PROJECT NO.: TCS/00116/03/600/R0526
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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 – OCTOBER 2003 (REVISION B)

PREPARED FOR
CHING CHIT CHEUNG CONSTRUCTION CO., LIMITED

Quality Index

Date	Reference No.	Prepared by	Approved By
14 November 2003	TCS/00116/03/600/R0526	Kin Hoo Ho (Environmental Consultant)	Cliff Lam (Environmental Team Leader)

Ove Arup & Partners
奧雅納工程顧問

Our ref 23597/L049/ST/fl
Date 14 November 2003

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Engineer's Representative
Drainage Services Department
Drainage Projects Division
45/F Revenue Tower
Wan Chai, Hong Kong

Attn: Mr Cheng Pan

By Fax & By Post
Fax No 2827 8700

Dear Sir,

Agreement No DP 01/2002
Hire of Services for an Independent Environmental Checker for 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
Verification of EM&A Report for October 2003 (Revision B)

We refer to ET's fax dated 14 November 2003 (ref: TCS/00116/03/300/F0553) regarding the captioned subject.

We hereby verify that the captioned report shall be submitted to the EPD in accordance with the requirement as stipulated in the FEP.

If you require any further information, please do not hesitate to contact the undersigned or our Mr Fredrick Leong at 2268 3639.

Yours sincerely,

Sam Tsoi
Independent Environmental Checker

cc AUES – Mr TW Tam (by fax only: 2959 6079)
CCC – Mr Wayne Kee (by fax only: 2482 4746)

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. 13) for the Project from **27 September 2003** to **26 October 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 6 Events
- Noise Monitoring 8 Events
- Water Quality Monitoring 12 Monitoring Days
- Site Inspection 4 Times
- Waste Management Audit 1 Time
- Ecological Monitoring 0 Occasion

Air Quality

Two 24-hour TSP Trigger-level and one 24-hour TSP Action-level exceedances were recorded on 15, 21 and 25 October 2003. On all three occasions no increase in construction activity were noted and the area of works on the days of exceedances were located downwind from the air monitoring station. The ET concludes that the exceedances are unlikely to be works related and reminded the contractor to fully implement dust mitigation measures particularly during dry weather. The IEC has not verified the investigation report submitted by the ET and considers that the handling of large stockpiles onsite is a major dust source. The contractor has agreed to increase watering of active stockpiles.

No exceedance in 1-Hr TSP was recorded during this reporting month.

Construction Noise

All daytime noise measurement results were below the Limit Level.

Water Quality

No exceedance in water quality 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	Not Required for 100% compliance
	24-Hr TSP	50	ET Investigation Completed#
Noise	Leq (30min) Daytime	100	Not Required for 100% compliance
Water Quality	Suspended Solids	100	Not Required for 100% compliance
	Total Zinc Level	100	Not Required for 100% compliance

 # Details of the monitoring exceedances recorded by the ET are presented in ***Appendix M****.*

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

Four environmental site inspections were carried out jointly by the representatives of IEC, the Engineer and the Contractor's environmental staff on 2, 8, 16 and 22 October 2003. The ET undertook an additional independent site inspection and waste management audit on 16 October 2003.

Future Key Issues

The construction works of the box culvert, the pumping station and the flood protection wall will continue in the 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 the coming dry weather conditions particularly along haul roads;
- Discharge of surface runoff from the work site into nearby river systems;
- Follow-up improvement on waste management; and
- Any stockpiles onsite should follow the environmental mitigation implementation schedule.

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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. 13) presents the results of EM&A works conducted in the reporting month of October 2003 (from 27 September to 26 October 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 October 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 OCTOBER 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 October 2003

Site Area	Construction	Description of Construction Activities
Wang Chau	Pump House	Wall and slab construction
	Control building	Wall and slab construction, remove sheetpile
	Outlet main	Construction works
	U/G storage tank	Backfill Work
	Box Culvert	Relocate Manhole
	Boundary Wall	Construction works
Mai Po	Pump House	Base Slab Construction
	Box Culvert	Backfilling Work
		Steel fixing and formwork
		Base slab, wall & roof construction
	Flood Wall	Backfilling Work
		Infrastructure (including formworks, steel fixing and concreting)
	Retaining Wall	Construction Works
	Rectangular Channel	Construction Works
	Storage Pond	Construction of Toe Block
		Backfilling work
	Low Flow Chamber	Construction Works
Tan Kwai Tsuen	Drainage Improvement	Sheet piling and Excavation
		Base slab and wall construction
		Drainage channel (including break wall & slab)
		Filling work (Granular)
		BC1 & BC3 Construction

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 October 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 No.IS38N/1	Issued on 7 February 03
6	Water Pollution Control (Discharge Licence) – Mai Po No.IS39/1	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	Marine Dumping (South Cheung Chau) – Uncontaminated Mud - Mai Po Lo Wai & Mai Po San Tsuen, EP/MD/04-036	Valid (4 Aug 03 – 3 Feb 04)
9	Chemical Waste Producer Registration – Mai Po WPN: 5113-542-C3234-03	Issued on 23 October 02
10	Chemical Waste Producer Registration – Wang Chau WPN: 5113-528-C3234-01	Issued on 10 October 02
11	Chemical Waste Producer Registration – Tan Kwai Tsuen, WPN: 5211-519-C3234-02	Issued on 3 October 02
12	Water Pollution Control (Discharge Licence) - Tan Kwai Tsuen No.IT301/1	Valid (4 Feb 03 – 31 Jan 08)

4.0 SUMMARY OF EM&A ACTIVITIES IN OCTOBER 2003

24-Hr and 1-Hr TSP:

Six 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:

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

Water Quality:

Twelve water quality monitoring days were undertaken at two designated (W(U)1 & W(D)1) stations during the reporting 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 October 2003

Date of Monitoring		Water Quality	Noise (Leq30)	Air Quality (1-Hr and 24-Hr)	Site Inspection
27-Sep-03	Sat				
28-Sep-03	Sun				
29-Sep-03	Mon				
30-Sep-03	Tue				
1-Oct-03	Wed				
2-Oct-03	Thu				
3-Oct-03	Fri				
4-Oct-03	Sat				
5-Oct-03	Sun				
6-Oct-03	Mon				
7-Oct-03	Tue				
8-Oct-03	Wed				
9-Oct-03	Thu				
10-Oct-03	Fri				
11-Oct-03	Sat				
12-Oct-03	Sun				
13-Oct-03	Mon				
14-Oct-03	Tue				
15-Oct-03	Wed				
16-Oct-03	Thu				
17-Oct-03	Fri				
18-Oct-03	Sat				
19-Oct-03	Sun				
20-Oct-03	Mon				
21-Oct-03	Tue				
22-Oct-03	Wed				
23-Oct-03	Thu				
24-Oct-03	Fri				
25-Oct-03	Sat			**24-Hr TSP***	
26-Oct-03	Sun				

**** Additional monitoring date***

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 mg/m^3	Action Level mg/m^3	Target Level mg/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 mg/m³	Action Level mg/m³	Target Level mg/m³
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 drip line; 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 routinely replacing motor brushes 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. Six 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 (ug/m^3)	1-Hr TSP (mg/hr)			
		1st TSP Measurement	2nd TSP Measurement	3rd TSP Measurement	1-Hr TSP Mean
29-Sep-03	**53**	146	151	162	153
3-Oct-03	**68**	162	153	135	150
9-Oct-03	**43**	154	140	160	151
15-Oct-03	**176**	133	124	140	132
21-Oct-03	**162**	84	97	112	98
25-Oct-03	**213**	-	-	-	-

Two 24-hour TSP Trigger-level and one 24-hour TSP Action-level exceedances were recorded on 15, 21 and 25 October 2003. On all three occasions no increase in construction activity were noted and the area of works on the days of exceedances were located downwind from the air monitoring station. The ET concludes that the exceedances are unlikely to be works related and reminded the contractor to fully implement dust mitigation measures particularly during dry weather. The IEC has not verified the investigation report submitted by the ET and considers that the handling of large stockpiles onsite is a major dust source. The contractor has agreed to increase watering of active stockpiles.

All 1-Hr TSP levels measured at A1 were below the TAT levels. 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 a 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. Ten monitoring days 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
30-Sep-03	17:58	18:28	48.7	46.2	60.8	51.3	48.8	46.6	54.2	**57.2**	75.0
2-Oct-03	14:29	14:59	45.7	46.8	50.4	47.8	48.0	48.4	48.1	**51.1**	75.0
7-Oct-03	17:00	17:30	46.4	48.2	50.8	49.7	47.7	49.7	49.0	**52.0**	75.0
9-Oct-03	18:10	18:40	55.5	48.4	48.0	48.6	49.9	48.0	50.8	**53.8**	75.0
14-Oct-03	13:20	13:50	44.1	45.0	46.9	47.4	45.6	43.7	45.7	**48.7**	75.0
16-Oct-03	16:00	16:30	47.5	48.8	50.6	51.3	49.5	47.5	49.4	**52.4**	75.0
21-Oct-03	17:20	17:50	53.0	55.0	53.6	53.2	50.8	50.6	53.0	**56.0**	75.0
23-Oct-03	16:10	16:40	47.5	48.8	50.6	51.3	49.5	47.5	49.4	**52.4**	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 construction noise monitoring schedule is presented in ***Table 4-1.*** The meteorological data for this month, recorded by HKO is 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. The TAT levels for 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°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 inputted 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 12 water monitoring days in this reporting month. The monitoring schedule for water quality monitoring is presented in ***Table 4-2***. A full set of the impact water monitoring data is 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*** below.

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	5	18
Max	15	23
Min	3	15
Impact Station (Downstream) W(D)1	**Suspended Solids (mg/L)**	**Total Zinc (ug/L)**
Mean	48	35
Max	164	84
Min	10	13

No exceedance in water quality (Suspended Solids and Zinc) was recorded in this reporting month.

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(U)1	W(D)1	W(U)1	W(D)1
29 September 03	6	17	58	44
2 October 03	4	16	35	42
3 October 03	7	21	164	84
7 October 03	4	19	26	26
8 October 03	3	15	19	20
9 October 03	15	23	29	22
14 October 03	6	20	10	13
15 October 03	5	16	22	18
16 October 03	5	21	47	37
21 October 03	6	16	116	79
22 October 03	3	15	26	18
23 October 03	3	15	27	17

Remark: Results for each location and parameter are the average of 2 samples with one being a 2nd sample at the same location.

8.0 WASTE MANAGEMENT

The ET carried out a waste management audit on 16 October 2003. A summary of the waste audit findings and follow up actions are presented in ***Table 8-1***. The waste audit findings are presented in ***Appendix L*** and some observations are noted as follows:

ET's Waste Audit Findings*:*

- Dumping permit for uncontaminated materials was valid;
- Trip ticket records of any waste disposal were taken;
- Any generator and chemical drums/containers should be provided with a drip tray; and
- Waste skips should be provided onsite to collect waste when necessary and to improve house keeping.

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

Item	Aspects	Key Audit Findings	Date Observed
Site Observation			
1	Waste	No waste issues observed at Wang Chau, Mai Po or Tan Kwai Tsuen in this reporting month	16 October 2003
Follow Up Action			
1	Waste	N/A	

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)	Nil	From Mai Po site to South Cheung Chau
Soil Material from Wang Chau (m^3)	Nil	WENT
Soil Material from Tan Kwai Tsuen (m^3)	190	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 village flood protection works. Annual counts and species identification of nesting birds are 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 are 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 MONITORING METHODOLOGY

A combined monitoring methodology is used consisting of nest counting from a distance which determines the nesting population of the study area and egg counting / hatching which determines the breeding success of the egrets. Little Egrets are the target species of this monitoring exercise as they accounted for 40% of the total nests in the Mai Po Village Egretry in 2002. A maximum of 30 Little Egret nests will be studied and where possible the breeding success of other nesting ardeids would also be monitored.

Nests are to be tagged with a red ribbon and marked with a numbered plastic label. Each nest is visited on average once a month with the main focus being on the peak-breeding season. The first and second surveys are aimed at investigating clutch size and hatching success. Sufficient time (about 21 days) will be given to allow the eggs to hatch so that the hatching success of the eggs can be estimated. A mirror attached to a pole will be used to view nests high from the ground. A digital camera is used to record contents of each nest during every visit.

The hatching success of a tagged nest is defined as the number of chicks hatched divided by the clutch size. The clutch size is determined as the total number of eggs present before hatching occurs in the monitoring sample under study. Those nests where re-visits are not possible due to the loss of tags or labels will not be considered in the estimation of clutch size and hatching success.

Monitoring Equipment

The main equipment used for the breeding success monitoring and the nesting population count is presented as follows:

Table 9-1 Ecological Monitoring Equipment

Equipment	Model
Binoculars	Leica 10x42
Digital Camera	Leica Digilux 4.3

Ecological Monitoring and audit

Ecological monitoring at the Mai Po Village egretry is done during the breeding season of the egrets at the start of April until the end July.

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

Two 24-hour TSP Trigger-level and one 24-hour TSP Action-level exceedances were recorded on 15, 21 and 25 October 2003. On all three occasions no increase in construction activity were noted and the area of works on the days of exceedances were located downwind from the air monitoring station. The ET concludes that the exceedances are unlikely to be works related and reminded the contractor to fully implement dust mitigation measures particularly during dry weather. The IEC has not verified the investigation report submitted by the ET and considers that the handling of large stockpiles onsite is a major dust source. The contractor has agreed to increase watering of active stockpiles.

Construction Noise Monitoring

No exceedance on construction noise was recorded this month.

Water Quality Monitoring

No exceedance in water quality was recorded in this reporting month.

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	N/A
October 2002	0	0	N/A
November 2002	0	0	N/A
December 2002	0	0	N/A
January 2003	0	0	N/A
February 2003	0	0	N/A
March 2003	0	0	N/A
April 2003	0	0	N/A
May 2003	0	0	N/A
June 2003	0	0	N/A
July 2003	0	0	N/A
August 2003	0	0	N/A
September 2003	0	0	N/A
October 2003	0	0	N/A

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	N/A
October 2002	0	0	N/A
November 2002	0	0	N/A
December 2002	0	0	N/A
January 2003	0	0	N/A
February 2003	0	0	N/A
March 2003	0	0	N/A
April 2003	0	0	N/A
May 2003	0	0	N/A
June 2003	0	0	N/A
July 2003	0	0	N/A
August 2003	0	0	N/A
September 2003	0	0	N/A
October 2003	0	0	N/A

11.0 SITE INSPECTION

Four environmental site inspections were carried out jointly by the representatives of IEC, the Engineer and the Contractor's environmental staff on 2, 8, 16 and 22 October 2003. The ET joined the site inspection on 16 October 2003.

A summary of the site inspection findings and the follow up actions are presented in ***Table 11-1*** *and* ***Appendix K***.

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

Item	Aspects	Key Audit Findings	Date Observed
Site Observation			
1	Water	The sedimentation trap was full of silt and sediment.	2-Oct-03
2	Air	Unpaved road surfaces were dry.	2-Oct-03
3	Waste	Oil drums (diesel) observed without drip trays.	2-Oct-03
4	Air	Exposed slope needs to covered by tarpaulin	2-Oct-03
5	Water	The sedimentation trap was full of silt and sediment.	8-Oct-03
6	Air	Ineffective dust suppression measures	8-Oct-03
7	Water	Silt observed in river channel	22 Oct 03
8	Water	Muddy water in wheel wash bay observed	22 Oct 03
Follow Up Action On Above Observation Points			
1	Water	Contractor agreed to improve maintenance work of the drainage system.	
2	Air	Watering on haul roads is continuing.	
3	Waste	Drip tray has been provided.	
4	Air	Stockpile will be watered.	
5	Water	The sedimentation trap was cleaned by the 16 October 03 site inspection.	
6	Air	Increase watering in areas of dust generation.	
7	Water	Improvement in progress.	
8	Water	Water in wheel wash bay is changed regularly.	

12.0 IMPLEMENTATION STATUS OF MITIGATION MEASURES

The Contractor has been implementing the required environmental mitigation measures according to the 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 NOVEMBER 2003

13.1 KEY ISSUES FOR THE COMING MONTH

The construction works of the box culvert, the pumping station and the flood protection wall will continue in the coming construction months. Construction noise, air and water quality impacts is expected to generate potential environmental concern and the key issues to be considered in the coming month will include:

- Noise impact from the excavation and formwork of the loading platform, low flow pumping chamber, box culvert and access ramp at Mai Po Lo Wai and Mai Po San Tsuen;
- Air quality impact from vehicle movement, loading and unloading of stockpiles, and backfilling work of the storage pond, flood wall and box culvert;
- Impact from surface runoff due to excavated areas;
- Management of chemical waste; and
- Follow-up of improvement on general waste management issues.

13.2 UPCOMING EM&A SCHEDULE IN OCTOBER 2003

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

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

Date of Monitoring		Water Quality	Noise (Leq30)	Air Quality (1-Hr and 24-Hr)	Site Inspection
27-Oct-03	Mon			■	
28-Oct-03	Tue	■	■		
29-Oct-03	Wed	■			
30-Oct-03	Thu	■	■		
31-Oct-03	Fri				
1-Nov-03	Sat			■	
2-Nov-03	Sun				
3-Nov-03	Mon				
4-Nov-03	Tue	■	■		
5-Nov-03	Wed	■			
6-Nov-03	Thu	■	■		
7-Nov-03	Fri			■	
8-Nov-03	Sat				
9-Nov-03	Sun				
10-Nov-03	Mon				
11-Nov-03	Tue	■	■		
12-Nov-03	Wed	■			
13-Nov-03	Thu	■	■	■	
14-Nov-03	Fri				
15-Nov-03	Sat				
16-Nov-03	Sun				
17-Nov-03	Mon				
18-Nov-03	Tue	■	■		
19-Nov-03	Wed	■		■	
20-Nov-03	Thu	■	■		■
21-Nov-03	Fri				
22-Nov-03	Sat				
23-Nov-03	Sun				
24-Nov-03	Mon				
25-Nov-03	Tue	■	■	■	
26-Nov-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 October 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	50	ET Investigation Completed#
Noise	Leq (30min)	100	Not Required for 100% compliance
Water Quality	Suspended Solids	100	Not Required for 100% compliance
	Total Zinc Level	100	Not Required for 100% compliance

 # Details of the monitoring exceedances recorded by the ET are presented in ***Appendix M****.*

Air Quality Monitoring

Two 24-hour TSP Trigger-level and one 24-hour TSP Action-level exceedances were recorded on 15, 21 and 25 October 2003. On all three occasions no increase in construction activity were noted and the area of works on the days of exceedances were located downwind from the air monitoring station. The ET concludes that the exceedances are unlikely to be works related and reminded the contractor to fully implement dust mitigation measures particularly during dry weather. The IEC has not verified the investigation report submitted by the ET and considers that the handling of large stockpiles onsite is a major dust source. The contractor has agreed to increase watering of active stockpiles.

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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

No exceedance in water quality impact was recorded this reporting month.

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 regularly maintained;
- Increase frequency of water spraying along haul roads;
- Stockpiles should be watered or covered with impervious sheets;
- Keep surface water channels clean from silt; 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.