

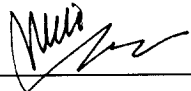

**The Hongkong Electric Co Ltd**  
香港電燈有限公司



**ENVIRONMENTAL IMPACT ASSESSMENT (EIA) ORDINANCE, CAP. 499**

**ENVIRONMENTAL PERMIT NO. EP-071/2000/B**

**LAMMA POWER STATION EXTENSION  
ENVIRONMENTAL MONITORING & AUDIT PROGRAMME  
AT CONSTRUCTION PHASE**

Report Title	Monthly EM&A Report (September 2002)
Date	15 October 2002
Certified by	 (Mr. IP Tat-Yan, Environmental Team Leader)
Verified by	 (ERM Hong Kong Ltd, Independent Environmental Checker)

# TABLE OF CONTENT

## EXECUTIVE SUMMARY

<b>1.</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	Background	1
1.2	Project Organisation	1
1.3	Construction Works undertaken during the Reporting Month	2
1.4	Summary of EM&A Requirements	3
<b>2.</b>	<b>AIR QUALITY.....</b>	<b>7</b>
2.1	Monitoring Requirements	7
2.2	Monitoring Locations	7
2.3	Monitoring Equipment	7
2.4	Monitoring Parameters, Frequency and Duration	8
2.5	Monitoring Procedures and Calibration Details	8
2.6	Results and Observations	9
<b>3.</b>	<b>NOISE.....</b>	<b>12</b>
3.1	Monitoring Requirements	12
3.2	Monitoring Locations	12
3.3	Monitoring Equipment	12
3.4	Monitoring Parameters, Frequency and Duration	13
3.5	Monitoring Procedures and Calibration Details	13
3.6	Results and Observations	14
<b>4.</b>	<b>WATER QUALITY MONITORING.....</b>	<b>16</b>
4.1	Monitoring Requirements	16
4.2	Monitoring Locations	16
4.3	Monitoring Equipment	17
4.4	Monitoring Parameters, Frequency and Duration	17
4.5	Monitoring Procedures and Calibration Details	18
4.6	Results and Observations	20
<b>5.</b>	<b>ENVIRONMENTAL AUDIT.....</b>	<b>22</b>
5.1	Review of Environmental Monitoring Procedures	22
5.2	Assessment of Environmental Monitoring Results	22
5.3	Site Environmental Audit	23
5.4	Status of Environmental Licensing and Permitting	23
5.5	Implementation Status of Environmental Mitigation Measures	25
5.6	Implementation Status of Event/Action Plans	25
5.7	Implementation Status of Environmental Complaint Handling Procedures	25
<b>6.</b>	<b>FUTURE KEY ISSUES.....</b>	<b>26</b>
6.1	Status of Natural Gas supply	26
6.2	Key Issues for the Coming Month	26
6.3	Monitoring Schedules for the Next 3 Months	27
6.4	Construction Program for the Next 3 Months	27
<b>7.</b>	<b>CONCLUSION.....</b>	<b>28</b>

## **LIST OF TABLES**

Table 1.1	Construction Activities and Their Corresponding Environmental Mitigation Measures
Table 2.1	Air Quality Monitoring Locations
Table 2.2	Air Quality Monitoring Equipment
Table 2.3	Air Quality Monitoring Parameter, Duration and Frequency
Table 3.1	Noise Monitoring Locations
Table 3.2	Noise Monitoring Equipment
Table 3.3	Noise Monitoring Duration and Parameter
Table 4.1	Water Quality Monitoring Locations
Table 4.2	Water Quality Monitoring Equipment
Table 4.3	Water Quality Monitoring Parameters and Frequency
Table 4.4	Laboratory Analysis Methodologies of Marine Water Samples
Table 5.1	Summary of AL Level Exceedances on Monitoring Parameters
Table 5.2	Estimated Amounts of Waste Generated in September 2002
Table 5.3	Summary of Environmental Licensing and Permit Status
Table 5.4	Environmental Complaints / Enquiries Received in September 2002
Table 5.5	Outstanding Environmental Complaints / Enquiries Received Before

## **LIST OF FIGURES**

Figure 1.1	Layout of Work Site
Figure 1.2	Cable Route of Transmission System
Figure 1.3	Location of Dumping Area (from 12 <sup>th</sup> June 2002)
Figure 2.1	Location of Air Quality Monitoring Stations
Figure 3.1	Location of Noise Monitoring Stations
Figure 4.1	Location of Water Quality Monitoring Stations

## **APPENDICES**

Appendix A	Organization Chart
Appendix B	Action and Limit Levels for Air Quality, Noise, Water quality Monitoring
Appendix C	Environmental Monitoring Schedule
Appendix D	Air Quality Monitoring Results for September 2002
Appendix E	Noise Monitoring Results for September 2002
Appendix F	Water Quality Monitoring Results for September 2002
Appendix G	The QA/QC Procedures and Results
Appendix H	Event/Action Plans
Appendix I	Site Audit Summary
Appendix J	Summary of EMIS
Appendix K	Tentative Construction Programme

## **EXECUTIVE SUMMARY**

This is the eighteenth monthly Environmental Monitoring and Audit (EM&A) report for the Project “Construction of Lamma Power Station Extension” prepared by the Environmental Team (ET). This report presents the results of impact monitoring on air quality, noise and marine water quality for the said project in September 2002.

Air, noise and water quality monitoring were performed. The results were checked against the established Action/Limit (AL) levels. An on-site audit was conducted once per week. The implementation status of the environmental mitigation measures, Event/Action Plan and environmental complaint handling procedures were also checked.

### **Construction Activities Undertaken**

Construction activities for Lamma Extension during the reporting month were tabulated as follows:

Item	Construction Activities
Site Formation	Placing of rockfill, seawall construction, sandfilling, sandfill compaction and piling of foundation for link bridges.
Unit L9	Bored pipe construction for piling foundation.
Transmission System	No construction activities.

### **Environmental Monitoring Works**

Post project monitoring work for marine water quality was started in August 2002 in the same manner as impact monitoring work for a period of at least 4 weeks and was completed on 19th September 2002. After successful completion of post project monitoring, no further marine water quality monitoring would be required. Final EM&A summary on marine water quality around the construction site will be provided in the forthcoming annual EM&A report (2002).

Due to adverse weather conditions, the marine water monitoring work on 11th September 2002 was rescheduled to 19th September 2002. Other than that, all monitoring work at designated stations was performed as scheduled in the reporting period.

#### *Air Quality*

No exceedance of Action and Limit levels for air quality was recorded in the month.

#### *Noise*

The hoarding works for the construction of transmission system were completed on 11 May 2002. The civil works would tentatively commence in November 2002. As there was no construction work in this reporting month, manual noise measurements for the construction of transmission system was suspended.

Construction work for Lamma Extension was carried out during the restricted hours including evening-time, holidays and night-time under valid Construction Noise Permits. Two marginal limit level exceedances were recorded at NSR at Long Tsai Tsuen/Hung Shing Ye on 5/9/2002 01:25-01:35. The construction contractor has been instructed to immediately stop the relevant noisy construction activities. The exceedances were caused by the construction contractor who used a loudspeaker in a tug boat for communication. Contractors have been reminded again to prohibit the use of any loudspeaker within the site during the restricted hours. With the implementation of the remedial measures, it is believed that the possible noise problems arising from the use of loudspeaker could be alleviated. EPD, IEC, Engineer and construction contractors have been informed of the limit level exceedances as per the requirements in the EM&A Manual.

#### *Water Quality*

There was no exceedance of Action and Limit Levels for water quality in the reporting month.

#### **Site Environmental Audit**

Site audits were carried out on a weekly basis to monitor environmental issues on the construction site. The site conditions were generally satisfactory. All required mitigation measures were implemented.

#### **Environmental Licensing and Permitting**

Description	Permit No.	Valid Period		Issued To	Date of Issuance
		From	To		
Varied Environmental Permit	EP-071/2000/B	13/07/01	-	HEC	13/07/01
Construction Noise Permit	GW-UW0076-02	17/04/02	09/09/02	Contractor	Superseded
Construction Noise Permit	GW-UW0099-02	07/05/02	06/11/02	Contractor	30/04/02
Construction Noise Permit	GW-UW0191-02	22/07/02	14/01/03	Contractor	22/07/02
Construction Noise Permit	GW-UW0262-02	10/09/02	09/03/03	Contractor	10/09/02
Registration of Chemical Waste Producer	WPN5213-912-G1050-01	01/06/02	-	Contractor	03/06/02
Dumping Permit	EP/MD/03-002	12/06/02	11/12/02	Contractor	10/06/02
Dumping Permit	EP/MD/03-075	14/09/02	13/01/03	Contractor	13/09/02
Waste Water Discharge Licence	EP742/912/006414I	10/06/02	30/06/07	Contractor	10/06/02
Waste Water Discharge Licence	EP742/912/006634I	16/07/02	31/07/07	Contractor	16/07/02

#### **Implementation Status of Environmental Mitigation Measures**

Environmental mitigation measures for the construction activities as recommended in the EM&A manual were implemented in the reporting month.

#### **Environmental Complaints**

No complaint against the construction activities was received in the reporting month.

## **Future Key Issues**

The future key issues to be considered in the coming month are as follows:

### Site Formation

- to continue monitoring the noise level during construction and to ensure compliance with the CNP's already obtained;
- to continue the preventive measures for noise exceedance and keep monitoring/reviewing the performance;
- to provide de-silting utilities for wastewater before discharge from the piling works;

### Transmission System

- to closely monitor the construction activities, if any, in order to avoid disturbance to the rare plants;
- to provide temporary fire fighting equipment for prevention of fire within the work sites;

### Unit L9 Piling Foundation

- to continue monitoring the noise level during construction and to ensure compliance with the CNPs already obtained;
- to continue the preventive measures for noise exceedance and keep monitoring/reviewing the performance;
- to spray water on the ground and road surface to prevent dust emission;
- to continue monitoring and reviewing the emission of smoke from construction machines;
- to recycle wastewater during the bored piling and interface coring works;
- to implement the Waste Management Plan.

## **Concluding Remarks**

Except the two marginal limit level exceedances caused by the construction contractor, the environmental performance of the project was generally satisfactory.

## **1. INTRODUCTION**

### **1.1 Background**

The Environmental Team (hereinafter called the “ET”) was formed within the Hongkong Electric Co. Ltd (HEC) to undertake Environmental Monitoring and Audit for “Construction of Lamma Power Station Extension” (hereinafter called the “Project”). Under the requirements of Section 6 of Environmental Permit EP-071/2000/B, an EM&A programme for impact environmental monitoring set out in the EM&A Manual (Construction Phase) is required to be implemented. In accordance with the EM&A Manual, environmental monitoring of air quality, noise and water quality and regular environmental audits are required for the Project.

The Project involves the construction of a gas-fired power station employing combined cycled gas turbine technology, forming an extension to the existing Lamma Power Station. The key elements of the Project including the construction activities associated with the transmission system and submarine gas pipeline are outlined as follows.

- dredging and reclamation to form approximately 22 hectares of usable area;
- construction of six 300MW class gas-fired combined cycle units;
- construction of a gas receiving station;
- construction of a new transmission system linking the Lamma Extension to load centres on Hong Kong Island;
- laying of a gas pipeline for the supply of natural gas to the new power station

This report summarizes the environmental monitoring and audit work for the Project for the month of September 2002.

### **1.2 Project Organisation**

An Environmental Management Committee (EMC) has been set up in HEC to oversee the Project. The management structure includes the following:

- Environmental Protection Department (The Authority);
- Environmental Manager (The Chairman of the Environmental Management Committee);
- Engineer;
- Independent Environmental Checker (IEC);
- Environmental Team (ET);
- Contractor.

The project organisation chart for the construction EM&A programme is shown in Appendix A.

### 1.3 Construction Works undertaken during the Reporting Month

Construction activities undertaken during the reporting month for site formation were placing of rock fill, construction of seawall, sandfilling, sandfill compaction and piling foundation for link bridge. Construction activity for Unit L9 was the construction of bored pile for piling foundation. There was no construction activity for Unit L9's associated transmission system. Layout plans for site formation and transmission system are shown in Figure 1.1 and Figure 1.2 respectively. Uncontaminated dredged/excavated materials arising from both the piling foundation work of Unit L9 and Main & East Bridges were dumped at the assigned location within the South Cheung Chau Spoil Disposal Area. Figure 1.3 shows the dumping location in September 2002.

The main construction activities carried out during the reporting month and the corresponding environmental mitigation measures are summarized in Table 1.1. The implementation of major mitigation measures in the month is provided in Appendix J.

Table 1.1 Construction Activities and Their Corresponding Environmental Mitigation Measures

Item	Construction Activities	Environmental Mitigation Measures
<b>Site Formation</b>		
1	Placing of Rockfill, Seawall Construction, Sandfilling & Sandfill Compaction	<p><b>Noise</b></p> <ul style="list-style-type: none"> <li>- General noise mitigation measures employed at all work sites throughout the construction phase.</li> </ul> <p><b>Waste Management</b></p> <ul style="list-style-type: none"> <li>- Waste Management Plan submitted and implemented.</li> </ul> <p><b>Marine Ecology</b></p> <ul style="list-style-type: none"> <li>- All construction related vessels approached the site from the designated route/channel to avoid possible disturbance to the finless porpoise.</li> </ul>
2	Piling Foundation for Link Bridge	<p><b>Water Quality</b></p> <ul style="list-style-type: none"> <li>- De-silting system is installed to treat the wastewater before being discharged.</li> </ul> <p><b>Noise</b></p> <ul style="list-style-type: none"> <li>- General noise mitigation measures implemented and silenced type equipment deployed.</li> </ul> <p><b>Air</b></p> <ul style="list-style-type: none"> <li>- Dust suppression measures implemented.</li> </ul>



<b>Construction of Transmission System</b>		
3	No construction activities	<b>Terrestrial Ecology</b> <ul style="list-style-type: none"> <li>- Special care and close monitoring to avoid disturbances to the rare plant species.</li> <li>- Temporary fire fighting equipment provided within the work area during construction.</li> </ul>
<b>Construction of Unit L9 Piling Foundation</b>		
4	Bored Pile Construction for Piling Foundation	<b>Water Quality</b> <ul style="list-style-type: none"> <li>- Wastewater is recycled during construction.</li> </ul> <b>Noise</b> <ul style="list-style-type: none"> <li>- General noise mitigation measures implemented and silenced type equipment deployed.</li> </ul> <b>Air</b> <ul style="list-style-type: none"> <li>- Dust suppression measures implemented.</li> </ul> <b>Waste Management</b> <ul style="list-style-type: none"> <li>- Waste is sorted, stored &amp; recycled.</li> <li>- Chemical waste is stored and collected.</li> </ul>

#### 1.4 Summary of EM&A Requirements

The EM&A program requires environmental monitoring for air, noise and water quality. Regular environmental site audits for air quality, noise, water quality and waste management were carried out. The detailed EM&A monitoring work for air quality, noise and water quality are described in Sections 2, 3 and 4 respectively.

The following environmental audits are summarized in Section 5 of this report:

- Environmental monitoring results;
- Waste Management Records;
- Weekly site audit results;
- The status of environmental licensing and permits for the Project;
- The implementation status of environmental protection and pollution control/mitigation measures.

Future key issues will be reported in Section 6 of this report.



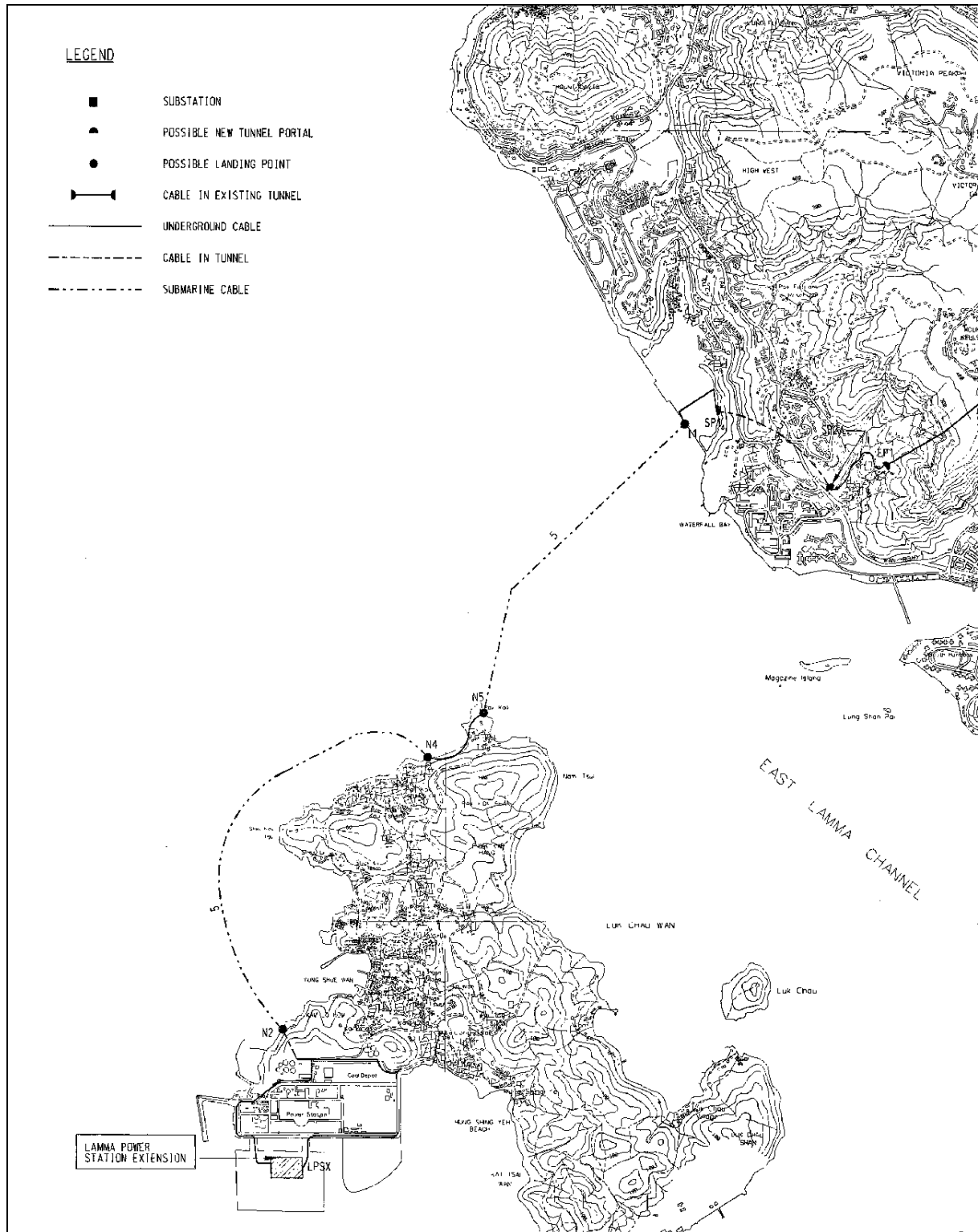


Figure 1.2 Cable Route of Transmission System

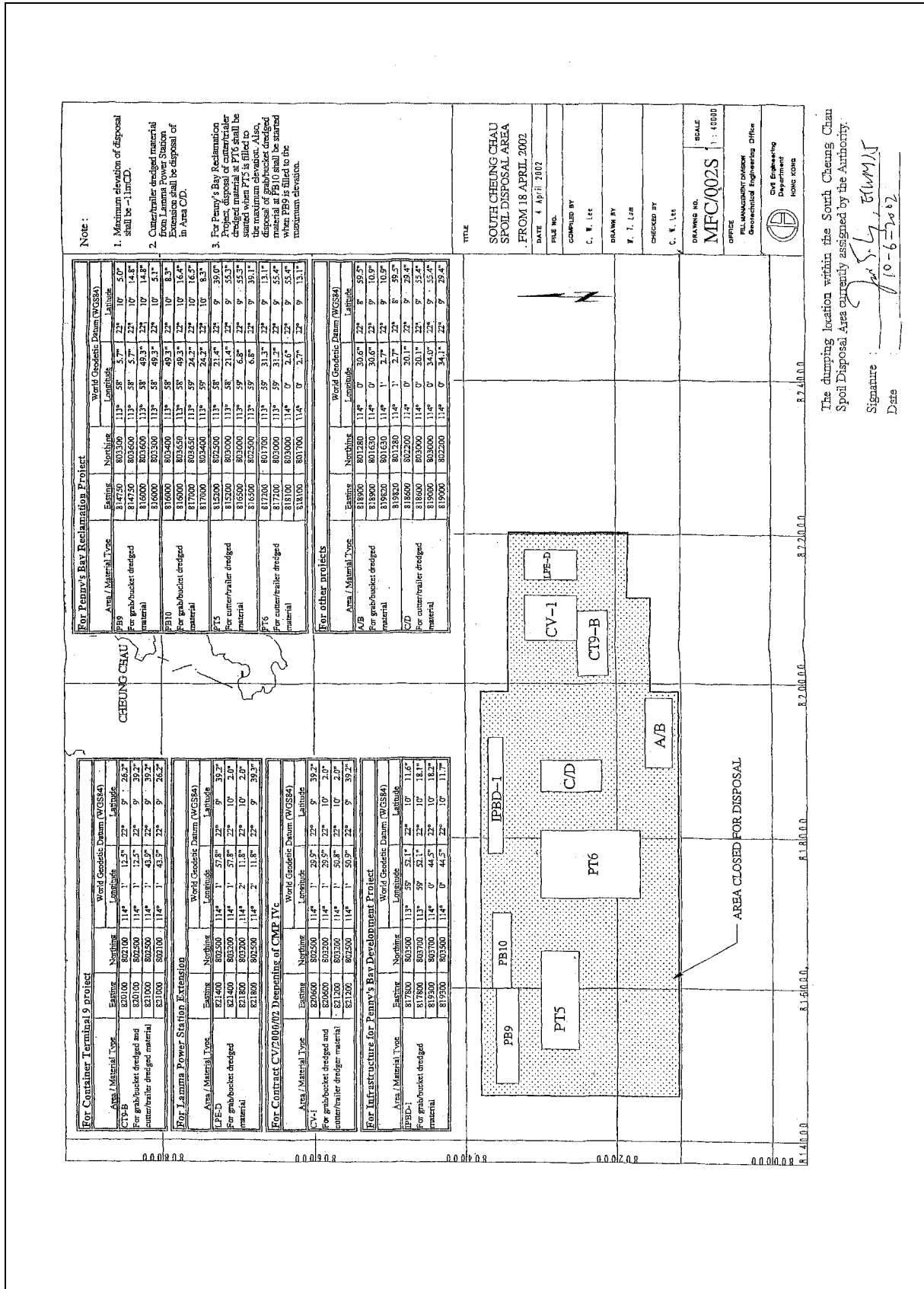


Figure 1.3 Location of Dumping Area (from 12<sup>th</sup> June 2002)

## 2. AIR QUALITY

### 2.1 Monitoring Requirements

1-hour and 24-hour TSP monitoring at agreed frequencies were conducted to monitor air quality. The impact monitoring data were checked against the Action/Limit Levels as determined in the Baseline Monitoring Report (Construction Phase). Appendix B shows the established Action/Limit Levels for Air Quality.

### 2.2 Monitoring Locations

Three dust monitoring locations were selected for 1-hour TSP sampling (AM1, AM2 & AM3) while four monitoring locations were selected for 24-hour TSP sampling (AM1, AM2, AM3 and AM4). Table 2.1 tabulates the monitoring stations. The locations of the monitoring stations are shown in Figure 2.1.

Table 2.1 Air Quality Monitoring Locations

<b>Location I.D.</b>	<b>Description</b>
AM1	Reservoir
AM2	East Gate
AM3	Ash Lagoon
AM4	Tai Yuen Village

### 2.3 Monitoring Equipment

Continuous 24-hour TSP air quality monitoring was performed using the GS2310 High Volume Air Samplers (HVAS), Partisol Model 2000 Sampler and the MINIVOL Portable Sampler at AM1&2, AM3 and AM4 respectively. TEOM Model 1400a continuous dust monitors were used to carry out 1-hour TSP monitoring at AM1, AM2 and AM3. Table 2.2 summarises the equipment used in dust monitoring.

Table 2.2 Air Quality Monitoring Equipment

<b>Equipment</b>	<b>Model and Make</b>
<i>24-hour sampling:</i> HVAS Sampler	Model GS2310 Anderson Instruments Inc.
Partisol Air Sampler	Partisol Model 2000 Rupprecht & Patashnick
MINIVOL Portable Sampler	AIRMETRICS
<i>1-hour sampling:</i> Continuous TSP Dust Meter	TEOM Model 1400a Rupprecht & Patashnick

## 2.4 Monitoring Parameters, Frequency and Duration

Table 2.3 summarises the monitoring parameters, duration and frequency of air quality monitoring. The monitoring schedule for the reporting month is shown in Appendix C.

Table 2.3 Air Quality Monitoring Parameter, Duration and Frequency

<b>Monitoring Stations</b>	<b>Parameter</b>	<b>Duration</b>	<b>Frequency</b>
AM1	1-hour TSP	1	3 hourly samples every 6 days
	24-hour TSP	24	Once every 6 days
AM2	1-hour TSP	1	3 hourly samples every 6 days
	24-hour TSP	24	Once every 6 days
AM3	1-hour TSP	1	3 hourly samples every 6 days
	24-hour TSP	24	Once every 6 days
AM4	24-hour TSP	24	Once every 6 days

## 2.5 Monitoring Procedures and Calibration Details

24- hour TSP Monitor:

### *Preparation of Filter Papers*

- Visual inspection of filter papers was carried out to ensure that there were no pinholes, tears and creases;
- The filter papers were then labelled before sampling.

- The filter papers were equilibrated at room temperature and relative humidity < 50% for at least 24 hours before weighing.

#### *Field Monitoring*

- During collection of the sampled filter paper, the information on the elapse timer was logged. Site observations around the monitoring stations, which might have affected the monitoring results, were also recorded. Major pollution sources, if any, would be identified and reported. The flow record chart for the previous sampling was checked to see if there was any abnormality.
- The post-sampling filter papers were removed carefully from the filter holder and folded to avoid loss of fibres or dust particles from the filter papers;
- The filter holder and its surrounding were cleaned;
- A pre-weighed blank filter paper for the next sampling was put in place and aligned carefully. The filter holder was then tightened firmly to avoid leakage;
- A new flow record chart was loaded into the flow recorder;
- The programmable timer was set for the next 24 hrs sampling period,  $\pm 1/2$  hr;
- The post-sampling filter papers were equilibrated at room temperature and relative humidity < 50% for at least 24 hours before weighing.

#### 1- hour TSP Monitor:

- The following parameters of the TEOM model dust meters are regularly checked to ensure proper functionality:
  - Mass concentration;
  - Total mass;
  - Frequency of the tapered element;
  - Electrical noise;
  - Main flow;
  - Auxiliary flow.

#### *Maintenance & Calibration*

- The monitoring equipment and their accessories are maintained in good working conditions.
- Monitoring equipment is calibrated at monthly intervals. Calibration details are shown in Appendix G.

## **2.6 Results and Observations**

Dust monitoring was conducted as scheduled in the reporting month. All monitoring data and graphical presentation of the monitoring results are provided in Appendix D. Key findings and observations are provided below:

*1-hour TSP*

No exceedance of 1-hour TSP Action/Limit Level was recorded in the month.

*24-hour TSP*

No exceedance of 24-hour TSP Action/Limit Level was recorded in the month.



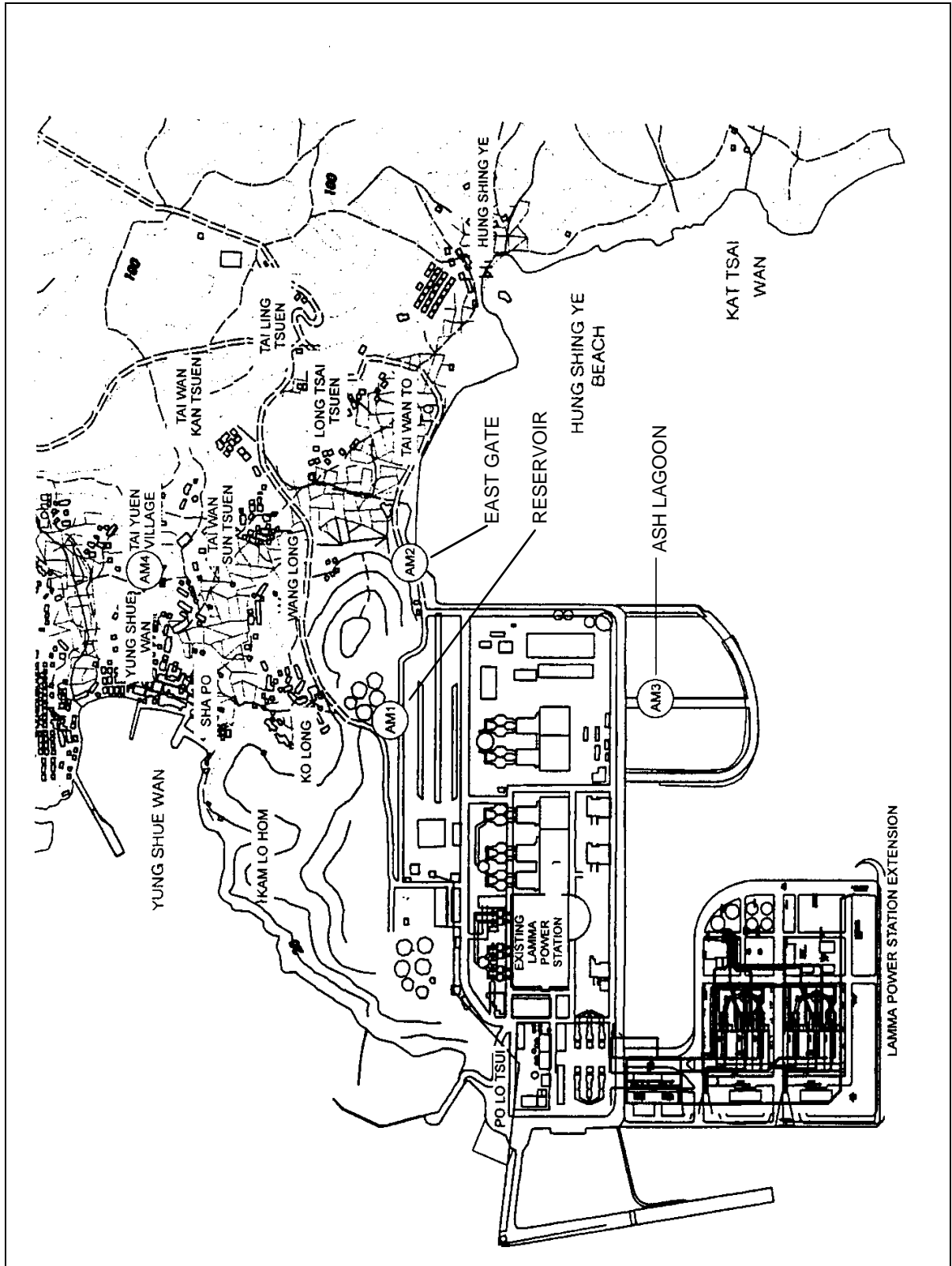


Figure 2.1 Location of Air Quality Monitoring Stations

### 3. NOISE

#### 3.1 Monitoring Requirements

Continuous noise alarm monitoring at Ash Lagoon/Ching Lam were carried out to calculate the noise contributed by the construction activities at the two critical NSR's, viz. Long Tsai Tsuen/Hung Shing Ye and the school within the village of Tai Wan San Tsuen. The impact monitoring data for construction noise other than percussive piling were checked against the limit levels specified in the EM&A Manual. With the availability of the construction noise permits, impact monitoring for the construction work during the restricted hours was also carried out. Section 5 presents the details of the construction noise permits. The impact noise monitoring data were checked against the limit levels specified in the EM&A Manual. Appendix B shows the established Action/Limit Levels for noise.

The hoarding works for the construction of transmission system were completed on 11 May 2002. The civil works would tentatively commence in November 2002. As there was no construction work in September 2002, manual noise measurements at Pak Kok Tsui residences was suspended in this reporting month.

#### 3.2 Monitoring Locations

In accordance with the EM&A manual, the identified noise monitoring locations are listed in Table 3.1 and shown in Figure 3.1.

Table 3.1 Noise Monitoring Locations

<b>Purpose of noise monitoring</b>	<b>Monitoring Location</b>
Lamma Extension	Ash Lagoon
Lamma Extension	Ching Lam

#### 3.3 Monitoring Equipment

The sound level meters used for noise monitoring complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The noise monitoring equipment used is shown in Table 3.2.

Table 3.2 Noise Monitoring Equipment

Equipment	Model
Sound level meter	Rion NA-27 and NL-31
Sound level calibrator	Rion NC-74

### 3.4 Monitoring Parameters, Frequency and Duration

Continuous alarm monitoring of A-weighted Leq levels was carried out at Ash Lagoon and Ching Lam. The measurement duration and parameter of noise monitoring were presented in Table 3.3 as follows:

Table 3.3 Noise Monitoring Duration and Parameter

Location	Time Period	Frequency	Parameter
Ash Lagoon	Daytime: 0700-1900 hrs on normal weekdays	Daytime: 30 minutes	30-min $L_{Aeq}$
	Evening-time & holidays: 0700-2300 hrs on holidays; and 1900-2300 hrs on all other days	Evening-time & holidays: 5 minutes	5-min $L_{Aeq}$
Ching Lam	Night-time: 2300-0700 hrs of next day	Night-time: 5 minutes	5-min $L_{Aeq}$

### 3.5 Monitoring Procedures and Calibration Details

#### *Monitoring Procedures*

#### *Continuous Noise Monitoring for Lamma Extension Construction*

The measured noise levels (MNL's) were collected at the noise alarm monitoring stations at Ash Lagoon and Ching Lam. The notional background noise levels (viz. baseline noise data at Ash Lagoon and Ching Lam) were applied to correct the corresponding MNL's in 30-min/5-min  $L_{Aeq}$ .

A wind speed sensor was installed at Station Building Rooftop. The wind speed signal was used to determine whether the data from Ash Lagoon and Ching Lam noise alarm monitoring stations were affected. The instantaneous data was discarded in case the instantaneous wind speed exceeded 10 m/s. The 30-min/5-min  $L_{Aeq}$  was considered valid only if the amount of valid data was equal to or above 70%.

When calibrating the noise measuring equipment, all observations around the monitoring stations, which might have affected the monitoring results, were recorded.

#### *Equipment Calibration*

The sound level meters and calibrators have been verified by the manufacturer or accredited laboratory. Equipment for continuous noise monitoring was calibrated at site on a monthly basis. Calibration details are shown in Appendix G.

### **3.6 Results and Observations**

Continuous noise monitoring was conducted at the two monitoring stations at Ash Lagoon and Ching Lam. All monitoring results and their graphical presentations are provided in Appendix E.

Two marginal Limit level exceedances were recorded at NSR at Long Tsai Tsuen/Hung Shing Ye on 5/9/2002 01:25-01:35. The contractor has been instructed to immediately stop the relevant noisy construction activities. The exceedances were caused by the construction contractor who used the loudspeaker in the tug boat for communication. Contractors have been reminded again to prohibit the use of any loudspeaker within the site during the restricted hours. With the implementation of the remedial measures, it is believed that the possible noise problems arising from the use of loudspeaker could be alleviated. EPD, IEC, Engineer and construction contractors have been informed of the Limit level exceedances.

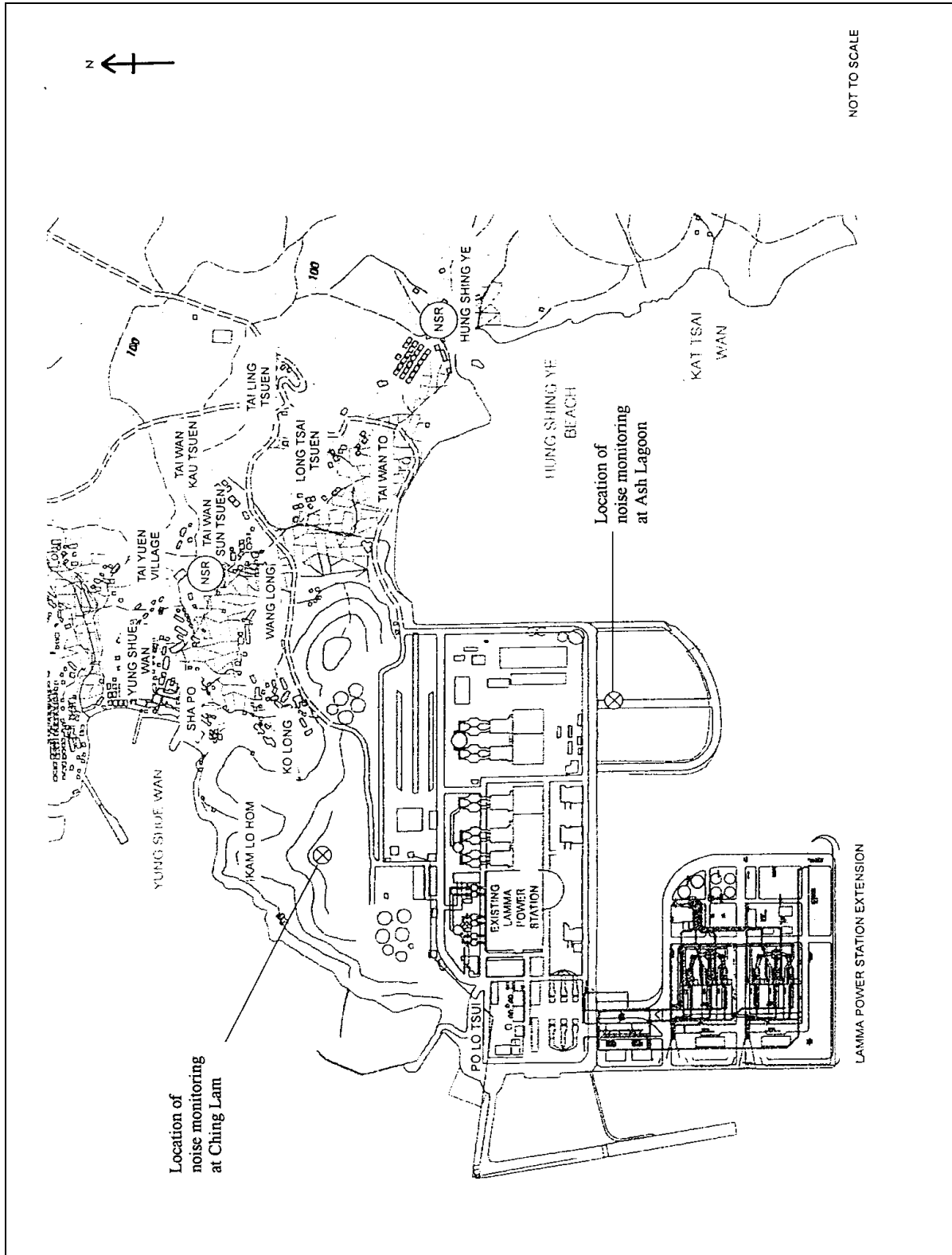


Figure 3.1 Location of Noise Monitoring Stations

## 4. WATER QUALITY MONITORING

### 4.1 Monitoring Requirements

After the closure of the seawall for the reclamation site in July 2002, post project monitoring work for marine water quality was started in August 2002 in the same manner as impact monitoring work and was completed on 19 September 2002. After successful completion of post project monitoring, no further marine water quality monitoring would be required.

Post project marine water quality monitoring was carried out at the monitoring locations adjacent to the construction site. The monitoring data were checked against the AL levels set out in the Baseline Monitoring Report (Construction Phase). As there were no activities for the laying of the gas pipeline in the reporting month, no water quality impact monitoring at the relevant stations was carried out.

### 4.2 Monitoring Locations

A total of 12 water quality monitoring locations were selected. 7 Sensitive Receiver (SR) stations were chosen on the basis of their proximity to the construction site, 5 Marine Control stations (C) as recommended in the EIA were selected to facilitate comparison of the water quality of the SR stations with ambient water quality conditions. Table 4.1 describes the locations of these monitoring stations. Their locations are shown in Figure 4.1.

Table 4.1 Water Quality Monitoring Locations

Type	Monitoring Location	HK Metric Grid E	HK Metric Grid N
Sensitive Receiver Stations	SR1	830 224	811 528
	SR2	829 004	810 903
	SR3	829 194 (829 166) <sup>1</sup>	808 600 (808 592) <sup>1</sup>
	SR4	830 119	808 650
	SR5	830 386	807 189
	SR6	829 977	805 758
	SR7	829 566	804 545
Marine Control Stations	C1	830 542	813 492
	C2	828 608	813 492
	C3	826 776	809 978
	C4	826 776	806 464
	C5	830 440	802 186

1. Due to the construction programme, the monitoring location SR3 was slightly shifted since the monitoring on 16<sup>th</sup> April 2001. EPD has verbally been informed of the shift of the monitoring location.

### 4.3 Monitoring Equipment

Table 4.2 summarizes the equipment used in the water-quality monitoring programme.

Table 4.2 Water Quality Monitoring Equipment

Equipment	Detection Limit
YSI 6920 Water Quality Monitor	Temperature: -5 to 45 °C; +/- 0.15 °C Salinity: 0 to 70 ppt; +/- 0.1 ppt Dissolved Oxygen: 0 to 200%; +/- 0.2% 0 to 20 mg/L; +/- 0.2 mg/L Turbidity: 0 to 000 NTU; +/- 5% of the range pH: 0 to 14 units; +/- 0.2 units
Trimble NT300D GPS	Accuracy better than 3m

### 4.4 Monitoring Parameters, Frequency and Duration

Table 4.3 summarizes the monitoring parameters, frequencies and total duration of water quality monitoring. The monitoring schedule for reporting month is shown in Appendix C.

Table 4.3 Water Quality Monitoring Parameters and Frequency

Monitoring Stations	Parameters	Frequency	No. of Depths	No. of Samples
Sensitive Receiver Stations SR1, SR2, SR4, SR5, SR6 & SR7  Marine Control Stations C1, C2, C3, C4 & C5	<ul style="list-style-type: none"> <li>• Depth, m</li> <li>• Temperature, oC</li> <li>• Salinity, ppt</li> <li>• DO, mg/L</li> <li>• DO Saturation, %</li> <li>• Turbidity, NTU</li> <li>• SS, mg/L</li> <li>• pH</li> </ul>	Three times per week	3 Surface, Mid-Depth and Bottom	2 Mid-ebb and Mid-flood

## 4.5 Monitoring Procedures and Calibration Details

### *Monitoring Procedures*

- The monitoring stations were accessed using survey boat to within 3m, guided by Differential Global Positioning System (DGPS).
- The depth of the monitoring location was measured using depth meter in order to determine the sampling depths. Afterwards, the water sampler was lowered into the water to the required depths of sampling. Upon reaching the pre-determined depth, a messenger to activate the sampler was then released to travel down the wire. The water sample was sealed within the sampler before retrieving.
- All in-situ measurements at each monitoring stations were taken at 3 water depths, where appropriate, namely 1m below water surface, mid-depth, and 1 meter from seabed, except where the water depth was less than 6m, the mid-depth measurement was omitted. If the water depth was less than 3m, only the mid-depth position was monitored.
- At each measurement/sampling depth, two consecutive measurements were taken. The probes were retrieved out of the water after the first measurement and then redeployed for the second measurement. Where the difference in the value between the first and the second readings of each set was more than 25% of the value of the first reading, the reading was discarded and further samplings were taken.
- The duplicate water samples for physical and chemical analysis were stored into a pre-labelled high-density polyethylene (HDPE) bottle pre-rinsed with the same water samples. The sample bottles were then packed in a cool-box (cooled to 4°C without being frozen) and delivered to a HOKLAS Laboratory for analysis upon the completion of each round of sampling.
- In addition, field information such as the general meteorological conditions and any observations regarding any significant activities in the vicinity of each monitoring location were also recorded. Major water pollution sources, if any, were identified and recorded.

### *Equipment Calibration*

The equipment deployed for in-situ measurement of marine water quality was calibrated before use. The methodologies for the calibration follow the instruction manuals provided by the corresponding manufacturers. The calibration records are shown in Appendix G.



### *Laboratory Analysis & QA/QC*

The collected marine water samples were analyzed for Suspended Solids with methodologies summarized in Table 4.4.

Table 4.4 Laboratory Analysis Methodologies of Marine Water Samples

<b>Parameter</b>	<b>Method</b>	<b>Limit of Reporting (mg/L)</b>
Suspended Solids	APHA 17 ed 2540 D	1.0

In order to ensure that the laboratory analysis works were carried out properly, stringent QA/QC procedures (which includes the sample preparation as well as the subsequent instrumentation analysis) were followed. According to the requirements stipulated in the EM&A Manual, QA/QC requirements for laboratory testing include:

- 1) "Blind" duplicate samples analysis of 10% collected marine water samples; and
- 2) in-house QA/QC procedures of the testing laboratory (this includes the use of blank, batch duplicates and quality control samples).

#### *Blind Duplicate:*

In order to cross check the precision of the measurement results obtained from the laboratory analysis, "blind" duplicate samples of 10% of the collected marine water samples were analysed alongside the normal samples. The sample codes for the "blind" duplicates were determined by the sampling team and are not identifiable by the laboratory. The results of the "blind" duplicate samples are summarized in Appendix G.

A total of 576 sets of samples (for Suspended Solids analysis) were received during the marine monitoring period including both ebb and flood tides. At least 5% laboratory blanks, batch duplicates, quality control samples and recovery tests for each parameter were conducted. The acceptance criteria are outlined in each type of Quality Control data.

#### *Blank:*

A laboratory blank is an analyte free matrix to which all reagents are added in the same volumes or proportions as used in the standard sample preparation to monitor contamination introduced in laboratory. All the laboratory blank values and acceptance criterion of suspended solids are summarized in Appendix G.

#### *Batch Duplicate:*

Batch duplicate is an intra-laboratory split sample randomly selected from the sample batch to monitor the method precision in a given matrix. The acceptance limit of duplicate values of suspended solids and their duplicate results are summarized in Appendix G.

*Quality Control Sample:*

The quality control sample is the analysis of a material with a known concentration of contaminants to determine the accuracy of results in a given matrix. The quality control samples results for suspended solids are shown in Appendix G.

The QA/QC results in Appendix G indicated that the laboratory analysis works of the collected marine water samples were properly carried out and the measurement results obtained were valid in accordance with the Hong Kong Laboratory Accreditation Scheme (HOKLAS) requirements. On the other hand, the “blind” duplicate measurement results indicated that the precision of the measurements for Suspended Solids are in compliance with the HOKLAS requirements.

#### **4.6 Results and Observations**

Due to adverse weather conditions, the marine water monitoring work on 11<sup>th</sup> September 2002 was rescheduled to 19<sup>th</sup> September 2002. Other than that, the post-project monitoring was conducted as scheduled in the reporting month. All monitoring data and graphical presentation of the monitoring results are provided in Appendix F. There was no Action / Limit Level exceedance for water quality in the reporting month. Final EM&A summary on marine water quality around the construction site will be provided in the forthcoming annual EM&A report (2002).

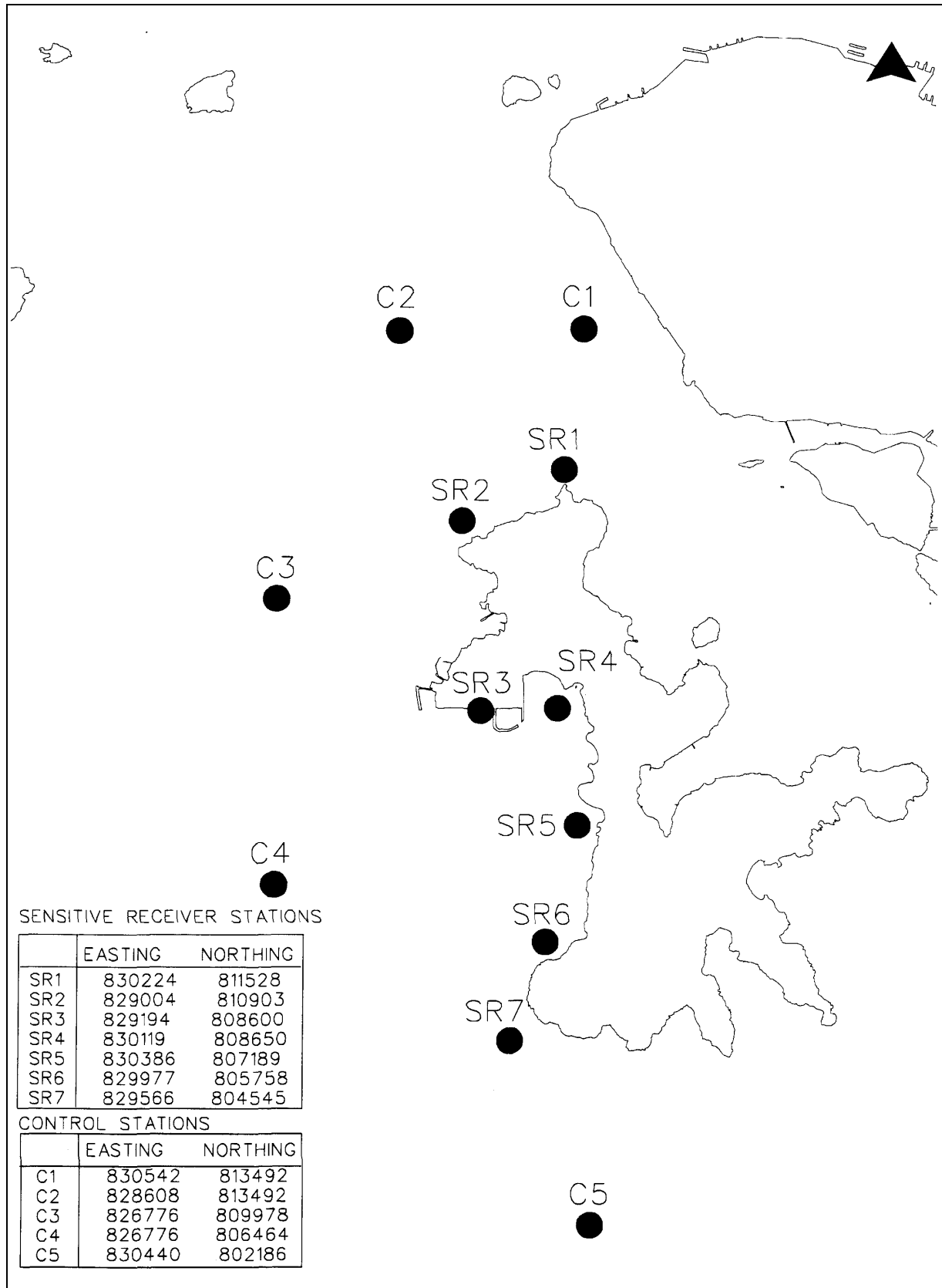


Figure 4.1 Location of Water Quality Monitoring Stations

## 5. ENVIRONMENTAL AUDIT

### 5.1 Review of Environmental Monitoring Procedures

The environmental monitoring procedures were regularly reviewed by the Environmental Team. No modification to the existing monitoring procedures was recommended.

### 5.2 Assessment of Environmental Monitoring Results

#### *Monitoring results for Air Quality, Noise and Water Quality*

The environmental monitoring results for Air Quality, Noise and Water Quality in the reporting month presented in sections 2,3 and 4 respectively are summarized in Table 5.1.

Table 5.1 Summary of AL Level Exceedances on Monitoring Parameters

Item	Parameter Monitored	Monitoring Period	No. of Exceedances In		Event/Action Plan Implementation Status and Results
			Action Level	Limit Level	
Air					
1	Ambient TSP (24-hour)	01/09/02-30/09/02	0	0	
2	Ambient TSP (1-hour)	01/09/02-30/09/02	0	0	
Noise					
1	Noise level at the critical NSR's predicted by the noise alarm monitoring system	01/09/02-30/09/02	0	2	Two marginal noise Limit level exceedances were recorded at NSR at Long Tsai Tsuen/Hung Shing Ye on 5/9/2002 01:25-01:35. Please refer to Section 3 for the detail actions taken.
2	Manual noise monitoring at the Pak Kok Tsui residences	01/09/02-30/09/02	N/A	N/A	Hoarding works at Pak Kok Tsui were completed on 11/5/2002. Civil works would tentatively commence in November. Manual noise monitoring was suspended during the period from 12/5/2002 to 30/9/2002.
Water					
1	DO (Surface & Middle)	01/09/02-19/09/02	0	0	

Item	Parameter Monitored	Monitoring Period	No. of Exceedances In		Event/Action Plan Implementation Status and Results
			Action Level	Limit Level	
2	DO (Bottom)	01/09/02-19/09/02	0	0	
3	SS	01/09/02-19/09/02	0	0	
4	Turbidity	01/09/02-19/09/02	0	0	

### *Waste Management Records*

The estimated amounts of different types of waste generated in September 2002 are shown in Table 5.2.

Table 5.2 Estimated Amounts of Waste Generated in September 2002

Waste Type	Examples	Estimated Amount
General Refuse	Domestic wastes collected on site	6.7 Ton
Recycled Paper	Domestic wastes collected on site	5 kg
Aluminum Cans	Domestic wastes collected on site	5 kg

### **5.3 Site Environmental Audit**

Site audits were carried out by ET on a weekly basis to monitor environmental issues at the construction sites to ensure that all mitigation measures were implemented timely and properly. The site conditions were generally satisfactory. All required mitigation measures were implemented. The weekly site inspection results are attached in Appendix I.

### **5.4 Status of Environmental Licensing and Permitting**

All permits/licenses obtained for the project are summarised in Table 5.3.

Table 5.3 Summary of Environmental Licensing and Permit Status

Description	Permit No.	Valid Period		Highlights	Status
		From	To		
Varied Environmental Permit	EP-071/2000/B	13/07/01	-	The whole construction work site.	Valid

Description	Permit No.	Valid Period		Highlights	Status
		From	To		
Construction Noise Permit	GW-UW0076-02	17/04/02	09/09/02	8 groups (A-H) of PME's are assigned.  Only one group can be used. Group G and H shall not be operated between 23:00 and 07:00 on next day.	Superseded
Construction Noise Permit	GW-UW0099-02	07/05/02	06/11/02	Operation of specified PME's allowed during the restricted hour (23:00-07:00 on next day). 2 groups of PME's are assigned and only one group can be used.	Valid
Construction Noise Permit	GW-UW0191-02	22/07/02	14/01/03	Operation of specified PME's allowed during the restricted hours (07:00-23:00 on holidays and 19:00-23:00 on all other days)	Valid
Construction Noise Permit	GW-UW0262-02	10/09/02	09/03/03	8 groups (A-H) of PME's are assigned.  Only one group can be used. Group G and H shall not be operated between 23:00 and 07:00 on next day.	Valid
Registration of Chemical Waste Producer	WPN5213-912-G1050-01	01/06/02	-	Unit L9 piling foundation work.	Valid
Dumping Permit	EP/MD/03-002	12/06/02	11/12/02	Dumping at South Cheung Chau Disposal Area; Unit L9 piling foundation work.	Valid
Dumping Permit	EP/MD/03-075	14/09/02	13/01/03	Dumping at South Cheung Chau Disposal Area; Main & East bridge – bored pile foundation	Valid
Waste Water Discharge Licence	EP742/912/006414I	10/6/02	30/6/07	Socketted H-piling works	Valid
Waste Water Discharge Licence	EP742/912/006634I	16/7/02	31/7/07	Bored piling works	Valid

## 5.5 Implementation Status of Environmental Mitigation Measures

Mitigation measures detailed in the permits and the EM&A Manual (Construction Phase) are required to be implemented. An updated summary of the Environmental Mitigation Implementation Schedule (EMIS) is presented in Appendix J.

## 5.6 Implementation Status of Event/Action Plans

The Event/Action Plans for air quality, noise and water quality extracted from the EM&A Manual (Construction Phase) and the review report on marine water quality monitoring are presented in Appendix H.

The exceedances were caused by the construction contractor who used the loudspeaker in the tug boat for communication. Contractors have been reminded again to prohibit the use of any loudspeaker within the site during the restricted hours. With the implementation of the remedial measures, it is believed that the possible noise problems arising from the use of loudspeaker could be alleviated. EPD, IEC and the construction contractor have been informed of the exceedances accordingly as per the requirements in the EM&A Manual.

## 5.7 Implementation Status of Environmental Complaint Handling Procedures

In September 2002, no complaint against the construction activities was received.

Table 5.4 Environmental Complaints / Enquiries Received in September 2002

Case Reference / Date, Time Received / Date, Time Concerned	Descriptions /Actions Taken	Conclusion / Status
Nil	N/A	N/A

Table 5.5 Outstanding Environmental Complaints / Enquiries Received Before

Case Reference / Date, Time Received / Date, Time Concerned	Descriptions /Actions Taken	Conclusion / Status
Nil	N/A	N/A

## **6. FUTURE KEY ISSUES**

### **6.1 Status of Natural Gas supply**

Based on current project schedule, HEC anticipates there is no delay in the supply of natural gas.

### **6.2 Key Issues for the Coming Month**

Key issues to be considered in the coming month include:

#### Site Formation

##### *Noise Impact*

- To continue monitoring the noise level during construction and to ensure compliance with the CNP's already obtained.
- To continue the preventive measures for noise exceedance and keep monitoring/reviewing the performance.

##### *Water Impact*

- To provide de-silting utilities for wastewater before discharge from the piling works.

HEC shall continue to exercise good site practice to ensure acceptable seawater quality. Every effort will be made to eliminate impact on seawater.

#### Transmission System

##### *Terrestrial Ecology Impact*

- To closely monitor the construction activities, if any, in order to avoid disturbance to the rare plants;
- To provide temporary fire fighting equipment for prevention of fire within the work sites.

#### Unit L9 Piling Foundation

##### *Noise Impact*

- To continue monitoring the noise level during construction and to ensure compliance with the CNPs already obtained.
- To continue the preventive measures for noise exceedance and keep monitoring/reviewing the performance.



*Air Impact*

- To spray water on the ground and road surface to prevent dust emission.
- To continue monitoring and reviewing the emission of smoke from construction machines.

*Water Impact*

- To recycle wastewater during the bored piling and interface coring works.

*Waste Management*

- To implement the Waste Management Plan.

### **6.3 Monitoring Schedules for the Next 3 Months**

According to the EIA Report (Volume 2, Part F Section 5.1.1 Page 17), marine water quality monitoring has been carried out during the dredging operations. As water quality impact is further minimized after the closure of the seawall on 30/7/2002, impact monitoring work is no longer required and therefore has been terminated on 31 July 2002. The removal of silt curtains was completed on 21 August 2002. Post project monitoring work was started in August 2002 in the same manner as impact monitoring work and was completed on 19/9/2002.

The hoarding works for the construction of transmission system at Pak Kok Tsui were completed on 11/5/2002. The civil works would tentatively commence in November 2002. As there was no construction work during the period from 12/5/2002 to end September 2002, the manual noise monitoring at Pak Kok Tsui was suspended in September 2002. The tentative environmental monitoring schedules for the next 3 months are shown in Appendix C.

### **6.4 Construction Program for the Next 3 Months**

The tentative construction program for the next 3 months is shown in Appendix K.

## 7. CONCLUSION

All environmental monitoring and site inspection were performed as scheduled in the reporting month. All monitoring results were checked and reviewed.

No Action/Limit level exceedance on 1-hour and 24-hour TSP level was recorded in the reporting month.

Two marginal noise limit level exceedances were recorded at NSR at Long Tsai Tsuen/Hung Shing Ye on 5/9/2002 01:25-01:35. The exceedances were caused by the construction contractor who used the loudspeaker in the tug boat for communication. Necessary actions have been taken to prevent it from occurring.

No Action/Limit level exceedance on water quality parameters was recorded in the reporting month.

Environmental mitigation measures recommended in the EM&A manual for the construction activities were implemented in the reporting month. No complaint against the construction activities was received in the reporting month. No prosecution was received for this Project in the reporting period.

Except the two marginal limit level exceedances on noise issue caused by the construction contractor, the environmental performance of the Project was generally satisfactory.