulate weight (g)	Average flow (m^3/min)	Total volume (m^3)
From		To													
Date	Time	Date	Time	Initial	Final	Initial	Final	Initial	Final						
28-Jan-10	12:12	29-Jan-10	12:12	2.8194	2.8939	0.9	0.9	14111.62	14135.62	24	55	cloudy	0.0745	0.9	1349
3-Feb-10	14:15	4-Feb-10	14:15	2.8108	2.8508	0.8	0.8	14138.62	14162.62	24	34	cloudy	0.0400	0.8	1179
9-Feb-10	14:20	10-Feb-10	14:20	2.7883	2.8165	0.9	0.9	14165.62	14189.62	24	21	cloudy	0.0282	0.9	1349
17-Feb-10	10:35	18-Feb-10	10:35	2.8235	2.8413	0.7	0.7	14192.62	14216.62	24	18	cloudy	0.0178	0.7	1009
23-Feb-10	12:25	24-Feb-10	12:25	2.8377	2.8678	0.8	0.8	14219.62	14243.62	24	26	fine	0.0301	0.8	1137

24-hr TSP Monitoring Results at Station AM2

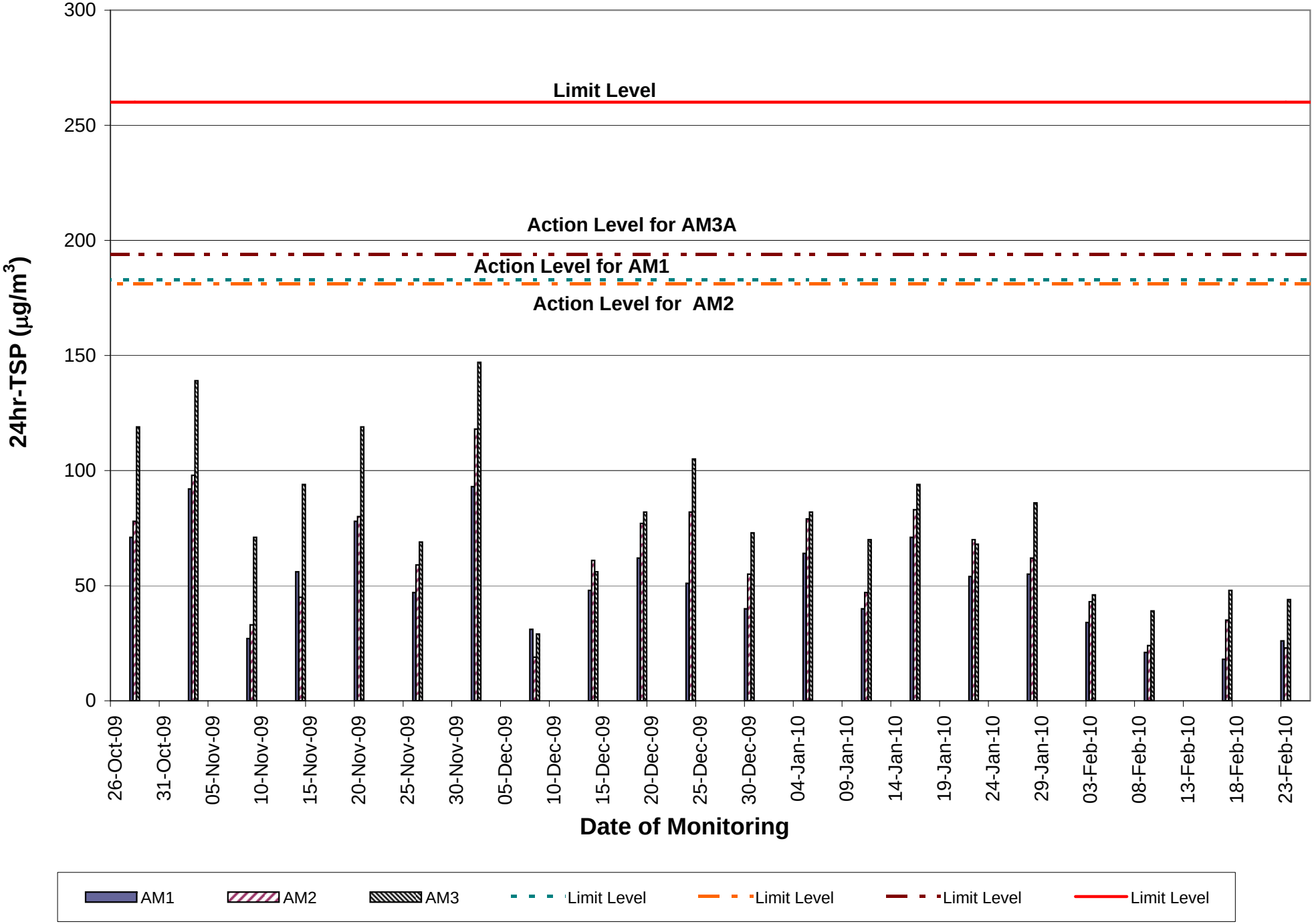
Monitoring Period				Filter Weight (g)		Flow Rate (m^3/min)		Elapse Time (hour)		Sampling Time (hours)	Concentration (µg/m^3)	Weather Condition	Particulate weight (g)	Average flow (m^3/min)	Total volume (m^3)
From		To													
Date	Time	Date	Time	Initial	Final	Initial	Final	Initial	Final						
28-Jan-10	12:06	29-Jan-10	12:06	2.8102	2.9117	1.1	1.1	13920.89	13944.89	24	62	cloudy	0.1015	1.1	1645
3-Feb-10	14:10	4-Feb-10	14:10	2.7931	2.8632	1.1	1.1	13947.89	13971.89	24	43	cloudy	0.0701	1.1	1645
9-Feb-10	14:15	10-Feb-10	14:15	2.8038	2.8488	1.3	1.3	13974.89	13998.89	24	24	cloudy	0.0450	1.3	1914
17-Feb-10	10:30	18-Feb-10	10:30	2.8272	2.8884	1.2	1.2	14001.89	14025.89	24	35	cloudy	0.0612	1.2	1735
23-Feb-10	12:10	24-Feb-10	12:10	2.8222	2.8528	0.9	0.9	14028.89	14052.89	24	23	fine	0.0306	0.9	1330

24-hr TSP Monitoring Results at Station AM3A

Monitoring Period				Filter Weight (g)		Flow Rate (m^3/min)		Elapse Time (hour)		Sampling Time (hours)	Concentration (µg/m^3)	Weather Condition	Particulate weight (g)	Average flow (m^3/min)	Total volume (m^3)
From		To													
Date	Time	Date	Time	Initial	Final	Initial	Final	Initial	Final						
28-Jan-10	11:54	29-Jan-10	11:54	2.8323	2.9843	1.2	1.2	16247.26	16271.26	24	86	cloudy	0.1520	1.2	1774
3-Feb-10	14:20	4-Feb-10	14:20	2.8172	2.8967	1.2	1.2	16274.26	16298.26	24	46	cloudy	0.0795	1.2	1731
9-Feb-10	14:25	10-Feb-10	14:25	2.7964	2.8663	1.2	1.2	16301.26	16325.26	24	39	cloudy	0.0699	1.2	1774
17-Feb-10	10:10	18-Feb-10	10:10	2.8174	2.9067	1.3	1.3	16328.26	16352.26	24	48	cloudy	0.0893	1.3	1860
23-Feb-10	12:00	24-Feb-10	12:00	2.8405	2.9252	1.4	1.4	16355.26	16379.26	24	44	fine	0.0847	1.4	1947

Remarks: 1. Bold value indicated an Action Level exceedance
2. Bold & Italic value indicated an Limit Level exceedance
3. x - denotes no measurement due to power supply failure
4. * - not 24 hrs due to power supply failure

Figure C.4 24-hr TSP monitoring results of Monitoring Station AM1, AM2 & AM3A



Appendix D – Noise Monitoring Results

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Annex F1 Noise Monitoring Data (Daytime Noise)

Daytime Noise Monitoring Results at Station CN1

Date	Weather Condition	Measured Noise Level for 30 mins., dB(A)				Baseline Noise Level, dB(A)	Limit Level, dB(A)	Exceedance (Y/N)
		Time	Leq	L10	L90			
29-Jan-10	Cloudy	14:34	69.3	70.3	67.0	60.2	70	N
2-Feb-10	Cloudy	16:40	68.9	70.9	66.2	60.2	70	N
9-Feb-10	Cloudy	15:25	69.2	71.7	67.6	60.2	70	N
19-Feb-10	Rainy	11:35	68.8	70.6	60.1	60.2	70	N
23-Feb-10	Fine	13:40	69.5	72.3	61.4	60.2	70	N

Daytime Noise Monitoring Results at Station CN2

Date	Weather Condition	Measured Noise Level for 30 mins., dB(A)				Baseline Noise Level, dB(A)	Limit Level, dB(A)	Exceedance (Y/N)
		Time	Leq	L10	L90			
26-Jan-10	Cloudy	16:15	55.2	58.0	52.5	61.0	75	N
2-Feb-10	Cloudy	15:15	60.1	62.2	57.3	61.0	75	N
9-Feb-10	Cloudy	13:00	58.2	61.4	55.7	61.0	75	N
19-Feb-10	Cloudy	13:45	58.0	59.9	49.7	61.0	75	N
23-Feb-10	Fine	14:30	60.5	62.2	58.4	61.0	75	N

Daytime Noise Monitoring Results at Station CN3

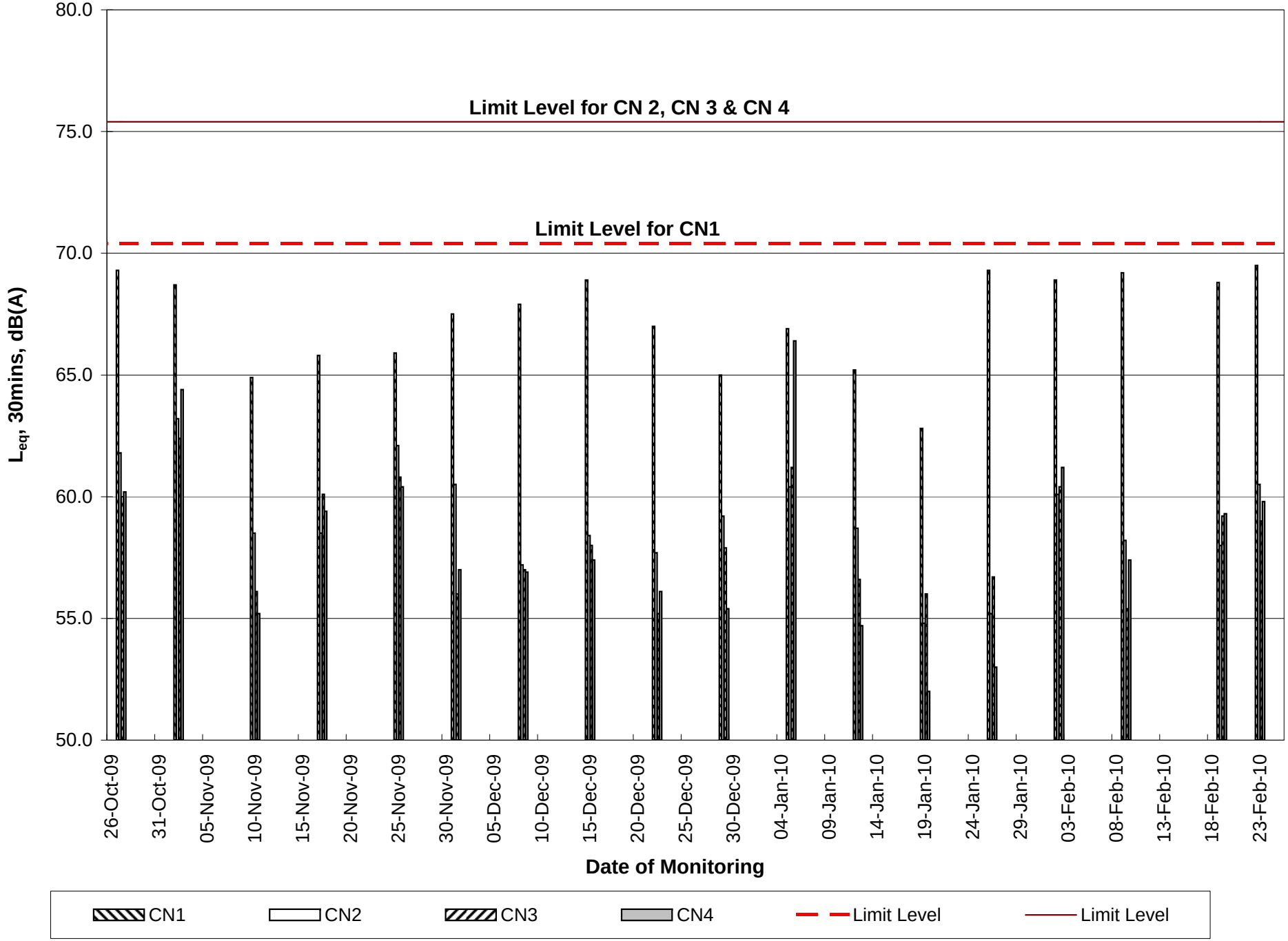
Date	Weather Condition	Measured Noise Level for 30 mins., dB(A)				Baseline Noise Level, dB(A)	Limit Level, dB(A)	Exceedance (Y/N)
		Time	Leq	L10	L90			
26-Jan-10	Cloudy	16:55	56.7	59.1	53.4	56.3	75	N
2-Feb-10	Cloudy	15:55	60.4	61.9	58.7	56.3	75	N
9-Feb-10	Cloudy	13:40	55.4	59.0	51.3	56.3	75	N
19-Feb-10	Cloudy	14:20	59.2	61.0	57.5	56.3	75	N
23-Feb-10	Fine	15:10	59.0	60.5	57.7	56.3	75	N

Daytime Noise Monitoring Results at Station CN4

Date	Weather Condition	Measured Noise Level for 30 mins., dB(A)				Baseline Noise Level, dB(A)	Limit Level, dB(A)	Exceedance (Y/N)
		Time	Leq	L10	L90			
26-Jan-10	Cloudy	15:25	53.0	55.9	52.0	56.9	75	N
2-Feb-10	Cloudy	17:15	61.2	63.0	60.5	56.9	75	N
9-Feb-10	Cloudy	14:35	57.4	60.6	54.9	56.9	75	N
19-Feb-10	Cloudy	13:00	59.3	62.2	55.8	56.9	75	N
23-Feb-10	Fine	13:00	59.8	62.7	55.9	56.9	75	N

Remarks: Bold & Italic value indicated an Limit Level exceedance

Fig D.1 - Daytime Noise Monitoring Results of Monitoring Stations CN1, CN2, CN3 & CN4



Appendix E – Calibration Details

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CALIBRATION DETAILS

Air Quality Monitoring Equipments

Monitoring Location	AM1	AM2	AM3A
High Volume Sample/Dust Trak Serial No.	1174	1177	9998
Sampler Identification	ET / EA / 003 / 08	ET / EA / 003 / 07	ET / EA / 003 / 12
Date of Calibration	05 Jan 2009	05 Jan 2009	05 Jan 2009
Calibration Due Date	04 Mar 2010	04 Mar 2010	04 Mar 2010
Result	Good	Good	Good

Noise Monitoring Equipments

Monitoring Location	CN1, CN2, CN3 & CN4
Sound Level Meter Brand Name and Model	Rion NL-31
Serial No.	00110024
Date of Calibration	15 April 2009
Calibration Due Date	14 April 2010
Result	Good

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東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED
8/F., Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan Street, Fotan, Hong Kong
Tel : 2695 8318 E-mail : etl@ets-testconsult.com
Fax : 2695 3944 Web site : www.ets-testconsult.com

TEST REPORT

Calibration Report of High Volume Air Sampler

Manufacturer : Graseby GMW

Date of Calibration : 05 January 2010

Serial No. : 1174 (ET / EA / 003 / 08)

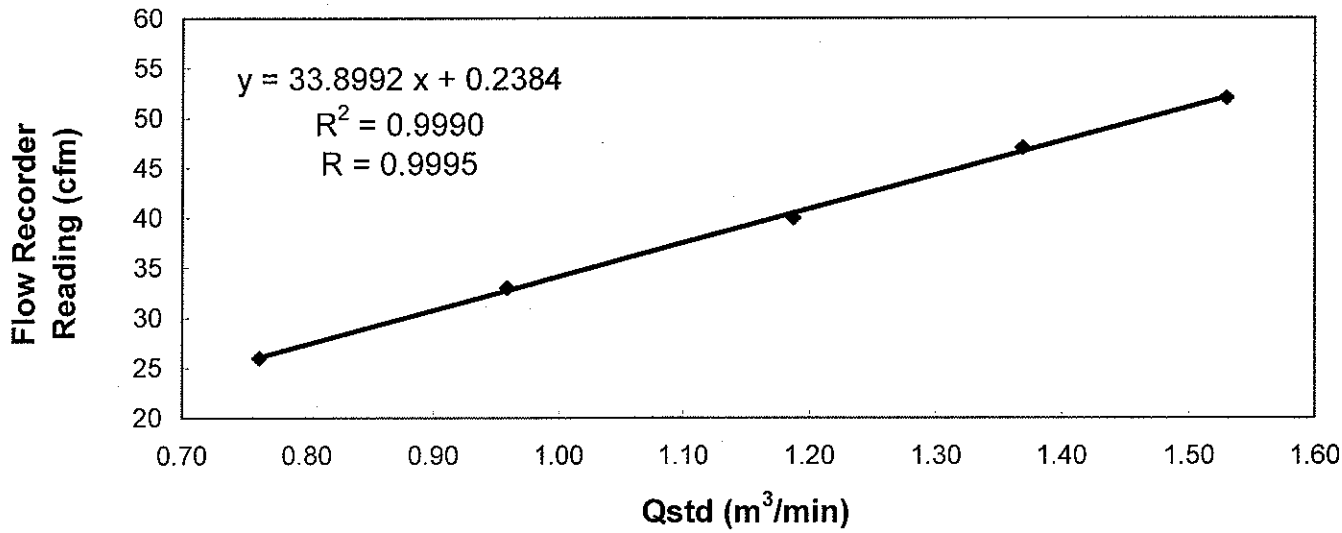
Calibration Due Date : 04 March 2010

Method : Five-point calibration by using standard calibration kit Tisch TE-5025A refer to the Operations Manual

Results :

Flow recorder reading (cfm)	53	47	40	33	26
Qstd (Actual flow rate, m^3/min)	1.53	1.37	1.19	0.96	0.76
Pressure : 759.06 mm Hg		Temp. : 288 K			

Sampler 1174 Calibration Curve
Site: Ocean Park (AM-1)



Acceptance Criteria : Correlation coefficient (r) of the calibration curve greater than 0.990 after a 5-point calibration.

The high volume sampler complies* / ~~does not comply~~* with the specified requirements and is deemed acceptable* / ~~unacceptable~~* for use.

Calibrated by : _____
LI, Wan Lung
(Technician)

Approved by : _____
LAW, Sau Yee
(Senior Environmental Officer)

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED
8/F., Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan Street, Fotan, Hong Kong
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Fax : 2695 3944 Web site : www.ets-testconsult.com

TEST REPORT

Calibration Report of High Volume Air Sampler

Manufacturer : Graseby GMW

Date of Calibration : 05 January 2010

Serial No. : 1177 (ET / EA / 003 / 07)

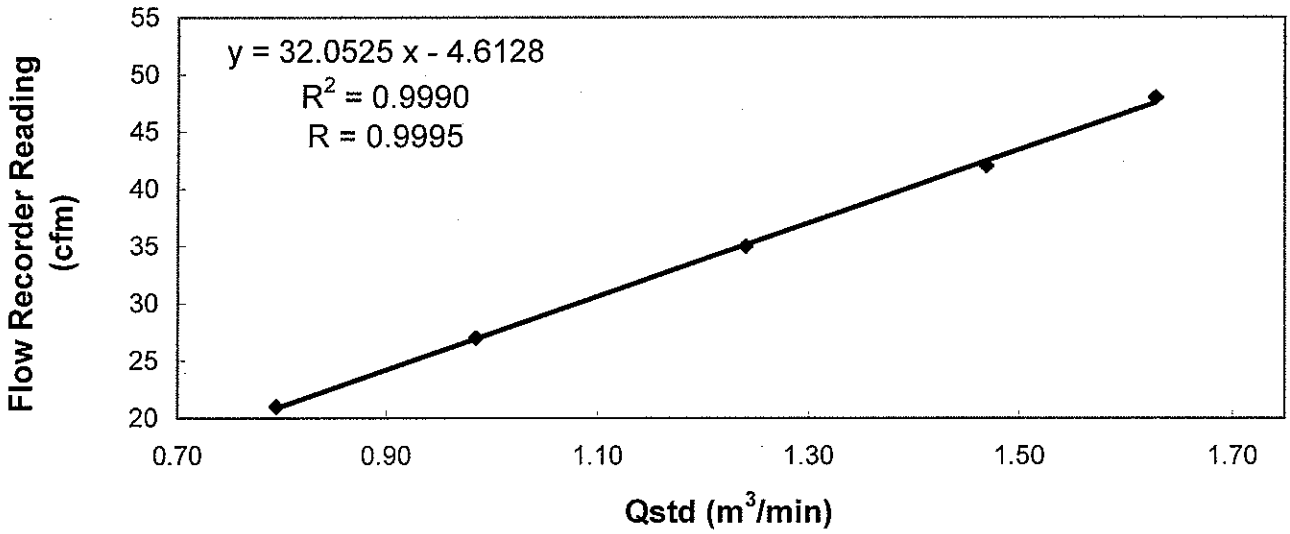
Calibration Due Date : 04 March 2010

Method : Five-point calibration by using standard calibration kit Tisch TE-5025A refer to the Operations Manual

Results :

Flow recorder reading (cfm)	48	42	35	27	21
Qstd (Actual flow rate, m^3/min)	1.63	1.47	1.24	0.98	0.80
Pressure : 759.06 mm Hg		Temp. : 288 K			

Sampler 1177 Calibration Curve
Site: Ocean Park (AM-2)



Acceptance Criteria : Correlation coefficient (r) of the calibration curve greater than 0.990 after a 5-point calibration.

The high volume sampler complies* / ~~does not comply~~* with the specified requirements and is deemed acceptable*/ ~~unacceptable~~* for use.

Calibrated by : LI, Wan Lung (Technician)

Approved by : LAW, Sau Yee (Senior Environmental Officer)

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED
8/F., Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan Street, Fotan, Hong Kong
Tel : 2695 8318 E-mail : etl@ets-testconsult.com
Fax : 2695 3944 Web site : www.ets-testconsult.com

TEST REPORT

Calibration Report of High Volume Air Sampler

Manufacturer : Graseby GMW

Date of Calibration : 05 January 2009

Serial No. : 9998 (ET / EA / 003 / 12)

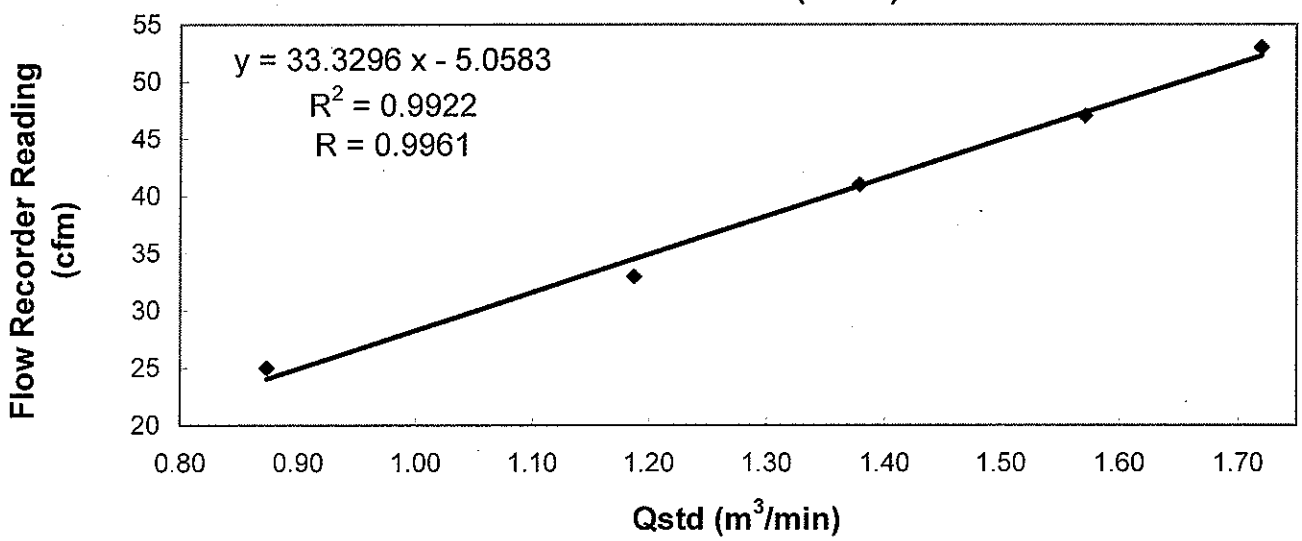
Calibration Due Date : 04 March 2010

Method : Five-point calibration by using standard calibration kit Tisch TE-5025A refer to the Operations Manual

Results :

Flow recorder reading (cfm)	53	47	41	33	25
Qstd (Actual flow rate, m^3/min)	1.72	1.57	1.38	1.19	0.87
Pressure : 759.06 mm Hg		Temp. : 288 K			

Sampler 9998 Calibration Curve
Site: Ocean Park (AM-3)



Acceptance Criteria : Correlation coefficient (r) of the calibration curve greater than 0.990 after a 5-point calibration.

The high volume sampler complies* / ~~does not comply~~* with the specified requirements and is deemed acceptable* / ~~unacceptable~~* for use.

Calibrated by : _____
LI, Wan Lung
(Technician)

Approved by : _____
LAW, Sau Yee
(Senior Environmental Officer)

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **91495**

Customer : ETS-Testconsult Limited

Address : 8/F., Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan St., Fotan, Hong Kong.

Order No. : Q90663 **Date of receipt :** 1-Apr-09

Item Tested

Description : Precision Integrating Sound Level Meter

Manufacturer : Rion

Model : NL-31 **Serial No. :** 00110024

Test Conditions

Date of Test : 15-Apr-09 **Supply Voltage :** --

Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure : Z01.

Test Results

All results were within the IEC 651 Type 1 & IEC 804 Type 1 specification.

The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Due Date	Traceable to
S017A	Multi-Function Generator	86228	11-Dec-09	SCL-HKSAR
S024	Sound Level Calibrator	82926	16-Jul-09	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).
The test results apply to the above Unit-Under-Test only

Calibrated by : P.F. Wong

Approved by : for Dorothy Cheuk

Date: 16-Apr-09

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

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Calibration Certificate

Results :

1. SPL Accuracy

UUT Setting			Applied Value (dB)	UUT Reading (dB)
Level Range (dB)	Weight	Response		
20 – 100	L_A	Fast	94.03	93.7
		Slow		93.7
	L_C	Fast		93.7
	Lp	Fast		93.7
30 – 120	L_A	Fast	94.03	93.6
		Slow		93.6
	L_C	Fast		93.6
	Lp	Fast		93.6
30 – 120	L_A	Fast	113.97	113.6
		Slow		113.6
	L_C	Fast		113.6
	Lp	Fast		113.6

IEC Type 1 Spec. : ± 0.7 dB
Uncertainty : ± 0.1 dB

2. Level Stability : 0.0 dB
IEC 651 Type 1 Spec. : ± 0.3 dB
Uncertainty : ± 0.01 dB

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Calibration Certificate

3. Linearity

3.1 Level Linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec. (Primary Indicator Range)
130	114.0	113.8	+0.2	± 0.7 dB
130	104.0	103.7	+0.1	
120	94.0	93.6 (Ref.)	- -	
110	84.0	83.6	0.0	
100	74.0	73.6	0.0	
90	64.0	63.7	+0.1	
80	54.0	53.8	+0.2	

Uncertainty : ± 0.1 dB

3.2 Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
120	84.0	83.7	+0.1	± 0.4 dB
	94.0	93.6 (Ref.)	- -	
	95.0	94.7	+0.1	± 0.2 dB
	104.0	103.6	0.0	± 0.3 dB
	105.0	104.6	0.0	± 1.0 dB

Uncertainty : ± 0.1 dB

4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	-39.8	- 39.4 dB, ± 1.5 dB
63 Hz	-26.5	- 26.2 dB, ± 1.5 dB
125 Hz	-16.5	- 16.1 dB, ± 1 dB
250 Hz	-8.9	- 8.6 dB, ± 1 dB
500 Hz	-3.4	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref.)	0 dB, ± 1 dB
2 kHz	+1.5	+ 1.2 dB, ± 1 dB
4 kHz	+1.4	+ 1.0 dB ,± 1 dB
8 kHz	-0.8	- 1.1 dB, + 1.5 dB ~ - 3 dB
16 kHz	-6.4	- 6.6 dB, + 3 dB ~- ∞

Uncertainty : ± 0.1 dB

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Calibration Certificate

5. Time Averaging

Applied Burst duty Factor	Applied Leq Value (dB)	UUT Reading (dB)	IEC 804 Type 1 Spec.
continuous	40.0	40.0	--
1/10	40.0	39.8	± 0.5 dB
$1/10^2$	40.0	39.8	
$1/10^3$	40.0	40.0	± 1.0 dB
$1/10^4$	40.0	40.3	

Uncertainty : ± 0.1 dB

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 002 hPa.

---------- END ----------

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香港校正有限公司

Calibration Certificate

Certificate No. **95693**

Customer : ETS-Testconsult Limited

Address : 8/F., Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan St., Fotan, Hong Kong.

Order No. : Q92297 **Date of receipt :** 5-Nov-09

Item Tested

Description : Sound Level Calibrator (ET/ EN/ 002/ 01)

Manufacturer : Rion

Model : NC-73 **Serial No. :** 10196943

Test Conditions

Date of Test : 11-Nov-09 **Supply Voltage :** --

Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure : F21, Z02.

Test Results

All results were within the manufacturer's specification.

The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Due Date	Traceable to
S014	Spectrum Analyzer	93091	18-Jun-10	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	93758	16-Jul-10	NIM-PRC & SCL-HKSAR
S041	Universal Counter	94005	6-Aug-10	SCL-HKSAR
S206	Sound Level Meter	93966	5-Aug-10	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).
The test results apply to the above Unit-Under-Test only

Calibrated by : P.F. Wong

Approved by : Dorothy Cheuk

Date: 16-Nov-09

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
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Calibration Certificate

Certificate No. 95693

Results :

1. Level Accuracy (at 1 kHz)

UUT Nominal Value	Measured Value	Mfr's Spec.
94 dB	93.72 dB	± 1 dB

Uncertainty : ± 0.1 dB

2. Frequency Accuracy

UUT Nominal Value	Measured Value	Mfr's Spec.
1 kHz	0.991 kHz	± 2 %

Uncertainty : ± 0.0 %

3. Level Stability : 0.0 dB
Uncertainty : ± 0.01 dB

4. Total Harmonic Distortion : < 0.8 %
Mfr's Spec. : < 3 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. The above measured values were the mean of 3 measurements.
4. Atmospheric Pressure : 1 002 hPa

---------- END ----------

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Appendix F – Environmental Mitigation Implementation Schedule

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Environmental Mitigation Implementation Schedule - Air Emission

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
1		yes	Use of regular watering, with complete coverage, to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather.	Superintendent/ Supervisor/Foremen	Weekly Environmental Inspection Checklist	08/08 - 11/10	OK
2		yes	Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines.	Superintendent/ Supervisor/Foremen	Weekly Environmental Inspection Checklist	08/08 - 11/10	OK
3		yes	Use of frequent watering for particularly dusty construction areas, temporary stockpiles and areas close to ASRs.	Superintendent/ Supervisor/Foremen	Weekly Environmental Inspection Checklist	08/08 - 11/10	OK
4		yes	Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 - 11/10	OK
5		yes	Restricting heights from which materials are dropped, as far as practicable to minimise the fugitive dust arising from unloading/loading.	Superintendent/ Supervisor/Foremen Subcontractor		08/08 - 11/10	OK
6		yes	Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 - 11/10	OK
7		yes	Use of vehicle wheel and body washing facilities at the exit points of the site.	Superintendent/ Supervisor/Foremen Project Environmental Co-ordinator Subcontractor	Weekly Environmental Inspection Checklist	08/08 - 11/10	OK
8		yes	Imposition of speed controls for vehicles on unpaved site roads. Ten kilometers per hour is the recommended limit.	Superintendent/ Supervisor/Foremen Project Environmental Co-ordinator		08/08 - 11/10	OK

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Environmental Mitigation Implementation Schedule - Air Emission

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
9		yes	Dusty activities should be re-scheduled if high-wind conditions are encountered.	Superintendent/ Supervisor/Foremen Project Environmental Co-ordinator		08/08 - 11/10	OK
10		yes	Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.	Superintendent/ Supervisor/Foremen Project Environmental Co-ordinator		08/08 - 11/10	OK
11		yes	Implementation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.	Project Environmental Co-ordinator		08/08 - 11/10	N.A.
12		yes	The works areas shall be fenced off with hoarding. The height of hoarding should not be less than 2.4 m from ground level	Superintendent/ Supervisor/Foremen	Weekly Environmental Inspection Checklist	08/08 - 11/10	OK

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Environmental Mitigation Implementation Schedule - Noise

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
1		yes	Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program	Superintendent/ Supervisor/Foremen Project Environmental Coordinator Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
2		yes	Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	N.A.
3		yes	Mobile plant, if any, should be sited as far from NSRs as possible	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
4		yes	Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
5		yes	Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
6		yes	Quiet Plant considered for at Entry Plaza construction for Site Clearance, Demolition, Realignment of Ocean Park Road, Drainage Diversion, Sewerage Diversion, Site Formation & Excavation, Piling Works and Superstructure Construction where calculated noise levels exceed limits	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
7		yes	Quiet Plant considered for Aqua City construction during - Site Clearance, Demolition, Slopeworks, Site Formation & Excavation, Piling Works and Superstructure Construction where calculated noise levels exceed limits	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
8		yes	Moveable noise barriers considered for at Entry Plaza construction for Site Clearance, Demolition, Realignment of Ocean Park Road, Drainage Diversion, Sewerage Diversion, Site Formation & Excavation, Piling Works and Superstructure Construction where calculated noise levels exceed limits	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	N.A.
9		yes	Moveable barriers considered for Aqua City construction during - Site Clearance, Demolition, Slopeworks, Site Formation & Excavation, Piling Works and Superstructure Construction where calculated noise levels exceed limits	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	N.A.

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Environmental Mitigation Implementation Schedule - Water

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
1		Yes	Before commencing any site formation work, all sewer and drainage connections should be sealed to prevent debris, soil, sand etc. from entering public sewers/drains.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 09/08	OK
2		Yes	Temporary ditches should be provided to facilitate run-off discharge into appropriate watercourses, via appropriately sized/ designed silt retention pond or similar structure. No site run-off should enter artificial ponds. Cut-off ditches should be provided for all major site clearance/ excavation works where soils would be exposed so that instances of uncontrolled run-off from exposed areas would be minimized. As well as channels, earth/ concrete bunds and/ or sand bags, as appropriate, should be deployed to direct surface run-off towards channels. Catchpits and perimeter channels should be constructed in advance of relevant site formation works.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK
3		Yes	Boundaries of earthworks should be marked and surrounded by dykes or embankments for flood protection, as necessary.	Superintendent/ Supervisor/Foremen land surveyor		08/08 to 11/10	OK
4		Yes	Sand/silt removal facilities such as sand/silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance. The design of silt removal facilities should be based on the guidelines provided in ProPECC PN 1/94. All drainage facilities and erosion and sediment control structures should be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.	Superintendent/ Supervisor/Foremen project environmental co-ordinator	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK
5		Yes	Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be regularly removed, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK
6		Yes	Exposed soil surfaces should be covered,	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK
7		Yes	Water pumped out from foundation excavations should be discharged into silt removal facilities.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK

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Environmental Mitigation Implementation Schedule - Water

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
8		Yes	If excavation cannot be avoided during rainy seasons, temporarily exposed slope/soil surfaces should be covered by a tarpaulin or other means, as far as practicable, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds. Interceptiong channels should be provided (e.g. along the crest/ edge of the excavation) to prevent storm runoff from washing across exposed soil surfaces. Arrangements should always be inplace to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm. Other measures that need to be implemented before, during and after rainstorms are summarized in ProPECC PN 1/94.	Superintendent/ Supervisor/Foremen project environmental co-ordiantor Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	N.A.
9		Yes	Exposed soil areas should be minimized to reduce potential for increased siltation and contamination of runoff.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK
10		Yes	Earthwork final surfaces should be well compacted and subsequent permanent work or surface protection should be immediately performed. Appropriate intercepting channels should be provided where necessary. Rainwater pumped out from trenches or excavations should be directed to silt removal facilities before discharge.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK
11		Yes	Open stockpiles of construction materials or construction wastes on-site of more than 50m^3 should be covered with tarpaulin or similar fabric during rainstorms	Superintendent/ Supervisor/Foremen Subcontractor		08/08 to 11/10	OK
12		Yes	Debris and refuse generated on-site should be collected, handled and disposed of properly to avoid entering any nearby water bodies and public drainage system. Stockpiles of cement and other construction materials should be kept covered when not being used.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK
13		Yes	Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site where necessary to handle sewage from the workforce. A licensed contractor would be responsible for appropriate disposal of waste matter and maintenance of these facilities.	Superintendent/ Supervisor/Foremen project environmental co-ordinator Subcontractor	Weekly Environmental Inspection Checklist	08/08 to 11/10	OK

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Environmental Mitigation Implementation Schedule - Ecological Resources

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
1		Yes	All excavation works carried out close to water bodies shall be carefully controlled to avoid runoff entering watercourses, especially during periods of heavy rain.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	N.A.
2		Yes	Site runoff shall be directed towards regularly cleaned and maintained silt traps and where appropriate, oil/grease separators to minimise risk of sedimentation and pollution.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
3		Yes	Suitable size / capacity silt traps and oil/grease interceptors shall be used.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	N.A.
4		Yes	Coral monitoring shall be implemented (by others)	Project Environmental Coordinator		08/08-11/10	N.A.
5		Yes	Noise mitigation measures including the use of quiet excavation methods, quiet construction plant and temporary noise barriers shall be implemented to minimise disturbance to habitats adjacent to the works areas	Superintendent/ Supervisor/Foremen Project Environmental Coordinator/ Engineer Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
6		Yes	Vegetation survey and subsequent transplantation of locally uncommon or restricted species (i.e. Long Tentacle Orchid, Sword-leaved Orchid, Green-flowered Rattlesnake-Plantain, Cycad-fern Balloon Flower and Chinese Lily) shall be carried out to determine the feasibility and suitability of individual plants for transplantation to protect plant species of conservation interest	Project Environmental Coordinator/ Engineer		08/08-11/10	OK
7		Yes	Receptor sites shall be identified.	Superintendent/ Supervisor/Foremen Project Environmental Coordinator		08/08-11/10	OK
8		Yes	Transplantation shall be supervised by a suitably qualified botanist/ horticulturist to protect plant species of conservation interest	Project Environmental Coordinator		08/08-11/10	OK
9		Yes	A detailed transplantation methodology shall be formulated during the detailed design stage based on the information collected during the detailed vegetation survey to protect plant species of conservation interest				N.A.

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Environmental Mitigation Implementation Schedule - Ecological Resources

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
10		Yes	Equipment or stockpile shall only be in designated works areas wherever practicable.	Superintendent/ Supervisor/Foremen		08/08-11/10	OK
11		Yes	Access routes shall be selected as far as practicable on existing disturbed land.	Superintendent/ Supervisor/Foremen Project Environmental Coordinator Subcontractor		08/08-11/10	N.A.
12		Yes	Construction activities shall be restricted to designated works areas.	Superintendent/ Supervisor/Foremen	Weekly Environmental Inspection Checklist	08/08-11/10	OK
13		Yes	The works areas shall be reinstated immediately after completion of works.	Superintendent/ Supervisor/Foremen Subcontractor		08/08-11/10	OK
14		Yes	Waste skips shall be provided to collect general refuse and construction wastes.	Superintendent/ Supervisor/Foremen Project Environmental Coordinator	Weekly Environmental Inspection Checklist	08/08-11/10	OK
15		Yes	The wastes shall be disposed of timely and properly off-site.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
16		Yes	Drainage arrangements shall include sediment traps to collect and control construction run-off	Superintendent/ Supervisor/Foremen Engineer	Weekly Environmental Inspection Checklist	08/08-11/10	OK
17		Yes	Open burning on works sites is illegal, and shall be strictly enforced.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK

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Environmental Mitigation Implementation Schedule - Archaeological and Historical Resources

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
1		Yes	If any works are planned within one metre of the grave, a one metre buffer zone will be provided around the grave, demarcated by a temporary fence.	Superintendent/ Supervisor/Foremen		08/08-11/10	N.A.

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Environmental Mitigation Implementation Schedule - Waste Management

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
1		Yes	Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site (Good site practices)	Superintendent/ project environmental coordinator		08/08-11/10	OK
2		Yes	Training of site personnel in proper waste management and chemical handling procedures	project environmental coordinator		08/08-11/10	OK
3		Yes	Provision of sufficient waste disposal points and regular collection of waste	Site supervisor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
4		Yes	Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
5		Yes	Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors.	project environmental coordinator	EMP	08/08-11/10	OK
6		Yes	Waste reduction measures: Sort C&D waste from demolition and decommissioning of the existing facilities to recover recyclable portions such as metals	Superintendent/ Supervisor/Foremen project environmental coordinator Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
7		Yes	Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
8		Yes	Encourage collection of aluminium cans by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the work force	Superintendent/ Supervisor/Foremen project environmental coordinator Subcontractor		08/08-11/10	OK
9		Yes	Proper storage and site practices to minimise the potential for damage or contamination of construction materials	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
10		Yes	Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.	Superintendent/ Supervisor/Foremen Subcontractor		08/08-11/10	OK

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Environmental Mitigation Implementation Schedule - Waste Management

ID No	Environmental Aspect (not required for actions specifically recommended in Environmental Impact Assessment)	Specifically Recommeded in Environmental Impact Assessment?	Actions Required These actions can be amended if necessary to suit particular needs unless they are in response to a specified legal requirements	Action party(s)	Additional Control/monitoring and measurement procedures/ methods (if necessary)	Scheduled months	Status
11		Yes	General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material	Superintendent/ Supervisor/Foremen project environmental coordinator Subcontractor		08/08-11/10	OK
12		Yes	In order to minimise impacts resulting from collection and transportation of C&D material for off-site disposal, the excavated materials arising from site formation should be reused on-site as backfilling material and for landscaping works as far as practicable. In addition, volcanic rock generated from the tunnelling works should be subject to beneficial re-use. Other mitigation requirements are listed below: - A Waste Management Plan should be prepared - A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be used - In order to monitor the disposal of C&D and solid wastes at public filling facilities and landfills, and to control fly-tipping, trip ticket systems will be adopted.	Engineer project environmental coordinator	Weekly Environmental Inspection Checklist	08/08-11/10	OK
13		Yes	Chemical waste: Contractor would be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* .	project environmental coordinator	Weekly Environmental Inspection Checklist	08/08-11/10	OK
14		Yes	Chemical waste: Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc.	Superintendent/ Supervisor/Foremen Subcontractor	Weekly Environmental Inspection Checklist	08/08-11/10	OK
15		Yes	Chemical waste:The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, either to the approved Chemical Waste Treatment Centre, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation	Superintendent/ Supervisor/Foremen		08/08-11/10	OK

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Appendix G – Event and Action Plans

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Event/Action Plan for Air Quality Monitoring

Event	Action			
Action Level	CET	Contractor	PMR	IEC
Exceedance for one sample	1. Identify source. 2. Notify IEC, PMR and Contractor. 3. Conduct additional monitoring to investigate the causes. 4. Report the investigation results and if exceedance is due to contractor's construction works to the IEC, PMR and Contractor. 5. Increase monitoring frequency to once per 2 days for 24-hour TSP and daily for 1-hour TSP until exceedance stops if exceedances are considered related to contractor's construction works and report the results to IEC, PMR and Contractor.	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice. 2. Submit air mitigation proposal to IEC and PMR for agreement if CET indicated that exceedance is related to the construction works. 3. Implement agreed proposal within a time scale agreed with PMR and IEC.	1. Confirm receipt of notification of failure in writing. 2. Notify Contractor. 3. Require Contractor to submit air mitigation proposal. 4. Ensure remedial measures are properly implemented.	1. Review monitoring data and investigation report submitted by CET. 2. Review Contractor's air mitigation proposal and advise the PMR accordingly. 3. Supervise and confirm in writing the implementation of remedial measures.
Exceedance for two or more consecutive samples	1. Identify source. 2. Notify EPD, IEC, PMR and Contractor. 3. Conduct additional monitoring to investigate the causes. 4. Report the investigation results and if exceedances are due to contractor's construction works to EPD, IEC, PMR and Contractor within 3 working days after additional monitoring. 5. Increase monitoring frequency to daily for 24-hour TSP and 1-hour TSP if exceedances are considered related to contractor's construction works until exceedance stops, and report the results to EPD, IEC, PMR and Contractor. 6. If exceedances continue after 1-week monitoring events, request PMR to arrange meeting with PMR, IEC and contractor to discuss remedial actions.	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice. 2. In consultation with the IEC, submit air mitigation proposal to IEC and PMR for agreement within 3 working days of notification if ET indicated that exceedances are related to construction works. 3. Implement agreed proposal within a time scale agreed with PMR and IEC. 4. Amend working methods if appropriate.	1. Confirm receipt of notification of failure in writing. 2. Notify Contractor. 3. Require Contractor to submit air mitigation proposal. 4. Ensure remedial measures are properly implemented.	1. Review monitoring data and investigation report submitted by CET. 2. Discuss amongst PMR, CET and Contractor in order to formulate air mitigation proposal. 3. Review Contractor's air mitigation proposal and advise the PMR accordingly. 4. Supervise and confirm in writing the implementation of remedial measures.

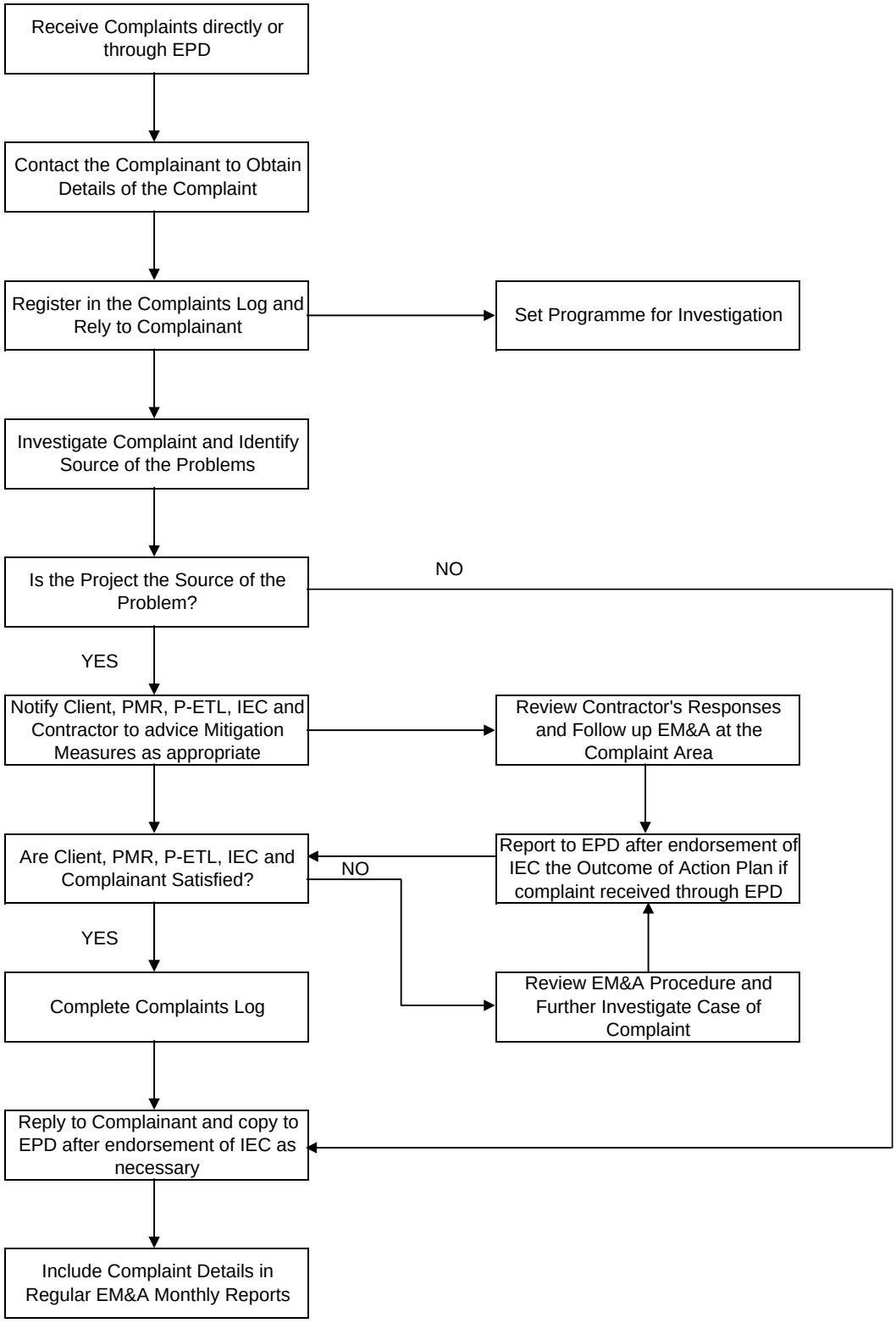
Event/Action Plan for Air Quality Monitoring

Event Limit Level	Action			
	CET	Contractor	PMR	IEC
Exceedance for one sample	1. Identify source. 2. Notify EPD, IEC, PMR and Contractor. 3. Conduct additional monitoring to investigate the causes. 4. Report the investigation results and if exceedances are due to contractor's construction works to EPD, IEC, PMR and Contractor within 3 working days after additional monitoring. 5. Increase monitoring frequency to daily if exceedances are considered related to contractor's construction works until exceedance stops, and report the results to EPD, IEC, PMR and Contractor.	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice 2. In consultation with the IEC, submit air mitigation proposal to IEC and PMR for agreement within 3 working days of notification if CET indicated that exceedances are related to construction works 3. Implement agreed proposal within a time scale agreed with PMR and IEC. 4. Amend working methods if appropriate.	1. Confirm receipt of notification of failure in writing. 2. Notify Contractor. 3. Require Contractor to submit air mitigation proposal. 4. Ensure remedial measures are properly implemented.	1. Review monitoring data and investigation report submitted by CET. 2. Discuss amongst PMR, CET and Contractor in order to formulate air mitigation proposal. 3. Review Contractor's air mitigation proposal and advise the PMR accordingly. 4. Supervise and confirm in writing the implementation of remedial measures.
Exceedance for two or more consecutive samples	1. Identify source. 2. Notify EPD, IEC, PMR and Contractor. 3. Conduct additional monitoring to investigate the causes. 4. Report the investigation results and if exceedances are due to contractor's construction works to EPD, IEC, PMR and Contractor within 3 working days after additional monitoring. 5. Increase monitoring frequency to daily if exceedances are considered related to contractor's construction works until exceedance stops, and report the results to EPD, IEC, PMR and Contractor. 6. If exceedances continue after 2 consecutive monitoring events, request PMR to arrange meeting with IEC and contractor to discuss remedial actions.	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice. 2. In consultation with the IEC, submit air mitigation proposal to IEC and PMR for agreement within 3 working days of notification if CET indicated that exceedances are related to construction works. 3. Implement agreed proposal within a time scale agreed with PMR and IEC. 4. Amend working methods and proposal if appropriate. 5. Stop relevant portion(s) of works as required by PMR, CET and IEC.	1. Confirm receipt of notification of failure in writing. 2. Notify Contractor. 3. Require Contractor to submit air mitigation proposal. 4. Ensure remedial measures are properly implemented. 5. If exceedances continue arrange meeting with Contractor, IEC and CET and to consider what portion(s) of works should be further mitigated or have to stop.	1. Review monitoring data and investigation report submitted by CET. 2. Discuss amongst PMR, CET and Contractor in order to formulate air mitigation proposal. 3. Review Contractor's air mitigation proposal and advise the PMR accordingly. 4. Supervise and confirm in writing the implementation of remedial measures.

Event/Action Plan for Regular Construction Noise Monitoring

Event	Action			
	CET	Contractor	PMR	IEC
Action Level Exceedance	1. Identify source. 2. Notify IEC, PMR and Contractor. 3. Conduct additional noise monitoring to investigate the causes. 4. Report the investigation results to the IEC, PMR and Contractor. 5. Discuss with Contractor for their formulation of remedial measures if the exceedance is related to construction works. 6. Conduct additional monitoring to check mitigation effectiveness.	1. Take immediate action to avoid further exceedance. 2. Submit noise mitigation proposals to ET, PMR and IEC. 3. Implement noise mitigation proposals.	1. Confirm receipt of notification of failure in writing. 2. Notify Contractor. 3. Require Contractor to propose remedial measures for the analysed noise problem. 4. Ensure remedial measures are properly implemented.	1. Review the analysed results submitted by the CET. 2. Review the proposed remedial measures by the Contractor and advise the PMR accordingly. 3. Supervise and confirm in writing the implementation of remedial measures
Limit Level Exceedance	1. Identify source. 2. Notify EPD, IEC, PMR and Contractor. 3. Conduct additional noise monitoring and analyse Contractor's working procedures to determine possible cause of exceedance. 4. Provide interim report to EPD, IEC and PMR on the causes and proposed actions to be taken for the exceedances if exceedance is related to construction works. 5. Assess effectiveness by additional monitoring and report to EPD, IEC, PMR and Contractor the results. 6. If exceedance stops, cease additional monitoring.	1. Take immediate action to avoid further exceedance. 2. Submit proposals for remedial actions to CET, PMR and IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Resubmit proposals if problem still not under control. 5. Stop the relevant portion of works as determined by the PMR until the exceedance is abated.	1. Confirm receipt of notification of failure in writing. 2. Notify Contractor. 3. Require Contractor to propose remedial measures for the analysed noise problem. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Discuss amongst PMR, CET and Contractor on the potential remedial actions. 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the PMR accordingly. 3. Supervise and confirm in writing the implementation of remedial measures.

Appendix H – Compliant Flow Diagram and Complaint Log

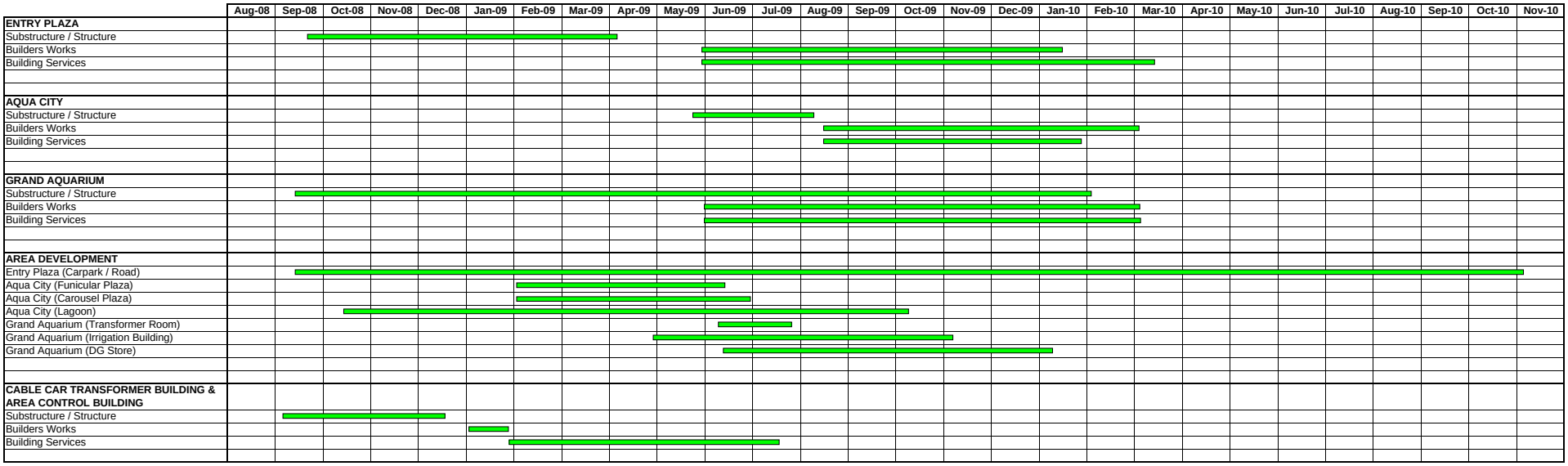

Receive Complaints directly or through EPD
Contact the Complainant to Obtain Details of the Complaint
Register in the Complaints Log and Rely to Complainant
Set Programme for Investigation
Investigate Complaint and Identify Source of the Problems
Is the Project the Source of the Problem?
NO
YES
Notify Client, PMR, P-ETL, IEC and Contractor to advice Mitigation Measures as appropriate
Review Contractor's Responses and Follow up EM&A at the Complaint Area
Are Client, PMR, P-ETL, IEC and Complainant Satisfied?
NO
Report to EPD after endorsement of IEC the Outcome of Action Plan if complaint received through EPD
YES
Complete Complaints Log
Review EM&A Procedure and Further Investigate Case of Complaint
Reply to Complainant and copy to EPD after endorsement of IEC as necessary
Include Complaint Details in Regular EM&A Monthly Reports

Complaint Record Register

Record ID	Data Received	Type (PMR / EPD / Public / Others)	Description	Project	Justified compliant?	Status (Open / Closed)
EC/CI07/001	17-Jun-09	Public thru EPD	Police Training School claimed that noise nuisance from CI07	CI07	N/A	The inspector of EPD came to the site and no significant observation was made, hence the complaint was closed.

Appendix I – Tentative Work Programme

CONTRACT CI07 - Entry Plaza, Aqua City & Grand Aquarium
Outline Programme
Updated to: 01-Sep-2008



Appendix J – Site Audit Summary

Remarks

Location – Carousel

1. The saw located near the hoarding in Carousel Plaza did not have bag provided to collect saw dust. The contractor was reminded to provide to collect and clean up the saw dust on the ground immediately.

2. Dust was generated during surface grinding on the roof. The contractor was reminded to wet the surface to suppress dust.

Inspected by :

RSS's Representative	Contractor's Representative	IEC Representative
Signatures:	Signatures:	Signatures:
Name: ANDY LEUNG	Name: Kelven Yip	Name:
Date: 2/2/10	Date: 02 February 2010	Date:

Inspection / Follow up Report No 063.

Date of Inspection: 02 Feb 10 Time of Inspection: 14:00

1. The saw located near the hoarding inside Carousel Plaza did not have bag provided to collect saw dust.

1. The contractor was reminded to provide to collect and clean up the saw dust on the ground immediately.

2. The saw located near the hoarding inside Carousel Plaza did not have bag provided to collect saw dust.

The contractor was reminded to provide to collect and clean up the saw dust on the ground immediately.

Inspected By:	Yip K. F., Kelven	Position:	Envm. Engineer	Date:	02 Feb 2010	Signature:	Kelv
Approved By:	ANDY LEUNG	Position:	AIOW - SEM	Date:	2/2/2010	Signature:	

Remarks

Location – Carousel & Entry Plaza

No major observation was found.

Inspected by :

RSS's Representative	Contractor's Representative	IEC Representative
Signatures:	Signatures:	Signatures:
Name: ANDY LEONG	Name: Kelven Yip	Name:
Date: 12/2/10.	Date: 12 February 2010	Date:

	• Is adequate space provided for the explosive vehicle to manoeuvre without reversing close to the magazine to limit the likelihood of vehicle accident?		✓			
	• Is lighting for explosive vehicles provided on temporary road(s)?		✓			
S11.4	• Is ammonium nitrate emulsion (ANE) delivered outside of Park opening times?		✓			

Observations for this month

① Cement mixing is carried out without enclosures on top and 3 sides. The enclosure is available but should be improved.

② Stagnant water was accumulated on site due to rain.

IEC Representative	Environmental Manager	Contractor's Representative CI07
Florence Yuen		Thomas
(Florence Yuen)	(ANDY LEUNG)	(Thomas Lee - LCAL)

Remarks

Location – Entry Plaza

1. Dust was generated during surface grinding along the exterior of West Building. The contractor was reminded to wet the surface to suppress dust.

Inspected by :

RSS's Representative	Contractor's Representative	IEC Representative
Signatures:	Signatures:	Signatures:
Name: LEUNG MA YIU	Name: Kelven Yip	Name:
Date: 26/2/10	Date: 26 February 2010	Date:

Inspection / Follow up Report No 065.

Date of Inspection: 26 Feb 10 Time of Inspection: 10:00

1. Dust was generated during surface grinding along the exterior of West Building.	1. The contractor was reminded to wet the surface to suppress dust.

Inspected By:	Yip K. F., Kelven	Position:	Envm. Engineer	Date:	26 Feb 2010	Signature:	
Approved By:	ANDY LEUNG	Position:	ALCW SEM	Date:	26/2/10	Signature:	

Appendix K – Summary of Amount of Waste Generated

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Monthly Waste Flow Table

Contract: **Entry Plaza, Aqua City and Grand Aquarium** Contract No: **CI07 (H2458)** **Year: 2010**

Month	Actual Quantities of Inert Construction Waste Reused/Recycled			Actual Quantities of Construction Waste Recycled[1]						Actual Quantities of Disposed Material			
	Broken Concrete[2] Recycled	Re-used in Project	Re-used in Other Projects[3]	Metals Recycled	Paper Recycled	Cardboard Packaging Recycled	Plastic[4] Recycled	Timber	Toner Cartridge	Chemical Waste[6] to Licensed Facilities		Inert Construction Waste[7] to Public Fill	Construction Waste to Landfill
										Liquid	Solid		
	(tonnes)	(tonnes)	(tonnes)	(tonnnes)	(kg)	(kg)	(kg)	(Kg)	(Box)	(litres)	(kg)	(tonnes)	(tonnes)
Jan	0	0	0	15.55	132	0	0	0	0	0	0	2139	659
Feb	0	0	0	6.61	132	0	0	0	0	0	220	1815	513
Mar													
Q1 total	0	0	0	22.16	264	0	0	0	0	0	220	3954	1172
Apr													
May													
Jun													
Q2 total	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul													
Aug													
Sep													
Q3 total	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct													
Nov													
Dec													
Q4 total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand total	0	0	0	22.16	264	0	0	0	0	0	220	3954	1172

Note / Definition:

1. Provide further breakdown in Part D2 of Monthly Environmental Report.
2. Broken concrete for recycling into aggregates (eg Tuen Mun Area 38).
3. Other projects include third-parties (eg quarries).
4. Plastic refers to plastic bottles/containers, plastic sheets/foam from packaging material.
5. Examples of other waste recycled may include tyres and computer equipment
6. Chemical waste is split into 2 components: liquid waste (eg spent lubricating oil) and solid waste (eg spent batteries). Provide further breakdown in Part D1 of Monthly Environmental Report.
7. Inert construction waste is also known as public fill. It includes, for example, concrete, rubble, earth, boulder, sand, tile, masonry and used bentonite.

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Part 3 CW-02 EM&A REPORT (February 2010)

W. Hing Construction Co., Ltd

Contract No. CW02

Ocean Park Redevelopment Project
- Astounding Asia

Monthly EM&A Report
(Version 1.0)

February 2010

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EXECUTIVE SUMMARY

Introduction

This is the 31st monthly Environmental Monitoring and Audit (EM&A) Report for the Contract No. CW02 "Ocean Park Redevelopment Project – Astounding Asia" (hereinafter called "the Project"). This document reports the findings of the environmental auditing works conducted in February 2010.

The major site activities undertaken in the reporting month included:

- Finishing Works for the Plant Room & Bridge at Main (Emerald) Aviary; and
- E&M Works for the Plant Room & Bridge at Main (Emerald) Aviary.

Environmental Monitoring and Audit Works

Environmental monitoring and audit works for the Project was performed as stipulated in the updated EM&A Manual. No environmental site audit was conducted in the reporting month. No non-compliance was observed during the reporting month.

No notification of exceedance was received in the reporting month. Summary of the events and action taken in the reporting month is tabulated in **Table I**.

Table I Summary Table for Events Recorded in the Reporting Month

Parameter	No. of Events		No. of Events Due to the Project	Action Taken
	Action Level	Limit Level		
1-hr TSP	0	0	0	N/A
24-hr TSP	0	0	0	N/A
Noise	0	0	0	N/A

Environmental Licenses and Permits

Licenses/Permits granted to the Project include the Environmental Permit (EP) for the Redevelopment Project, Registration of Waste Producer and Water Discharge License.

A notification pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation was received prior the commencement of the Project.

Complaints and Prosecutions

No environmental complaint and prosecution was received in the reporting month.

Future Key Issues

Key issues to be considered in the coming month include:

- Maintenance & Reinstatement Works at Main (Emerald) Aviary.

1 INTRODUCTION

Background

1.1 The "Repositioning and Long Term Operation Plan of Ocean Park" has been implementing by the Ocean Park Corporation at its existing site of Ocean Park and Nam Long Shan, Aberdeen. The purpose of this project is to upgrade and expand the existing Ocean Park to meet anticipated visitor demands and to position Ocean Park as a premium tourist attraction and a regional leader in themed recreational and educational park experience. The site layout plan is illustrated in Figure 1.1.

1.2 An environmental impact assessment (EIA) report for "Repositioning and Long Term Operation Plan of Ocean Park" (Report No. 121/2006 and Register No. AEIAR-101/2006) has been prepared in 2006 and the Environmental Monitoring and Audit Manual (Project's EM&A Manual) was also included as part of the EIA report in the register. An Environmental Permit (EP) No. EP-249/2006 was issued on 28 July 2006 for the above project to Ocean Park Corporation as Permit Holder and a varied EP No. EP-249/2006/A was subsequently issued on 23 October 2006 for the above project to Ocean Park Corporation as Permit Holder.

1.3 W. Hing Construction Co., Ltd. (the Contractor) was commissioned by the Employer to undertake the design and construction of the Contract No. CW02 "Ocean Park Redevelopment Project – Astounding Asia" (hereinafter call "the Project").

1.4 The Project includes design and construction of:

(a) ETFE roof membrane system including the membrane, mullion, supporting frame, fixing to main structure, openings and all associated elements
(b) Aviary netting including mesh and supporting wire and fixing to main structures
(c) Artificial Rockwork including concrete foundations, internal structural supporting systems and fixing details
(d) All GRC works
(e) Skylight at back of house of Panda Habitat
(f) Nest box of Red Panda
(g) E&M supporting structures
(h) Balustrade
(i) Mural
(j) Exhibit glazing at the alligator, panda mountain viewing shelter, otter viewing, and goldfish exhibit
(k) Bamboo Rail including foundation
(l) Bamboo and Reed Barriers including foundation
(m) Planter Wall
(n) Fog system within Panda Habitat
(o) Glass Guard Rails
(p) Snow Production System
(q) Chilled rock system
(r) Fire Services
(s) "Rock Delta" Stone Wool Intensive Medium for the rice paddy wall
(t) Woven willow cladding for fence wall/gate

(u) Foundation for shelter support pole for panda mountain viewing shelter
(v) Kid's climbing tree & giant panda climbing structure

1.5 Cinotech Consultants Ltd. (Cinotech) was commissioned by the Contractor to undertake the Environmental Team (ET) services for the Project from the commencement of works to October 2009. This is the 31st monthly EM&A Report summarizing the EM&A works for the Project in February 2010.

Project Organizations

1.6 Different parties with different levels of involvement in the project organization include:

- The Engineer and Project Environmental Team Leader (ETL) – AECOM Asia Co. Ltd.
- Contractor – W. Hing Construction Co. Ltd.
- Contractor Environmental Team (CET) –W. Hing Construction Co. Ltd.
- Independent Environmental Checker (IEC) – Mott MacDonald HK Ltd.

1.7 The responsibilities of respective parties are provided in Section the Contractor's EM&A Manual of the Project.

1.8 The key contacts of the Project are shown in **Table 1.1**.

Table 1.1 Key Project Contacts

Party	Name	Role	Phone No.	Fax No.
Project ET	Mr. Benny Chan	Safety Manager	2910 3155	2552 1256
	Mr. Andy Leung	Assistant Inspector of Works	2910 3156	
Contractor	Mr. Billy Lee	Project Manager	6193 4096	8343 9188
	Mr. Eddie Chiu	Environmental & Safety Manager	6105 4075	
Contractor's ET	Mr. Eddie Chiu	Contractor's Environmental Team Leader (CETL)	6105 4075	8343 9188
	Mr. Kan Kwok	ET Coordinator & Audit Team Leader	6277 1747	
IEC	Miss Florence Yuen	Independent Environmental Checker (IEC) Representative	2828 5757	28271823

Construction Programme

1.9 The site activities undertaken in the reporting month were:

- Finishing Works for the Plant Room & Bridge at Main (Emerald) Aviary; and
- E&M Works for the Plant Room & Bridge at Main (Emerald) Aviary.

Summary of EM&A Requirements

1.10 The EM&A programme requires construction phase environmental site audit. The duties and responsibilities comprise the following:

- monitor various environmental parameters, if necessary, as specified in the Contractor's EM&A Manual;
- analyze the environmental monitoring and audit data;
- review the EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify and adverse environmental impacts arising;
- carry out site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems;
- audit and prepare EM&A reports on the site environmental conditions;
- report the environmental audit results to the Contractor;
- recommend appropriate mitigation measures to the Contractor in case of exceedance of Action and Limit Levels in accordance with the Event and Action Plans; and
- adhere to the procedures for carrying out complaint investigation in accordance with Sections 7.11 to 7.14 of the Contractor's EM&A Manual.

1.11 This report presents the environmental monitoring and audit works for the Project in February 2010.

2 ENVIRONMENTAL AUDIT

Environmental Site Audits

2.1 Environmental site audits were carried out on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.

2.2 No environmental site audit was conducted in the reporting month.

Status of Environmental Licensing and Permitting

2.3 All valid permits/licenses obtained for the Project are summarized in **Table 2.1**.

Table 2.1 Summary of Environmental Licensing and Permit Status

Permit No.	Valid Period		Details	Status
	From	To		
Environmental Permit				
EP-249/2006/A	23/10/2006	N/A	Expansion of the existing Ocean Park and reconstruction / modification of its existing facilities.	Valid
Registration of Chemical Waste Producer				
WPN5213-199-W2894-18	20/08/2007	N/A	Waste Disposal (Chemical Waste) (General) Regulation -- Registration of Waste Producer	Valid
Water Discharge License				
EP820/W9/XW240	12/10/2007	31/10/2012	Discharge of industrial trade effluent arising from the Sedimentation tank at the construction site (CW02 Astounding Asia, Ocean Park Redevelopment Project) to communal storm water drain.	Valid
Others				
001022180	N/A	N/A	Notification Pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation	Valid
7005864	N/A	N/A	Construction Waste Disposal Billing Account with EPD	Valid

Status of Waste Management

2.4 The amount of waste generated by the construction activities of the Project in the reporting month is attached in **Appendix A**.

Implementation Status of Environmental Mitigation Measures

2.5 According to the Environmental Permit and the Contractor's EM&A Manual, the mitigation measures detailed in the documents are required to be implemented. An updated summary of the EMIS is provided in **Appendix B**.

Summary of Exceedances

2.6 No Action/Limit Level exceedance was reported in the reporting month.

Implementation Status of Event Action Plans

2.7 The Event Action Plans for air quality and construction noise are presented in **Appendix C**.

Summary of Complaints and Prosecutions

2.8 No environmental complaint and prosecution related to the Project works was received during the reporting month.

3 FUTURE KEY ISSUES

Key Issues for the Coming Month

3.1 Key issues to be considered in the coming month include:

- Maintenance & Reinstatement Works at Main (Emerald) Aviary.

Construction Program for the Next Month

3.2 There is no major works for the Project.

4 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

4.1 No environmental site audit was conducted in the reporting month.

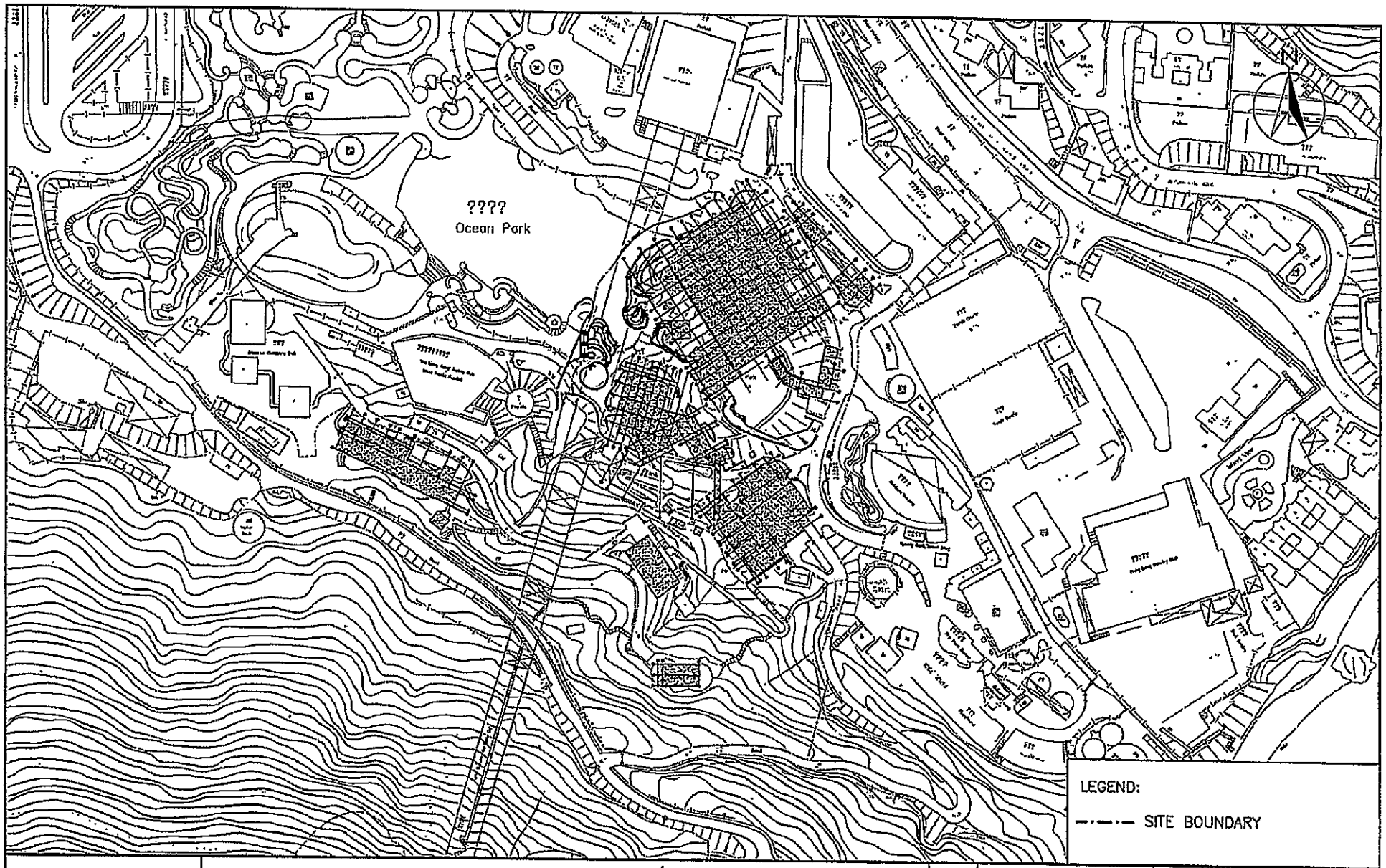
4.2 No execeedance of environmental monitoring was reported in the reporting month.

4.3 No environmental complaint and prosecution related to the project was received in the reporting month.

Recommendations

4.4 As there is no major works to be carried out for the Project, no particular recommendations could be suggested.

FIGURE



CINOTECH
Cinotech Consultants Limited

CONTRACT NO. CW02
OCEAN PARK REDEVELOPMENT PROJECT – ASTOUNDING ASIA

SITE LAYOUT PLAN

SCALE	A4 1:2000	DATE	AUG 2007
CHECK	EW	DRAWN	TL
JOB No.	MA7025	DRAWING No.	1.1
		REV	—

F:\PROJECT_DRAWINGS\MA7025\EM&A MANUAL\FIGURE_1.DWG

APPENDIX A
SUMMARY OF WASTE GENERATED

Appendix A

Name of Department: W. Hing Construction Co., Ltd

Contract No.: CW-02

Monthly Summary Waste Flow Table For February 2010

Month	Actual Quantities of Inert C&D Materials Generated Monthly		Non-inert C&D Waste disposed to Tseung Kwan O Sorting Facility	Non-inert C&D Waste disposed to SENT Landfill	Chemical Waste disposed to Chemical Waste Treatment Facility at Tsing Yi	Recycle Metals	Packaging (e.g. Plastic, paper wrapping etc.) and other general refuse
	Disposed to Public filling area at Tseung Kwan O	Disposed to Public Barging area at Chai Wan *					
	(in tonnes)	(in tonnes)	(in tonnes)	(in tonnes)	(in litres)	(in tonnes)	(in tonnes)
Sep-07	100.49	28.75	8.61	1.94	N/A	N/A	N/A
Oct-07	16.42	19.61	8.47	16.06	N/A	N/A	N/A
Nov-07	N/A	95.29	N/A	4.95	N/A	N/A	N/A
Dec-07	N/A	15.63	10.68	3.83	N/A	N/A	N/A
Jan-08	N/A	158.91	13.18	16.37	N/A	N/A	N/A
Feb-08	N/A	708.19	4.58	15.01	N/A	N/A	N/A
Sub-total	**116.91**	**1,026.38**	**45.52**	**58.16**	**0.00**	**0.00**	**0.00**
Mar-08	N/A	857.78	25.17	36.22	N/A	N/A	N/A
Apr-08	N/A	1,309.35	N/A	52.10	N/A	N/A	N/A
May-08	N/A	334.03	11.44	40.86	N/A	N/A	N/A
Jun-08	N/A	528.74	18.19	9.15	N/A	N/A	N/A
Jul-08	9.87	832.48	24.00	26.89	N/A	N/A	N/A
Aug-08	37.88	1682.03	60.62	76.08	N/A	N/A	N/A
Sep-08	N/A	101.29	40.47	58.92	N/A	N/A	N/A
Oct-08	N/A	2230.36	18.22	98.98	N/A	N/A	N/A
Nov-08	N/A	732.82	20.61	91.11	N/A	N/A	N/A
Dec-08	54.24	7.62	11.78	92.82	N/A	N/A	N/A
Jan-09	N/A	2019.85	29.99	142.90	N/A	N/A	N/A
Feb-09	N/A	1898.85	21.41	62.12	N/A	N/A	N/A
Sub-total	**218.90**	**13,561.58**	**327.42**	**846.31**	**0.00**	**0.00**	**0.00**
Mar-09	33.54	535.70	249.55	98.87	N/A	N/A	N/A
Apr-09	92.38	232.51	328.14	110.54	N/A	N/A	N/A
May-09	53.10	304.10	71.57	23.98	N/A	N/A	N/A
Jun-09	554.47	341.72	93.42	36.72	N/A	N/A	N/A
Jul-09	395.55	870.41	49.52	23.71	N/A	N/A	N/A
Aug-09	N/A	34.37	18.75	9.29	N/A	N/A	N/A
Sep-09	N/A	37.61	N/A	16.40	N/A	N/A	N/A
Oct-09	12.10	469.31	11.55	8.11	N/A	N/A	N/A
Nov-09	N/A	442.56	17.42	7.99	N/A	N/A	N/A
Dec-09	8.61	79.75	N/A	36.00	N/A	N/A	N/A
Jan-10	N/A	9.57	21.37	8.32	N/A	N/A	N/A
Feb-10	N/A	5.39	3.42	N/A	N/A	N/A	N/A
Total	**1,368.65**	**16,924.58**	**1,192.13**	**1,226.24**	**0.00**	**0.00**	**0.00**

APPENDIX B
ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE (EMIS)

Appendix B - Summary of Environmental Mitigation Implementation Schedule

Types of Impacts	Mitigation Measures	Status
Construction Dust	• Use of regular watering, with complete coverage, to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather.	^
	• Use of frequent watering for particularly dusty construction areas, temporary stockpiles and areas close to ASRs.	^
	• Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines.	N/A
	• Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs.	*
	• Restricting heights from which materials are dropped, as far as practicable to minimise the fugitive dust arising from unloading/ loading.	^
	• Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.	^
	• Use of vehicle wheel and body washing facilities at the exit points of the site.	^
	• Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading points, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods.	N/A
	• Imposition of speed controls for vehicles on unpaved site roads. Ten kilometers per hour is the recommended limit.	^
	• Dusty activities should be re-scheduled if high-wind conditions are encountered.	N/A
	• Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.	N/A
	• Suitable buffer zone should be provided and the works areas should be fenced off with hoarding. The height of hoarding should not be less than 2.4m from ground level.	N/A
	Crushing Plant	
	• Water sprays on the crusher.	N/A
	• Fabric filters installed for the crushing plant.	N/A
	• When transferring materials from crusher to the conveyors, chutes or dust curtains would be used for controlling dust.	N/A

Types of Impacts	Mitigation Measures	Status
	Barging Point & Conveyor Belt System	
	• The conveyors would be placed within a totally enclosed structure	N/A
	• Profiled steel cladding would be provided at two sides of loading point.	N/A
	• Dust suppression sprays would be installed and operated in strategic locations at the feeding inlet and outlet.	N/A
	• The barging point would be placed within a totally enclosed structure incorporating an enclosed chute for material transfer to the barge. Flexible curtain would be hanged on the enclosed chute prevent dust emission when excavated materials/rocks transported into the barge.	N/A
	• Some areas of the Park would remain open for visitors during the construction period. Therefore, suitable buffer zones from major construction activities should be provided where practical and the works areas should be fenced off with hoarding during the construction phase. It is recommended to erect hoarding of a height not less than 2.4m from ground level.	^
Construction Noise	*Construction Phase*	
	• Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme	^
	• Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction programme	N/A
	• Mobile plant, if any, should be sited as far from NSRs as possible.	N/A
	• Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum	^
	• Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs	^
	• Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities	N/A
	Adoption of Quieter Plant	
	• In order to reduce the excessive noise impacts at the affected NSRs at the Waterfront during normal daytime working hours, quieter plants are recommended. The Contractors do not have to use specific items of quiet plant adopted in this assessment. The Contractors may use other type of quiet plant, which have the same total SWL, to meet their needs	^

Types of Impacts	Mitigation Measures	Status
	Use of Movable Noise Barrier	
	• The use of movable barrier for certain PME could further alleviate the construction noise impacts. In general, 5dB (A) reduction for movable PME and 10dB (A) for stationary PME can be achieved depending on the actual design of movable noise barrier.	N/A
	• The Contractor should be responsible for designing of the movable noise barrier with due consideration given to the size of the PME and the requirement of intercepting the line of sight between the NSRs and PME. Barrier material of surface mass in excess of 7kg/m2 is recommended to achieve the predicted screening effect.	N/A
	• Exceedance of up to 5dB (A) would be predicted at the Police Training School (NSR PTS) during the examination periods. Early liaison with the principal of this impacted school is recommended to plan for the construction programme. Noisy construction activities should be avoided during the examination period as far as practicable so as to reduce the potential noise impact at the school to comply with the noise criterion of 65dB(A).	N/A
Ecology	*Construction Phase*	
	• All excavation works carried out close to water bodies shall be carefully controlled to avoid runoff entering watercourses, especially during periods of heavy rain.	^
	• Site runoff shall be directed towards regularly cleaned and maintained silt traps and where appropriate, oil/grease separators to minimize risk of sedimentation and pollution.	N/A
	• Suitable size / capacity silt traps and oil/grease interceptors shall be used.	N/A
	• Noise mitigation measures including the use of quiet construction plant and movable noise barriers shall be implemented to minimize disturbance to habitats adjacent to the work areas.	N/A
	• Trees located within the works areas shall be preserved as far as practicable.	^
	• Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural habitats	^
	• Construction activities shall be restricted to the work areas that would be clearly demarcated	^
	• The work areas shall be reinstated immediately after completion of the works	^
	• Waste skips shall be provided to collect general refuse and construction wastes. The wastes would be disposed of timely and properly off-site.	N/A
	• Drainage arrangements shall include sediment traps to collect and control construction run-off	^
	• Open burning on works sites is illegal, and shall be strictly enforced	^
	• Landscaping works on newly formed land shall as far as possible make use of native plant species	^

Types of Impacts	Mitigation Measures	Status
Water Quality	*Construction Runoff and Drainage*	
	• Before commencing any site formation work, all sewer and drainage connections should be sealed to prevent debris, soil, sand etc. from entering public sewers/drains.	^
	• Temporary ditches should be provided to facilitate run-off discharge into appropriate watercourses, via appropriately sized/ designed silt retention pond or similar structure. No site run-off should enter artificial ponds. Cut-off ditches should be provided for all major site clearance/ excavation works where soils would be exposed so that instances of uncontrolled run-off from exposed areas would be minimized. As well as channels, earth/ concrete bunds and/ or sand bags, as appropriate, should be deployed to direct surface run-off towards channels. Catchpits and perimeter channels should be constructed in advance of relevant site formation works.	^
	• Boundaries of earthworks should be marked and surrounded by dykes or embankments for flood protection, as necessary.	^
	• Sand/silt removal facilities such as sand/silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance. The design of silt removal facilities should be based on the guidelines provided in ProPECC PN 1/94. All drainage facilities and erosion and sediment control structures should be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.	^
	• Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be regularly removed, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.	^
	• Exposed soil surfaces should be covered.	^
	• Water pumped out from foundation excavations should be discharged into silt removal facilities.	^
	• If excavation cannot be avoided during rainy seasons, temporarily exposed slope/soil surfaces should be covered by a tarpaulin or other means, as far as practicable, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds. Interceptiong channels should be provided (e.g. along the crest/ edge of the excavation) to prevent storm runoff from washing across exposed soil surfaces. Arrangements should always be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm.. Other measures that need to be implemented before, during and after rainstorms are summarized in ProPECC PN 1/94.	^
	• Exposed soil areas should be minimized to reduce potential for increased siltation and contamination of runoff.	^
	• Earthwork final surfaces should be well compacted and subsequent permanent work or surface protection should be immediately performed. Appropriate intercepting channels should be provided where necessary. Rainwater pumped out from trenches or excavations should be directed to silt removal facilities before discharge.	^

Types of Impacts	Mitigation Measures	Status
	• Open stockpiles of construction materials or construction wastes on-site of more than $50m^3$ should be covered with tarpaulin or similar fabric during rainstorms	^
	General Construction Activities	
	• Debris and refuse generated on-site should be collected	*
	• Oils and fuels should only be used and stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to nearby water bodies and public drains	^
	Sewage from Construction Workforce	
	• Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site where necessary to handle sewage from the workforce. A licensed contractor would be responsible for appropriate disposal of waste matter and maintenance of these facilities	^
Waste / Chemical	*Good Site Practice*	
	• nomination of an approved personnel, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site	^
	• regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors	N/A
	• training of site personnel in proper waste management and chemical handling procedures	^
	• provision of sufficient waste disposal points and regular collection for disposal	*
	• appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers	^
	Waste Reduction Measures	
	• sort C&D waste from demolition and decommissioning of the existing facilities to recover recyclable portions such as metals	^
	• segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.	^
	• proper storage and site practices to minimise the potential for damage or contamination of construction materials	^
	• to encourage collection of aluminium cans by individual collectors, separate labelled bins shall be provided to segregate this waste from other general refuse generated by the work force.	^
	• plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.	^

Types of Impacts	Mitigation Measures	Status
	General Refuse • General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material.	*
	Construction and Demolition Material • A Waste Management Plan should be prepared.	^
	• In order to monitor the disposal of C&D and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included. One may make reference to ETWB TCW No.31/2004 for details.	^
	• A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.	^
	Chemical Waste • If chemical wastes are produced at the construction site, the Contractor would be required to register with the EPD as a Chemical Waste Producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to either the Chemical Waste Treatment Centre at Tsing Yi, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation	^

Remarks:	^ Compliance of mitigation measure;	X Non-compliance of mitigation measure;
	N/A Not Applicable;	• Non-compliance but rectified by the contractor;
	* Recommendation was made during site audit but improved/rectified by the contractor.	

APPENDIX C
EVENT ACTION PLANS

Appendix C: Event and Action Plan for Construction Noise

Event	Action		
	Contractor's ET	Contractor	PM
Action Level	1. Identify source 2. Notify Contractor and PM 3. Conduct additional noise monitoring to investigate the causes, if necessary 4. Report the investigation results to Contractor and PM 5. Discuss with Contractor for their formulation of remedial measures if the exceedance is related to construction works 6. Conduct additional monitoring to check mitigation effectiveness, if necessary	1. Take immediate action to avoid further exceedance 2. Submit noise mitigation proposals to Contractor's ET and PM 3. Implement noise mitigation proposals	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented
Limit Level	1. Identify source 2. Notify Contractor and PM 3. Conduct additional noise monitoring and analyse Contractor's working procedures to determine possible cause of exceedance, if necessary 4. Provide interim report to Contractor and PM on the causes and proposed action to be taken for the exceedances if exceedance is related to construction works 5. Assess effectiveness by additional monitoring and report Contractor and PM, if necessary 6. If exceedance stops, cease additional monitoring, if any	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to Contractr's ET, and Pm within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the PM until the exceedance is abated	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented 5. If exceedance continues, consider what protion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated

Appendix C: Event and Action Plan for Air Quality

Event	Action		
	Contractor's ET	**Contractor**	**PM**
Action Level	1. Identify source 2. Notify Contractor and PM 3. Conduct additional monitoring to investigate the causes, if necessary 4. Report the investigation results and if exceedance to Contractor and PM	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice. 2. Submit air mitigation proposal and PM for agreement if Contractor's ET indicated that exceedance is related to the construction works 3. Implement agreed proposal within a time scale agreed with PM	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to submit air mitigation proposal 4. Ensure remedial measures are properly implemented
Limit Level	1. Identify source 2. Notify Contractor and PM 3. Conduct additional monitoring and investigate the causes, if necessary	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice 2. In consultation with the PM, submit air mitigation proposal to PM for agreement within 3 working days of notification if Contractor's ET indicated that exceedances are related to construction works 3. Implement agreed proposal within a time scale agreed with PM 4. Amend working methods if appropriate.	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to submit air mitigation proposal 4. Ensure remedial measures are properly implemented

Part 4 CS-02 EM&A REPORT (February 2010)

W. Hing Construction Co., Ltd

Ocean Park Redevelopment Project
Contract No. CS02 - Rainforest

Monthly EM&A Report
(Version 1.0)

February 2010

Approved By: _____

Tony Lai
Construction Manager

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

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F. Tentative Works Program

EXECUTIVE SUMMARY

Introduction

This is the 9th monthly Environmental Monitoring and Audit (EM&A) Report prepared by W. Hing Construction Co., Ltd. for the Contract No. CS02 "Ocean Park Redevelopment Project – Rainforest" (hereinafter called "the Project"). The Project was commenced on 11th May 2009. This document reports the findings of the environmental auditing works conducted in February 2010.

- Blockwall Construction, Conduit Works, Wiring, Plastering Works at Exhibition House
- Control Tower Demolition, Retaining Wall Works, Rapid Ride Trough Construction, Ancillary Building Construction, Rapid Ride Equipment Installation, Roadworks & Steelworks for Ancillary Building at the External Area

Environmental Monitoring and Audit Works

Environmental monitoring and audit works for the Project was performed as stipulated in the updated EM&A Manual. Weekly Environmental site audits were conducted on 2nd, 9th, 17th, 23rd February 2010. No non-compliance was observed during the site audits. Monthly Environmental Audit was conducted on 19th February 2010 by Independent Environmental Checker (IEC). No non-compliance was observed during the site audits.

The implementation of the environmental mitigation measures, Event Action Plans and environmental complaint handling procedures were also checked.

No notification of exceedance was received from the Project Environmental Team Leader (ETL) in the reporting month. Summary of the events and action taken in the reporting month is tabulated in **Table I**.

Table I Summary Table for Events Recorded in the Reporting Month

Parameter	No. of Events		No. of Events Due to the Project	Action Taken
	Action Level	Limit Level		
1-hr TSP	0	0	0	N/A
24-hr TSP	0	0	0	N/A
Noise	0	0	0	N/A

Environmental Licenses and Permits

Licenses/Permits granted to the Project include the Environmental Permit (EP) for the Redevelopment Project, Registration of Waste Producer, Registration of Chemical Waste Producer and Water Discharge License.

A notification pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation was received prior the commencement of the Project.

Complaints and Prosecutions

No environmental complaint and prosecution was received in the reporting month.

Future Key Issues

Key issues to be considered in the coming month include:

- Blockwall Construction, Conduit Works, Wiring, Plastering Works at Exhibition House
- Control Tower Demolition, Retaining Wall Works, Rapid Ride Trough Construction, Ancillary Building Construction, Rapid Ride Equipment Installation, Roadworks & Steelworks for Ancillary Building at the External Area

1. INTRODUCTION

1.1 Background

1.11 The "Repositioning and Long Term Operation Plan of Ocean Park" has been implementing by the Ocean Park Corporation at its existing site of Ocean Park and Nam Long Shan, Aberdeen. The purpose of this project is to upgrade and expand the existing Ocean Park to meet anticipated visitor demands and to position Ocean Park as a premium tourist attraction and a regional leader in themed recreational and educational park experience. The site layout plan is illustrated in APPENDIX A.

1.12 An environmental impact assessment (EIA) report for "Repositioning and Long Term Operation Plan of Ocean Park" (Report No. 121/2006 and Register No. AEIAR-101/2006) has been prepared in 2006 and the Environmental Monitoring and Audit Manual (Project's EM&A Manual) was also included as part of the EIA report in the register. An Environmental Permit (EP) No. EP-249/2006 was issued on 28 July 2006 for the above project to Ocean Park Corporation as Permit Holder and a varied EP No. EP-249/2006/A was subsequently issued on 23 October 2006 for the above project to Ocean Park Corporation as Permit Holder.

1.13 W. Hing Construction Co., Ltd. (the Contractor) was commissioned by the Employer to undertake the design and construction of the Contract No. CS02 "Ocean Park Redevelopment Project –Rainforest" (hereinafter call "the Project").

1.14 The Project includes design and construction of:

Rainforest Land (may also be referred to as Expedition River).

1. New roadwork and infrastructure support;
2. Open seatin;
3. Construction of elevated walkway;
4. Construction of one to three storey buildings (exhibit building);
5. Construction of back of house facilities;
6. Installation of building services;
7. Construction of associated footpaths;
8. Construction of ride lagoon;
9. Construction of guest route paving and railing, utilities & services works and associated civil engineering works;
10. Soft and hard landscape works;
11. Balustrade, skylight, window, lourve, cladding and canopy, retail/food carts and kiosks, vertical green walls and structure;
12. Provision of new and diversion/decommissioning of existing drainage, sewerage, water mains and underground utilities as necessary for the operation of the Ocean Park;
13. Construction of all ancillary works;
14. Installation of the water rapids ride (also known as raft ride) and associated services;
15. Co-ordination of the works with the Works for the installation of props to be supplied and installed by OTHER Contractors;

16. Construction of underground utilities and services;
17. Construction of earth retaining structures;
18. Take over the completed filtration plant room structure by previous contractor and complete all outstanding works, finishes, waterproofing, E&M installations, etc.
19. Take over and verify completed foundation by previous contractor for the Rainforest Exhibition Building and Rapids Ride elevated structure;

General

20. Take over of existing hoardings with graphics;
21. Tree transplanting and protection to remaining trees if any;
22. Installation of civil provisions for IT system and all operational equipment ;
23. Construction of irrigation and drainage system for planting area;
24. Supply and installation of all elevator(s);
25. Design and build all temporary works with necessary statutory submissions including, but not limited to:
    (a) Temporary support to excavations greater than 2m in depth;
    (b) Temporary cut or fill slopes greater than 2m high;
    (c) Falsework and temporary platforms, structures and the like required;
    (d) Temporary platforms, structures and the like required for supporting construction plant; and
    (e) Excavation and lateral supports for all Rainforest works; and
26. Design and build works as specified in the Contract, but not necessary limited to, with necessary statutory submissions, including the following:
    (a) Artificial Rockwork.
    (b) GRC/GRG/GRP/shotcrete works and associated supporting structures.
    (c) Artificial trees and plants.
    (d) Mesh long span cover structure for Rainforest Exhibit building (also known as exhibition building or Rainforest box) including the metal structural frame.
    (e) Animal exhibits:

    Building Services as further specified in Sections 30 to 37 and Sections 45 to 49
    (g) Water features
    (h) Interpretives, interactive interpretives, and building marquee signs.
    (i) Life support systems.
    (j) Maintenance and delivery machinery including hoist(s).
    (k) Special Effects including lighting and sound effects.
    (l) Rope suspension cross bridge at exhibit exit (cargo crawl bridge).

1.15 This is the 9th monthly EM&A Report summarizing the EM&A works for the Project in February 2010.

1.2 Project Organizations

1.2.1 Different parties with different levels of involvement in the project organization include:

- The Engineer and Project Environmental Team Leader (ETL) – Aecom Asia Consultant Ltd. (AACL)
- Contractor Environmental Team – W. Hing Construction Co. Ltd.
- Independent Environmental Checker (IEC) – Mott MacDonald HK Ltd.

1.2.2 The responsibilities of respective parties are provided in Section the Contractor's EM&A Manual of the Project.

1.2.3 The key contacts of the Project are shown in Table 1.1.

Table 1.1 Key Project Contacts

Party	Name	Role	Phone No.	Fax No.
Project ET	Mr. Benny Chan	Safety Manager	2910 3155	2552 1256
	Mr. Andy Leung	Assistant Inspector of Works	2910 3156	
Contractor ET	Mr. Tony Lai	Project Manager	6105 4080	2518 4883
	Mr. Eddie Chiu	Environmental & Safety Manager	6105 4075	
	Mr. Ken Chong	Environmental Officer	6276 1192	
	Mr. Kan Kwok	ET member (Safety Officer)	6277 1747	
IEC	Miss Florence Yuen	Independent Environmental Checker (IEC) Representative	2828 5757	28271823

1.3 Construction Programme

1.3.1 The site activities undertaken in the reporting month were:

- Blockwall Construction, Conduit Works, Wiring, Plastering Works at Exhibition House
- Control Tower Demolition, Retaining Wall Works, Rapid Ride Trough Construction, Ancillary Building Construction, Rapid Ride Equipment Installation, Roadworks & Steelworks for Ancillary Building at the External Area

1.4 Summary of EM&A Requirements

1.4.1 The EM&A program requires construction phase environmental site audit. The duties and responsibilities comprise the following:

- monitor various environmental parameters, if necessary, as specified in the Contractor's EM&A Manual;
- analyze the environmental monitoring and audit data;
- review the EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify and adverse environmental impacts arising;
- carry out site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems;
- audit and prepare EM&A reports on the site environmental conditions;
- report the environmental audit results to the Contractor;
- recommend appropriate mitigation measures to the Contractor in case of exceedance of Action and Limit Levels in accordance with the Event and Action Plans; and
- adhere to the procedures for carrying out complaint investigation

1.4.2 This report presents the environmental monitoring and audit works for the Project in February 2010.

2. ENVIRONMENTAL AUDIT

2.1 Environmental Site Audits

2.1.1 Environmental site audits were carried out on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.

2.1.2 Site audits for the Project in the reporting month were conducted on 2nd, 9th, 17th, 23rd February 2010. No non-compliance was observed during the site audits. The monthly site audits conducted by the IEC conducted on 19th February 2010 are attached in APPENDIX B.

2.1.3 During site inspections in the reporting month, no non-conformance was identified. The observations and recommendations are summarized in Table 2.1.

Table 2.1 Observations and Recommendations of Site Audits

Parameters	Date	Observations / Recommendations	Remediation/ Follow up
Air	23/02/2010	Site haul road should be water sprayed regularly to avoid dust dispersion.	This item was rectified on 24/02/2010.
Water Quality	17/02/2010	Pond water observed at the excavation trench. The Contractor was reminded to remove it.	This item was rectified on 18/02/2010.
Waste/ Chemical Management	19/02/2010	The chemical waste storage area shall be enclosed and locked.	This item was rectified on 23/02/2010.
	02/02/2010	Stockpile of dusty construction material was observed not covered.	This item was rectified on 02/02/2010.
	09/02/2010	Stockpile of dusty construction material was observed not covered. Construction material should be compacted, water sprayed or covered with tarpaulin.	This item was rectified on 09/02/2010.

2.2 Status of Environmental Licensing and Permitting

2.2.1 All valid permits/licenses obtained for the Project are summarized in Table 2.2.

Table 2.2 Summary of Environmental Licensing and Permit Status

Permit No.	Valid Period		Details	Status
	From	To		
Environmental Permit				
EP-249/2006/A	23/10/2006	N/A	Expansion of the existing Ocean Park and reconstruction / modification of its existing facilities.	Valid
Registration of Chemical Waste Producer				
WPN5214-176-W1150-03	13/05/2009	N/A	Waste Disposal (Chemical Waste) (General) Regulation -- Registration of Waste Producer	Valid
Construction Noise Permit				
GW-RS0925-09	14/12/2009	08/06/2010	Notice of Issue of Construction Noise Permit Pursuant to Section 8(6) of the Noise Control Ordinance	Valid
GW-RS0756-09	10/10/2009	13/03/2009	Notice of Issue of Construction Noise Permit Pursuant to Section 8(6) of the Noise Control Ordinance	Cancel
Water Discharge License				
WT00004136-2009	19/06/2009	30/06/2014	Discharge of industrial trade effluent arising from the Sedimentation tank at the construction site (CS02 Rainforest, Ocean Park Redevelopment Project) to communal storm water drain.	Valid
Others				
305349	N/A	N/A	Notification Pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation	Valid
WFG07578	N/A	N/A	Construction Waste Disposal Billing Account with EPD	Valid

2.3 Status of Waste Management

2.3.1 The amount of waste generated by the construction activities of the Project in the reporting month is attached in APPENDIX C.

2.4 Implementation Status of Environmental Mitigation Measures

2.4.1 According to the Environmental Permit and the Contractor's EM&A Manual, the mitigation measures detailed in the documents are required to be implemented. An updated summary of the EMIS is provided in APPENDIX D.

2.5 Summary of Exceedances

2.5.1 No Action/Limit Level exceedance was reported in the reporting month.

2.6 Implementation Status of Event Action Plan

2.6.1 The Event Action Plans for air quality and construction noise are presented in APPENDIX E.

2.7 Summary of Complaints and Prosecutions

2.7.1 No environmental complaint and prosecution related to the Project works was received during the reporting month.

3. FUTURE KEY ISSUES

3.1 Key Issues for the Coming Month

3.1.1 Key issues to be considered in the coming month include:

- Blockwall Construction, Conduit Works, Wiring, Plastering Works at Exhibition House
- Control Tower Demolition, Retaining Wall Works, Rapid Ride Trough Construction, Ancillary Building Construction, Rapid Ride Equipment Installation, Roadworks & Steelworks for Ancillary Building at the External Area

3.2 Construction Program for the Next Month

3.2.1 The tentative construction program for the Project is provided in APPENDIX F.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

4.1.1 Four environmental site audits were performed in February 2010. No non-compliance was observed during the site audits.

4.1.2 No exceedance of environmental monitoring was reported in the reporting month.

4.1.3 No environmental complaint and prosecution related to the project was received in the reporting month.

4.2 Recommendations

4.2.1 According to the environmental audits performed in the reporting month, the following recommendations are suggested:

Dust Impact

- Stockpile of dusty construction material was observed not covered. Construction material should be compacted, water sprayed or covered with tarpaulin.

Water Quality Impact

- Ponding water observed at the excavation trench and footing. Waste water shall only be discharged in accordance with requirement of the permit.

Air Impact

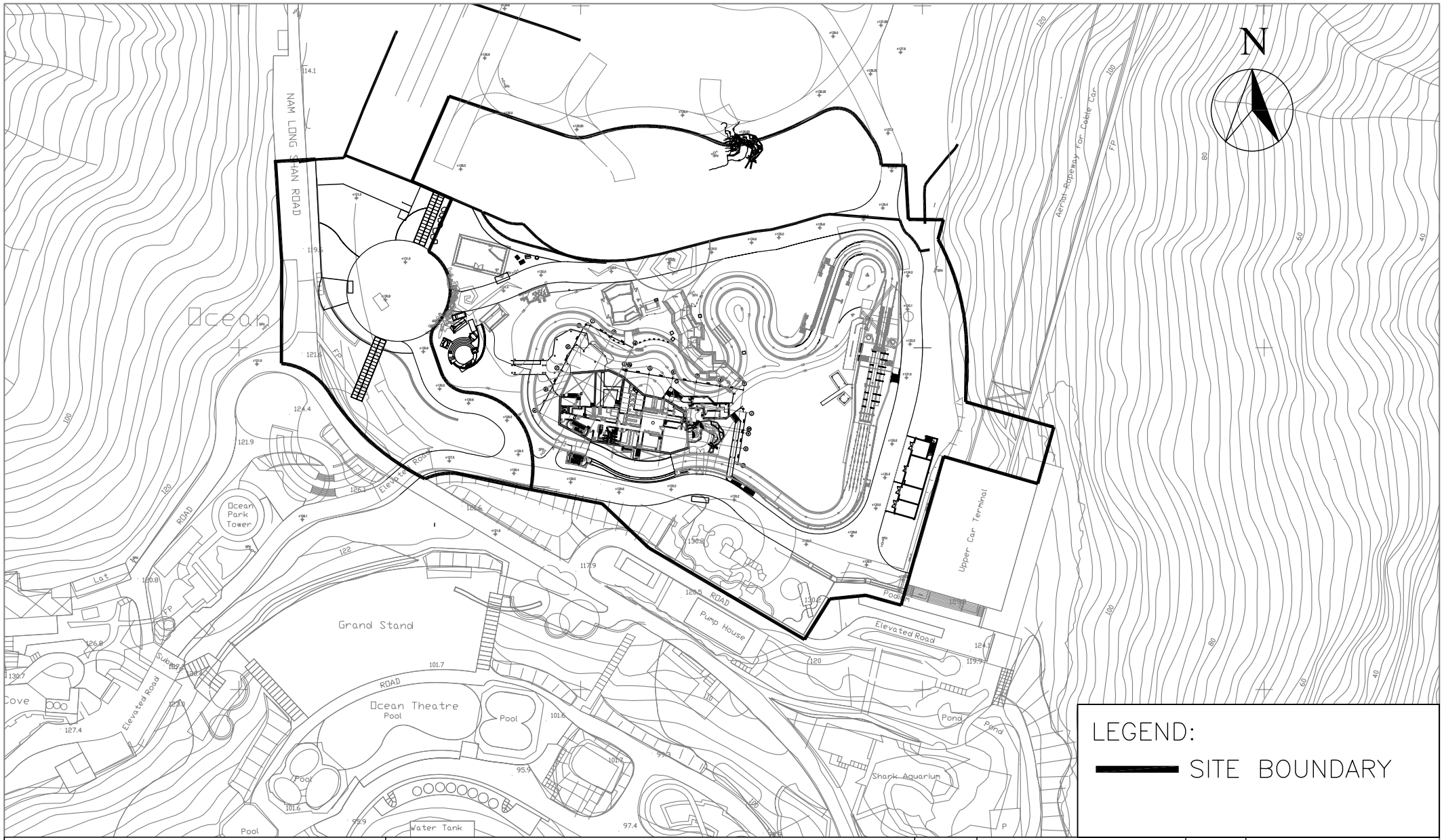
- Site haul road should be water sprayed regularly to avoid dust dispersion.

Chemical Management

- Chemical drums and chemical waste shall be stored in the drip tray to avoid oil spillage.
- The chemical waste storage area shall be enclosed and locked.

APPENDIX A

SITE LAYOUT PLAN



永興聯合建築有限公司
W. HING CONSTRUCTION CO. LTD.

CONTRACT NO. CS02

OCEAN PARK REDEVELOPMENT PROJECT – RAINFOREST

SITE LAYOUT PLAN

SCALE	A4 1:1500	DATE	JULY 2009
CHECK	Kan Kwok	DRAWN	HC LAU
JOB No.	CS02	DRAWING No.	CS02/SL/01
		REV	–

APPENDIX B

SITE AUDIT SUMMARY

Ocean Park Master Redevelopment Project
Contract P007
Independent Environmental Checker

MONTHLY SITE INSPECTION CHECKLIST

Inspection Date	19/02/2010	Time	10:00	Inspected By	EM: IEC: Florence Yuen Contractor: CI07: T. Lee CS02: K. Kwok CS03: S. Wong
Site Location	CI07 CS02 CS03				

Weather

Condition	[ ]	Sunny	[ ]	Fine	[✓]	Overcast	[ ]	Drizzle	[ ]	Rain	[ ]	Storm	[ ] Hazy
Temperature	9 °C				Humidity	[✓]	High	[ ]	Moderate	[ ]	Low		
Wind	[✓]	Calm	[ ]	Light	[ ]	Breeze	[ ]	Strong	[ ]	Direction			

		Close-out on last comments Y/N	N/A or not obs	Yes	No	Photo/Remarks
	Construction Noise					
S2.18	Is a valid Construction Noise Permit (CNP) obtained for works during restricted hours?			✓		
S2.26	Good Site Practices: • Are the operating plants well-maintained and serviced regularly?			✓		
	• Are silencers or mufflers utilized on construction equipment? Are they properly maintained?			✓		
	• Is the mobile plant sited far enough from NSRs?			✓		
	• Are intermittently used machines and plants shut down between work periods?			✓		
	• Is the plant known to emit noise strongly in one direction, if any, oriented to direct noise away from the NSRs?		✓			
	• Is the stockpile or other structures utilized effectively, wherever practicable, in screening noise from the works?		✓			
S2.27	Are suitable quiet plants adopted?			✓		
S2.28	Are movable barriers used for both movable PME and stationary PME?		✓			
S2.29	Do the screening materials used achieve the predicted noise reduction?		✓			
S2.30	Are the noisy works avoided during examination period of the nearby school?		✓			
	Blasting Noise					
S2.32	• Are the NSRs informed of the blasting work in advance?		✓			

• Is sufficient time allowed for alerting all the potential NSRs prior to every blasting work?		✓			
• Are proper procedures put in place to alert and minimise any startling effect on the staff working in Ocean Park?		✓			
• Is the optimal amount of charge used evaluated for noise reduction?		✓			
Landscape and Visual					
S3.10 Consideration on existing surrounding vegetation:					
• Are temporary tree nurseries set up?		✓			
• Is "no-intrusion zones" implemented?		✓			
• Is the existing vegetation protected from damage?			✓		
• Are hill fire prevention measures taken?			✓		
• Is dust and erosion controlled for exposed soil?			✓		
• Are the irrigation networks set up throughout the Establishment Period?		✓			
• Is Quarterly Report on existing trees to be retained or transplanted prepared by the Contractor?		✓			
S3.11 Consideration on appearance and view:					
• Is the appearance of hoardings suitable?			✓		
• Is the appearance of construction workers, plants/machines suitable?			✓		
• Are the screening and alignment of the temporary barging point and conveyor system suitable?		✓			
• Are the selected security floodlights suitable		✓			
Ecology					
S4.5 Transplantation:					
• Is the transplantation work supervised by a qualified botanist/horticulturalist in the ET?			✓		
• Are the transplanted plant species of conservation interest monitored during the first 12 months after transplantation?			✓		
S4.7 Construction:					
• Is the runoff entering watercourses avoided by control measure, especially during heavy rain?			✓		
• Is the site runoff directed to regularly cleaned and maintained silt traps (or oil separators)?			✓		
• Are sediment traps included in drainage to collect and control construction run-off?			✓		
• Is suitable size silt traps or oil interceptor used?			✓		
• Is vegetation survey carried out to determine the feasibility and suitability of individual plants for transplantation?			✓		
• Are the trees located within the works area preserved suitably?			✓		
• Are individual plants of conservation interest transplanted prior to the construction phase?			✓		

• Are the equipments and stockpiles placed in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural habitats?			✓		
• Are construction activities restricted to the work areas demarcated?			✓		
• Are waste skips provided to collect general refuse and construction wastes?			✓		
• Are the wastes disposed of timely and properly off-site?			✓		
• Is open burning on works sites prohibited?			✓		
• Are native plant species made use of as far as possible on newly formed land?			✓		
Construction Waste					
S5.4 Good Site Practices					
• Are arrangements made for collection and effective disposal of all wastes generated?			✓		
• Are the waste management and chemical handling procedures followed?			✓		
• Are sufficient waste disposal points provided?			✓		
• Are the wastes disposed of regularly?	✓				
• Are appropriate measures taken to minimise windblown litter and dust during transportation of waste by either covering trucks or transporting wastes in enclosed containers?			✓		
• Are the drainage systems, sumps and oil interceptors regularly cleaned and maintained?			✓		
S5.5 Waste Reduction Measures:					
• Is the C&D waste from demolition and decommissioning of existing facilities sorted to recover recyclable materials?			✓		
• Are different types of wastes segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling and the proper disposal?			✓		
• Are aluminium cans segregated in labelled bins and collected by individual collectors for recycling?			✓		
• Are proper storage and site practices maintained to minimise the potential for damage or contamination of construction material?			✓		
• Are the construction materials planned and stocked carefully to avoid unnecessary generation of waste?			✓		
S5.7 General Refuse					
• Is the general refuse stored in enclosed bins or compaction units separate from C&D material?			✓		
• Is the general refuse removed regularly by a waste collector?			✓		
S5.8 C&D Material					
• Are the excavated materials from site formation of the expansion areas and tunnel construction for the funicular system reused on-site as backfilling material and for landscape works?			✓		
• Are the surplus rock and other inert C&D material disposed of at the public fill sites?			✓		
• Is a waste management plan prepared?					

	• Is a recording system present for the record of amount of wastes generated, recycled and disposed?			✓		
	• Is the trip-ticket system required in ETWB TCW No.31/2004 followed on site?			✓		
	Chemical Wastes					
S5.9	Is chemical wastes generated from the works? And if yes,			✓		
	• Is the Contractor registered as a Chemical Waste Producer?			✓		
	• Are good quality containers used for separating and storing chemical wastes?				✓	CS03② P1080540
	• Are appropriate labels securely attached on each chemical waste container to indicate their corresponding chemical characteristics?				✓	CS02① P1080541
	• Is the Contractor licensed to transport and dispose of the chemical wastes?			✓		
	Land Contamination					
S6.11	• Is the contact of construction workers with contaminated materials minimised by using bulk earth-moving excavator equipment?		✓			
	• Are appropriate cloth, personal protective equipment, hygiene and washing facilities provided to minimise exposure to any contaminated material?		✓			
	• Is stockpiling of contaminated excavated materials avoided?		✓			
	• Is the use of contaminated soil for landscaping without proper treatment prohibited?		✓			
	• Are vehicles containing excavated materials covered properly to limit potential dust emissions or contaminated wastewater runoff?		✓			
	• Is the speed of the trucks carrying contaminated materials controlled?		✓			
	• Are the necessary waste disposal permits obtained from appropriate authorities in according with Waste Disposal (Chemical Waste) (General) Regulation?		✓			
	• Are silt removal facilities provided with retention time for silt/sand traps of 5 minutes under maximum flow conditions?		✓			
	• Are the records maintained for quantity of wastes generated and disposal of?		✓			
	Remediation Process					
S6.12	• Is biopile covered by tarpaulin or low permeable sheet to avoid dust emission?		✓			
	• Is vented air from biopile treated by blower and carbon adsorption system before released to the atmosphere?		✓			
	• Are the materials which may generate airborne dust emissions adequately wetted prior to and during the loading, unloading and handling operations?		✓			
	• Are silencers installed at biopile blower to minimise noise impact?		✓			
	• Are quiet plants such as generator and blower used for biopile?		✓			

• Are the mixing process and other associated material handling activities properly scheduled to minimise potential noise impact?		✓			
• Are impermeable liners placed at the bottom of biopile?		✓			
• Is leachate collection sump construction along the perimeter of biopile?		✓			
• Is the lachate recycled back to the biopile or truck away to Chemical Waste Treatment Centre for disposal?		✓			
• Is the mixing of contaminated soils and cement/water/other additive(s) undertaken at a solidification plant to minimise the potential for leaching?		✓			
• Is a concrete bund construction along the perimeter of the solidification/stabilisation area to prevent runoff?		✓			
• Are the loading, unloading, handling, transfer and storage of cement carried out in an enclose system?		✓			
• Are the contaminated soils transported by roll-off trucks (contrainerisation)?		✓			
• Is temporary hoarding provided around the treatment area to minimise the visual impact?		✓			

Air Quality

S7.23 Good Site Practices

• Is watering carried out regularly with complete coverage to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather?	✓				
• Is watering frequently carried out for particularly dusty construction areas, temporary stockpiles and areas close to ASRs?			✓		
• Are the aggregate or dusty material storage piles covered with their side enclosed to reduce emissions? Or if this is not practicable, is watering applied to aggregate fines?	✓				
• Is open stockpiles avoided or covered and placed far enough from the ASRs?			✓		
• Is the dropping height of material restricted to minimise the fugitive dust from unloading/loading?			✓		
• Is tarpaulin used to cover all dusty vehicle loads transported to, from and within the site?			✓		
• Are vehicle wheel and body washing facilities available at the exit points of the site?			✓		
• Are wind shield and dust extraction units or similar dust mitigation measures provided at the loading points? If dust generation is likely during the process, particularly in dry seasons, is water sprinklers provided at the loading site?	✓			✓	CI07 ① P1080518
• Do the vehicles comply with the recommended speed limit of 10 km/h on unpaved roads?			✓		
• Are dusty activities rescheduled during high-wind conditions?		✓			
• Are the routing of vehicles and positioning of construction plants at maximum possible distance from the ASRs?			✓		
• Is suitable buffer zone provided and work areas fenced off with hoarding (not less than 2.4m from ground level)?			✓		

S7.24 Drilling & Blasting

• Is watering carried out on the exposed area after blasting?		✓			
• Is vacuum extraction drilling method used?		✓			
• Is the blasting process carefully sequenced?		✓			
• Is the firing of explosive carried out in the morning prior to opening of the Park?		✓			
S7.25 Crushing Plant					
• Is water sprayed on the crusher?		✓			
• Are fabric filters installed for the crushing plant?		✓			
• Is chute or dust curtain used for controlling dust when transferring materials from crusher to the conveyors?		✓			
S7.26 Barging Point & Conveyor Belt System					
• Are the conveyors placed within enclosed structures?		✓			
• Is profiled steel cladding provided at two sides of loading point?		✓			
• Are dust suppression sprays installed and operated at the feeding inlet and outlet?		✓			
• Is the barging point placed within an enclosed structure incorporating an enclosed chute for material transfer to the barge?		✓			
• Is a flexible curtain hanged on the enclosed chute to prevent dust emission when excavated materials/rocks transported into the barge?		✓			
Water Quality					
S8.3 Site Run-off and Drainage					
• Are all sewer and drainage connections sealed to prevent debris, soil, sand etc. from entering public sewer before commencing any site formation work?	✓				
• Are temporary ditches provided to facilitate runoff discharge into appropriate watercourses, via appropriate sized silt retention pond?			✓		
• Are cut-off ditches provided for all major site clearance/excavation works where soils would be exposed to control runoff from the areas?			✓		
• Are channels, earth/concrete bunds and sand bags deployed to direct surface runoff?			✓		
• Are catchpits and perimeter channels constructed in advance of relevant site formation works?			✓		
• Are the boundaries of earthworks marked and surrounded by dykes or embankments for flood protection?			✓		
• Are sand/silt traps and sediment basins provided to remove sand/silt particles from runoff?			✓		
• Are silt removal facilities, channels and manholes maintained and deposited silt/grit removed regularly to ensure that these facilities are functioning properly at all times?			✓		
• Are exposed soil surfaces covered?			✓		
• Is the water pumped out from foundation excavations discharged into silt removal facilities?				✓	CS03 ① P1080534 CI07 ② P1080499
• Are exposed soil areas minimised to reduce potential for increased siltation and contamination of runoff?			✓		

	• Are earthwork final surfaces well compacted and is subsequent permanent work or surface protection performed immediately?			✓	
	• Is the rainwater pumped out from trenches or excavation directed to silt removal facilities before discharge?			✓	
	• Are open stockpiles of construction materials or construction wastes of more than $50m^3$ covered with tarpaulin during rainstorm?		✓		
	In case of an excavation in rainy seasons: • Is temporary exposed slope/soil surfaces covered by tarpaulin as far as practicable?		✓		
	• Are intercepting channels provided to prevent storm runoff from washing across exposed soil surfaces?		✓		
	• Are surface protection measures and arrangements implemented to prepare for arrival of a rainstorm?		✓		
	Coral Sites				
S8.4	• Are enhanced (with the use of flocculants added) sand/silt removal facilities employed for treatment of runoff from the major excavation at the Summit?			✓	
	• Is a silt curtain system used to enclose the construction phase discharge point at Tai Shue Wan?			✓	
	• Are debris and refuse collected, handled and disposed of properly to avoid entering any nearby water bodies and public drainage system?			✓	
	• Are stockpiles of cement and other construction materials kept covered when not being used?			✓	
	• Are oils and fuels used and stored in designated areas which have pollution prevention facilities (Fuel tanks and storage areas provided with locks and sited on sealed areas, within bunds of a capacity equality to 110% of the storage capacity of the largest tank)?	✓			
	• Are temporary sanitary facilities, such as portable chemical toilets, employed on-site where necessary to hand sewage from the workforce? Is a licensed contractor employed for disposal of waste matter and maintenance of these facilities?			✓	
	• Is a reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law?			✓	
	• Are aluminium cans recovered from the waste stream and collected separate labelled bins?			✓	
	• Are office wastes reduced through the recycling of paper?			✓	
	• Are training provided to workers on site cleanliness & waste management procedure?			✓	
	Cultural Heritage				
S10.6	If there is any work planned within one metre of the grave, is a one metre buffer zone provided around the grave and is the grave demarcated by temporary fence?			✓	
	Hazard to Life				
S11.3	Good Site Practices:				

• Is the area around the magazine free of vegetation?		✓			
• Is the control of (small) fires planned and provided through the following?					
- Weekly checking of fire fighting equipment and the on-site fire water tank level.		✓			
- Daily checking of all critical safety equipment on vehicle, including the fire extinguishers.		✓			
- Maintaining back-up means of fighting fire on the explosive vehicles.		✓			
- Providing safety training for drivers and other personnel present during explosive delivery with regard to operating fire hydrants and fighting of explosive fires.		✓			
• Is the magazine secured against unauthorised entry and theft of explosive through the following?					
- Maintaining a list of persons authorised to enter the magazine and ensuring the list is available to the magazine security guard.		✓			
- Activating an alarm system that limits times at which explosive can be removed from the magazine and connecting the system to central security station.		✓			
- Incorporating "Duress code" function in the alarm system.		✓			
- Maintaining alarm system in good condition.		✓			
• Is the magazine security guard located separately from the magazine complex?		✓			
• Is the communication maintained in emergency with the following measures?					
- Providing non-hazardous electronic equipment for persons working within 60 m of detonators.		✓			
- Ensuring availability of phone numbers for all key personnel.		✓			
• If there is a typhoon signal no. 3 or above, or black rainstorm signal, are all operations at magazine and transport ceased?		✓			
• Is the risk of detonators explosion on vehicle reduced during transit through the following?					
- Ensuring that magazine within vehicle is lined.		✓			
- Limiting off-site transport to 5 to 6 a.m. each day.		✓			
- Escorting vehicles with separate security vehicle when using the public road.		✓			
- Ensuring that UN 1.4B packaging of detonators remains intact until handed over at blasting site.		✓			
• Is the fuel isolation switch available on vehicle to prevent fire spreading in case a fire breaks out?		✓			
• Is an experienced driver with accident-free record employed for explosive vehicle and security escort?		✓			
• Are the drivers checked for health before employing?		✓			
• Are the vehicles regularly checked to maintain in good condition to reduce chance of accident due to breaking down?		✓			
• Is the truck fuel fire escalating to cause explosion avoided through the following means?					

- Ensuring that the Contractor is aware of the potential hazards to site.		✓			
- Maintaining appropriate fire fighting equipment.		✓			
- Requiring the Contractor to plan and make emergency arrangements.		✓			
• Is spare/redundant fire fighting equipment provided?		✓			
• Can communications be maintained between two vehicles (drivers and security) during the trip to prevent collision of two explosive vehicles in case of an accident?		✓			
• Are the processes of checking of condition of drivers to suspend any driver of concern carried out?		✓			
Project specific measures:					
• Is the speed of vehicle limited along the Ocean Park portion of Nam Long Shan Road within 100 m of the explosives magazine to 25 km/hr?		✓			
• Is other contractors' use of the Ocean Park Internal service road restricted during delivery of explosives, i.e. 6 to 7 a.m?		✓			
• Is the Ocean Park guard required to call to the magazine guard on an hourly basis when explosives are stored in magazines?		✓			
• Is the evacuation of part or all of Ocean Park Headland Area arranged in case of the explosive magazine being engulfed in fire?		✓			
• Is the risk to the public from accidental initation during charging and blasting limited by the following means?					
- Closing the Ocean Park from commencement of charging holes until completion of blasting each day.		✓			
- Arranging for relevant authorities to post notices to mariners – warning them of blasting operations and advising them to stay away from a strip 100m wide immediately to the east of Headland from commencement of charge holes until completion of blasting each day (i.e. 9 a.m).		✓			
- Not operating amusement rides in the event of accidental explosion until confirmed free of critical damage.		✓			
• If unexploded explosives are found in blasthole(s), is the opening of Ocean Park delayed or is part of the Ocean Park delayed when there are unspent explosives?		✓			
• Is the opportunity for arson/deliberate initiation of explosive reduced with the following means?					
- Paying attention to the security alert status from the Government.		✓			
- Developing a security plan to address high alert level.		✓			
• Is an emergency plan developed to address uncontrolled fire in magazine area?		✓			
• Is the transfer of explosives between 5 to 6 a.m agreed by Mines Division?		✓			
• Is the road surface along the explosive transportation route maintained?		✓			
• Are the contractor's driver and security escort tested in respect of safety plan? Is the route driven before the driver undertakes the first delivery of explosives?		✓			

	• Is adequate space provided for the explosive vehicle to manoeuvre without reversing close to the magazine to limit the likelihood of vehicle accident?		✓			
	• Is lighting for explosive vehicles provided on temporary road(s)?		✓			
S11.4	• Is ammonium nitrate emulsion (ANE) delivered outside of Park opening times?		✓			

Observations for this month

① Cement mixing is carried out without enclosures on top and 3 sides. The enclosure is available but should be improved.

② Stagnant water was accumulated on site due to rain.

IEC Representative	Environmental Manager	Contractor's Representative CI07
Florence Yuen		Thomas
(Florence Yuen)	(ANDY LEUNG)	(Thomas Lee - LCAL)

Observations for this month

① Chemical Waste Storage Area was not fully provided with door and lock.

IEC Representative	Environmental Manager	Contractor's Representative CS02
Florence Yuen		
(Florence Yuen)	(ANDY CHEUNG)	(KAN KWOK)

APPENDIX C

SUMMARY OF WASTE GENERATED

APPENDIX E SUMMARY OF WASTE GENERATED

W. Hing Construction Co., Ltd.
Ocean Park Redevelopment Project Contract No. CS02 - Rainforest

Monthly Summary Waste Flow Table

Month	Actual Quantities of Inert C&D Materials Generated		Non-inert C&D Waste disposed to Sorting Facilities at Tseung Kwan O	Non-inert C&D Waste disposed to SENT Landfill	Chemical Waste disposed to Chemical Waste Treatment Facility at Tsing Yi	Recycle Metals	Packaging and other general refuse (e.g. Plastic, paper wrapping etc.)
	Disposed to Fill Bank at Tseung Kwan O	Disposed to Public Fill Barging Point at Quarry Bay / Chai Wan *					
	(in tonnes)	(in tonnes)	(in tonnes)	(in tonnes)	(in tonnes)	(in tonnes)	(in tonnes)
May-09	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jun-09	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jul-09	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aug-09	N/A	10.1	N/A	23.74	N/A	N/A	N/A
Sep-09	N/A	152.30	N/A	9.27	N/A	N/A	N/A
Oct-09	N/A	256.09	N/A	20.55	N/A	N/A	N/A
Nov-09	N/A	522.69	N/A	23.15	N/A	N/A	N/A
Dec-09	N/A	207.94	N/A	22.46	N/A	N/A	N/A
Jan-10	N/A	427.83	N/A	39.62	N/A	N/A	N/A
Feb-10	N/A	437.81	N/A	21.44	N/A	N/A	N/A
Total:	0	2014.76	0	160.23	0	0	0

APPENDIX D

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE (EMIS)

Types of Impacts	Mitigation Measures	Status
Construction Dust	♦ Use of regular watering, with complete coverage, to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather.	R
	♦ Use of frequent watering for particularly dusty construction areas, temporary stockpiles and areas close to ASRs.	R
	♦ Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines.	R
	♦ Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs.	R
	♦ Restricting heights from which materials are dropped, as far as practicable to minimize the fugitive dust arising from unloading/ loading.	C
	♦ Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.	C
	♦ Use of vehicle wheel and body washing facilities at the exit points of the site.	C
	♦ Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading points, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods.	R
	♦ Imposition of speed controls for vehicles on unpaved site roads. Ten kilometers per hour is the recommended limit.	
	♦ Dusty activities should be re-scheduled if high-wind conditions are encountered.	C
	♦ Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.	N/A
	♦ Suitable buffer zone should be provided and the works areas should be fenced off with hoarding. The height of hoarding should not be less than 2.4m from ground level.	N/A
	Crushing Plant	
	♦ Water sprays on the crusher. •	N/A
	♦ Fabric filters installed for the crushing plant. •	N/A
	♦ When transferring materials from crusher to the conveyors, chutes or dust curtains would be used for controlling dust.	N/A

Remarks:

C	Compliance of mitigation measure	NC	Non-compliance of mitigation measure	N/A	Not Applicable
*	Non-compliance but rectified by the contractor	R	Recommendation was made during site audit but improved/rectified by the contractor.		

Types of Impacts	Mitigation Measures	Status
Construction Dust	*Barging Point & Conveyor Belt System*	
	♦ The conveyors would be placed within a totally enclosed structure •	N/A
	♦ Profiled steel cladding would be provided at two sides of loading point. •	N/A
	♦ Dust suppression sprays would be installed and operated in strategic locations at the feeding inlet and outlet.	N/A
	♦ The barging point would be placed within a totally enclosed structure incorporating an enclosed chute for material transfer to the barge. Flexible curtain would be hanged on the enclosed chute prevent dust emission when excavated materials/rocks transported into the barge.	N/A
	♦ Some areas of the Park would remain open for visitors during the construction period. Therefore, suitable buffer zones from major construction activities should be provided where practical and the works areas should be fenced off with hoarding during the construction phase. It is recommended to erect hoarding of a height not less than 2.4m from ground level.	N/A
Construction Noise	*Construction Phase*	
	♦ Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme	C
	♦ Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction programme	C
	♦ Mobile plant, if any, should be sited as far from NSRs as possible.	C
	♦ Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum	C
	♦ Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs	C
	♦ Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities	N/A

Remarks:

C	Compliance of mitigation measure	NC	Non-compliance of mitigation measure	N/A	Not Applicable
*	Non-compliance but rectified by the contractor	R	Recommendation was made during site audit but improved/rectified by the contractor.		

Types of Impacts	Mitigation Measures	Status
Construction Noise	*Adoption of Quieter Plant* ♦ In order to reduce the excessive noise impacts at the affected NSRs at the Waterfront during normal daytime working hours, quieter plants are recommended. The Contractors do not have to use specific items of quiet plant adopted in this assessment. The Contractors may use other type of quiet plant, which have the same total SWL, to meet their needs	C
	Use of Movable Noise Barrier ♦ The use of movable barrier for certain PME could further alleviate the construction noise impacts. In general, 5dB (A) reduction for movable PME and 10dB (A) for stationary PME can be achieved depending on the actual design of movable noise barrier. ♦ The Contractor should be responsible for designing of the movable noise barrier with due consideration given to the size of the PME and the requirement of intercepting the line of sight between the NSRs and PME. Barrier material of surface mass in excess of 7kg/m2 is recommended to achieve the predicted screening effect. ♦ Exceedance of up to 5dB (A) would be predicted at the OPC Guest Route during the examination periods. Early liaison with the OPC of this impacted area is recommended to plan for the construction programme. Noisy construction activities should be avoided during the examination period as far as practicable so as to reduce the potential noise impact at the area to comply with the noise criterion of 65dB(A).	C C N/A

Remarks:

C	Compliance of mitigation measure	NC	Non-compliance of mitigation measure	N/A	Not Applicable
*	Non-compliance but rectified by the contractor	R	Recommendation was made during site audit but improved/rectified by the contractor.		

Types of Impacts	Mitigation Measures	Status
Ecology	*Construction Phase*	
	♦ All excavation works carried out close to water bodies shall be carefully controlled to avoid runoff entering watercourses, especially during periods of heavy rain.	C
	♦ Site runoff shall be directed towards regularly cleaned and maintained silt traps and where appropriate, oil/grease separators to minimize risk of sedimentation and pollution.	N/A
	♦ Suitable size / capacity silt traps and oil/grease interceptors shall be used.	N/A
	♦ Noise mitigation measures including the use of quiet construction plant and movable noise barriers shall be implemented to minimize disturbance to habitats adjacent to the work areas.	N/A
	♦ Trees located within the works areas shall be preserved as far as practicable.	C
	♦ Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural habitats	C
	♦ Construction activities shall be restricted to the work areas that would be clearly demarcated	C
	♦ The work areas shall be reinstated immediately after completion of the works	C
	♦ Waste skips shall be provided to collect general refuse and construction wastes. The wastes would be disposed of timely and properly off-site.	C
	♦ Drainage arrangements shall include sediment traps to collect and control construction run-off	C
	♦ Open burning on works sites is illegal, and shall be strictly enforced	C
	♦ Landscaping works on newly formed land shall as far as possible make use of native plant species	C

Remarks:

C	Compliance of mitigation measure	NC	Non-compliance of mitigation measure	N/A	Not Applicable
*	Non-compliance but rectified by the contractor	R	Recommendation was made during site audit but improved/rectified by the contractor.		

Types of Impacts	Mitigation Measures	Status
Water Quality	*Construction Runoff and Drainage*	
	♦ Before commencing any site formation work, all sewer and drainage connections should be sealed to prevent debris, soil, sand etc. from entering public sewers/drains	C
	♦ Temporary ditches should be provided to facilitate run-off discharge into appropriate watercourses, via appropriately sized/ designed silt retention pond or similar structure. No site run-off should enter artificial ponds. Cut-off ditches should be provided for all major site clearance/ excavation works where soils would be exposed so that instances of uncontrolled run-off from exposed areas would be minimized. As well as channels, earth/ concrete bunds and/ or sand bags, as appropriate, should be deployed to direct surface run-off towards channels. Catchpits and perimeter channels should be constructed in advance of relevant site formation works.	C
	♦ Boundaries of earthworks should be marked and surrounded by dykes or embankments for flood protection, as necessary.	C
	♦ Sand/silt removal facilities such as sand/silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance. The design of silt removal facilities should be based on the guidelines provided in ProPECC PN 1/94. All drainage facilities and erosion and sediment control structures should be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.	C
	♦ Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be regularly removed, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.	C
	♦ Exposed soil surfaces should be covered.	C

Remarks:

C	Compliance of mitigation measure	NC	Non-compliance of mitigation measure	N/A	Not Applicable
*	Non-compliance but rectified by the contractor	R	Recommendation was made during site audit but improved/rectified by the contractor.		

Types of Impacts	Mitigation Measures	Status
Water Quality	♦ Water pumped out from foundation excavations should be discharged into silt removal facilities.	C
	♦ If excavation cannot be avoided during rainy seasons, temporarily exposed slope/soil surfaces should be covered by a tarpaulin or other means, as far as practicable, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds. Interceptiong channels should be provided (e.g. along the crest/ edge of the excavation) to prevent storm runoff from washing across exposed soil surfaces. Arrangements should always be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm.. Other measures that need to be implemented before, during and after rainstorms are summarized in ProPECC PN 1/94.	C
	♦ Exposed soil areas should be minimized to reduce potential for increased siltation and contamination of runoff.	C
	♦ Earthwork final surfaces should be well compacted and subsequent permanent work or surface protection should be immediately performed. Appropriate intercepting channels should be provided where necessary. Rainwater pumped out from trenches or excavations should be directed to silt removal facilities before discharge	C
	♦ Open stockpiles of construction materials or construction wastes on-site of more than 50m3 should be covered with tarpaulin or similar fabric during rainstorms	C
	General Construction Activities	
	♦ Debris and refuse generated on-site should be collected	R
	♦ Oils and fuels should only be used and stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to nearby water bodies and public drains	C
	Sewage from Construction Workforce	
	♦ Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site where necessary to handle sewage from the workforce. A licensed contractor would be responsible for appropriate disposal of waste matter and maintenance of these facilities	C

Remarks:

C	Compliance of mitigation measure	NC	Non-compliance of mitigation measure	N/A	Not Applicable
*	Non-compliance but rectified by the contractor	R	Recommendation was made during site audit but improved/rectified by the contractor.		

Types of Impacts	Mitigation Measures	Status
Waste / Chemical	*Good Site Practice*	
	♦ nomination of an approved personnel, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site	C
	♦ regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors	N/A
	♦ training of site personnel in proper waste management and chemical handling procedures	C
	♦ provision of sufficient waste disposal points and regular collection for disposal	C
	♦ appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers	C
	Waste Reduction Measures	
	♦ sort C&D waste from demolition and decommissioning of the existing facilities to recover recyclable portions such as metals	C
	♦ segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.	C
	♦ proper storage and site practices to minimise the potential for damage or contamination of construction materials	C
	♦ to encourage collection of aluminium cans by individual collectors, separate labelled bins shall be provided to segregate this waste from other general refuse generated by the work force.	C
	♦ plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.	C

Remarks:

C	Compliance of mitigation measure	NC	Non-compliance of mitigation measure	N/A	Not Applicable
*	Non-compliance but rectified by the contractor	R	Recommendation was made during site audit but improved/rectified by the contractor.		

Types of Impacts	Mitigation Measures	Status
Waste / Chemical	*General Refuse* ♦ General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material.	R
	Construction and Demolition Material ♦ A Waste Management Plan should be prepared. ♦ In order to monitor the disposal of C&D and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included. One may make reference to ETWB TCW No.31/2004 for details. ♦ A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.	C C C
	Chemical Waste ♦ If chemical wastes are produced at the construction site, the Contractor would be required to register with the EPD as a Chemical Waste Producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to either the Chemical Waste Treatment Centre at Tsing Yi, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation	C

Remarks:

C	Compliance of mitigation measure	NC	Non-compliance of mitigation measure	N/A	Not Applicable
*	Non-compliance but rectified by the contractor	R	Recommendation was made during site audit but improved/rectified by the contractor.		

APPENDIX E
EVENT ACTION PLANS

APPENDIX E - Event and Action Plan for Construction Noise

Event	Action		
	Contractor's ET	Contractor	PM
Action Level	1. Identify source 2. Notify Contractor and PM 3. Conduct additional noise monitoring to investigate the causes, if necessary 4. Report the investigation results to Contractor and PM 5. Discuss with Contractor for their formulation of remedial measures if the exceedance is related to construction works 6. Conduct additional monitoring to check mitigation effectiveness, if necessary	1. Take immediate action to avoid further exceedance 2. Submit noise mitigation proposals to Contractor's ET and PM. 3. Implement noise mitigation proposals	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented
Limit Level	1. Identify source 2. Notify Contractor and PM 3. Conduct additional noise monitoring and analyse Contractor's working procedures to determine possible cause of exceedance, if necessary 4. Provide interim report to Contractor and PM on the causes and proposed action to be taken for the exceedances if exceedance is related to construction works 5. Assess effectiveness by additional monitoring and report Contractor and PM, if necessary 6. If exceedance stops, cease additional monitoring, if any	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to Contractr's ET, and Pm within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control. 5. Stop the relevant portion of works as determined by the PM until the exceedance is abated	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented 5. If exceedance continues, consider what protion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.

APPENDIX E - Event and Action Plan for Air Quality

Event	Action		
	Contractor's ET	Contractor	PM
Action Level	1. Identify source 2. Notify Contractor and PM 3. Conduct additional monitoring to investigate the causes, if necessary 4. Report the investigation results and if exceedance to Contractor and PM	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice. 2. Submit air mitigation proposal and PM for agreement if Contractor's ET indicated that exceedance is related to the construction works 3. Implement agreed proposal within a time scale agreed with PM	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to submit air mitigation proposal 4. Ensure remedial measures are properly implemented
Limit Level	1. Identify source 2. Notify Contractor and PM 3. Conduct additional monitoring and investigate the causes, if necessary	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice 2. In consultation with the PM, submit air mitigation proposal to PM for agreement within 3 working days of notification if Contractor's ET indicated that exceedances are related to construction works 3. Implement agreed proposal within a time scale agreed with PM 4. Amend working methods if appropriate.	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to submit air mitigation proposal 4. Ensure remedial measures are properly implemented

APPENDIX F

TENTATIVE WORKS PROGRAMME

W. Hing Construction Co., Ltd.

Ocean Park Redevelopment Project Contract No.: CS02 – Rainforest

<u>Outline Program</u>

	2009								2010				
	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Funicular Plaza													
Defect Rectification Works													
Exhibition House													
Substructure													
Superstructure													
E&M works													
Internal Finishing Works													
External Finishing Works													
External Area													
Substructure													
E&M works													
External Finishing works													
Demolition Works													
Roadworks													

Part 5 CS-03 EM&A REPORT (February 2010)

KADEN - ATAL JOINT VENTURE

Contract No. CS03

Ocean Park Redevelopment Project - Thrill Mountain & Polar Adventure

Monthly EM&A Report

February 2010

Certified By

(Eric Wong)

(Construction Manager)

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EXECUTIVE SUMMARY

Introduction

This is the 3rd monthly Environmental Monitoring and Audit (EM&A) Report prepared by Kaden – ATAL JV for the Contract No. CS03 "Ocean Park Redevelopment Project – Thrill Mountain & Polar Adventure" (hereinafter called "the Project"). The Project was commenced on 2nd November 2009. This document reports the findings of the environmental auditing works conducted in February 2010.

The major site activities undertaken in the reporting month included:

- Concrete Casting for Footings of Polar Adventure;
- Construction Works for Fence Wall and backfill for Retaining Wall
- Construction of South Pole Penguin Pool;
- Backfilling and Construct North Pole On Grade Slab;
- Cast Base Slab and Wall for Summit Reservoir;
- Rock Dowels Installation for Polar Adventure and Summit Reservoir;
- Piling Works for Floorless Coaster;
- Construction of Footing for Floorless Coaster Station;
- Construction of Column for Summit Reservoir and
- Disposal Existing Stockpile.
- Construction of Utilities Draw Pit and Underground Drainage Manhole.

Environmental Monitoring and Audit Works

Environmental monitoring and audit works for the Project was performed as stipulated in the updated EM&A Manual. Site audits were conducted once per week. Environmental site audits were conducted on 3rd, 10th, 17th & 24th February 2010 and the environmental ICE monthly site inspection was conducted on 19th February 2010 No non-compliance was observed during the site audits.

The implementation of the environmental mitigation measures was checked and the environmental management plan was submitted.

No notification of exceedance was received from the Project Environmental Team Leader (ETL) in the reporting month.

Environmental Licenses and Permits

Licenses/Permits granted to the Project include the Environmental Permit (EP) for the Redevelopment Project, Construction Noise Permit (CNP) and Billing Account for Disposal of Construction Waste.

Registration of Waste Producer (Chemical Waste), Water Discharge License and notification pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation was applied.

Complaints and Prosecutions

No environmental complaint and prosecution was received in the reporting month.

Future Key Issues

Key issues to be considered in the coming month include:

- R.C. Works for Column, Wall and Slab of Polar Adventure;
- Backfilling at Polar Adventure and Construction On Grade
- R.C. Works for Penguin Pool and Walrus Pool at Polar Adventure;
- R.C. Works for Summit Reservoir & Pump Room;
- Construction of Footings and Wall for Floorless Coaster and Bobsled Station
- Existing Stockpile Disposal;
- Drainage and Sewerage Laying.

1. INTRODUCTION

Background

1.1 Kaden-ATAL JV (the Contractor) was commissioned by the Employer to undertake the construction of the Contract No. CS03 "Ocean Park Redevelopment Project – Thrill Mountain & Polar Adventure" (the Project) and the project was commenced on 2nd November 2009. The site layout plan is illustrated in Figure 1.1.

1.2 These report summaries the environmental monitoring and audit works for the Project in the month of January 2010.

1.3 The scope of works for the Project includes:

(a) Construction of summit reservoir and associated pump room.
(b) Construction of vehicular bridge.
(c) Construction of the Polar Adventure Building.
(d) Construction of back of house facilities in the Polar Adventure Building.
(e) Construction of other one to three storey buildings in Polar Adventure.
(f) Construction of foundation and installation of Bobsled Ride.
(g) Installation of Life Support Systems.
(h) Construction of one to three storey buildings in Thrill Mountain.
(i) Construction of foundation and installation of the Floorless Coaster.
(j) Installation of the Ultramax, Aviator, Musik Express and Bumper Car.
(k) New roadwork, paving, footpaths and infrastructure support.
(l) Installation of building services.
(m) Soft and hard landscape works.
(n) Construction of underground utilities and services.
(o) Construction of earth retaining structures.
(p) Construction of all interior fitting out works.
(q) Supply and installation of all elevator(s) and escalator(s).
(r) Coral survey and maintenance of existing suit curtain.

Project Organizations

1.4 Different parties with different levels of involvement in the project organization include:

- The Engineer and Project Environmental Team Leader (ETL) – AECOM Consultant Ltd.
- Contractor – Kaden-ATAL JV.
- Independent Environmental Checker (IEC) – Mott MacDonald HK Ltd.

1.5 The responsibilities of respective parties are provided in Section the Contractor's EM&A Manual of the Project.

1.6 The key contacts of the Project are shown in **Table 1.1**.

Table 1.1 Key Project Contacts

Party	Name	Role	Phone No.	Fax No.
Project ET	Mr. Benny Chan	Safety Manager	2910 3155	2552 1256
	Mr. Andy Leung	Assistant Inspector of Works	2910 3156	
Contractor	Mr. K.M. Book	Project Manager	3582 6088	3582 4877
	Mr. Eric Wong	Construction Manager	3582 6005	
Contractor's ET	Mr. Sunny Wong	Contractor's Environmental Team Leader	3582 4880	3582 4877
IEC	Miss Florence Yuen	Independent Environmental Checker (IEC) Representative	2828 5757	28271823

Construction Programme

1.7 The site activities undertaken in the reporting month were:

- Concrete Casting for Footings and Wall for Polar Adventure;
- Backfilling Works for Retaining Wall and Fence Wall;
- Construct On Grade Slab at Polar Adventure,
- Construct Footing, Column and Wall for Summit Reservoir;
- Rock Dowels Installation for Summit Reservoir and Polar Adventure;
- Piling Works for Floorless Coaster;
- Construction Drainage Work and Pile Laying;
- Carry Out Diversion for EVA Road to CS02 Site; and
- Existing Stockpile Disposal.

Summary of EM&A Requirements

1.8 The EM&A programme requires construction phase environmental site audit. The duties and responsibilities comprise the following:

- monitor various environmental parameters, if necessary, as specified in the Contractor's EM&A Manual;
- analyze the environmental monitoring and audit data;
- review the EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify and adverse environmental impacts arising;
- carry out site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems;
- audit and prepare EM&A reports on the site environmental conditions;
- report the environmental audit results to the Contractor;
- recommend appropriate mitigation measures to the Contractor in case of exceedance

of Action and Limit Levels in accordance with the Event and Action Plans; and

- adhere to the procedures for carrying out complaint investigation in accordance with the Contractor's EM&A Manual.

1.9 This report presents the environmental monitoring and audit works for the Project in February 2010.

2. ENVIRONMENTAL AUDIT

Environmental Site Audits

2.1 Environmental site audits were carried out on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.

2.2 Site audits for the Project in the reporting month were conducted on 3rd, 10th, 17th & 24th February 2010 and the environmental ICE monthly site inspection was conducted on 19th February 2010. No non-compliance was observed during the site audits. The summaries of site audits are attached in **Appendix A**.

2.3 During site inspections in the reporting month, no non-conformance was identified. The observations and recommendations are summarized in **Table 2.1**.

Table 2.1 Observations and Recommendations of Site Audits

Parameters	Date	Observations / Recommendations	Remediation/ Follow up
Water Quality	19/02/10	Stagnant water pond was observed due to rain near Flash Ride.	Remove stagnant water and level the road surface.
	19/02/10	The wastewater was recycled for wheel washing and dust control.	The sedimentation tank should ensure well function before discharging waste water off site.
Waste/ Chemical Management	19/02/10	Chemical waste storage area was accumulated with rainwater.	Ensure suitable label has been shown at the chemical waste storage area.
Dust Control	19/02/10	Routine water spray to all haul roads is required to minimise the generation of dust.	Ensure all haul road was properly controlled.
	03/02/10	Not suitable enclose during pile drilling.	Ensure fully enclosure has been installed for pile drilling.

Status of Environmental Licensing and Permitting

2.4 All valid permits/licenses obtained for the Project are summarized in **Table 2.2**.

Table 2.2 Summary of Environmental Licensing and Permit Status

Permit No.	Valid Period		Details	Status
	From	To		
Environmental Permit				
EP-249/2006/A	23/10/2006	N/A	Expansion of the existing Ocean Park and reconstruction / modification of its existing facilities.	Valid
Registration of Chemical Waste Producer				
WPN5213-176-K2880-02	25/11/2009	N/A	Waste Disposal (Chemical Waste) (General) Regulation -- Registration of Waste Producer	Valid
Construction Noise Permit				
GW-RS0893-09 GW-RS0893-10	01/12/2009 01/03/2010	31/05/2010 31/07/2010	Construction Noise Permit for Top of Nam Long Shan Rd., Ocean Park, 180 Wong Chuk Hang, Hong Kong	Valid Valid
Water Discharge License				
WT00005926-2010	05/11/2009	28/02/2015	Discharge of industrial trade effluent arising from the Sedimentation tank at the construction site (CS03 Ocean Park Redevelopment Project) to communal storm water drain.	Valid
Others				
Application in progress	N/A	N/A	Notification Pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation	
7009695	N/A	N/A	Construction Waste Disposal Billing Account with EPD	Valid

Status of Waste Management

2.5 The amount of waste generated by the construction activities of the Project in the reporting month is attached in **Table 2.3.**

Table 2.3 Actual Quantity of Waste Generated in Jan 2010

Waste Type	Examples	Actual quantity disposed (Tonnes)	Disposal Locations
C&D Waste	Construction waste (Plastic, wood and bamboo)	10.2	SENT Landfill
	Mixed rock & soil	2538	CW barging point
Chemical waste	Used oil, spent solvent	Nil	Collected by licensed collector

Implementation Status of Environmental Mitigation Measures

2.6 During site inspections in the month, the following observations and recommendations were made.

Water Quality Mitigation Measures

- The waste water was recycled for wheel washing and dust control.

Air Quality Mitigation Measures

- The Contractor to ensure cement bags was well covered.
- The Contractor to ensure fully enclosure has been installed for pile drilling.
- The Contractor was reminded to cover the existing stockpile general fill material when they were not in use.

Noise

- No violation was observed nor recorded.

Ecology

- No violation was observed nor recorded.

Waste / Chemical Management

- Chemical waste storage area was not labelled. Contractor to ensure suitable label has been shown at the chemical waste storage area.
- Oil stain was observed during drilling rig maintenance. Ensure spent oil keep in dip tray during drilling rig maintenance.

Others

- No other violation was observed nor recorded.

Summary of Exceedances

2.7 No Action/Limit Level exceedance was reported in the reporting month.

Implementation Status of Event Action Plans

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

Summary of Complaints and Prosecutions

2.9 No environmental complaint and prosecution related to the Project works was received during the reporting month.

3. FUTURE KEY ISSUES

Key Issues for the Coming Month

3.1 Key issues to be considered in the coming month include:

- Excavation Works and R.C. Works for Footings of Polar Adventure;
- Excavation Works for Fence Wall
- R.C. Works for Retaining Wall & Fence Wall;
- Tower Crane TC-3 Erection;
- R.C. Works for Summit Reservoir & Pump Room;
- Rock Dowel Installation for Summit Reservoir and Floorless Coaster;
- Existing Stockpile Disposal;
- Temporary salt water pipeline laying for LSS at TM-2;
- Pre-drilling and Piling Works for Floorless Coaster; and
- Drainage and Sewerage Laying.

4. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

4.1 Four environmental site audits were performed in February 2010. No non-compliance was observed during the site audits.

4.2 No exceedance of environmental monitoring was reported in the reporting month.

4.3 No environmental complaint and prosecution related to the project was received in the reporting month.

Recommendations

4.4 According to the environmental audits performed in the reporting month, the following recommendations are suggested:

Water Quality Impact

- Should ensure that the sedimentation tank is well function before discharging waste water off site.

Dust Impact

- To provide suitable cover to cement bags.
- To provide fully enclosure for pile drilling.
- To cover the existing stockpile general fill material when they were not in use.

Waste / Chemical Waste Impact

- To provide suitable label has been shown at the chemical waste storage area.
- To ensure spent oil keep in dip tray during drilling rig maintenance.

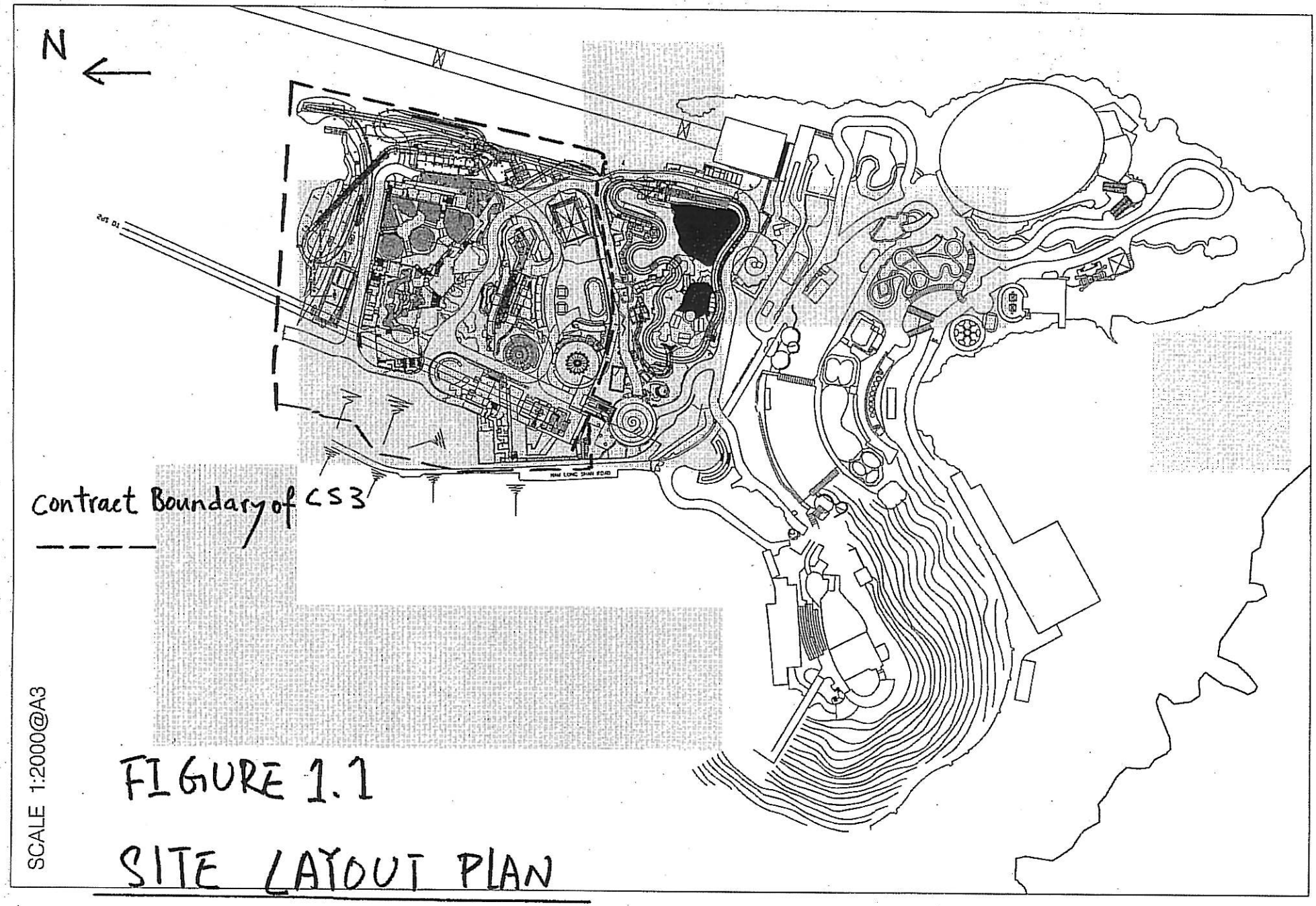


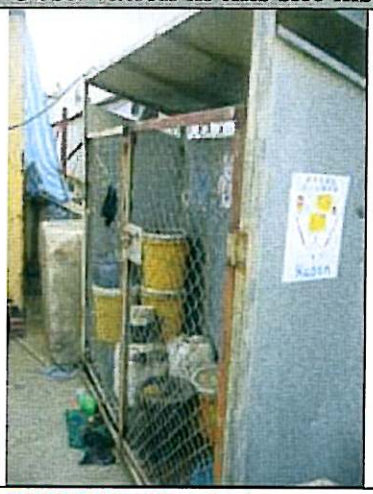
FIGURE 1.1

SITE LAYOUT PLAN

Appendix A

Site Audit Summary

MONTHLY SITE INSPECTION PHOTOS

Contract CS03 Trill Mountain and Polar Adventure	
Follow up observations in January 2010	
Observation in last site inspection	**Observation in this site inspection**
N/A	
Chemical waste storage area was properly labelled but not properly secured. The Contractor should ensure the chemical waste storage area is properly secured/ locked.	P1080540: Chemical waste storage area was accumulated with water due to rainy weather. The Contractor should ensure the chemical waste storage area is maintained properly.
P1080429: Haul road near the site entrance was dry and dusty. The Contractor should provide water spray to all haul road on-site more frequently.	Closed - P1080529: Water spray was provided to all haul roads on-site.

Observations in February 2010	
P1080534: Stagnant water was accumulated on-site. The Contractor should remove them as soon as possible.	

Appendix B

Coral Survey Report

OCEAN PARK CORPORATION MASTER REDEVELOPMENT PROJECT

CONTRACT NO. CS-03

THRILL MOUNTAIN AND POLAR ADVENTURE

BASELINE CORAL REVIEW & RE-TAGGING REPORT

FEBRUARY 2010

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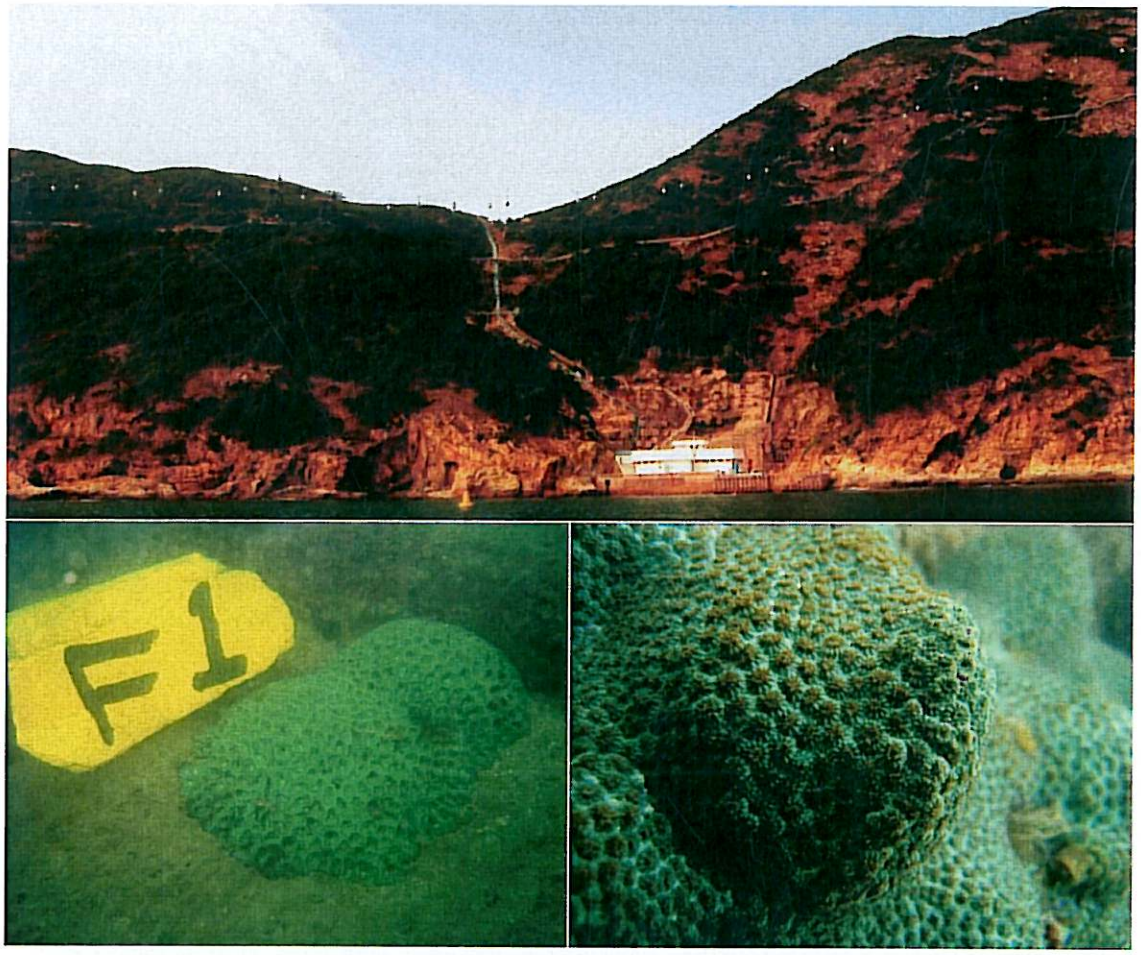
DATE:

18 Feb 2010

Ocean Park Corporation Master Redevelopment Project

Contract No. CS-03

Thrill Mountain and Polar Adventure



Report for

Baseline Coral Review & Re-tagging Report

February 2010

miniprojects co. Ltd.

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4.1 Evaluation of Monitoring Results against Action and Limit Level for Coral Monitoring Survey.

1 INTRODUCTION

1.1 Project Background

1.1.1 Ocean Park planned to upgrade and expand the existing area to meet the anticipated visitor demands and to position Ocean Park as a premium tourist attraction and a regional leader in the themed recreational and educational park experience.

1.1.2 Lam Environmental Services Limited (LAM) has been appointed to formulate a Coral Survey Team to conduct the Marine Ecology Survey for Ocean Park Corporation Master Redevelopment Project Contract No. C105 – Site Formation, Funicular Tunnel and Miscellaneous Works.

1.1.3 miniprojects Company Limited (miniprojects co. Ltd.) has been commissioned by LAM to undertake Coral Monitoring Survey on the tagged hard coral colonies at five Monitoring Sites around the Construction Site and one Control Site for captioned project.

1.1.4 In the impact monitoring surveys conducted on 16 August 2009, six out of the 60 tagged coral colonies were found to detach completely from their substrate and 46 tagging stones or marks were loss or worn out in all five Monitoring Sites and one Control Site. Such physical damage on the coral colonies and tags was believed to be caused by several strong tropical cyclones attacked Hong Kong prior to the August 2009 surveys.

1.1.5 miniprojects co. Ltd. has been commissioned by LAM to undertake the Coral Re-tagging Exercise and Baseline Data Re-collection on the re-tagged hard coral colonies in November 2009 at all five Monitoring Sites around the Construction Site and one Control Site and subsequent quarterly monitoring surveys since November 2009 for captioned project.

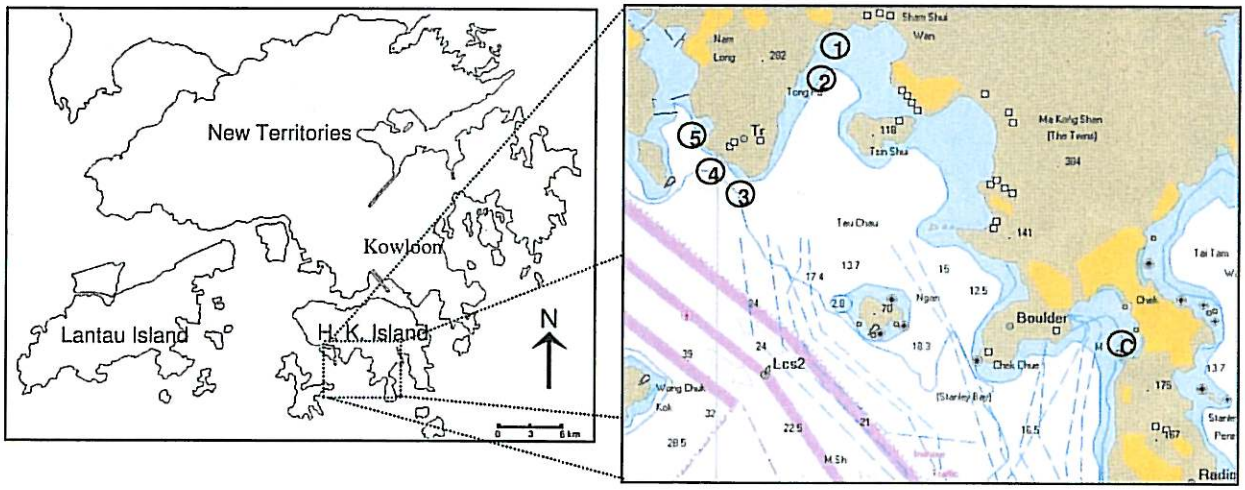
1.1.6 This report presents the results of the 1st Coral Monitoring Survey conducted on 06 February 2010 after Coral Re-tagging Exercise in November 2009.

2 METHODOLOGY

2.1 Monitoring Surveys – Locations

2.1.1 Five locations close to the potential impact areas were identified and designated as Impact Monitoring Sites (Sites 1 to 5; Fig. 2.1). In order to identify background environmental perturbations that are not associated with the construction, St. Stephen Beach, which is away from the impact areas, was designated as the Control Site (Control Site C; Fig. 2.1). Locations (GPS coordinates) of the five Impact Monitoring Sites and one Control Site C are summarized in Table 3.1.

Fig. 2.1 Map Showing the Locations of the Five Impact Monitoring Sites (1 to 5) and One Control Site (C).



2.2 Monitoring Requirements

2.2.1 The construction phase coral monitoring programme comprises an Initial Survey, Coral Tagging Exercise and Impact Monitoring Surveys. Initial Survey and Coral Tagging Exercise were completed on 07-12 April 2007.

2.2.2 Impact monitoring aims to determine whether impacts are occurring on tagged corals during the period of construction works commenced in June 2007. A particular focus of the Impact Monitoring is the effects of sedimentation, bleaching and mortality on corals.

2.2.3 As required in the EM&A manual, coral monitoring at Site 5 and Control Site C should be conducted twice a month at first 3 months of the construction (i.e. June, July and August 2007). The monitoring frequency would be changed to monthly for month 4 to month 6 (i.e. September, October and November 2007) if no adverse effects were recorded (Table 2.1). After that, the monitoring will be changed to quarterly from month 7 (i.e. December 2007) until the end of construction works.

2.2.4 Monitoring Survey for Sites 1 to 4 should be conducted monthly during the first 2 months (i.e. June and July 2007) of the construction works. If there is no exceedance recorded (Table 2.1), the monitoring frequency would be adjusted to quarterly from month 3 (i.e. August 2007) till the end of the construction period.

2.2.5 Several tropical cyclones, attacked Hong Kong between May and August 2009, led to serious physical damage on tagged and un-tagged coral colonies and the loss of the tagging stones and marks in all five Monitoring Sites and one Control Site. Coral re-tagging exercise and baseline data re-collection were undertaken in November 2009 (month 30) at all five Monitoring Sites around the Construction Site and one Control Site. The results will be as reference and reviewed during further Coral Monitoring surveys.

2.2.6 At each of the Impact Monitoring and Control Sites, 10 hard coral colonies were re-tagged for continuous monitoring over the course of construction phase. The health status of the re-tagged corals including area of bleaching and partial mortality, and level of sedimentation as percentage of sediment cover and approximate thickness of sediment on the colony and on adjacent hard substrate were recorded. The condition of each re-tagged coral colony was also recorded by taking photographs that best represents the entire colony. General physical parameters were recorded for each survey site, including visibility, weather, tidal conditions and water current.

2.2.7 The results of the Coral Re-tagging Exercise and Baseline Data Re-collection will be as reference and reviewed with further the Coral Monitoring Surveys.

2.2.8 This report presented the results of the 1st Coral Monitoring Survey in month 33 (February 2010) after Coral Re-tagging Exercise and Baseline Data Re-collection, required at Sites 1 to 5 and Control Site C. The schedule was summarized as follow,

	Coral Monitoring Survey Date
	06 February 2010
Site 1	✓
Site 2	✓
Site 3	✓
Site 4	✓
Site 5	✓
Control Site C	✓

2.3 Compliance / Event Action Plan

2.3.1 Coral monitoring results were evaluated against Action and Limit Levels. Evaluation were based on recorded changes in,

- Percentage of partial mortality
- Percentage of sediment cover
- Percentage of bleaching

2.3.2 Action and Limit Levels are defined in Table 2.1

2.3.3 If the defined Action Level or Limit Levels for coral monitoring were exceeded, the stepwise procedures should be implemented in accordance to the EM&A manual to reverse the unfavourable impact on the coral communities.

Table 2.1 Action and Limit Level for Coral Monitoring

Parameter	Action Level Definition	Limit Level Definition
Sedimentation	If during Impact Monitoring a 15% increase in the percentage of sediment cover on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of sediment cover occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Limit Level is exceeded.
Bleaching	If during Impact Monitoring a 15% increase in the percentage of bleaching (bleached white) on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of bleaching (bleached white) occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Limit Level is exceeded.
Mortality	If during Impact Monitoring a 15% increase in the percentage of partial mortality on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of partial mortality occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Limit Level is exceeded.

3 RESULTS

3.1 Sites 1 to 5 and Control Site C – Coral Re-tagging Exercise and Baseline Data Collection Date: 06 February 2010

3.1.1 Coral monitoring survey at Sites 1 to 5 and Control Site C were conducted on 06 February 2010. The physical conditions of each site are summarized in Table 3.1.

Table 3.1 Sites 1 to 5 and Control Site C – Physical Conditions.

Site	Site 1	Site 2	Site 3	Site 4	Site 5	Control Site C
GPS Coordinates	N 22°14'34.1" E 114°10'43.6"	N 22°14'25.39" E 114°10'37.2"	N 22°13'49.3" E 114°10'14.2"	N 22°13'53.3" E 114°10'07.3"	N 22°14'01.9" E 114°09'59.3"	N 22°12'48.3" E 114°12'51.2"
Date	06 February 2010					
Sedimentation on Rock surfaces (mm)	1-2	1-2	1-2	1-2	1-2	1-2
Visibility (m)	0.5-1.0					
Weather	Northeast wind; Cloudy					
Tide	Spring					
Current (Knot)	1.0-1.5	1.0-1.5	1.0-1.5	1.0-1.5	1.0-1.5	0.5-1.0

3.1.2 Percentages of sedimentation, bleaching and mortality of each re-tagged colony were presented in Tables 3.2 and 3.3. Photographs of each re-tagged coral in Sites 1 to 5 and Control Site C were illustrated in Appendices Ia to If, respectively.

Site 1

3.1.3 When compared with baseline data in November 2009, increased sedimentation cover was recorded on 4 colonies (A3, A4, A9 and A10), ranged from 1 to 2%. Decrease in sedimentation was observed in 3 colonies (A2, A5 and A8) by 1%. No bleaching was recorded. Partial mortality found in 2 colonies (A2 and A7) in baseline survey had no further increase (Table 3.2).

Site 2

3.1.4 When compared with baseline data in November 2009, sedimentation increased in 4 colonies (B4, B5, B6 and B9), ranged from 1 to 2%, and decreased in 1 colony (B2) by 2%. No bleaching was recorded. Partial mortality found in 4 colonies (B3, B4, B5 and B9) in baseline survey had no further increase (Table 3.2).

Site 3

3.1.5 When compared with baseline data in November 2009, sedimentation increased in 2 colonies (C2 and C4) 1% and decreased in 2 colonies (C3 and C8), ranged

from 1 to 2%. No bleaching was recorded. Partial mortality found in 4 colonies (C1, C2, C3, and C5) in baseline survey had no further increase (Table 3.2).

Site 4

3.1.6 When compared with baseline data in November 2009, sedimentation increased in 2 colonies (E4 and E9), ranged from 2 to 3% and decreased in 3 colonies (E2, E6 and E10), ranged from 2 to 4%. No bleaching was recorded. Partial mortality found in 5 colonies (E3, E5, E6, E8 and E10) in baseline survey had no further increase (Table 3.2).

Site 5

3.1.7 When compared with baseline data in November 2009, sedimentation increased in 4 colonies (D1, D5, D6 and D10), ranged from 2 to 4% and decreased in 2 colonies (D3 and D9), ranged from 2 to 3%. No bleaching was recorded. Partial mortality found in 5 colonies (D1, D6, D7, D9 and D10) in baseline survey had no further increase (Table 3.2).

Control Site C

3.1.8 When compared with baseline data in November 2009, sedimentation increased in 4 colonies (F4, F7, F8 and F9), ranged from 1 to 3% and decreased in 1 colony (F1) by 1%. No bleaching was recorded. Partial mortality found in 3 colonies (F2, F3 and F6) in baseline survey had no further increase (Table 3.2).

Table 3.2 Sites 1 to 5 and Control Site C – Percentage and thickness of Sedimentation, Bleaching and Mortality of the Re-tagged Coral Colonies in Coral Re-tagging Exercise and Baseline Data Collection (November 2009) and the Present Monitoring Survey (February 2010). "▲" and "▼" indicate increased and decreased in percentage, respectively, when compared with the coral re-tagging exercise and baseline data collection.

Site 1

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
A1	*Platygyra carnosus*	1200	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
A2	*Favites abdita*	400	5, 1	4, 1▼	-	-	0	0	-	-	2	2	-	-
A3	*Plesiastrea versipora*	600	0, 0	1, 1▲	-	-	0	0	-	-	0	0	-	-
A4	*Leptastrea purpurea*	6200	0, 0	2, 1▲	-	-	0	0	-	-	0	0	-	-
A5	*Platygyra carnosus*	3200	1, 1	0, 0▼	-	-	0	0	-	-	0	0	-	-
A6	*Platygyra carnosus*	2600	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
A7	*Favia speciosa*	500	2, 1	2, 1	-	-	0	0	-	-	5	5	-	-
A8	*Platygyra carnosus*	1500	2, 1	1, 1▼	-	-	0	0	-	-	0	0	-	-
A9	*Leptastres purpurea*	700	4, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
A10	*Platygyra carnosus*	2000	0, 0	1, 1▲	-	-	0	0	-	-	0	0	-	-

Site 2

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
B1	*Platygyra carnosus*	1300	2, 1	2, 1	-	-	0	0	-	-	0	0	-	-
B2	*Plesiastrea versipora*	650	4, 1	2, 1▼	-	-	0	0	-	-	0	0	-	-
B3	*Psammocora superficialis*	4400	5, 1	5, 1	-	-	0	0	-	-	3	3	-	-
B4	*Favia speciosa*	800	0, 0	2, 1▲	-	-	0	0	-	-	2	2	-	-
B5	*Plesiastrea versipora*	1000	2, 1	3, 1▲	-	-	0	0	-	-	2	2	-	-
B6	*Platygyra carnosus*	1500	0, 0	2, 1▲	-	-	0	0	-	-	0	0	-	-
B7	*Hydnophora exesa*	1600	1, 1	1, 1	-	-	0	0	-	-	0	0	-	-
B8	*Plesiastrea versipora*	1300	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
B9	*Favia speciosa*	450	1, 1	2, 1▲	-	-	0	0	-	-	2	2	-	-
B10	*Psammocora superficialis*	400	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-

Site 3

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
C1	*Porites sp*	100	2, 1	2, 1	-	-	0	0	-	-	3	3	-	-
C2	*Porites sp*	210	3, 1	4, 1▲	-	-	0	0	-	-	5	5	-	-
C3	*Goniopora stutchburyi*	410	5, 1	3, 1▼	-	-	0	0	-	-	7	7	-	-
C4	*Pavona decussata*	240	4, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
C5	*Pavona decussata*	210	3, 1	3, 1	-	-	0	0	-	-	1	1	-	-
C6	*Pavona decussata*	200	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
C7	*Montipora peltiformis*	960	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
C8	*Goniopora stutchburyi*	140	1, 1	0, 0▼	-	-	0	0	-	-	0	0	-	-
C9	*Porites sp*	300	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
C10	*Cyphastrea serailia*	600	4, 1	4, 1	-	-	0	0	-	-	0	0	-	-

Site 4

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	28 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
E1	*Goniopora stutchburyi*	290	5, 1	3, 1▼	-	-	0	0	-	-	0	0	-	-
E2	*Coscinaraea sp.*	620	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
E3	*Goniopora stutchbury*	300	4, 1	4, 1	-	-	0	0	-	-	3	3	-	-
E4	*Goniopora stutchbury*	130	3, 1	6, 1▲	-	-	0	0	-	-	0	0	-	-
E5	*Goniopora stutchbury*	460	6, 1	6, 1	-	-	0	0	-	-	4	4	-	-
E6	*Goniopora stutchbury*	380	10, 1	7, 1▼	-	-	0	0	-	-	8	8	-	-
E7	*Goniopora stutchbury*	120	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
E8	*Goniopora stutchbury*	230	4, 1	4, 1	-	-	0	0	-	-	2	2	-	-
E9	*Goniopora stutchbury*	170	3, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
E10	*Goniopora stutchbury*	540	7, 1	3, 1▼	-	-	0	0	-	-	3	3	-	-

Site 5

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	29 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
D1	*Psammocora* sp.	800	6, 1	4, 1▼	-	-	0	0	-	-	3	3	-	-
D2	*Montipora peltiformis*	600	4, 1	4, 1	-	-	0	0	-	-	0	0	-	-
D3	*Goniopora stutchburyi*	450	2, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
D4	*Cyphastera serailia*	100	3, 1	3, 1	-	-	0	0	-	-	0	0	-	-
D5	*Montipora cf. turgescens*	320	4, 1	2, 1▼	-	-	0	0	-	-	0	0	-	-
D6	*Montipora peltiformis*	480	10, 1	8, 1▼	-	-	0	0	-	-	20	20	-	-
D7	*Montipora peltiformis*	500	8, 1	8, 1	-	-	0	0	-	-	2	2	-	-
D8	*Montipora peltiformis*	410	6, 1	6, 1	-	-	0	0	-	-	0	0	-	-
D9	*Montipora peltiformis*	200	5, 1	7, 1▲	-	-	0	0	-	-	5	5	-	-
D10	*Goniopora stutchburyi*	510	7, 1	3, 1▼	-	-	0	0	-	-	5	5	-	-

Control Site C

Code	Coral Species	Area (cm^2)	Sedimentation (%, mm)				Bleaching (%)				Mortality (%)			
			21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010	21 Nov 09 (baseline)	Feb 2010	May 2010	Aug 2010
F1	*Goniastrea aspera*	450	2, 1	1, 1▼	-	-	0	0	-	-	0	0	-	-
F2	*Favites pentagona*	2100	2, 1	2, 1	-	-	0	0	-	-	2	2	-	-
F3	*Favites pentagona*	1000	0, 0	0, 0	-	-	0	0	-	-	5	5	-	-
F4	*Favites pentagona*	1300	2, 1	4, 1▲	-	-	0	0	-	-	0	0	-	-
F5	*Cyphastrea seraili*	2100	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-
F6	*Porites sp*	2100	5, 1	5, 1	-	-	0	0	-	-	2	2	-	-
F7	*Plesiastrea versipora*	3000	2, 1	5, 1▲	-	-	0	0	-	-	0	0	-	-
F8a	*Favites pentagona*	680	0, 0	1, 1▲	-	-	0	0	-	-	0	0	-	-
F9	*Favites pentagona*	2600	0, 0	3, 1▲	-	-	0	0	-	-	0	0	-	-
F10	*Favia rotumana*	600	0, 0	0, 0	-	-	0	0	-	-	0	0	-	-

4 SUMMARY AND CONCLUSION

4.1 Summary

4.1.1 In the monitoring surveys conducted in February 2010, sedimentation on the tagged colonies from all the 5 Monitoring Sites 1 to 5 and the Control Site C increased or decreased by less than 5% when compared with the baseline data in November 2009. There was no bleaching in all the 5 Monitoring Sites and the Control Site C. Partial mortality had no further increase.

4.1.2 In all the 5 Monitoring Sites 1 to 5 and the Control Site C, level of sedimentation on the tagged corals varied within a small range (<5%) without an observable trend. The variation was believed to be resulted from combined environmental factors such as monsoonal wind, tidal current, peripheral transports, substratum type, etc. No increment in partial mortality suggested minor adverse effect was caused by the observed sedimentation.

4.1.3 The data from this monitoring survey showed no significant enhancement in sedimentation, bleaching or mortality in all the 5 Monitoring Sites 1 to 5 and the Control Site C. Hence, no adverse impact by the construction activity on the coral community was evidenced.

4.2 Compliance / Event Action Plan

4.2.1 The monitoring results were evaluated against the Action and Limit Levels as defined in the EM&A manual and summarized in Table 4.1.

4.2.2 Overall, the healthy status of the tagged coral colonies was normal, with low levels of sedimentation. Neither action/limit level of sedimentation, bleaching or mortality was exceeded in the monitoring survey conducted in February 2010.

Table 4.1 Evaluation of Monitoring Results against Action and Limit Level for Coral Monitoring Survey. Note Definition of Action/Limit levels are listed in Table 2.1. "No" indicates NO exceedance.

Exceedance / Site	Sedimentation		Bleaching		Mortality	
	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level
Site 1	No	No	No	No	No	No
Site 2	No	No	No	No	No	No
Site 3	No	No	No	No	No	No
Site 4	No	No	No	No	No	No
Site 5	No	No	No	No	No	No
Control Site C	No	No	No	No	No	No

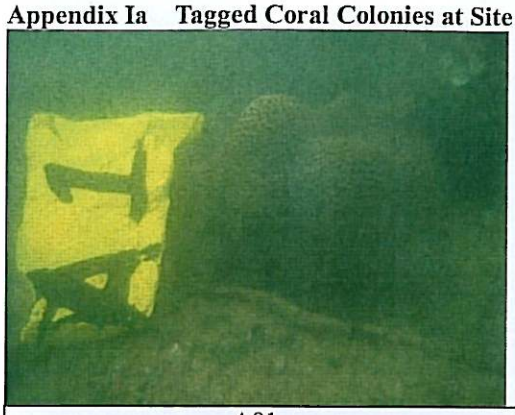
APPENDIX I

Photographs of the Tagged Corals at Sites 1 to 5 and Control Site C

Appendix Ia

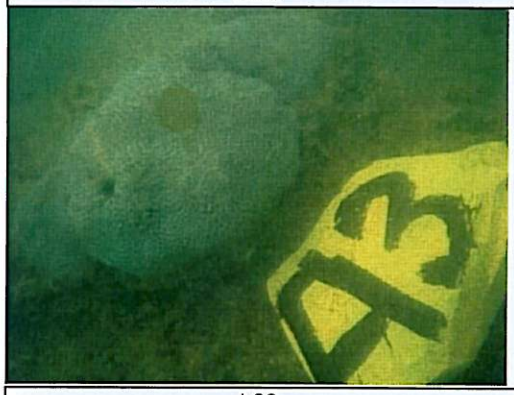
Tagged Coral Colonies in Site 1

Appendix Ia Tagged Coral Colonies at Site 1.



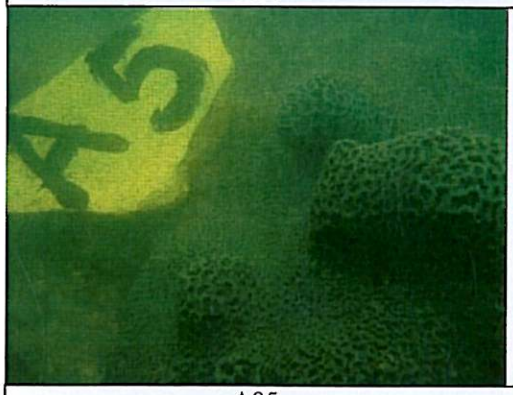
A01 *Platygyra carnosus*

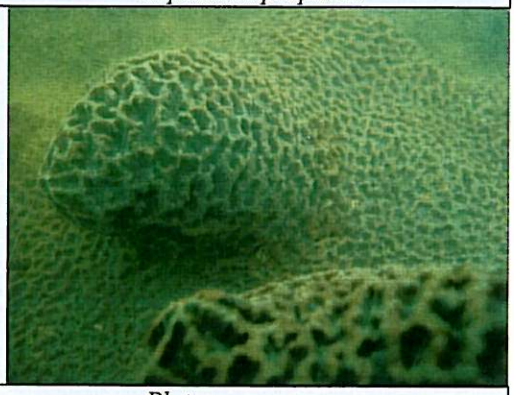
A02 *Favites abdita.*



A03 *Plesiastrea versipora*

A04 *Leptastrea purpurea*





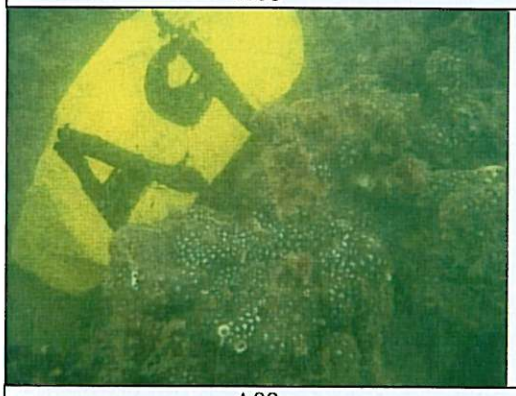
A05 *Platygyra carnosus*

Appendix Ia Tagged Coral Colonies at Site 1…continued.

A06 *Platygyra carnosus*

A07 *Favia speciosa*

A08 *Platygyra carnosus*



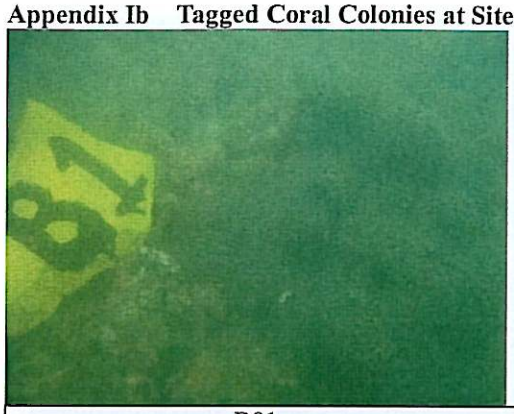
A09 *Leptastrea purpurea*

A10 *Platygyra carnosus*

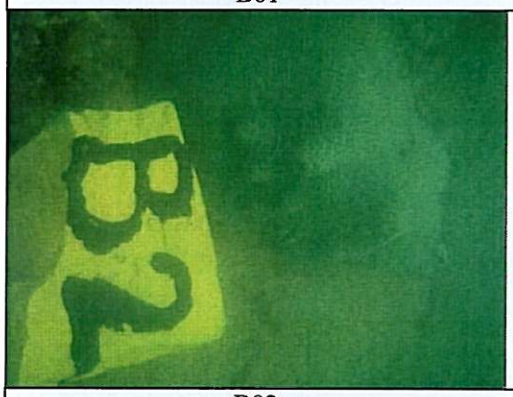
Appendix Ib

Tagged Coral Colonies in Site 2

Appendix Ib Tagged Coral Colonies at Site 2.

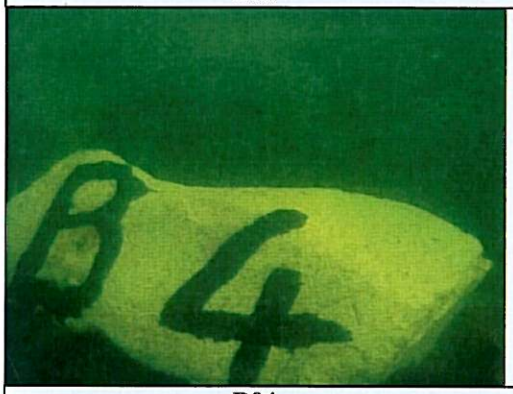


B01 *Platygyra carnosus*

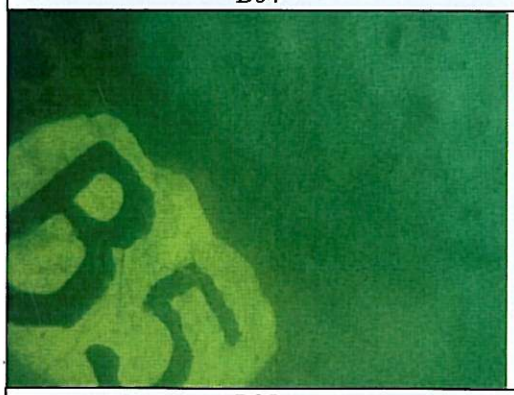


B02 *Plesiastrea versipora.*

B03 *Psammocora superficialis*

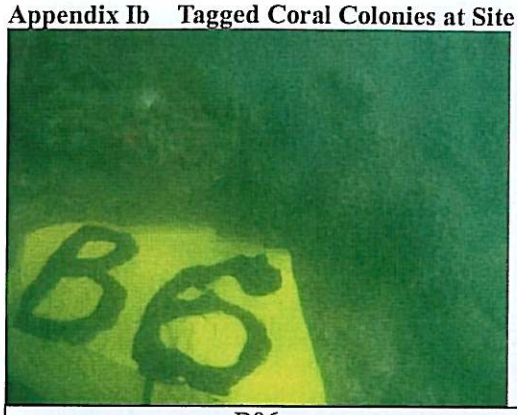


B04 *Favia speciosa*

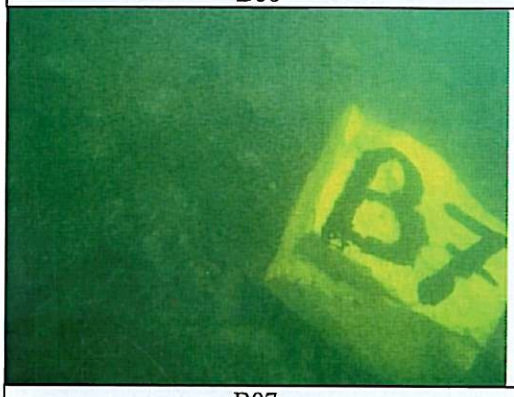


B05 *Plesiastrea versipora*

Appendix Ib Tagged Coral Colonies at Site 2…continued.

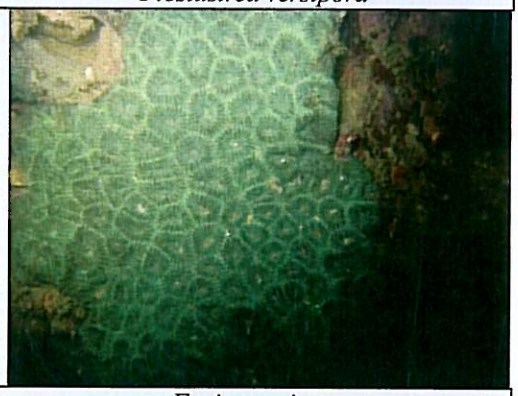


B06 *Platygyra carnosus*



B07 *Hydnophora exesa*

B08 *Plesiastrea versipora*



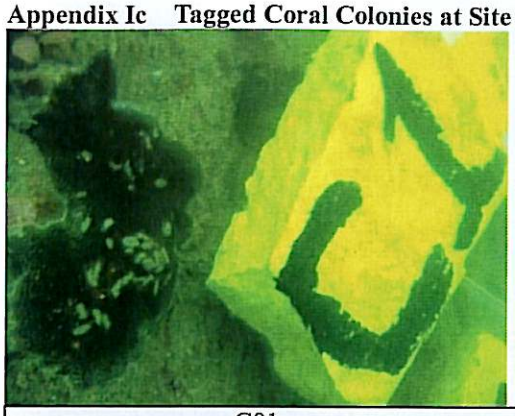
B09 *Favia speciosa*

B10 *Psammocora superficialis*

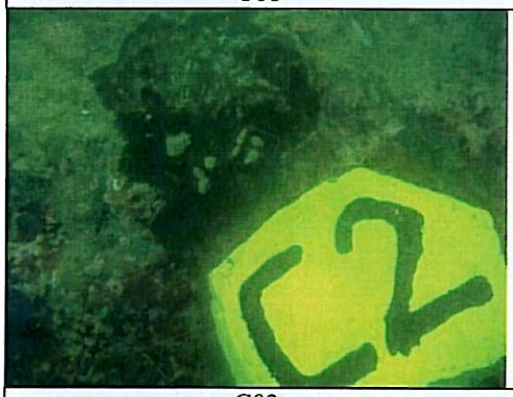
Appendix Ic

Tagged Coral Colonies in Site 3

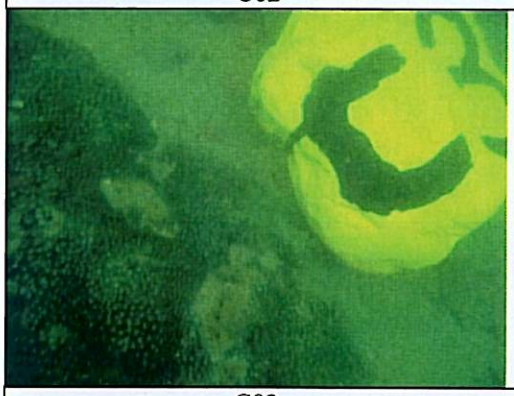
Appendix Ic Tagged Coral Colonies at Site 3.



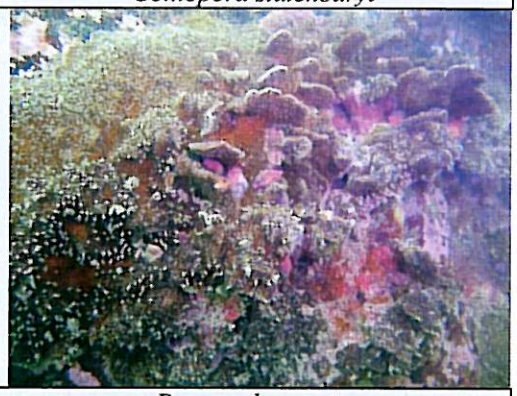
C01 | *Porites* sp.



C02 | *Porites* sp.



C03 | *Goniopora stutchburyi*



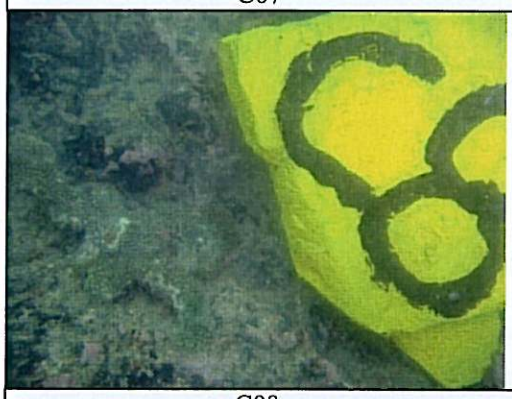
C04 | *Pavona decussata*

C05 | *Pavona decussata*

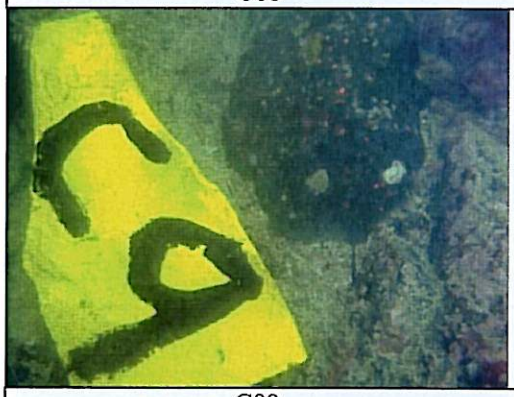
Appendix Ic Tagged Coral Colonies at Site 3…continued.

C06 *Pavona decussata*

C07 *Montipora cf. turgescens*



C08 *Goniopora stutchburyi*



C09 *Porites* sp.

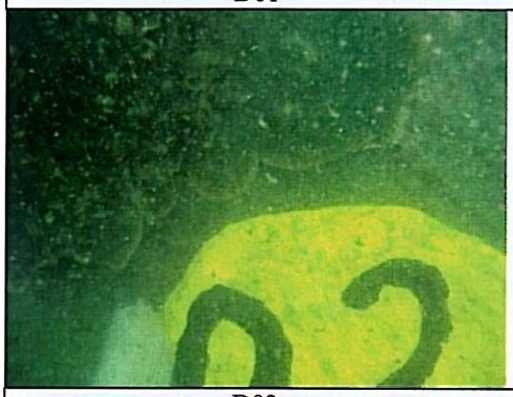
C10 *Cyphastrea serailia*

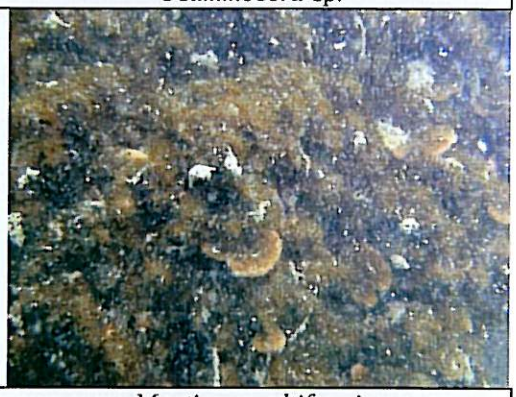
Appendix Id

Tagged Coral Colonies in Site 4

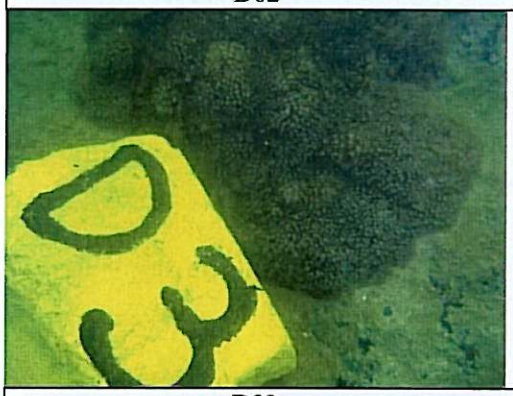
Appendix Ie Tagged Coral Colonies at Site 5.

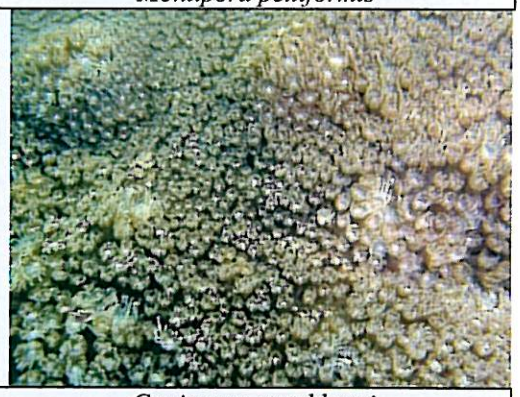
D01 *Psammocora* sp.





D02 *Montipora peltiformis*





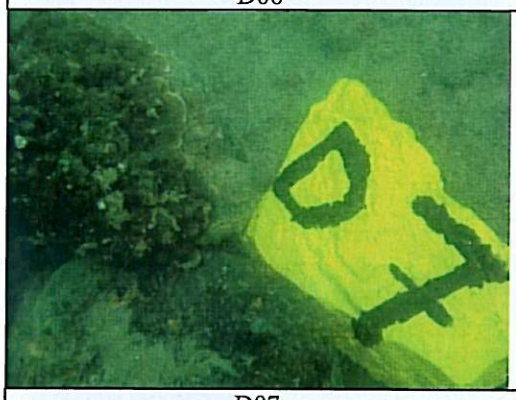
D03 *Goniopora stutchburyi*

D04 *Cyphastera serailia*

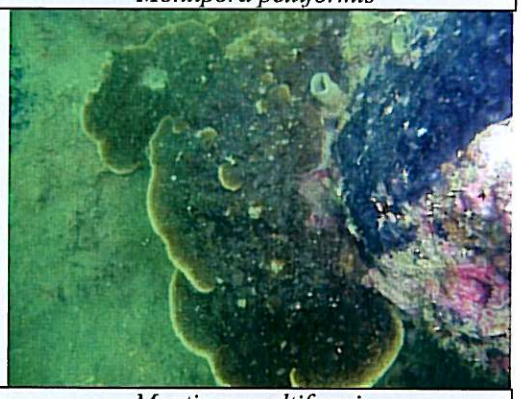
D05 *Montipora cf. turgescens*

Appendix Ie Tagged Coral Colonies at Site 5…continued.

D06 *Montipora peltiformis*



D07 *Montipora peltiformis*



D08 *Montipora peltiformis*

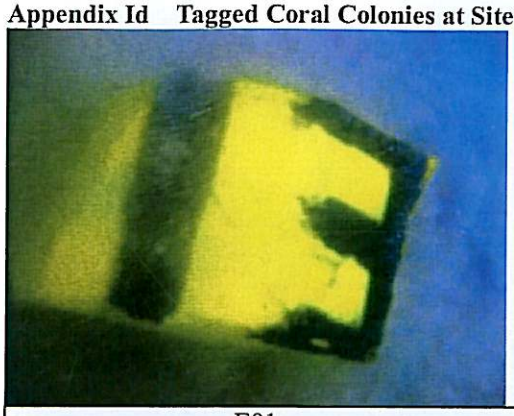
D09 *Montipora peltiformis*

D10 *Goniopora stutchburyi*

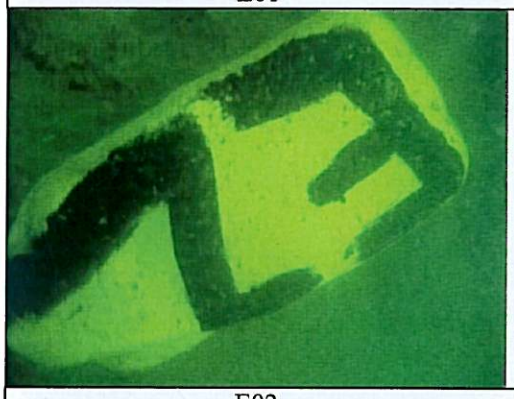
Appendix Ie

Tagged Coral Colonies in Site 5

Appendix Id Tagged Coral Colonies at Site 4.



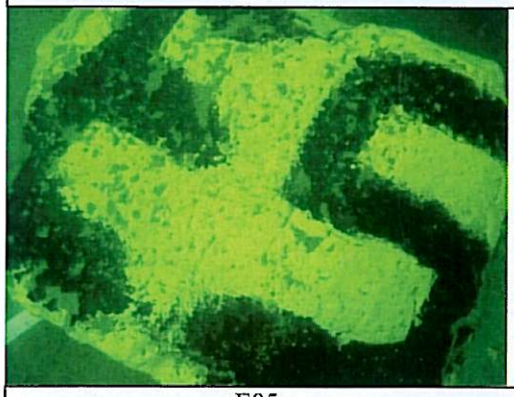
E01 *Goniopora stutchburyi*



E02 *Coscinaraea sp.*

E03 *Goniopora stutchburyi*

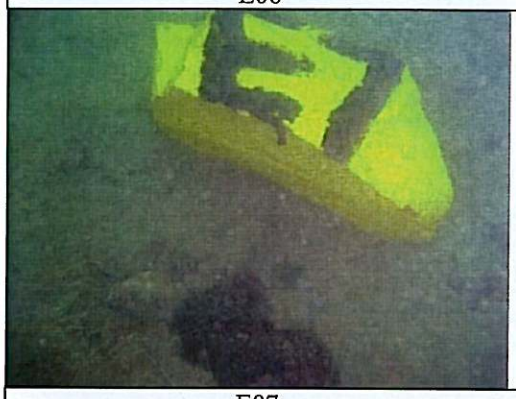
E04 *Goniopora stutchburyi*



E05 *Goniopora stutchburyi*

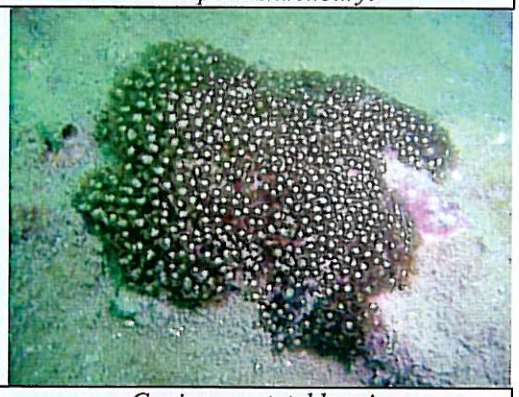
Appendix Id Tagged Coral Colonies at Site 4…continued.

E06 *Goniopora stutchburyi*

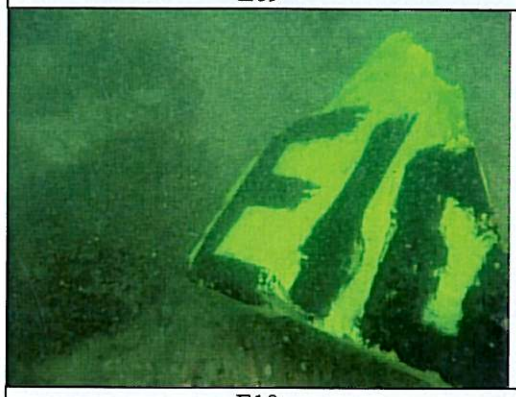


E07 *Goniopora stutchburyi*

E08 *Goniopora stutchburyi*



E09 *Goniopora stutchburyi*



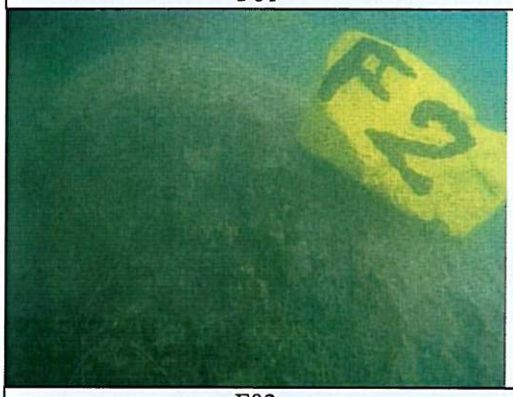
E10 *Goniopora stutchburyi*

Appendix If

Tagged Coral Colonies in Site 6

Appendix IF Tagged Coral Colonies at Control Site C.

F01 *Goniastrea aspera*



F02 *Favites pentagona.*

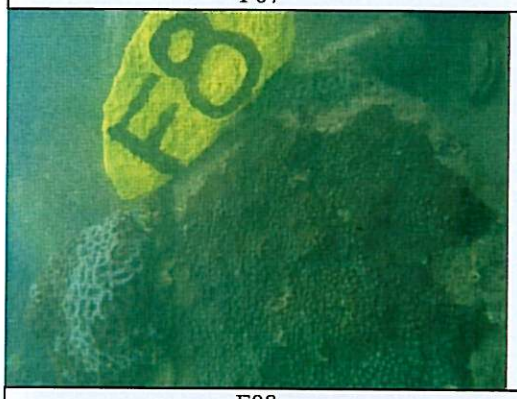
F03 *Favites pentagona*

F04 *Favites pentagona*

F05 *Cyphastrea seraili*

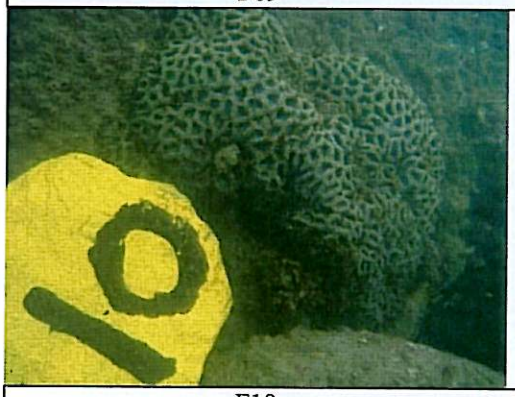
F06 *Porites sp*

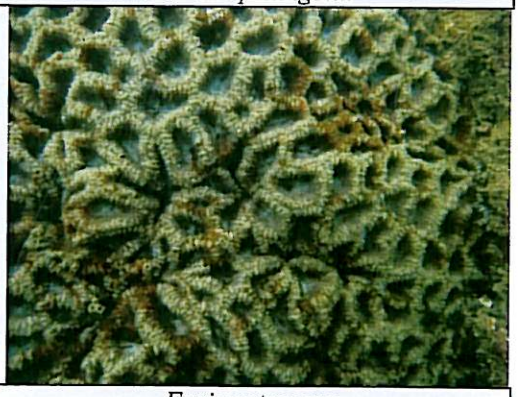
F07 *Plesiastrea versipora*



F08 *Favites pentagona*

F09 *Favites pentagona*





F10 *Favia rotumana*