


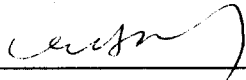
**The Hongkong Electric Co Ltd**  
香港電燈有限公司



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

**ENVIRONMENTAL PERMIT NO. EP-083/2000**

**LAMMA POWER STATION  
CONVERSION OF TWO EXISTING GAS TURBINES (GT5 & GT7) INTO A  
COMBINED CYCLE UNIT  
ENVIRONMENTAL MONITORING & AUDIT PROGRAMME  
AT OPERATIONAL PHASE**

Report Title	<u>Monthly EM&amp;A Report (June 2003)</u>
Date	<u>8 July 2003</u>
Certified by	<u></u> (Mr. Chan Kwok-Fai, Environmental Team Leader)
Verified by	<u></u> (Nature & Technologies (HK) Ltd, Independent Environmental Checker)

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## **EXECUTIVE SUMMARY**

The actual dredging work for the Project “Lamma Navigation Channel Improvement” was conducted on 18<sup>th</sup> June 2003. This is the first monthly Environmental Monitoring and Audit (EM&A) report for the Project prepared by the Environmental Team (ET). This report presents the results of impact monitoring on marine water quality for the said project in June 2003.

Marine water quality monitoring was performed. The results were checked against the established Action/Limit (AL) levels. 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 the project during the reporting month was dredging and dumping of dredged mud. The maximum hourly and daily dredging rates actually achieved by the contractors were within the limits specified in the latest dredging schedule.

### **Environmental Monitoring Works**

All monitoring work at designated stations was performed as scheduled in the reporting period.

#### *Water Quality*

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

### **Site Environmental Audit**

Hopper barge No. 21470V accidentally dumped one barge load of dredged mud at about 1.5km from Lamma Power Station dredging site around 06:30 a.m. on 25/6/2003 due to hydraulic system failure. The hopper was immediately towed away and the incident reported to EPD. (c.f. letter from the contractor to Waste & Water Management Group/EPD dated 26/6/2003). The said hopper barge would not be deployed for any loading or dumping operations until the defects of the barge have been fully rectified. No action/limit level exceedance in water quality was found at all sensitive receivers on 26/6/2003, suggesting that the impact of this incident on the water quality on that area was minimal. This incident has been recorded in the ET Leader’s log-book.

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		
Environmental Permit	EP-0165/2003	08/04/03	-	HEC	08/04/03
Construction Noise Permit	GW-UW0156-03	01/06/03	30/11/03	Contractor	23/05/03
Marine Dumping Permit	EP/MD/04-011	01/06/03	30/09/03	Contractor	22/05/03

### 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 was received in the reporting month.

### Future Key Issues

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

- to continue executing the preventive measures for avoiding noise exceedance and monitoring/ reviewing the noise performance;
- to ensure compliance with the CNP already obtained;
- to keep reviewing the monitoring results and to take necessary actions to ensure the seawater quality;
- to carry out routine inspection and necessary maintenance for the cage-type silt curtains.

### 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 “Lamma Power Station Navigation Channel Improvement” (hereinafter called the “Project”). Under the requirements of Clause 4 of Environmental Permit EP-165/2003, an EM&A programme for impact environmental monitoring is required to be implemented. In accordance with the EM&A Manual, environmental monitoring of water quality and regular environmental audits are required for the Project.

The Project involves restoring the depth of existing channel by dredging to a water depth of -16 mPD approximately with an estimated total dredging volume of 2.98 million m<sup>3</sup>.

The Project Area is illustrated in Figure 1.1. The shaded area shows the region of the Channel where dredging will be required under this Project. According to the latest bathymetric survey of the Channel, there is already sufficient water depth in the remaining section of the Channel in the south (beyond the shaded area in Figure 1.1) and no dredging will be required.

The dredging options for the Project are:

- (1) continuous dredging using grab dredgers with cage-type silt curtains or
- (2) intermittent dredging using one Trailer Suction Hopper Dredger (TSHD).

Only one of these two dredging options will be deployed. The contractor has chosen to adopt the continuous dredging method using grab dredgers with cage-type silt curtains.

This report summarizes the environmental monitoring and audit work for the Project for the month of June 2003.

### **1.2 Project Organisation**

The management structure to oversee the Project includes the following:

- Environmental Protection Department (The Authority);
- Chief Engineer (Projects) (The official contact person between HEC and EPD);
- 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 this Project were dredging and dumping of dredged mud. The total volume of dredged materials from 18<sup>th</sup> to 30<sup>th</sup> June 2003 was 80,670m<sup>3</sup>. Uncontaminated materials were dumped at the designated location within the East Ninepin Disposal Area and the total dumped volume in June 2003 was 80,670m<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 maximum hourly and daily dredging rates actually achieved by the contractors were within the limits specified in the latest dredging schedule.

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 I.

Table 1.1 Construction Activities and Their Corresponding Environmental Mitigation Measures

<b>Construction Activities</b>	<b>Environmental Mitigation Measures</b>
Dredging	<p><b>Water Quality</b></p> <ul style="list-style-type: none"> <li>– Three number of grab dredgers with grab capacity of no less than 8m<sup>3</sup> were operated on site.</li> <li>– Both maximum total hourly and daily dredging rates specified in the latest dredging schedule were strictly followed.</li> <li>– Daily dredging volume was spread as evenly as possible over the 24-hour period.</li> <li>– Cage-type silt curtains were deployed for all grab dredgers.</li> <li>– Grabs were tightly closed and the hoist speed was suitably low.</li> <li>– All barges for transportation of dredged materials were fitted with tight bottom seals.</li> </ul> <p><b>Noise</b></p> <ul style="list-style-type: none"> <li>– General noise mitigation measures were employed at work site throughout the construction phase.</li> <li>– The number of dredgers and operation conditions as specified in the CNP were strictly followed.</li> </ul> <p><b>Dredging Waste</b></p> <ul style="list-style-type: none"> <li>– All vessels for marine transportation of dredged sediment were fitted with tight fitting seals at the bottom openings to prevent leakage.</li> <li>– All vessels were filled to a level such that dredged materials would not spill over during loading and transportation.</li> </ul>

<b>Construction Activities</b>	<b>Environmental Mitigation Measures</b>
	<ul style="list-style-type: none"><li>- Dredged wastes were disposed of at Licensed dumping site – East Ninepin.</li><li>- Records of the quantities of waste generated and disposed of off-site were taken.</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 to avoid the Finless Porpoise habitat area.</li><li>- The dumping of chemicals, rubbish, oils etc. into the water was strictly prohibited.</li></ul>

#### 1.4 Summary of EM&A Requirements

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

The following environmental audits are summarized in Section 3 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 4 of this report.



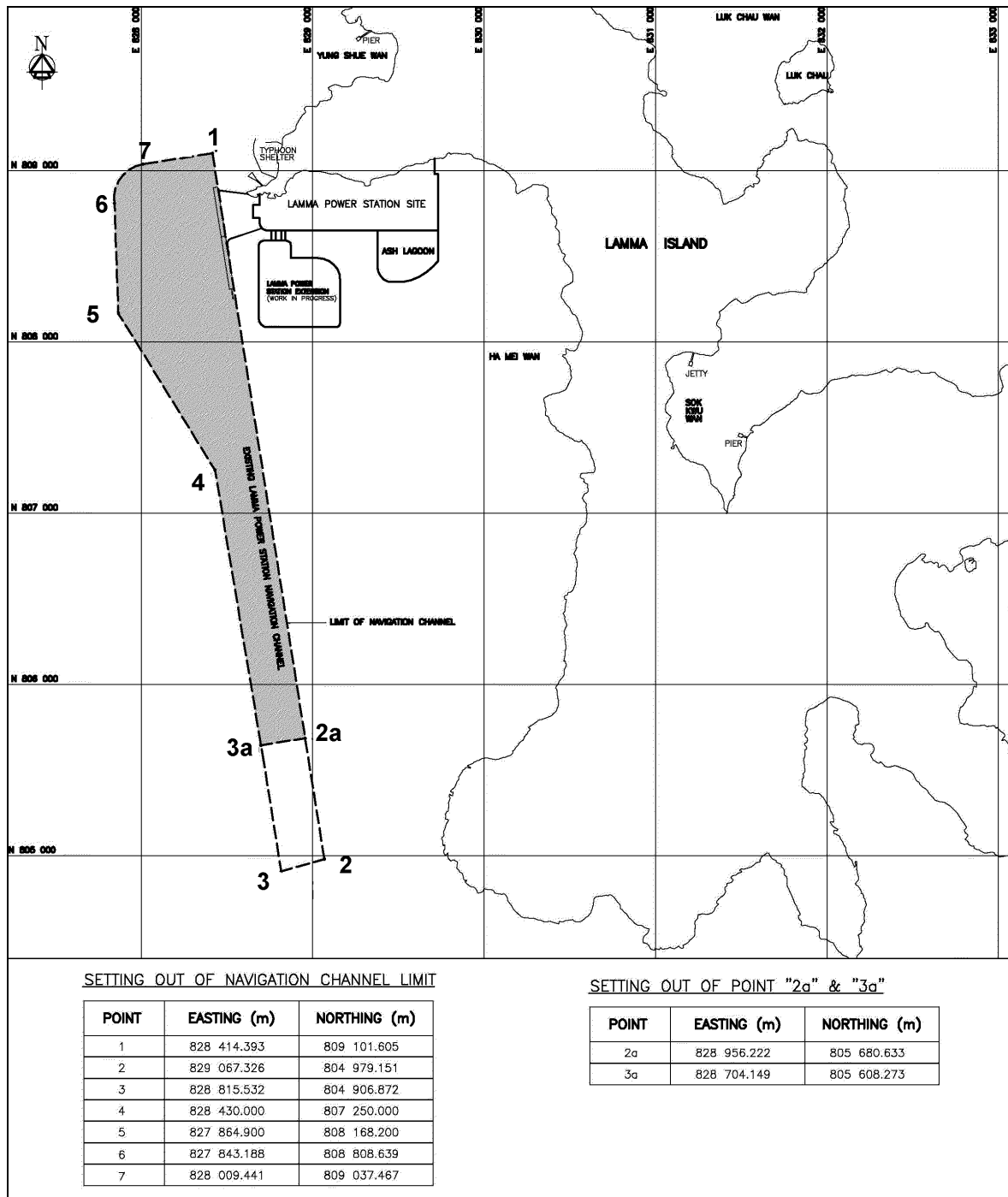


Figure 1.1 Layout of Work Site

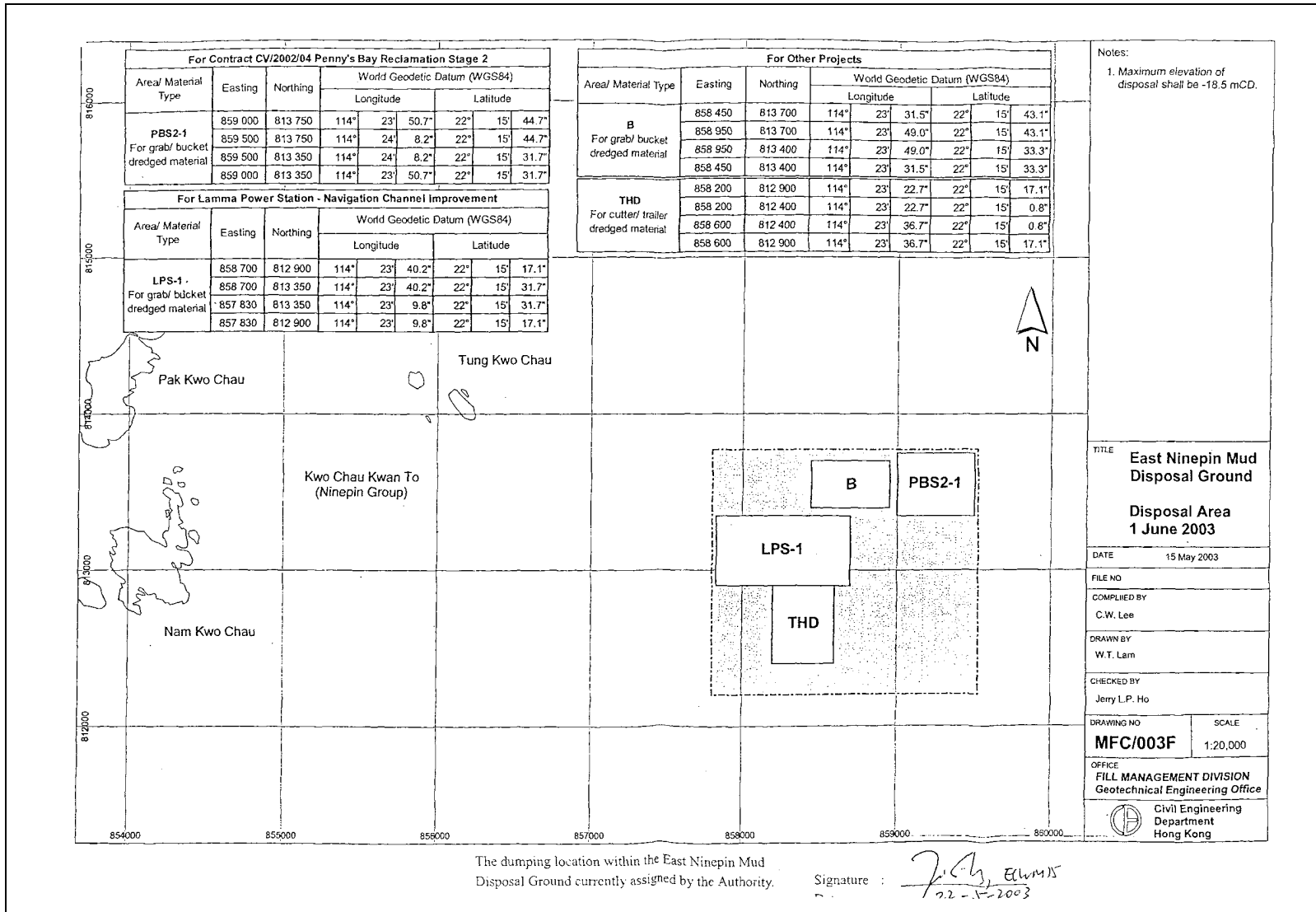


Figure 1.2 Location of Dumping Area

## 2. WATER QUALITY MONITORING

### 2.1 Monitoring Requirements

Marine water quality monitoring at the monitoring locations adjacent to the project area was carried out. The purpose was to ensure that deterioration of water quality, if any, would immediately be detected and that timely action could be taken to rectify the situation. The impact monitoring data were checked against the AL levels set out in the Baseline Monitoring Report (Revision 1).

### 2.2 Monitoring Locations

A total of 10 water quality monitoring locations were selected. 7 Sensitive Receiver (SR) stations were chosen on the basis of their proximity to the construction site. 3 Marine Control stations (CS) as recommended in the EIA were selected to facilitate comparison of the water quality of the SR stations with ambient water quality conditions. Table 2.1 describes the locations of these monitoring stations. Their locations are shown in Figure 2.1.

Table 2.1 Water Quality Monitoring Locations

Type	Monitoring Location	HK Metric Grid E	HK Metric Grid N
<b>Sensitive Receiver Stations</b>	SR6	830 150	811 500
	SR7	829 004	810 903
	SR10	829 194	808 600
	SR11	830 119	808 650
	SR12	830 386	807 189
	SR14	829 977	805 758
	SR15	829 566	804 545
<b>Marine Control Stations</b>	CS1	828 000	813 492
	CS2	825 000	808 000
	CS3	829 000	802 000

## 2.3 Monitoring Equipment

Table 2.2 summarizes the equipment used in the water-quality monitoring programme.

Table 2.2 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 1000 NTU; +/- 5% of the range pH: 0 to 14 units; +/- 0.2 units
Trimble NT300D GPS	Accuracy better than 3m
Eagle Fisheasy ST Portable Depth Finder	Accuracy better than 0.5m

## 2.4 Monitoring Parameters, Frequency and Duration

Table 2.3 summarizes the monitoring parameters, frequencies and total duration of water quality monitoring. The monitoring schedule for reporting month is shown in Appendix D.

Table 2.3 Water Quality Monitoring Parameters and Frequency

Monitoring Stations	Parameters	Frequency	No. of Depths	No. of Samples
Sensitive Receiver Stations SR6, SR7, SR10, SR11, SR12, SR14 & SR15	<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> </ul>	Three times per week	3 Surface, Mid-Depth and Bottom	2 Mid-ebb and Mid-flood
Marine Control Stations CS1, CS2, CS3	<ul style="list-style-type: none"> <li>• SS, mg/L</li> <li>• pH</li> </ul>			

## 2.5 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 water depth of the monitoring location at sampling time was measured using depth meter. Afterwards, the probes of the in-situ measurement equipment were lowered to the predetermined depths and the measurements taken accordingly.
- A water sampler was lowered into the water to the required sampling depths. Upon reaching the pre-determined depth, a messenger to activate the sampler was released which travel down the wire. The water sample was sealed within the sampler before retrieving.
- All measurements 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, whereupon the mid-depth measurement would be omitted. If the water depth was less than 3m, only the mid-depth position was monitored.
- One duplicate in-situ measurement and water sample for laboratory analyses were taken at all sampling locations.
- At each measurement depth, two consecutive measurements were taken. The probe was retrieved out of the water after the first measurement and then redeployed for the second measurement. When the difference in value between the first and second measurement of on-site parameters was more than 25% of the value of the first reading, the reading was discarded and further readings were taken.
- A water sampler, consisting of a transparent PVC or glass cylinder of not less than two litres which could be effectively sealed with cups at both ends, was used. The water sampler had a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler was at the selected water depth.
- Water samples for SS measurements were transferred directly to high density polythene sample bottles, packed in ice (cooled to 4°C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.
- In addition, field information such as the general meteorological conditions and observations regarding any significant activities in the vicinity of each monitoring location were also 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 F.

### *Laboratory Analysis & QA/QC*

The collected marine water samples were analyzed for Suspended Solids with methodologies shown in Table 2.4.

Table 2.4 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 include sample preparation as well as 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 accuracy of the measurement results by the laboratory analysis, "blind" duplicate samples of 10% of the collected marine water samples were analyzed 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 F.

#### *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 F.

#### *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 F.

*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 results of quality control samples for suspended solids are shown in Appendix F.

A total of 1,200 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 and quality control samples for Suspended Solids were used. The acceptance criteria are outlined in Quality Control data.

The QA/QC results in Appendix F 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. Moreover, the “blind” duplicate measurement results indicated that the precision of the measurements for Suspended Solids complied with HOKLAS requirements.

## **2.6 Results and Observations**

Marine water monitoring was conducted as scheduled in the reporting month. All monitoring data and graphical presentation of the monitoring results are provided in Appendix E.

There was no Action / Limit Level exceedance for water quality in the reporting month.

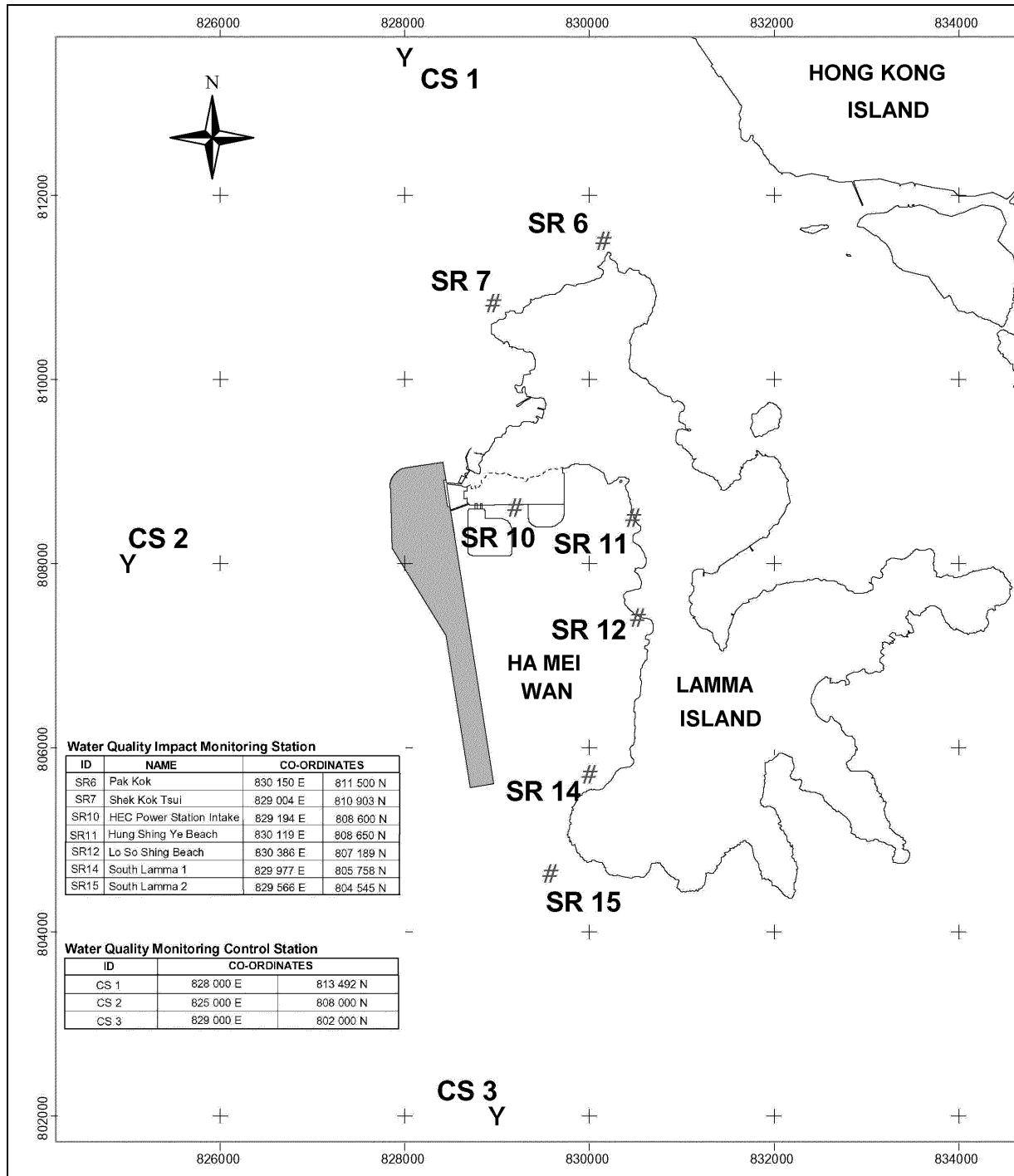


Figure 2.1 Location of Water Quality Monitoring Stations



### 3. ENVIRONMENTAL AUDIT

#### 3.1 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.

#### 3.2 Assessment of Environmental Monitoring Results

##### *Monitoring results for Water Quality*

The environmental monitoring results for Water Quality in the reporting month presented in Sections 2 are summarized in Table 3.1.

Table 3.1 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	
Water					
1	DO (Surface & Middle)	10/06/03-30/06/03	0	0	
2	DO (Bottom)	10/06/03-30/06/03	0	0	
3	SS	10/06/03-30/06/03	0	0	
4	Turbidity	10/06/03-30/06/03	0	0	

##### *Waste Management Records*

The estimated amounts of different types of waste generated in June 2003 are shown in Table 3.2.

Table 3.2 Estimated Amounts of Waste Generated in June 2003

Waste Type	Examples	Estimated Amount (m <sup>3</sup> )
Dredged Materials	Marine Mud	80,670

The total bulk volume of dredged material was 80,670m<sup>3</sup>.

### 3.3 Site Environmental Audit

Hopper barge No. 21470V accidentally dumped one barge load of dredged mud at about 1.5km from Lamma Power Station dredging site around 06:30 a.m. on 25/6/2003 due to hydraulic system failure. The hopper was immediately towed away and the incident reported to EPD. (c.f. letter from the contractor to Waste & Water Management Group/EPD dated 26/6/2003). The said hopper barge would not be deployed for any loading or dumping operations until the defects of the barge have been fully rectified. No action/limit level exceedance in water quality was found at all sensitive receivers on 26/6/2003, suggesting that the impact of this incident on the water quality on that area was minimal. This incident has been recorded in the ET leader's log-book.

Site audits were carried out by ET on a weekly basis to monitor environmental issues at the project area 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 H.

### 3.4 Status of Environmental Licensing and Permitting

All permits/licenses obtained for the project are summarised in Table 3.3.

Table 3.3 Summary of Environmental Licensing and Permit Status

Description	Permit No.	Valid Period		highlights	Status
		From	To		
Environmental Permit	EP-0165/2003	08/04/03	-	The whole construction work site.	Valid
Construction Noise Permit	GW-UW0156-03	01/06/03	30/11/03	Operation of PME's allowed during the restricted hours (07:00-07:00 of next day on holidays and 19:00-07:00 of next day on all other days). Only one grab dredger allowed to be operated within each zone (viz. Zone A, B and C). Only one tug boat allowed to be operated within Zone A and B combined.	Issued on 23/05/2003
Marine Dumping Permit	EP/MD/04-011	01/06/03	30/09/03	Dumping at East Ninepin Disposal Area	Valid.

### 3.5 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 I.

### 3.6 Implementation Status of Action/Limit Plans

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

### 3.7 Implementation Status of Environmental Complaint Handling Procedures

In June 2003, no complaint against the construction activities was received.

Table 3.4 Environmental Complaints / Enquiries Received in June 2003

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

Table 3.5 Outstanding Environmental Complaints / Enquiries Received Before

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

## **4. FUTURE KEY ISSUES**

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

Key issues to be considered in the coming month include:

#### *Noise Impact*

- To continue executing the preventive measures for avoiding noise exceedance and monitoring/ reviewing the noise performance
- To ensure compliance with the CNP already obtained.

#### *Water Impact*

- To keep reviewing the monitoring results in order to take corresponding action to ensure the seawater quality.
- to carry out routine inspection and necessary maintenance for the cage-type silt curtains.

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

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

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

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

## **5. CONCLUSION**

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

The maximum hourly and daily dredging rates actually achieved by the contractor were within the limits specified in the latest dredging schedule. 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 Project were implemented in the reporting month. No complaint against the Project was received. No prosecution was received for this Project in the reporting period.

The environmental performance of the Project was generally satisfactory.