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HONG KONG DRAINAGE SERVICES DEPARTMENT
CONTRACT NO. DC/2000/08
VILLAGE FLOOD PROTECTION WORKS FOR WANG CHAU, MAI PO LO WAI AND MAI PO SAN TSUEN AND DRAINAGE IMPROVEMENT WORKS AT TAN KWAI TSUEN

ENVIRONMENTAL MONITORING & AUDIT (EM&A) REPORT – FEBRUARY 2003 (REVISION A)

PREPARED FOR
CHING CHIT CHEUNG CONSTRUCTION CO., LIMITED

Abbreviations

A1	Air Sensitive Receiver
AUES	Action United Environmental Services
ET	Environmental Team
DSD	Drainage Services Department
EAP	Event and Action Plan
EIA	Environmental Impact Assessment
EM&A	Environmental Monitoring and Audit
EP	Environmental Permit
EPD	Environmental Protection Department
FEP	Further Environmental Permit
HOKLAS	The Hong Kong Laboratory Accreditation Scheme
HVS	High Volume Sampler
IEC	Independent Environmental Checker
N1	Noise Sensitive Receiver
QA/QC	Quality Assurance and Quality Control
TAT	Trigger/ Action/ Target
TSP	Total Suspended Particulates
W(D)1	Water Sensitive Receiver (Down Stream)
W(U)1	Water Sensitive Receiver (Up Stream)

Executive Summary

Ching Chit Cheung Construction Co., Ltd. (The Contractor) has been awarded the Contract DC/2000/08 from the Drainage Services Department (DSD) to undertake the Village Flood Protection Works for Wang Chau, Mai Po Lo Wai and Mai Po San Tsuen and Drainage Improvement Works at Tan Kwai Tsuen (the Project).

Action-United Environmental Services and Consulting (AUES) has been commissioned by the Contractor to undertake an impact Environmental Monitoring and Audit (EM&A) program for this project.

This report presents the findings of the impact EM&A reporting month (No. 5) for the Project from **27 January 2003** to **26 February 2003** in accordance with the Environmental Monitoring & Audit (EM&A) Manual.

Environmental Monitoring and Audit Progress

The impact EM&A program was undertaken in accordance with the EM&A manual. A summary of the monitoring activities in this reporting month is listed below:

- 1-Hr TSP Monitoring 15 Events
- 24-Hr TSP Monitoring 5 Events
- Noise Monitoring 9 Events
- Water Quality Monitoring 13 Monitoring Days
- Site Inspection 6 Times
- Waste Management Audit 1 Time
- Ecological Monitoring 0 Occasion

Air Quality

One Trigger-Level Exceedance was recorded on 22 February 2003 for 24-Hr TSP at the designated monitoring location (A1). ET investigation noted that a predominant Northeast wind blew over Hong Kong on that monitoring day. The area of works is located downwind from A1 thus the wind direction did not favour the air quality impact at A1. The ET considered that the dust exceedance was not likely to be due to the works from the Project. An investigation report was submitted to IEC on 5 March 2003.

Construction Noise

All daytime noise measurement results were below the Limit Level.

Water Quality

Two Action-Level Exceedances of Suspended Solids (SS) were recorded on 28 and 29 January 2003 at the downstream Water Sensitive Receiver (W(D1)). The ET investigation concluded that the presence of algal matter for both monitoring occasions was the primary reason causing the SS exceedances at the designated monitoring station W(D1) and unlikely to be due to the works from the Project. An investigation report was submitted to IEC on 18 February 2003.

No exceedance of zinc was recorded in this reporting month.

Summary of Environmental Exceedance

A summary of environmental exceedance for air, noise and water in this reporting period is presented below:

Env. Quality	Parameters	% Compliance	Investigation & Corrective Actions
Air Quality	1-Hr TSP	100%	NA
	24-Hr TSP	80%	ET Investigation Completed- Not Project Related
Noise	Leq (30min) Daytime	100%	NA
Water Quality	Suspended Solids	85%	ET Investigation Completed - Not Project Related
	Total Zinc Level	100%	NA

Ecological Monitoring

No ecological monitoring is required in this reporting month.

Environmental Complaints

No environmental complaint was received in this reporting month.

Environmental Summons

No summon or prosecution related to environmental issue was received in this reporting month.

Site Inspection and Audit

Five environmental site inspections were carried out jointly by the representatives of IEC, the Engineer and the Contractor's environmental staff on 28 January 2003, 4, 11, 21 and 25 February 2003. The ET undertook an additional independent site inspection and waste management audit on 18 February 2003.

Future Key Issues

The construction works of box culvert, pumping station and flood protection wall will continue in coming construction months. It is expected that construction noise, air and water quality impacts will be of particular environmental concern. Key issues to be considered are as follows:

- Noise mitigation measures on works using powered mechanical plants;
- Dust suppression during dry weather conditions particularly along haul roads;
- Discharge of surface runoff from the work site into nearby river systems; and
- Follow-up improvement on waste management.

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1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

Ching Chit Cheung Construction Co., Ltd. (the Contractor) has been awarded the Contract DC/2000/08 from the Drainage Services Department (DSD) to construct the Village Flood Protection Works for Wang Chau, Mai Po Lo Wai and Mai Po San Tsuen and drainage improvement works at Tan Kwai Tsuen (the Project).

Action-United Environmental Services and Consulting (AUES) has been commissioned by the Contractor to implement an environmental monitoring and audit (EM&A) program in compliance with the legal and the contractual requirements of the Project.

The construction works at Mai Po Lo Wai and Mai Po San Tsuen are the section classified as Designated Project governed by the Environmental Permit system. A Further Environmental Permit (FEP-01/088/2002) was issued to the Contractor on 22 Aug 2002. According to Condition 4.0 of the FEP, an Environmental Monitoring and Audit (EM&A) program is required for Mai Po Lo Wai and Mai Po San Tsuen of this Project.

This monthly EM&A report (No. 5) presents the results of EM&A works conducted in the reporting month of February 2003 (from 27 January to 26 February 2003).

1.2 STRUCTURE OF THE MONTHLY EM&A REPORT

The structure of this EM&A report is organized into 14 sections as follows:

Section 1 Introduction

Section 2 Project Activities

Section 3 Status of Environmental Permit

Section 4 Summary of Impact EM&A Activities in February 2003

Section 5 Air Quality Monitoring

Section 6 Noise Monitoring

Section 7 Water Quality Monitoring

Section 8 Waste Management

Section 9 Ecological Monitoring

Section 10 Environmental Complaint and Non-Compliance

Section 11 Site Inspection

Section 12 Implementation Status of Mitigation Measures

Section 13 Forecast and Schedule

Section 14 Conclusion

2.0 PROJECT ACTIVITIES

2.1 CONSTRUCTION WORKS IN FEBRUARY 2003

A summary of the major construction activities undertaken in this reporting month is shown in ***Table 2-1.***

Table 2-1 Major Construction Activities in February 2003

Site Area	Construction	Description of Construction Activities
Wang Chau	Pump House	Backfilling work
		Wall and slab construction
	Control building	Wall and slab construction
	Footway	Trial trench
	U/G storage tank	Base slab, wall, roof construction and driving sheet pile
Mai Po	Pump House	Backfilling
	Box Culvert	Backfilling Work
		Installation of geotextile
		Filling Work (Rock & Granular)
		Steel fixing and formwork
		Base slab, wall & roof construction
	Flood Wall	Backfilling Work
		Infrastructure (including formworks, steel fixing and concreting)
Tan Kwai Tsuen	Drainage Improvement	Sheetpiling and Excavation
		Base slab and wall construction
		Drainage channel (including break wall & slab)

3.0 STATUS OF ENVIRONMENTAL PERMITS

3.1 ENVIRONMENTAL PERMITS

The current status of all environmental permits, licences, and/or notification to EPD for this project as of February 2003 is presented in ***Table 3-1***.

Table 3-1 Summary of the Licence/Permit Status

Item	Item Description	Permit Status
1	Further Environmental Permit, FEP-01/088/2002	Issued to Ching Chit Cheung on 29 July 2002
2	Air Pollution Control (Construction Dust) – Mai Po	Notified EPD on 13 Aug 02
3	Air Pollution Control (Construction Dust) – Wang Chau	Notified EPD on 13 Aug 02
4	Air Pollution Control (Construction Dust) – Tan Kwai Tsuen	Notified EPD on 13 Aug 02
5	Water Pollution Control (Discharge Licence) – Septic Tanks, RE and Contractor's Offices	Issued on 7 February 03
6	Water Pollution Control (Discharge Licence) – Mai Po	Valid (27 Nov 02 – 30 Nov 07)
7	Water Pollution Control (Discharge Licence) – Wang Chau, No.IU366/1	Valid (9 Sep 02 – 30 Sept 07)
8	Noise Control (Percussive Piling) – Wang Chau, PP-TW0037-02	Valid (4 Sep 02 – 3 Jul 03)
9	Noise Control (Percussive Piling) – Tan Kwai Tsuen, PP-TW0038-02	Valid (4 Sep 02 – 31 Jul 03)
10	Chemical Waste Producer Registration – Mai Po WPN: 5113-542-C3234-03	Issued on 18 September 02
11	Chemical Waste Producer Registration – Wang Chau WPN: 5113-528-C3234-01	Issued on 10 October 02
12	Chemical Waste Producer Registration – Tan Kwai Tsuen, WPN: 5211-519-C3234-02	Issued on 3 October 02
13	Marine Dumping – Uncontaminated Mud disposal on South Cheung Chau, EP/MD/03-095	Valid (4 Nov 02 – 3 May 03)
14	Water Pollution Control (Discharge Licence) - Tan Kwai Tsuen	Valid (4 Feb 03 – 31 Jan 08)

4.0 SUMMARY OF EM&A ACTIVITIES IN FEBRUARY 2003

24-Hr and 1-Hr TSP:

Five events of 24-Hr TSP, and 15 events of 1-Hr TSP monitoring work were undertaken at one designated (A1) station during the reporting period.

Noise:

Nine events of construction noise monitoring were undertaken at one designated (N1) station during the reporting period.

Water Quality:

Thirteen events of water quality monitoring were undertaken at two designated (W(U)1 & W(D)1) stations during the report period.

The schedule which details all monitoring activities during the reporting month is presented in ***Table 4-1***.

Table 4-1 EM&A Activities in February 2003

Date of Monitoring		Water Quality Monitoring	Noise Level Monitoring	Air Quality Monitoring	
				24-Hour TSP	1-Hour TSP
27-Jan-03	Mon				
28-Jan-03	Tue	■	■		
29-Jan-03	Wed	■	■		
30-Jan-03	Thu	■		■	■
31-Jan-03	Fri				
1-Feb-03	Sat				
2-Feb-03	Sun				
3-Feb-03	Mon				
4-Feb-03	Tue	■	■		
5-Feb-03	Wed			■	■
6-Feb-03	Thu	■	■		
7-Feb-03	Fri				
8-Feb-03	Sat	■			
9-Feb-03	Sun				
10-Feb-03	Mon				
11-Feb-03	Tue	■	■	■	■
12-Feb-03	Wed				
13-Feb-03	Thu	■	■		
14-Feb-03	Fri				
15-Feb-03	Sat	■			
16-Feb-03	Sun				
17-Feb-03	Mon			■	■
18-Feb-03	Tue	■	■		
19-Feb-03	Wed				
20-Feb-03	Thu	■	■		
21-Feb-03	Fri				
22-Feb-03	Sat	■		■	■
23-Feb-03	Sun				
24-Feb-03	Mon				
25-Feb-03	Tue	■	■		
26-Feb-03	Wed				

Remarks:

Sunday or Public Holiday

■ Monitoring Event

5.0 AIR QUALITY MONITORING

The potential air quality impact arising from the construction is measured in terms of 1-Hr and 24-Hr Total Suspended Particulates (TSP).

5.1 MONITORING EQUIPMENT

24-Hr TSP Monitoring

The impact dust monitoring of 24-Hr TSP was undertaken in accordance with the Code of Federal Regulations Chapter 1 (Part 50) Appendix B. For all monitoring events, the 24-Hr TSP levels were determined by drawing air through a pre-conditioned, pre-weighed glass fiber filter inside a high volume sampler (HVS) at a controlled flow rate for 24 ± 1 hours.

1-Hr TSP Monitoring

The 1-Hr TSP levels were determined by using the 1-Hr TSP portable meter, which is capable of measuring and recording 1-hour time weighted average dust concentration between 0.01 and 100 mg/m^3. ***Table 5-1*** summaries the equipment that was used in the air quality monitoring program.

Table 5-1 Air Quality Monitoring Equipment

Equipment	Model
24-Hr TSP Monitoring	
HVS	Grasby Anderson GMWS 2310 HVS
Calibration Kit	TE-5025A TISCH Orifice
1-Hr TSP Monitoring	
Portable meter	TSI DustTrak Aerosol Monitor

5.2 MONITORING LOCATION

The air quality monitoring location is presented in ***Table 5-2.*** The geographic location of the monitoring station is shown in ***Appendix A***:

Table 5-2 Location of Air Monitoring Station

Monitoring Station	Name of Location	Description
A1	Mai Po Lo Wai	An open area close to a village house

5.3 TRIGGER/ACTION/TARGET LEVELS OF AIR QUALITY

The Trigger/Action/Target (TAT) Levels for air quality monitoring were proposed in the baseline monitoring report. The TAT levels for 24-Hr and 1-Hr TSP monitoring are presented in ***Table 5-3*** **and** ***5-4*** respectively.

Table 5-3 Trigger/Action/Target Levels for 24-Hr TSP Monitoring

Monitoring Station	Name of Location	Trigger Level µg/m^3	Action Level µg/m^3	Target Level µg/m^3
A1	Mai Po Lo Wai	114	187	260

Table 5-4 Trigger/Action/Target Levels for 1-Hr TSP Monitoring

Air Monitoring Stations	Name of Location	Trigger Level µg/m^3	Action Level µg/m^3	Target Level µg/m^3
A1	Mai Po Lo Wai	165	333	500

5.4 MONITORING PROCEDURE AND CALIBRATION DETAILS

Installation

The HVS was placed at the aforesaid location, which was freestanding with no obstruction. The following criteria were considered in the installation of the HVS.

- A horizontal platform with appropriate support to secure the samplers;
- The distance between the sampler and obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
- A minimum of 2 m separation from walls, parapets and penthouses for rooftop samplers;
- A minimum of 2 m separation from any supporting structure measured horizontally;
- No furnace or incinerator flue nearby;
- Unrestricted airflow around the sampler;
- A minimum separation of 20 m from the dripline; and
- Any wire fence and gate to protect the sampler will not cause any obstruction during monitoring.

Preparation of Filter Papers by HOKLAS-accredited laboratory

- Glass-fibre filters, 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%; and
- *ALS Technichem (HK) Pty Ltd* has comprehensive quality assurance and quality control programs for TSP analysis and has attained HOKLAS accreditation for a range of other environmental testing. The certificate for the laboratory is shown in ***Appendix B***.

Field Monitoring

- The power supply was checked to ensure that the HVS worked 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 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;
- Then the shelter lid was closed and 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, 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; and
- Filters were sent to *ALS Technichem (HK) Pty Ltd* for analysis.

Maintenance & Calibration

- The HVSs and their accessories was maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply;
- The HVSs were calibrated at quarterly intervals using TE-5025A TISCH Calibration Kit throughout all stages of the air quality monitoring; and
- The portable dust meter was calibrated by the manufacturer before the instrument was shipped to the site. The zero response of the instrument was checked before and after each monitoring event. The schedule of calibration and/or certificates is provided in ***Appendix C***.

5.5 IMPACT AIR QUALITY MONITORING RESULTS AND AUDITS

The 24-Hr and 1-Hr TSP monitoring at A1 were carried out by the ET. Five measurement events of 24-Hr TSP, and 15 events of 1-Hr TSP monitoring were undertaken in this reporting month. The monitoring data are presented in ***Table 5-5***, and graphical presentations of the monitoring results are provided in ***Appendix D***.

Table 5-5 Impact Air Quality Monitoring Results

Monitoring Date	24-Hr TSP ($\mu g/m^3$)	1-Hr TSP ($\mu g/m^3$)			
		1st Measurement	2nd Measurement	3rd Measurement	Mean
30-Jan-03	101	155	161	152	156
5-Feb-03	52	42	68	59	56
11-Feb-03	93	67	79	55	67
17-Feb-03	84	102	78	84	88
22-Feb-03	**144**	88	110	93	97

One Trigger-Level Exceedance was recorded on 22 February 2003 for 24-Hr TSP at the designated monitoring location (A1). ET investigation noted that a predominant Northeast wind blew over Hong Kong on that monitoring day. The area of works is located downwind from A1 thus the wind direction did not favour the air quality impact at A1. The ET considered that the dust exceedance was not likely to be due to the works from the Project. An ET investigation was submitted on 5 March 2003.

The monitoring schedule for TSP monitoring activities is presented in ***Table 4-1.*** The meteorological data for this month is recorded by the Hong Kong Observatory (HKO) and is presented in ***Appendix F***.

6.0 NOISE MONITORING

6.1 MONITORING EQUIPMENT

An Integrating Sound Level Meter was used for noise monitoring. It is a Type 1 sound level meter 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). It complies with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). A portable electronic wind speed indicator capable of measuring the wind speed in m/s was employed to check the wind speed. ***Table 6-1*** details the noise monitoring equipment used.

Table 6-1 Noise Monitoring Equipment

Equipment	Model
Integrating Sound Level Meter	Rion NL-14
Calibrator	Rion NC-73
Portable Wind Speed Indicator	Testo Anemometer

6.2 MONITORING LOCATION

The noise monitoring was undertaken at one designated monitoring location as shown in ***Table 6-2*** and geographically in ***Appendix A.***

Table 6-2 Location of Noise Monitoring Station

Monitoring stations	Location	ASR	Description
N1	Mai Po Lo Wai	A	Village house - Facing the construction site

ASR refers to Area Sensitivity Rating as defined in the Technical Memorandum under the Noise Control Ordinance.

6.3 TRIGGER/ACTION/TARGET LEVELS OF CONSTRUCTION NOISE

The Trigger/Action/Target (TAT) Levels for noise monitoring were adopted from the baseline monitoring data. ***Table 6-3*** and ***Table 6.4*** presents the established TAT levels for the noise monitoring.

Table 6-3 Trigger / Action Levels for Construction Noise

Time Period		Trigger Level	Action Level
Normal hours	07:00-19:00 hrs on normal weekdays	Receipt of a single documented complaint of construction noise level.	Receipt of more than one documented complaint of construction noise in any two weeks period on the same event or at the same location.
Restricted hours	07:00-23:00 hrs on public holidays; and 19:00-23:00 hrs on all other days		
	23:00-07:00 hrs of next day		

Table 6-4 Target Levels for Construction Noise

Time Period		Target Level
Normal hours	07:00-19:00 hrs on normal weekdays	Leq (30 min) 75 dB(A) Leq (30 min) 70 dB(A) for schools and 65 dB(A) during examination periods.
Restricted hours	07:00-23:00 hrs on public holidays; and 19:00-23:00 hrs on all other days	60 dB(A) for ASR* "A" Areas
	23:00-07:00 hrs of next day	45 dB(A) for ASR* "A" Areas

ASR refers to Area Sensitivity Rating as defined in the Technical Memorandum of Noise Control Ordinance.

6.4 MONITORING PROCEDURE AND CALIBRATION DETAILS

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 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 are more than 1 dB(A), the measurement will be considered invalid and repeat of noise measurement will 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}, L_{90} and L_{10} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- During normal construction working hours (0700-1900 Monday to Saturday), monitoring of $L_{Aeq, 30min}$ noise levels (as six consecutive $L_{Aeq, 5min}$ readings) were carried out.
- Noise measurement was paused during periods of high intrusive noise (e.g. dog barking, human noise or another sources are not come from the construction works) if possible. Observations were recorded when intrusive noise was unavoidable.

Maintenance and Calibration

- The microphone head of the sound level meter and calibrator is cleaned with soft cloth at quarterly intervals.
- The meter was sent to HOKLAS laboratory for calibration at yearly intervals. The schedule of calibration and certificates are provided in ***Appendix C***.

6.5 NOISE MONITORING RESULTS AND AUDITS

The construction noise monitoring was carried out at one designated monitoring station. Nine events were carried out in this reporting month. The noise monitoring results are tabulated in ***Table 6-5*** and graphical presentations of the monitoring results are provided in ***Appendix E***.

Table 6-5 Summary of Construction Noise Monitoring Results

Date	Start Time	End Time	1st Leq5	2nd Leq5	3rd Leq5	4th Leq5	5th Leq5	6th Leq5	Leq(30) dB(A)	Corrected * Leq(30) dB(A)	Target Level
28-Jan-03	14:00	14:30	52.2	52.4	53.1	51.8	52.0	52.5	52.4	55.4	**75.0**
29-Jan-03	14:00	14:30	53.6	52.8	55.4	54.3	55.2	52.6	54.1	57.1	**75.0**
4-Feb-03	14:00	14:30	52.5	53.7	55.0	54.8	53.9	52.7	53.9	56.9	**75.0**
6-Feb-03	14:30	15:00	53.8	51.7	50.0	52.0	51.5	51.6	51.9	54.9	**75.0**
11-Feb-03	14:45	15:15	51.6	56.2	60.6	62.5	63.1	61.6	60.7	63.7	**75.0**
13-Feb-03	13:50	14:20	52.7	51.8	52.2	60.1	61.3	57.5	57.6	60.6	**75.0**
18-Feb-03	13:45	14:15	54.6	55.1	54.4	53.4	54.1	53.7	54.3	57.3	**75.0**
20-Feb-03	13:30	14:00	51.2	53.6	52.8	54.0	52.7	55.3	53.4	56.4	**75.0**
25-Feb-03	14:00	14:30	54.2	51.6	52.0	53.7	55.0	55.7	53.9	56.9	**75.0**

Remark: * Acoustical Correction of +3 dB(A) was made as free field measurements were undertaken.

All noise levels measured at N1 were below the target level. No complaint was received in this reporting month. The monitoring schedule for construction noise monitoring activities is presented in ***Table 4-1.*** The meteorological data of this month recorded by Hong Kong Observatory (HKO) are presented in ***Appendix F***.

7.0 WATER QUALITY MONITORING

7.1 MONITORING EQUIPMENT

The equipment for the water quality monitoring presented in ***Table 7-1***.

Table 7-1 Water Quality Monitoring Equipment

Equipment	Model / Description
Water Depth Detector	Steel Ruler
Water Sampling Equipment	Telfon bailor
Thermometer	YSI Model 55
Sample Container	High density polythene bottles (provided by laboratory)
Storage Container	Cooled box with ice pack

7.2 MONITORING LOCATIONS

Water quality monitoring was undertaken at the two designated locations as shown in ***Table 7-2*** and geographically in ***Appendix A.*** The water samples were analysed for Suspended Solids and Total Zinc.

Table 7-2 Locations of Marine Water Monitoring Stations

Station	Location
W(U)1	Upstream of site - Control Station
W(D)1	Downstream of site - Impact Station

7.3 TRIGGER/ACTION/TARGET LEVELS OF WATER QUALITY

The Trigger/Action/Target (TAT) Levels for water monitoring were proposed in the baseline monitoring report, which is currently pending for endorsement. The TAT levels for the water quality monitoring are presented in ***Table 7-3***.

Table 7-3 Trigger / Action / Target Levels for Water Quality

Parameter	Trigger Level	Action Level	Target Level
Suspended Solids (mg/L)	Trigger Level is exceeded if Suspended Solids (SS) at water sampling station W(D)1 exceeds 203mg/L and 120% of SS level at the upstream control water sampling station W(U)1 at the same monitoring day	Action Level is exceeded if Suspended Solids (SS) at water sampling station W(D)1 exceeds 203mg/L and 130% of SS level at the upstream control water sampling station W(U)1 at the same monitoring day	Target Level is exceeded if SS at water sampling station W(D)1 exceeds 203 mg/L and 130% of the SS level at water sampling station W(U)1 for three consecutive monitoring days.
Total Zinc (ug/L)	Trigger Level is exceeded if Zinc at water sampling station W(D)1 exceeds 145 ug/L, and 120% of zinc level at the upstream control water sampling station W(U)1 at the same monitoring day	Action Level is exceeded if Zinc at water sampling station W(D)1 exceeds 145ug/L and 130% of zinc level at the upstream water sampling station W(U)1 at the same monitoring day	Target Level is exceeded if Zinc at water sampling station W(D)1 exceeds 145ug/L and 130% of zinc level at water sampling station W(U)1 for three consecutive monitoring days.

7.4 MONITORING METHODOLOGY

Sampling

A strain steel ruler was used for the determination of water depth at each designated monitoring station.

As the water column at the monitoring station was less than 1.5 m at the time of sampling, one water sample was taken in the middle of the water column.

Water samples were collected using a telfon bailor and the samples were stored in high-density polythene bottles. Sampling bottles were pre-rinsed with the same water samples. The sample bottles were then packed in cool boxes (cooled at 4 ^{o}C without being frozen), and delivered to *ALS Technichem (HK) Pty Ltd* for analysis of suspended solids and zinc.

The results of the in-situ measurements were recorded on the field data sheets and subsequently input into a computer database for data interpretation.

Laboratory Analysis

All laboratory work was carried out by a local HOKLAS-accredited laboratory. The analyses followed the standard methods according to the APHA Standard Methods for the Examination of Water and Wastewater unless otherwise specified. The analytical methods of the water samples are presented in ***Table 7-4*** below:

Table7-4 Analytical Methods of Water Samples

Determinants	Testing Method	Detection Limit
Suspended Solids	APHA 19ed 2540D	2 mg/L
Zinc	APHA 17ed 3111B	10 ug/L

7.5 WATER MONITORING RESULTS AND AUDITS

There were a total of 13 monitoring days in this reporting month. The monitoring schedule for water quality monitoring activities is presented in ***Table 4-2***. Full set of the impact water monitoring data are presented in ***Appendix G*** and graphically illustrated in ***Appendix H.*** The monitoring results of suspended solids and total zinc are summarized in ***Table 7-5.***

Table 7-5 Summary of Impact Water Quality Monitoring Results

Control Station (Upstream) W(U)1	Suspended Solids (mg/L)	Total Zinc (ug/L)
Mean	10	26
Max	34	74
Min	2	13
Impact Station (Downstream) W(D)1	**Suspended Solids (mg/L)**	**Total Zinc (ug/L)**
Mean	140	42
Max	606	84
Min	24	17

Two Action-Level Exceedances of Suspended Solids (SS) were recorded on 28 and 29 January 2003 at the downstream Water Sensitive Receiver (W(D1)). The ET investigation concluded that the presence of algal matter for both monitoring occasions was the primary reason causing the SS exceedances at the designated monitoring location W(D1) and unlikely to be due to works from the Project. No subsequent SS exceedance was recorded. The ET investigation report was submitted on 18 February 2003.

All Zinc levels measured at the impact station W(D)1 in this report month were below the Trigger/Action/Target Levels. The laboratory testing results are presented in ***Table 7-6***.

Table 7-6 Laboratory Testing Results of Suspended Solids and Total Zinc.

Monitoring Date	Suspended Solids(mg/L)		Zinc(ug/L)	
	W(D)1	W(U)1	W(D)1	W(U)1
28-Jan-03	599	3	78	21
29-Jan-03	606	22	84	20
30-Jan-03	67	2	25	17
04-Feb-03	101	4	53	22
06-Feb-03	98	4	56	26
08-Feb-03	41	10	26	25
11-Feb-03	32	20	36	47
13-Feb-03	52	3	31	16
15-Feb-03	27	7	18	18
18-Feb-03	24	34	17	74
20-Feb-03	41	12	28	13
22-Feb-03	43	12	20	20
25-Feb-03	84	3	75	19

8.0 WASTE MANAGEMENT

The ET carried out a waste management audit on 18 February 2003. A summary of the waste audit findings and follow up actions are presented in ***Table 8-1***. The audit findings are presented in ***Appendix K*** and some observations are noted as follows:

ET's Waste Audit Findings*:*

- Dumping permits for contaminated and uncontaminated materials were valid;
- Trip ticket records of waste disposal were taken;
- The generator and chemical drums/containers should be provided with a drip tray; and
- Waste skips should be provided onsite to collect waste when necessary.

Table 8-1 Summary of Waste Audit Findings and Follow Up Action

Item	Aspects	Key Audit Findings	Date Observed
Site Observation			
1	Waste	Temporary refuse area was observed onsite. Refuse should be cleared regularly.	28 January 2003
Follow Up Action			
1	Waste	Temporary refuse observed on 28 January 2003 was not observed during 4 Feb 2003 Inspection	

Records of Waste Quantities

All type of wastes arising from the construction work are classified into the following

- Excavated material;
- Construction & demolition (C&D) material;
- Chemical waste; and
- Dredged materials.

The quantities of waste for disposal in this reporting month are summarized in ***Table 8-2.***

Table 8-2 Summary of Quantities of Waste for Disposal

Type of Waste	Quantity	Disposal Location
Excavated Material (Contaminated) (m^3)	Nil	From Mai Po site to East Sha Chau
Excavated Material (Uncontaminated) (m^3)	2305	From Mai Po site to South Cheung Chau
Soil Material from Wang Chau (m^3)	5	WENT
Soil Material from Tan Kwai Tsuen (m^3)	155	WENT
Construction & Demolition Material (Inert) (m^3)	Nil	NA
Construction & Demolition Material (Non-inert) (m^3)	Nil	NA
Chemical Waste (m^3)	Nil	NA

9.0 ECOLOGICAL MONITORING

The ecological assessment reported in the EIA recommended ecological monitoring and audit to be carried out.

9.1 MONITORING PARAMETERS AND FREQUENCY

The monitoring of the egretry is carried out during the construction phase of the project to identify and evaluate any impacts from the new channel construction. Annual counts and species identification of nesting birds is conducted during the nesting season from April through to July. Nest productivity is estimated from sample numbers of eggs and chicks in nests at each egretry. The nest occupancy and productivity is then determined based on 4 counts at each egretry conducted between 1 April and 31 July. Trends in numbers and species representation at egretries is assessed for any indications of adverse impacts from channel construction. The monitoring results are reported in the relevant monthly report.

9.2 MONITORING LOCATION

The monitoring location of the egretry is at Mai Po Lo Wai and Mai Po San Tsuen in accordance with the EM&A Manual.

9.3 ECOLOGICAL MONITORING AND AUDIT

In accordance with the EIA and EM&A Manual, the monitoring consists of annual counts during the nesting season from April to July every year. No monitoring was required in this reporting month.

10.0 ENVIRONMENTAL NON-COMPLIANCE AND COMPLAINT

10.1 ENVIRONMENTAL COMPLIANCE REQUIREMENT

Should there be any monitoring exceedance of TAT Levels, the Event and Action Plan (EAP) would be followed. The EAP is as outlined in the EM&A Manual.

SUMMARY OF MONITORING EXCEEDANCES

Air Quality Monitoring

One Trigger-Level Exceedance was recorded on 22 February 2003 for 24-Hr TSP at the designated monitoring location (A1). ET investigation noted that a predominant Northeast wind blew over Hong Kong on that monitoring day. The area of works is located downwind from A1 thus the wind direction did not favour the air quality impact at A1. The ET considered that the dust exceedance was not likely to be due to the works from the Project. An investigation report was submitted on 5 March 2003.

Construction Noise Monitoring

No exceedance on construction noise was recorded this month.

Water Quality Monitoring

Two Action-Level Exceedances of Suspended Solids (SS) were recorded on 28 and 29 January 2003 at the downstream Water Sensitive Receiver (W(D1)). The ET investigation concluded that the presence of algal matter for both monitoring occasions was the primary reason causing the SS exceedances at the designated monitoring schedule W(D1) and unlikely to be due to works from the Project. An investigation report was submitted on 18 February 2003. All Total zinc levels recorded in this reporting month were well below the TAT Levels.

10.3 SUMMARY OF ENVIRONMENTAL COMPLAINTS

No environmental complaint was received in this reporting month. A statistical summary of environmental complaints since project commencement is presented in ***Table 10-1***.

Table 10-1 Statistical Summary of Environmental Complaints

Reporting Month	Complaint Statistics		
	Frequency	Cumulative	Complaint Nature
September 2002	0	0	NA
October 2002	0	0	NA
November 2002	0	0	NA
December 2002	0	0	NA
January 2003	0	0	NA
February 2003	0	0	NA

10.4 ENVIRONMENTAL SUMMONS

No summon was received in this reporting month. A statistical summary of legal proceedings since project commencement is presented in ***Table 10-2***.

Table 10-2 Statistical Summary of Environmental Summons

Reporting Month	Summon Statistics		
	Frequency	Cumulative	Nature of Summons
September 2002	0	0	NA
October 2002	0	0	NA
November 2002	0	0	NA
December 2002	0	0	NA
January 2003	0	0	NA
February 2003	0	0	NA

11.0 SITE INSPECTION

Five environmental site inspections were carried out jointly by the representatives of IEC, the Engineer and the Contractor's environmental staff on 28 January 2003, 4, 11, 21 and 25 February 2003. The ET undertook an additional independent site inspection and waste management audit on 18 February 2003. A summary of the site inspection findings and the follow up actions are presented in ***Table 11-1***. Details of the ET's waste management audit is presented in ***Appendix K.***

Table 11-1 Summary of Site Inspection Findings and Follow Up Action

Item	Aspects	Key Audit Findings	Date Observed
Site Observation			
1	Waste	Temporary refuse area was observed onsite. Refuse should be cleared regularly.	28 January 2003
2	Air	Stockpiles were not covered or wetted during dry weather.	4 February 2003
3	Water	Areas along side surface water channels had a lot of loose soil.	4 February 2003
4	Water	Water Logged areas around the wheel wash area.	4 February 2003
5	Water	Stockpiles were not covered in rainy weather.	11 February 2003
6	Air	Dusty Conditions during unloading and loading.	18 February 2003
7	Air	Dusty Conditions on haul roads.	21 February 2003
8	Air	Dusty Conditions on haul roads.	25 February 2003
Follow Up Action On Above Observation Points			
1	Waste	Temporary refuse observed on 28 January 2003 had been cleared.	
2	Air	Increase watering on stockpiles.	
3	Water	Area around surface channel has been compacted.	
4	Water	Water logged areas around wheel wash has been flattened out.	
5	Water	Stockpiles will be covered before the rainy season starts.	
6	Air	Increase watering on stockpiles.	
7	Air	Increase watering on haul roads.	
8	Air	Increase watering on haul roads.	

12.0 IMPLEMENTATION STATUS OF MITIGATION MEASURES

The Contractor has been implementing the required environmental mitigation measures according to the tentative Environmental Mitigation Implementation Schedule. A summary of the implementation status of the mitigation measures is presented in ***Appendix I***.

13.0 IMPACT FORECAST AND MONITORING SCHEDULE FOR FEBRUARY 2003

13.1 KEY ISSUES FOR THE COMING MONTH

The excavation and construction works of a box culvert, pump house and flood wall will continue in the coming construction month. It is expected that potential dust, noise and water quality impact will be of particular concern. Key issues to be considered in the coming month include:

- Construction noise impact due to construction works at Mai Po Lo Wai and Mai Po San Tsuen;
- Air quality impact due to vehicle movement and loading and unloading of stockpiles;
- Waste water impact due to construction works below ground level;
- Management of chemical wastes; and
- Follow-up of improvement on general waste management issues.

13.2 UPCOMING EM&A SCHEDULE IN MARCH 2003

The EM&A schedules for the coming reporting month is presented as follows:

Table 13-1 Upcoming EM&A Schedule in March 2003

Date of Monitoring		Water Quality Monitoring	Noise Level Monitoring	Air Quality Monitoring		Ecological Monitoring
				24-Hour TSP	1-Hour TSP	
27-Feb-03	Thu	■	■			
28-Feb-03	Fri	■		■	■	
1-Mar-03	Sat					
2-Mar-03	Sun					
3-Mar-03	Mon					
4-Mar-03	Tue	■	■			
5-Mar-03	Wed	■				
6-Mar-03	Thu	■	■	■	■	
7-Mar-03	Fri					
8-Mar-03	Sat					
9-Mar-03	Sun					
10-Mar-03	Mon					
11-Mar-03	Tue	■	■			
12-Mar-03	Wed	■		■	■	
13-Mar-03	Thu	■	■			
14-Mar-03	Fri					
15-Mar-03	Sat					
16-Mar-03	Sun					
17-Mar-03	Mon					
18-Mar-03	Tue	■	■	■	■	
19-Mar-03	Wed	■				
20-Mar-03	Thu	■	■			
21-Mar-03	Fri					
22-Mar-03	Sat					
23-Mar-03	Sun					
24-Mar-03	Mon			■	■	
25-Mar-03	Tue	■	■			
26-Mar-03	Wed					

Remarks:

■ Sunday or Public Holiday
■ Monitoring Event

13.3 CONSTRUCTION WORKS FOR THE 3 MONTHS ROLLING PROGRAM

The construction works for the 3 months rolling program is included in ***Appendix J.***

14.0 CONCLUSIONS AND RECOMMENDATIONS

The EM&A program in February 2003 was undertaken in accordance with the EM&A manual. A summary of environmental compliances for air, noise and water quality in this reporting month is presented as follows:

Summary of Environmental Compliance

Env. Quality	Parameters	Compliance %	Investigation & Corrective Actions
Air Quality	1-Hr TSP	100	Not Required for 100% compliance
	24-Hr TSP	80	ET Investigation Completed
Noise	Leq (30min)	100	Not Required for 100% compliance
Water Quality	Suspended Solids	85	ET Investigation Completed
	Total Zinc	100	Not Required for 100% compliance

Air Quality Monitoring

One Trigger-Level Exceedance was recorded on 22 February 2003 for 24-Hr TSP at the designated monitoring location (A1). ET investigation noted that a predominant Northeast wind blew over Hong Kong on that monitoring day. The area of works is located downwind from A1 thus the wind direction did not favour the air quality impact at A1. The ET considered that the dust exceedance was not likely to be due to the works from the Project. An investigation report was submitted to IEC on 5 March 2003. A summary of the TSP exceedance is presented in ***Appendix L***.

All 1-Hr TSP were well below the TAT Levels. No exceedance was recorded in this reporting month.

Construction Noise Monitoring

All noise levels measured at N1 were below the target level. No complaint was received in this reporting month.

Water Quality Monitoring

Two Action-Level Exceedances of Suspended Solids (SS) were recorded on 28 and 29 January 2003 at the downstream Water Sensitive Receiver (W(D1)). The ET investigation concluded that the presence of algal matter for both monitoring occasions was the primary reason causing the SS exceedances at the designated monitoring schedule W(D1) and unlikely to be due to works from the Project. An investigation report was submitted to IEC on 18 February 2003. A summary of the SS exceedances is presented in ***Appendix L***.

All total zinc measured in this reporting month was below the TAT Levels and no exceedance was recorded.

Ecology

No monitoring was required in this reporting month.

Environmental Complaint/Summons

No environmental complaint or summon was received during the reporting month.

Recommendations

Based on the site inspection records, the following key recommendations are pertinent:

- Noise barrier and mitigation measures should be implemented as necessary;
- Silt removal facilities should be provided for site runoff;
- Increase frequency of water spraying along haul roads;
- Keep surface water channels clean from silt;
- Chemical drums should be provided with drip trays; and
- Exposed slopes should be protected to prevent dust generation.

The ET will keep track on the EM&A program to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.