

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



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

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

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

Report Title Monthly EM&A Report  
(April 2001)

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## **EXECUTIVE SUMMARY**

The site formation work for Lamma Extension started on 2<sup>nd</sup> April 2001 and the actual dredging work was conducted on 12<sup>th</sup> April 2001. This is the first 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 April 2001.

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.

### **Environmental Monitoring Works**

One marine water quality monitoring on 11<sup>th</sup> April 2001 was cancelled due to adverse weather conditions. Except this, all monitoring work at designated stations was performed on schedule in the reporting period.

#### *Air Quality*

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

#### *Noise*

Construction work was carried out during the restricted hours including evening time and holidays (effective from 2<sup>nd</sup> April 2001) and night-time (effective from 24<sup>th</sup> April 2001). Four cases of Limit level exceedances on 5-min Leq noise level were reported at Long Tsai Tsuen/Hung Shing Ye in the reporting month. It is suspected that two of them were caused by birds' activities. As the limit level exceedances were not related to construction activities, no further action can be devised.

#### *Water Quality*

A total of twenty-eight cases of Action level exceedances and seventeen cases of Limit Level exceedance for water quality were recorded in the reporting month. All of these exceedances were considered not related to site activities. No further action was required.

### **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/A	22/12/00	-	HEC	22/12/00
Construction Noise Permit	GW-UW0109-01	02/04/01	01/10/01	Contractor	31/03/01
	GW-UW0163-01	24/04/01	08/10/01	Contractor	24/04/01
Dumping Permit	EP/MD/01-174	07/04/01	06/10/01	Contractor	27/03/01

### Implementation Status of Environmental Mitigation Measures

Environmental mitigation measures for the dredging activities were implemented in the reporting month.

### Environmental Complaints

No complaint was received in the reporting month.

### Concluding Remarks

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/A, an EM&A programme for impact environmental monitoring as 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 following outlines the key elements of the Project including the construction activities associated with the transmission system and submarine gas pipeline.

- 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 April 2001

### **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

The site formation work for Lamma Extension started on 2<sup>nd</sup> April 2001 and the actual dredging work commenced on 12<sup>th</sup> April 2001. Construction activities undertaken during the reporting month were dredging and dumping of dredged mud. A Layout Plan showing the dredging locations for the Project is shown in Figure 1.1. The total volume of dredged material from 12<sup>th</sup> to 30<sup>th</sup> April 2001 was 214,132m<sup>3</sup>. No filling activities were undertaken in the month. Uncontaminated materials were dumped at the assigned location within the South Cheung Chau Spoil Disposal Area and the total dumped volume in April 2001 was 214,132m<sup>3</sup>. Figure 1.2 shows all dumping locations for this project. Daily records of dredged / dumped volume are presented in Appendix B.

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 K.

Table 1.1 Construction Activities and Their Corresponding Environmental Mitigation Measures

Item	Construction Activities	Environmental Mitigation Measures
1	Dredging	The following mitigation measures related to dredging have been implemented:  a. Installation of silt curtains; b. Allowable equipment configuration and maximum rates of dredging; c. Appropriate procedures for preventing leakage/spillage of dredged materials during loading and transport; d. Dredging equipment equipped with silencers or mufflers.



## **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.

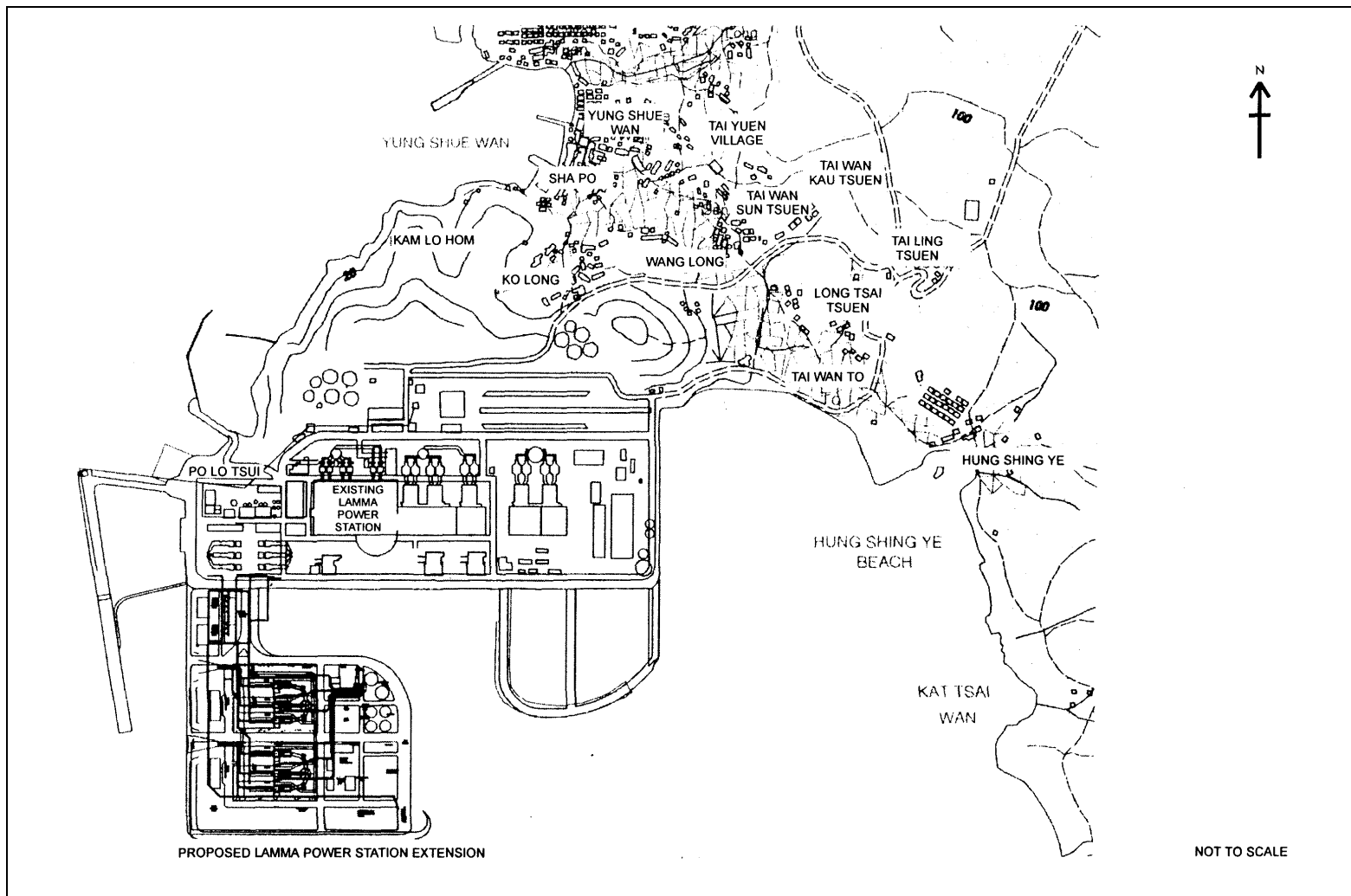


Figure 1.1 Layout of Work Site

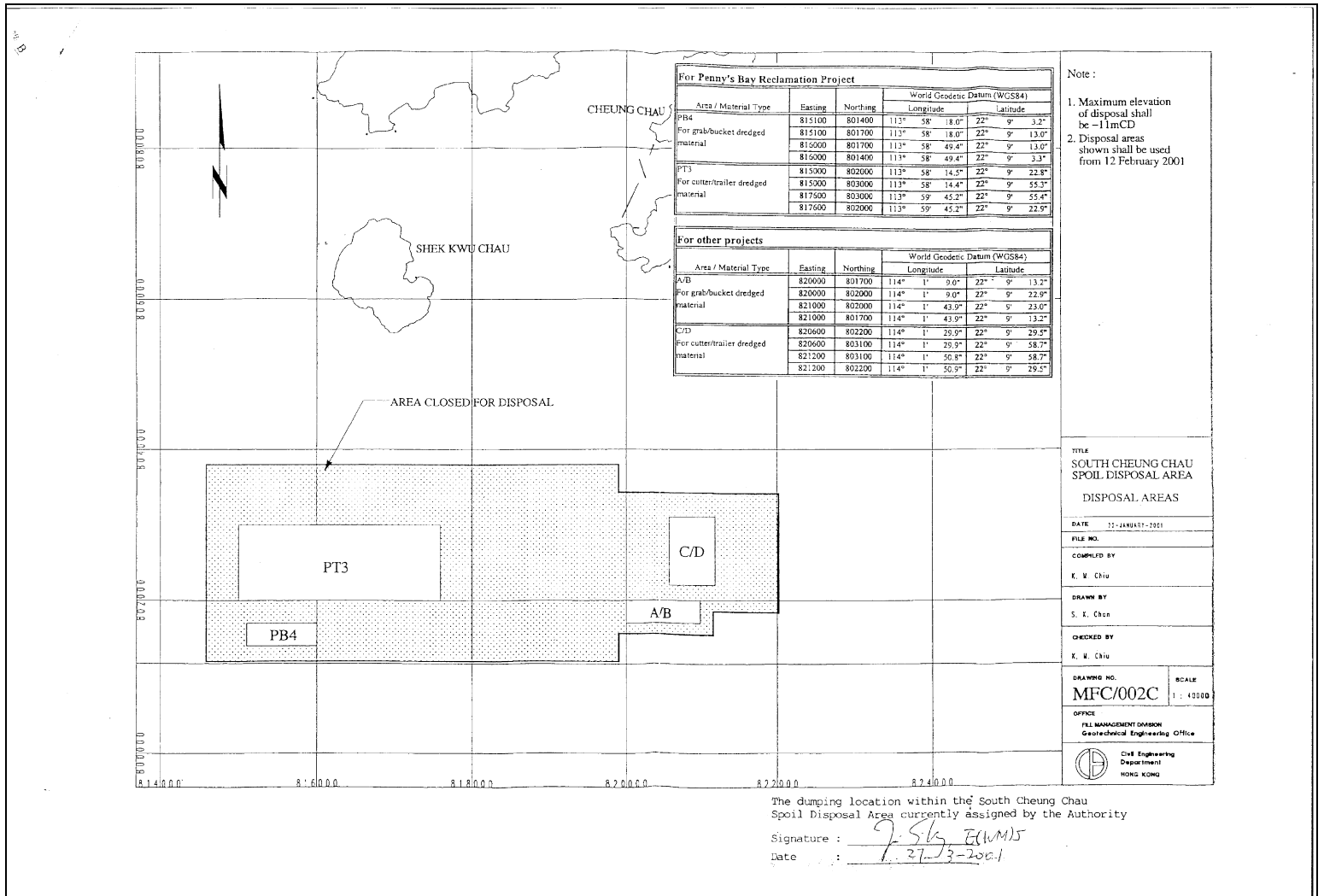


Figure 1.2 Location of Dumping Area

## 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 C 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) whereas 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

Location I.D.	Description
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 the 1-hour TSP monitoring at AM1, AM2 and AM3. Table 2.2 summarises the equipment used in the 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 D.

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 times every 6 days
	24-hour TSP	24	Once every 6 days
AM2	1-hour TSP	1	3 times every 6 days
	24-hour TSP	24	Once every 6 days
AM3	1-hour TSP	1	3 times 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 made to ensure that no pinholes, tears and creases were found;
- 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 should be tightened firmly to avoid leakage;
- A new flow record chart was set into the flow recorder;
- The programmable timer was set for the next sampling period of 24 hrs  $\pm$  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 H.

## 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 E. Key findings and observations are provided as 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 Levels was reported in the month.

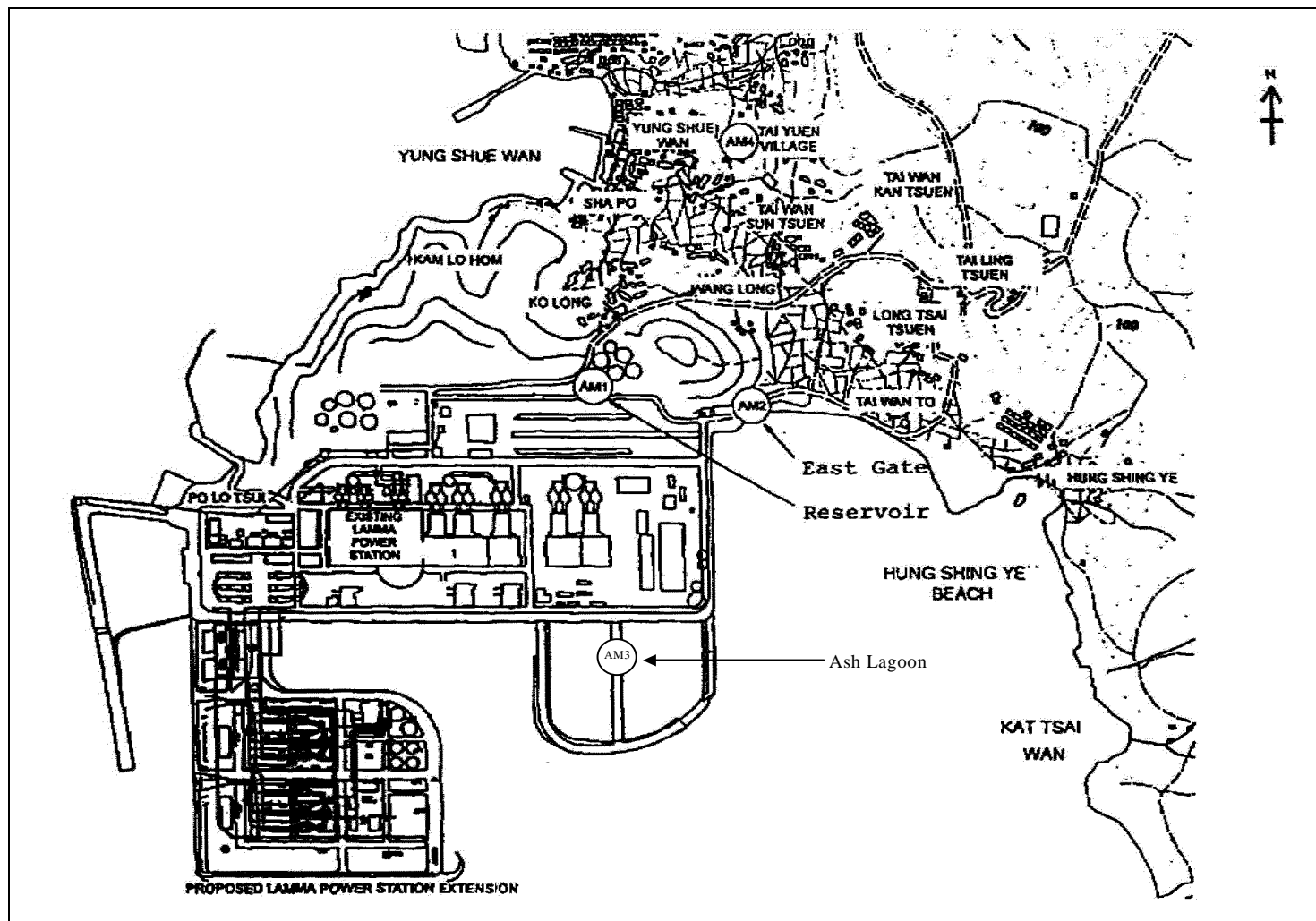


Figure 2.1 Location of Air Quality Monitoring Stations



### 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 at Long Tsai Tsuen/Hung Shing Ye and the school within the village of Tai Wan San Tsuen. The noise impact monitoring data for construction noise other than percussive piling were checked against the limit levels as specified in the EM&A Manual. With the availability of the two construction noise permits on 2/4 and 24/4 respectively, impact monitoring for the construction work during the restricted hours was also carried out. Section 5 presents the details of the construction noise permits.

As there were no activities for the construction of the transmission system, no manual noise measurement at the Pak Kok Tsui residences was carried out in the reporting month. Appendix C shows the established Action/Limit Levels for noise.

#### 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

<b>Equipment</b>	<b>Model</b>
Sound level meter	Rion NA-27
Calibrator (IEC 60942 Class 1)	Rion NC-74

### 3.4 Monitoring Parameters, Frequency and Duration

Continuous noise 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 Ching Lam	Daytime: 0700-1900 hrs on normal weekdays	Daytime: 30 minutes	30-min $L_{Aeq}$
	Evening-time & holiday *: 0700-2300 hrs on holidays; and 1900-2300 hrs on all other days	Evening-time & holiday: 5 minutes	5-min $L_{Aeq}$
	Night-time *: 2300-0700 hrs of next day	Night-time: 5 minutes	5-min $L_{Aeq}$

\* Noise monitoring is only carried out after the CNP was effective

### 3.5 Monitoring Procedures and Calibration Details

#### *Monitoring Procedures*

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 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%.

The Environmental Team, when calibrating the noise measuring equipment, recorded all observations around the monitoring stations, which might have affected the monitoring results.

#### *Equipment Calibration*

Monthly calibration of the noise measuring equipment was carried out. Calibration details are shown in Appendix H.

The sound level meters and calibrators were verified by the manufacturer. A copy of calibration certificates is shown in Appendix H.

### 3.6 Results & 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 F.

Based on monitoring results, four cases of noise limit level exceedances were estimated for Long Tsai Tsuen/Hung Shing Ye in the reporting month. Details are summarised as follows:

Date	Time	Cause	Action taken
8/4/2001	13:05-13:15	Two limit level exceedances on noise at Long Tsai Tsuen/Hung Shing Ye was recorded (measured noise level: 66 and 63dBA; Limit noise level: 60dBA). As there was no dredging work on that day, the exceedances were not related to the construction work. Hence no further action was required.	The construction contractor was informed of the limit level exceedances for investigation of the causes on 17/4/2001. IEC and EPD were informed of the exceedances on 27/4/2001.
30/4/2001	05:10-05:15	One marginal limit level exceedance on noise at Long Tsai Tsuen/Hung Shing Ye was recorded (measured noise level: 46dBA; Limit noise level: 45dBA). After investigation, it is suspected that the limit level exceedance was caused by birds' activities as birds were seen to gather around the noise monitoring station early in the morning. Measures to deter birds are being devised.	The construction contractor was informed of the limit level exceedance for investigation of the causes on 5/5/2001. IEC and EPD were informed of the exceedance on 11/5/2001.
1/5/2001	06:40-06:45	One marginal limit level exceedance on noise at Long Tsai Tsuen/Hung Shing Ye was recorded (measured noise level: 46dBA; Limit noise level: 45dBA). After investigations, it is suspected that the limit level exceedance was caused by birds' activities as birds were seen to gather around the noise monitoring station early in the morning. Measures to deter birds are being devised.	The construction contractor was informed of the limit level exceedance for investigation of the causes on 5/5/2001. IEC and EPD were informed of the exceedance on 11/5/2001.

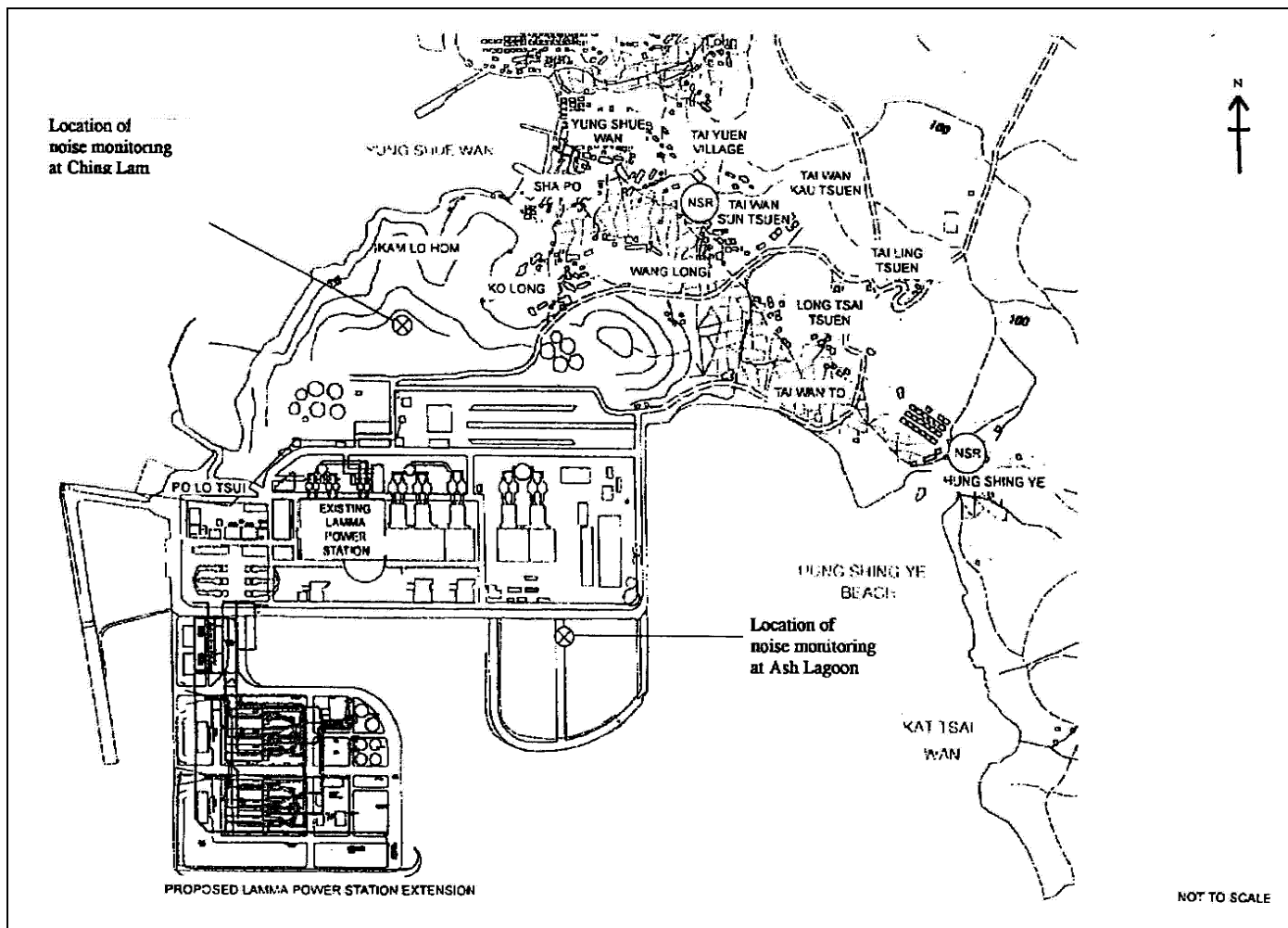


Figure 3.1 Location of Noise Monitoring Stations

## 4. WATER QUALITY MONITORING

### 4.1 Monitoring Requirements

Marine water quality monitoring at the monitoring locations adjacent to the dredging and filling operations for Lamma Extension was carried out by a monitoring consultant, HKPC. The purpose was to ensure that any deterioration of water quality could be detected and that timely action would be taken to rectify the situation. The impact monitoring data were checked against the AL levels as 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. Appendix C shows the established Action/Limit Levels for water quality.

### 4.2 Monitoring Locations

A total of twelve water quality monitoring locations were selected. 7 Sensitive Receiver (SR) stations were chosen on the basis of their proximity to the dredging and filling operations, 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 baseline water-quality monitoring programme.

Table 4.2 Water-Quality Monitoring Equipment

Equipment	Detection Limit
YSI 6820 Water Quality Monitor	Temperature: -5 to 50 °C; +/- 0.15 °C Salinity: 0 to 70 ppt; +/- 0.2 ppt Dissolved Oxygen: 0 to 200%; +/- 0.5% 0 to 20 mg/L; +/- 0.2 mg/L Turbidity: 0 to 100 and 100 to 1000 NTU; +/- 5% of the range pH: 0 to 14 units; +/- 0.2 units
Trimble NT200 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 D.

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, °C</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> <li>• Total inorganic nitrogen, mg/L</li> <li>• Un-ionised ammonia, mg/L</li> </ul>	Three times per week	3 Surface, Mid-Depth and Bottom	2 Mid-ebb and Mid-flood

For laboratory analysis of marine water samples collected at SR3, only SS parameter was measured.

## 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 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 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, would be 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 H.

### *Laboratory Analysis & QA/QC*

The collected marine water samples were analyzed for Suspended Solids, Total Inorganic Nitrogen and Unionized Ammonia with methodologies as 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
Total Inorganic Nitrogen	APHA 18 ed 4500 NO <sub>2</sub> B & NO <sub>3</sub> E + APHA 17ed 4500-NH <sub>3</sub> B, E	0.01
Ammoniacal Nitrogen (Un-ionized Ammonia)	APHA 17 ed 4500-NH <sub>3</sub> G	0.01 (Limit of Reporting for Ammoniacal Nitrogen) x degree of ionization

Note: The determination of unionized ammonia was based on the articles entitled “Aqueous Ammonia Equilibrium Calculation: Effect of pH and Temperature” and “Ionization of Ammonia in Seawater: Effects of Temperature, pH and Salinity” which was accepted by EPD.

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 as 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, quality control samples and matrix spike recovery test).

#### 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 H.

In accordance with the QA/QC procedures of Environmental Management Laboratory of HKPC, QA/QC procedures shall be conducted for at least 5% of samples. A total of 792 sets of samples (for Total Inorganic Nitrogen and Unionized Ammonia) and 864 sets of samples (for Suspended Solids analysis) were received during the marine monitoring period including both ebb and flood tides. Therefore 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. The acceptance criterion for laboratory blank in Environmental Management Division (EMD) Laboratory of HKPC stipulated in EMD Quality Manual is less than the detection limit. All the laboratory blank values and acceptance criterion of the following testing parameter are summarized in Appendix H.

- Suspended Solids
- Unionized Ammonia
- Total Inorganic Nitrogen

#### 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 the following testing parameters and their duplicate results are summarized in Appendix H.

- Suspended Solids
- Unionized Ammonia
- Total Inorganic Nitrogen

#### Quality Control Sample:

The quality control sample is the analysis of material with a known concentration of contaminants to determine the accuracy of results in a given matrix. The quality control samples are not applicable to all testing parameters due to the constraints of the testing parameters. The quality control samples results for the following testing parameters are shown in Appendix H.

- Unionized Ammonia
- Total Inorganic Nitrogen

Quality control sample testing is not applicable to the testing of Suspended Solids.

### Matrix Spike:

Matrix spike is an intra-laboratory split of a sample digested spiked with target known concentration analyte to determine method bias in a given matrix. The matrix spike is applicable to the following tests:

- Unionized Ammonia
- Total Inorganic Nitrogen

Matrix spike testing is not applicable to testing of Suspended Solids. The matrix spike samples results are shown in Appendix H.

The QA/QC results in Appendix H 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, Total Inorganic Nitrogen and Unionized Ammonia are in compliance with the HOKLAS requirements.

## 4.6 Results and Observations

Marine water monitoring was conducted as scheduled in the reporting month except the monitoring on 11<sup>th</sup> April 2001 which was cancelled due to adverse weather. All monitoring data and graphical presentation of the monitoring results are provided in Appendix G. Key findings and observations are provided in the following tables:

Summary of Exceedances in Dissolved Oxygen (Surface and Middle) in April 2001

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
2nd April	0	0	N. A.
4th April	0	0	N. A.
6th April	0	0	N. A.
9th April	0	0	N. A.
13th April	0	0	N. A.
16th April	0	0	N. A.
18th April	0	0	N. A.
20th April	0	0	N. A.
23rd April	0	0	N. A.
25th April	0	0	N. A.
27th April	0	0	N. A.
30th April	0	0	N. A.

Summary of Exceedances in Dissolved Oxygen (Bottom) in April 2001

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
2nd April	0	0	N. A.
4th April	0	0	N. A.
6th April	0	0	N. A.
9th April	0	0	N. A.
13th April	0	0	N. A.
16th April	0	0	N. A.
18th April	0	0	N. A.
20th April	0	0	N. A.
23rd April	0	0	N. A.
25th April	0	0	N. A.
27th April	0	0	N. A.
30th April	0	0	N. A.

Summary of Exceedances in Turbidity (Depth Average) in April 2001

Monitoring Dates	No. of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
2nd April	0	0	N. A.
4th April	0	0	N. A.
6th April	0	0	N. A.
9th April	0	0	N. A.
13th April	0	0	N. A.
16th April	0	0	N. A.
18th April	0	0	N. A.
20th April	0	0	N. A.
23rd April	0	0	N. A.
25th April	0	0	N. A.
27th April	0	0	N. A.
30th April	0	0	N. A.

Summary of Exceedances in Suspended Solids (Depth Average) in April 2001

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
2nd April	0	0	N. A.
4th April	0	0	N. A.
6th April	0	1 (SR1 at mid flood tide)	Not related to site activities since no dredging and reclamation works were carried out
9th April	0	0	N. A.
13th April	0	0	N. A.
16th April	0	0	N. A.
18th April	0	0	N. A.
20th April	0	0	N. A.
23rd April	0	0	N. A.
25th April	1 (SR1 at mid flood)	0	Not related to site activities since SR1 was located at the upstream of the study area during the sampling
27th April	0	0	N. A.
30th April	0	1 (SR1 at mid flood)	Not related to site activities since the results at SR2, located upstream of SR1, was much lower than the result at SR1 suggesting that the background fluctuation is significant

Summary of Exceedances in Unionized Ammonia (Depth Average) in April 2001

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
2nd April	0	0	N. A.
4th April	1 (SR6 at mid ebb tide)	0	Not related to site activities since no dredging works were carried out
6th April	1 (SR2 at mid ebb tide)	0	Not related to site activities since no dredging works were carried out
9th April	0	0	N. A.
13th April	0	0	N. A.
16th April	0	0	N. A.
18th April	0	0	N. A.
20th April	0	0	N. A.
23rd April	5 (SR1, SR2, SR5, SR7 during mid ebb; SR2 during mid flood)	0	<p>The exceedances at SR1 and SR2 during ebb tide were not related to site activities since they were located upstream of the site works activities during the sampling.</p> <p>The exceedances at SR5 and SR7 during mid ebb tide were not related to site activities. By reviewing the literature data of EPD in 1999, the range of SS in the vicinity of the said stations (i.e. SM5) was &lt;0.001 to 0.003, therefore the elevated measurement results might be due to the background fluctuation of the study area.</p> <p>For the elevated measurement result at SR2 during flood tide, the routine monitoring results on 25/4/01 at the flood tide was used for result confirmation purpose and it was below the Action Level. Therefore, it is considered that the elevated measurement result at SR2 during flood tide might be due to the background fluctuation.</p>
25th April	1 (SR2 at mid ebb)	0	The exceedance was not related to site activities. It was rainy during sampling and SR2 was located quite close to the shore. Therefore, it would be expected that the water quality at SR2 was significantly affected by the surface runoff from the shore.
27th April	8 (SR1,SR4, SR5, SR6 & SR7 at mid ebb; (SR2, SR5 & SR6 at mid flood)	2 (SR2 at mid ebb; SR7 at mid flood)	Measurement results at control stations were notably high (some measurements even higher than the impact station results) indicating that the background concentrations were already high. In addition, based on the site diary there was no significant increase in the magnitude of construction works at the site area. On the other hand, as recorded from the AFCD that red tide occurred in HK waters on 25 <sup>th</sup> April suggesting that the elevated measurement results might be due to the background fluctuation. Taking the above into account, the said exceedances were considered not related to site activities.

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
30th April	7 (SR4, SR5, SR6 & SR7 during mid ebb; SR5, SR6 and SR7 during mid flood)	0	Measurement results at control stations were found to be higher than the impact stations results suggesting that the background concentration were high. The said exceedances were considered not related to site activities. However, it was found that the magnitude of exceedances have decreased as compared with the results on 27 <sup>th</sup> April 2001.

Summary of Exceedances in Total Inorganic Nitrogen (Depth Average) in April 2001

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
2nd April	0	0	N. A.
4th April	0	0	N. A.
6th April	0	0	N. A.
9th April	1 (SR4 at mid flood)	1 (SR4 at mid ebb)	Not related to site activities since no dredging works were carried out
13th April	0	0	N. A.
16th April	0	0	N. A.
18th April	0	0	N. A.
20th April	0	0	N. A.
23rd April	0	0	N. A.
25th April	0	1 (SR2 at mid ebb)	The exceedance was not related to site activities. It was rainy during sampling and SR2 was located quite close to the shore. Therefore, it would be expected that the water quality at SR2 was significantly affected by the surface runoff from the shore.
27th April	1 (SR4 at mid ebb)	9 (SR1, SR2, SR5, SR6 & SR7 during mid ebb; SR2, SR5, SR6 and SR7 during mid flood)	Measurement results at control stations were notably high (some measurements even higher than the impact station results) indicating that the background concentrations were already high. In addition, based on the site diary there was no significant increase in the magnitude of construction works at the site area. On the other hand, as recorded from the AFCD that red tide occurred in HK waters on 25 <sup>th</sup> April 2001 suggesting that the elevated measurement results might be due to the background fluctuation. Taking the above into account, the said exceedances were considered not related to site activities.
30th April	2 (SR2 & SR4 during mid ebb)	2 (SR5 & SR6 during mid ebb)	Measurement results at control stations were found to be higher than the impact stations results suggesting that the background concentration were high. The said exceedances were considered not related to site activities. However, it was found that the magnitude of exceedances have decreased as compared with the results on 27 <sup>th</sup> April 2001.

As all of the above exceedances were not related to site activities, no further action need to be devised. Nevertheless, EPD, IEC and the construction contractor have been informed of the exceedances accordingly as per the requirements of the EM&A Manual.

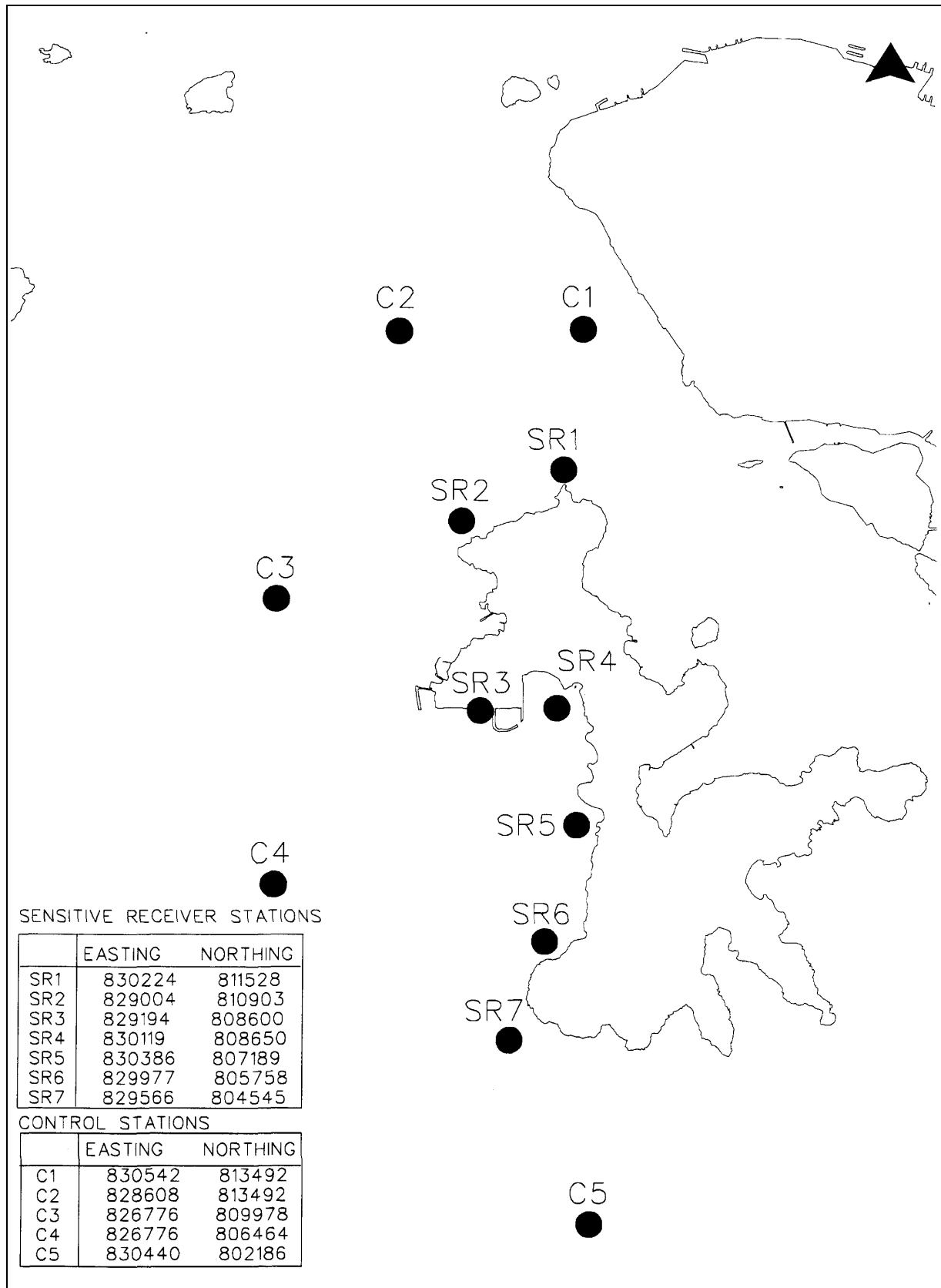


Figure 4.1 Location of Water Quality Monitoring Stations

## 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 April 2001 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)	02/04/01-30/04/01	0	0	
2	Ambient TSP (1-hour)	02/04/01-30/04/01	0	0	
Noise					
1	Noise level at the critical NSR's predicted by the noise alarm monitoring system	02/04/01-30/04/01	0	4	The exceedances were considered not related to the construction site. For details, please refer to section 3 of the report.
2	Manual noise monitoring at the Pak Kok Tsui residences	02/04/01-30/04/01	NA	NA	Construction of transmission system not yet commenced.
Water					
1	DO (Surface & Middle)	02/04/01-30/04/01	0	0	
2	DO (Bottom)	02/04/01-30/04/01	0	0	
3	SS	02/04/01-30/04/01	1	2	The exceedances were considered not related to the construction site. Please refer to section 4 of the report for details.

Item	Parameter Monitored	Monitoring Period	No. of Exceedances In		Event/Action Plan Implementation Status and Results
			Action Level	Limit Level	
4	Turbidity	02/04/01-30/04/01	0	0	
5	NH <sub>3</sub> -N	02/04/01-30/04/01	23	2	The exceedances were considered not related to the construction site. Please refer to section 4 of the report for details.
6	TIN	02/04/01-30/04/01	4	13	The exceedances were considered not related to the construction site. Please refer to section 4 of the report for details.

### *Waste Management Records*

The estimated amounts of different types of waste generated in April 2001 are shown in Table 5.2.

Table 5.2 Estimated Amounts of Waste Generated in April 2001

Waste Type	Description	Estimated Amount (m <sup>3</sup> )
Dredged Materials	Marine Mud	214,132
Construction Waste	Concrete Waste, Used formwork	0
Excavated Materials	Rock and soil	0
General Refuse	Domestic wastes collected on site	1

The total bulk volume of dredged material was 214,132m<sup>3</sup>. No filling took place.

### **5.3 Site Environmental Audit**

EPD officials have inspected the construction site on 4<sup>th</sup> April 2001 and 20<sup>th</sup> April 2001. They were generally satisfied with the environmental performance of the Project. In addition to these, site audits were carried out by ET on a weekly basis to monitor environmental issues on 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 J.

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

All permits/licenses obtained as of April 2001 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/A	22/12/00	-	The whole construction work sites	Valid
Construction Noise Permit	GW-UW0109-01	02/04/01	01/10/01	4 derrick barges, 4 dredger grabs and 6 tug boats for 0700 to 2300 & holiday	Valid
	GW-UW0163-01	24/04/01	08/10/01	2 dredger barges and 1 tug boat for 2300 to 0700 next day	
Dumping Permit	EP/MD/01-174	07/04/01	06/10/01	Dumping at South Cheung Chau Disposal Area	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 K.

### 5.6 Implementation Status of Action/Limit Plans

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

As all the action/limit level exceedances were not related to the construction work, no further action can be devised. Nevertheless, EPD, IEC and the construction contractor have been informed of the exceedances accordingly as per requirements of the EM&A Manual.

### 5.7 Implementation Status of Environmental Complaint Handling Procedures

There was no complaint / enquiry on environmental issues received in April 2001.

Table 5.4 Environmental Complaints / Enquiries Received in April 2001

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:

- Noise from the operating equipment and machinery on-site;
- Accumulation of waste materials on site.

The following mitigation measures are required:

#### *Construction Noise Impact*

- To follow up any exceedance caused by the construction works.

#### *Construction Water Impact*

- To avoid the debris floating/suspending in the sea which may probably be generated during filling works.

#### *Construction Waste Management*

- To check for any accumulation of waste materials or rubbish on site.

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

The tentative environmental monitoring schedules for the next 3 months are shown in Appendix D.

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

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

## 7. CONCLUSION

Environmental monitoring and site inspection were performed on schedule in the reporting month except one marine water quality monitoring which was cancelled on 11<sup>th</sup> April 2001 due to adverse weather. 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.

A total of four cases of limit level exceedance on noise were recorded in the reporting month. It is suspected that two of them were caused by birds' activities. As the limit level exceedances were not related to construction activities, no further action can be devised.

A total of 45 cases of action/limit level exceedance on water quality parameters were recorded in the reporting month. As the action/limit level exceedances were not related to construction activities, no further action can be devised.

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

The environmental performance of the Project was generally satisfactory.