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MateriaLab

Drainage Services Department, Contract No. DC/2006/01
Drainage Improvement Works in Sai Kung

Environmental Monitoring and Audit Report
for
July 2007

Client: Sum Kee Construction Limited

MateriaLab Ref. No. : 075117EN70481

Prepared by : Clarence Chu

Checked by : John Ho

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1. Executive Summary

The requisite construction works for the Drainage Services Department Contract No. DC/2006/01 Drainage Improvement Works in Sai Kung has commenced constructional activity. It was of main concern to ascertain if there was any undesirable effect of the construction activities on the air quality, noise level and water quality over the construction site and on nearby designated sensitive receivers. Impact environmental monitoring on noise level was undertaken throughout this review period to acquire data for accessing any potential impact associated with the construction activities on the environment.

Air Quality

Ad hoc air quality monitoring at the project site will only be conducted by ET when instructed by the ER/IC(E) or on receipt of complaint. Nonetheless, the Contractor is advised to maintain the deployment of dust mitigation measures to minimize potential impacts from constructional works to a minimum, which include frequent water spraying at dust generation areas.

Noise Level

Noise level monitoring at the project site was conducted on 31st July 2007 during this reporting period. Monitoring comprising of one set of L_{10}, L_{90} and Leq(30min) measurements was undertaken on each weekday monitoring date.

In this review month, no non-compliance event was recorded. Construction sourced activity was not considered influencing any nuisance impact to the sensitive receivers. The noise emanating from vehicular road traffic was found to be the major influential factor dominating the environment.

Water Quality

The water quality monitoring comprising monitoring of dissolved oxygen level, dissolved oxygen saturation, water temperature, turbidity, suspended solids and pH were conducted on two days per week in the first three months at four downstream monitoring stations (W2,W3, W5 and W7). In this review month, monitoring works was suspended as normal construction works were not yet commenced.

Complaints

As far as the complaint on the construction work in respect of environmental protection and pollution control was concerned, there were no complaints received during this review session.

Waste Management

For dealing with wastes generated at the site, the contractor has been advised to follow the guideline in Appendix 2.

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Impact Prediction Review

Construction activities of site clearance and trees transplant will proceed in August 2007. It is forecasted that these works may impose slight degree of air and noise impact on the sensitive receivers. The Contractor was hence advised to implement necessary mitigation measures and effective surveillance program so as to prevent deterioration of the existing environment.

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2. Introduction

This monthly report reviews the progress of the environmental monitoring and audit work associated with the construction works for contract number DC/2006/01 Drainage Improvement Works in Sai Kung for July 2007 and forecasts the activities for August 2007. The monitoring results for noise parameter along with their graphical plots are shown in Appendix 4 and Appendix 5 respectively.

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3. General Review

3.1 Background

The Drainage Services Department (DSD) of the Hong Kong Special Administrative Region Government has commissioned the drainage improvement works in Sai Kung under Contract No. DC/2006/01.

The location of the project site is shown in Figure 1.1of Appendix 8.

The project commence in July 2007 with the duration of the contract for the civil works approximately 24 months and scheduled for completion in July 2009.

The Contract for the construction works under Contract No. DC/2006/01 was awarded to Sum Kee Construction Limited.

MateriaLab Division of Fugro Technical Services Limited, was requested by Sum Kee Construction Limited to carry out the environmental monitoring and audit (EM&A) in connection with the project works.

The major works items under this contract comprise the following:

(A) Sai Kung River and Sha Ha Culvert :

(i) Construction of approximately 150m long of trapezoidal using gabion lining with planting pits and natural substrates and rip-rap bedding; and
(ii) Construction of approximately 280m long three cells 3m x 3m culvert to connect sai Kung River to the downstream box culvert.

(B) Ho Chung Channel :

(i) Construction of approximately 300m long of trapezoidal using gabion lining with planting pits and natural substrates and rip-rap bedding; and
(ii) Construction of approximately 350m long of rectangular channel by bored pile with natural substrates and rip-rap bedding; and
(iii) Reprovision of three pedestrian crossing;
(iv) Reconstruction of existing vehicular crossing and weir arrangement adjacent to WSD to Ho Chung Lowland Pumping Station.

(C) Pak Kong River :

(i) Reprovision of one pedestrian and one vehicular crossing to 3-cell box culvert.
(ii) Construction of approximately 100m long retaining walls to stabilize an existing river slope adjacent to the Hiram's Highway.

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The project organization with respect to environmental protection works is shown in Figure 3.2, which indicates responsibilities and lines of communication of the various parties concerned. The organization chart of the Environmental Team is shown in Figure 3.3.

Figure 3.2 Project Organization Structure

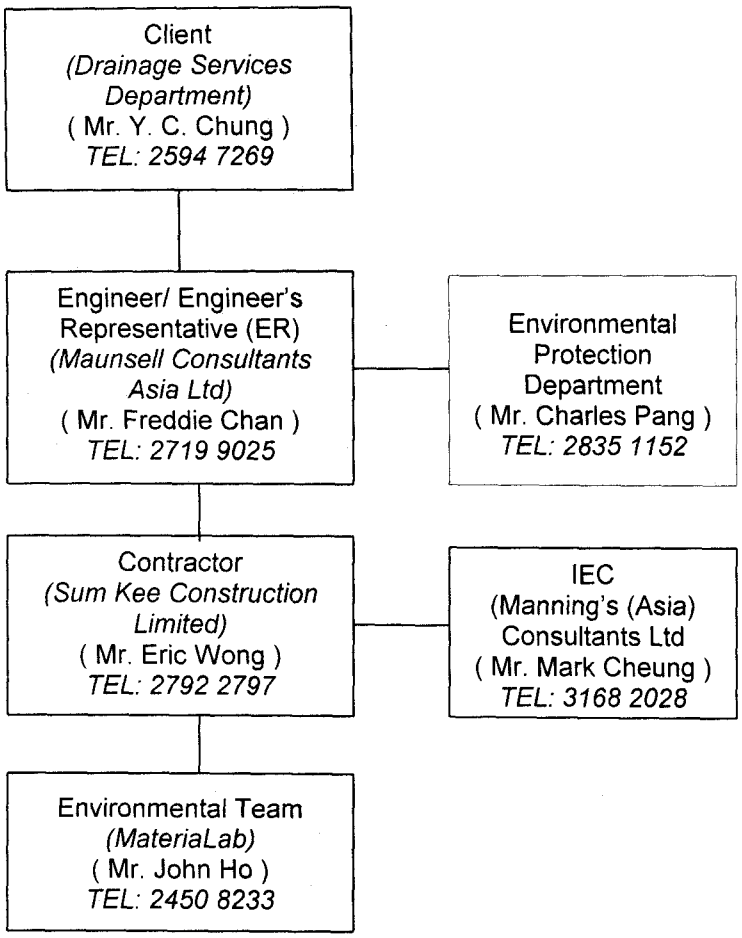

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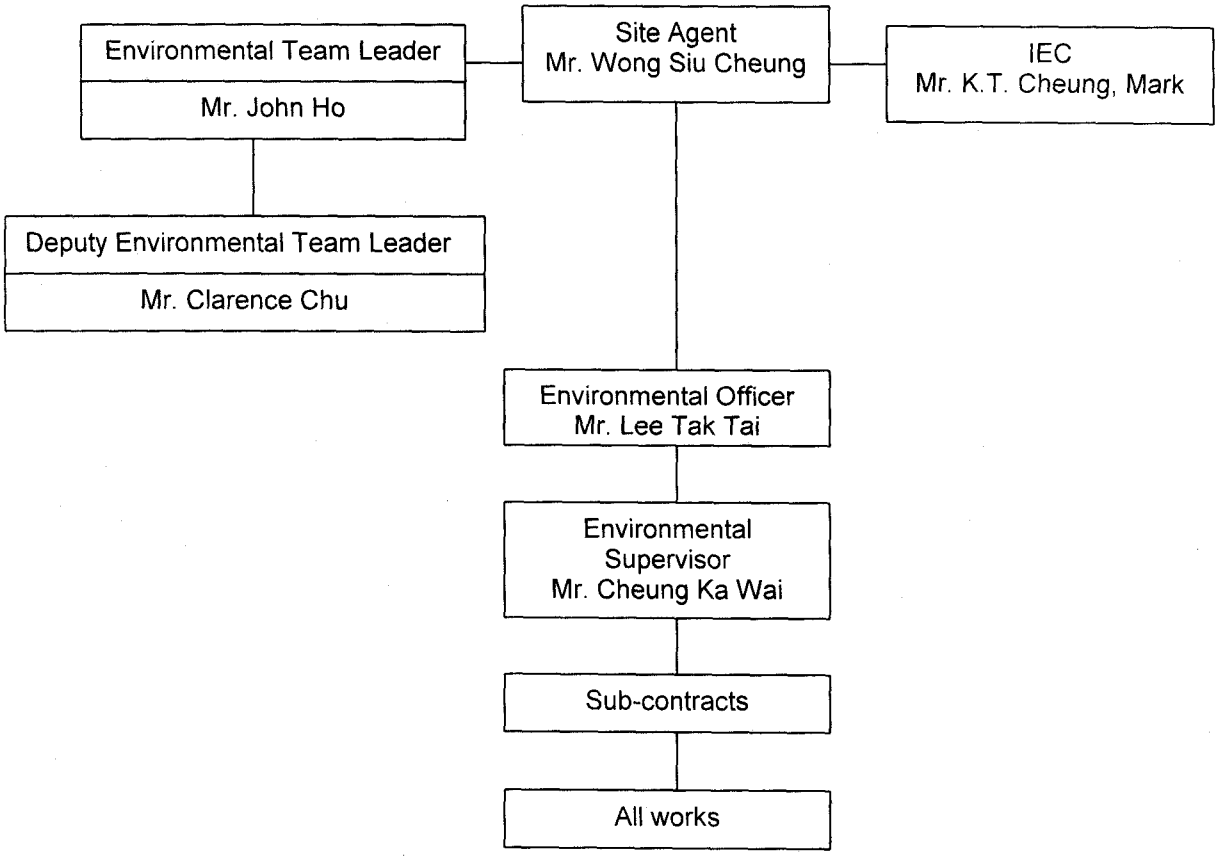
Figure 3.3 Organization Chart of Site Environmental Team



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3.2 Summary of Environmental Monitoring and Audit (EM&A) Requirements

The EM&A programme requires the monitoring of air quality, noise level and water quality at the pre-agreed monitoring stations prior to the commencement of construction activities at the project site. During the course of construction, impact monitoring of air quality, noise levels and water quality will be undertaken at the designated monitoring stations in accordance to the active site works area(s) in operation. The requisite monitored parameters are summarised in Table 3.1.

Environmental auditing on the monitoring data is to be undertaken via the establishment of a set of quality performance limits known as Action/Limit (AL) levels for the environmental parameters in concern to check against any exceedances.

The AL levels are summarised in Table 3.2, Table 3.3 and Table 3.4 and their derivations are detailed in the Baseline Environmental Monitoring Report.

Should the monitoring results indicate any non-compliance of the concerned Action/Limit (AL) levels, actions according to the event action plan for air, noise and water in Appendix 6 should be followed and appropriate environmental mitigation measures as shown in Appendix 1 are to be implemented to rectify the situation.

Advice in regard to the implementation status of the environmental protection and pollution control mitigation measures are shown in Appendix 3.

Table 3.1 Summary of Monitored Parameters

Parameter	Monitoring Items	Number of Stations	Frequency	Requirements
Ad hoc Impact Monitoring for Air	Total suspended particulates (TSP)	3	When required by the ER or IC(E) during the course of the works	1 x 24-hour sampling and 3 x 1-hour sampling
Noise	Daytime noise level of L_{Aeq}(30min)	6	Once per week	1 x Leq (30 min.) between 0700 and 1900 on normal weekdays.
Water	DO, DOS, PH, Turbidity Temp, SS	4	Twice per week in the first three months, then once per week if no exceedances occur	A set of measurements on normal weekdays.

3.3 Action and Limit Levels

Air Quality

The action and Limit levels for 1-hour and 24-hour total suspended particulate (TSP) are formulated from the baseline monitoring data. The quality performance levels are shown in Table 3.2.

Table 3.2 Action and Limit Level for Air Quality

Location	1-hour TSP ($\mu g/m^3$)		24-hour TSP ($\mu g/m^3$)	
	Action Level	Limit Level	Action Level	Limit Level
HCAM	346	500	195	260
PKAM	293	500	160	260
SKAM	291	500	149	260

Noise Level

The 'Action' and 'Limit' levels for noise is based on the number of complaints received during construction and the specified noise limits. The 'Action' and 'Limit' levels are shown in Table 3.3

Table 3.3 Action and Limit Level for Construction Noise

Time Period	Action Level	Limit Level, dB (A)
0700-1900 hrs on normal weekdays	When one documented complaint is received	75*

* - reduce to 70dB(A) for schools and 65dB(A) during school examination periods.

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Water Quality

The Action and Limit levels for the respective water quality parameters are formulated as follows:

Table 3.4 Action and Limit Level for Water Quality

Parameter	Station	Action	Limit
DO in mg/L (mid-depth)	W2	5	4
	W3	5	
	W5	6	
	W7	5	
SS in mg/l (mid-depth)	W2	27	39
	W3	27	39
	W5	12	21
	W7	7	9
Turbidity in NTU (mid-depth)	W2	50	63
	W3	50	63
	W5	9	14
	W7	11	18

Remark:
1. For DO, Non-compliance occurs when monitoring result is lower than the limits.
2. For SS and turbidity, non-compliance occurs when monitoring result is higher than the limits.

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4. Construction Phase Environmental Monitoring

4.1. Review of the Construction Phase Monitoring Programme

The schedule for the monitoring programme in this review month, July 2007 is shown in Table 4.1.

Table 4.1 Environmental Monitoring Schedule For This Review Month

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31 N				

Legend: The sampling date is shaded
N - Noise Monitoring (1 x Leq 30 minute) at 6 locations
A - Air Monitoring (1-hour and 24-hour TSP sampling by High Volume method) at 3 locations
W- Monitoring of DO, DOS, turbidity, pH, temp and SS at mid-water depth of W2, W3, W5 and W7

4.2 Monitoring Locations

Air Quality

Impact air quality monitoring is performed at three locations. The locations of the monitoring station selected as the nearest nearby air sensitive receiver is listed in Table 4.2 and shown in Figures 2.2, 4.1 and 4.2 of Appendix 8.

Table 4.2 Air Quality Monitoring Stations

Designation	Air Quality Monitoring Station
HCAM	At the side of Ho Chung Store on Ho Chung Road roadside
PKAM	At the side of door No. 14 at Fung On Village, Tai Chung Hau
SKAM	At the side of door No. 17 at Wang Kong Village

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Noise Level

Impact noise level monitoring is performed at six locations. The locations of the monitoring stations selected as the nearest nearby noise sensitive receiver is listed in Table 4.3 and shown in Figures 3.2 and 4.2 of Appendix 8.

Table 4.3 Noise Level Monitoring Stations

Designation	Noise Level Monitoring Station
HCM1	In front of door No. 5B, 1st Lane at Ho Chung Village
HCM2	In front of door No. 107 at Ho Chung New Village
PKM1	At the side of door No. 14 at Fung On Village, Tai Chung Hau
PKM2	In front of Green House Nursery at Pak Kong Riverside
SKM1	In front of door No. 13 at Muk Min Shan
SKM2	In front of Waste Recycling Site at Muk Min Shan

Water Quality

The monitoring work was carried out at the mid-water depth of the four impact monitoring stations downstream of the construction work, W2, W3, W5 and W7, at the Ho Chung River, Pak Kong River and Sai Kung River. The exact locations of the water quality monitoring stations are shown in Figures 4.1, 4.2 and 4.3.

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4.3 Monitoring Methodology

Air Quality

The 1-hour and 24-hour TSP levels are measured with a high volume sampler following the standard method as set out in the Title 40 of the Code of Federal Regulations (U.S.), Chapter 1 (Part 50), Appendix B.

The total suspended particulate is sampled by drawing air through a piece of conditioned and pre-weighed filter paper inside the high volume sampler at controlled flowrate of about 40-60 c.f.m. After sampling, the filter paper with the retained particulate is then kept in a plastic bag and transported back to the laboratory for further conditioning and weighing. The TSP level is calculated from the ratio of the mass of particulate retained on the filter to the total volume of air sampled.

Noise level

The impact noise monitoring is carried out at the six monitoring stations selected as the nearest nearby noise sensitive receiver (NSR). Measurement of one L_{Aeq} 30min. should be conducted at each of the monitoring stations on one occasion every week during normal construction working daytime hours (0700 to 1900 hours) (Monday to Saturday).

Noise measurement should be made in terms of the A-weighted equivalent continuous sound pressure level (Leq) measured with an integrating sound level meter complying with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1).

Where a measurement is to be carried out at a building, the assessment point shall normally be at a position 1 metre from the exterior of the building façade. The assessment point shall be at a position 1.2 metre above the ground at a place other than a building.

Immediately prior to and following each noise measurement, the accuracy of the sound level meter is checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration levels from before and after the noise measurements agree to within 1.0 dB.

Noise measurement should not be made in the presence of fog, rain, wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10m/s.

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Water Quality

Water quality monitoring is carried out two times a week at the first three months at four downstream monitoring stations (W2, W3, W5 and W7). Dissolved oxygen level, dissolved oxygen saturation, water temperature, pH value and turbidity (NTU) are measured in-situ at the monitoring stations, while the suspended solids level is ascertained by laboratory analysis.

The parameters of in-situ measurements include water depth, dissolved oxygen (DO), dissolved oxygen saturation (DOS), turbidity level, pH value and water temperature. Water samples is collected by the water sampler and filled into HDPE bottles for laboratory determination of suspended solids. Bottles are filled up to the rim, capped tightly and labeled immediately. The samples are delivered to the laboratory as soon as possible for subsequent analysis.

4.4 Monitoring Equipment

The equipment employed for the requisite monitoring and their respective updated calibration details are summarised in Appendix 7.

4.5 Summary of non-compliance of the environmental quality performance limit for July 2007

Noise Level

No documented complaints were received in this reporting period. The range and variation of the daytime noise level were comparable to the baseline data, indicating that the construction noise did not engender significant nuisance to the sensitive receivers. The noise emanating from vehicular road traffic was found to be the major influential factor dominating the environment.

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5. Summary of Complaints, Summons and Successful Prosecutions

No documented correspondence regarding complaints, summons and successful prosecutions in association with the construction activities was received in this review month.

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6. Works Programme for August 2007

The principal activities on site for August 2007 are updated and listed as follows:

- Site clearance
- Trees transplant

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7. Monitoring Schedule for August 2007

For the forthcoming period, water quality and noise level impact monitoring are to be conducted, with the monitoring schedule shown in Table 8.1.

Table 8.1 Environmental Monitoring Schedule for the Forthcoming Month

SUN	MON	TUE	WED	THU	FRI	SAT
			1 W	2	3 W	4
5	6	7 N,W	8	9	10 W	11
12	13	14 N,W	15	16 W	17	18
19	20	21 N,W	22	23 W	24	25
26	27	28 N,W	29	30 W	31	

Legend: The sampling date is shaded
N - Noise Monitoring (1 x Leq 30 minute) at 6 locations
A - Air Monitoring (1-hour and 24-hour TSP sampling by High Volume method) at 3 locations
W- Water Monitoring of DO, DOS, turbidity, pH, temp and SS at mid-water depth of W2, W3, W5 and W7

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8. Comments and Conclusions for July 2007

Air Quality

Ad hoc air quality monitoring at the project site will only be conducted by ET when instructed by the ER/IC(E) or on receipt of complaint. However, the Contractor should deploy dust mitigation measures to reduce potential impacts from constructional works to a minimum, which include frequent water spraying at dust generation areas.

Noise Level

During this review month, noise levels around the project confines were of comparable range and variation to the attained baseline data measurements with no nuisance impact effected on the local environment. Construction sourced noise was not of significant contribution whereby the surrounding environment which dominated by the vehicular traffic traversing the public roadways.

Water Quality

In this review month, monitoring works was suspended as normal construction works were not yet commenced. The contractor is advised to conduct mitigation measures to avoid potential surface run-off discharge into appropriate watercourses.