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 (July 2001)
Date	16 August 2001
Certified by	(Mr. IP Tat-Yan, Environmental Team Leader)
Verified by	(ERM - Hong Kong Ltd, Independent Environmental Checker)

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EXECUTIVE SUMMARY

This is the fourth 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 July 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.

Construction Activities Undertaken

Construction activities undertaken during the reporting month were dredging and dumping of dredged mud. 902,632m^3 of marine mud was dredged from site and dumped at the allocated dumping area in Cheung Chau during the month. No filling activities were undertaken in the reporting month.

Environmental Monitoring Works

Several environmental monitoring works were rescheduled as shown in the following table.

Monitoring work	Original Schedule	Makeup Sampling	Reasons
Marine water quality monitoring	5th July 2001	10th July 2001	Adverse weather conditions
Marine water quality monitoring	7th July 2001	12th July 2001	Adverse weather conditions
Marine water quality monitoring	25th July 2001	31st July 2001	Adverse weather conditions
1 hour TSP monitoring at AM1	15th July 2001	16th July 2001	Power failure of TEOM

Other than these, 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

Construction work was carried out during the restricted hours including evening time, holidays and night-time under valid Construction Noise Permits. No exceedance of Action and Limit levels for noise was recorded in the month.

Water Quality

There were 231 cases of Action level exceedance and 148 cases of Limit Level exceedance in the reporting month. 181 out of 379 cases of action/limit level exceedances were contributed by TIN and NH_3-N while 193 cases by DO. For these exceedances, comprehensive investigations had been carried out. It was found that similar measurement results were also obtained at the control stations during the monitoring period, suggesting that the background DO levels were also low and TIN & NH_3-N levels high. Furthermore, when compared with EPD's published monitoring data at the monitoring locations adjacent to Lamma Island, all the measurement results exceeding Action/Limit Levels lay within the range of EPD's data. This showed that the Action/Limit level as established by the baseline monitoring work which was carried out during cooler season, was not appropriate for the current water body condition.

Hence, all of these exceedances were considered not related to site activities and have been explained to the satisfaction of EPD. No further action was required. Nevertheless, HEC has started a dialogue with EPD on reviewing the impact-monitoring programme for water quality and would revise the criteria for establishing action and limit levels accordingly.

Site Environmental Audit

Two warning letters were issued by EPD to the dredging contractor on 5th July 2001 and 8th August 2001 about the malfunction of the automatic self monitoring devices installed in the barge No. 21648V (Hang Wo 9) and 21502V respectively. The contractor has been warned by HEC to take necessary actions to prevent them from happening again.

EPD enquired about the conditions of the installed silt curtains by letter to HEC ref: ( ) in L/M Ax (5) to EP2/N9/D/60 dated 1st August 2001. A response to EPD is being prepared.

EPD officials have inspected the marine water monitoring work on 11th July 2001. They were generally satisfied with the performance of the environmental monitoring consultant.

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 (superseded by EP-071/2000/B)	22/12/00	-	HEC	22/12/00
	EP-071/2000/B	13/07/01	-	HEC	13/07/01
Construction Noise Permit	GW-UW0109-01 (superseded by GW-UW0256-01 on 20/07/01)	02/04/01	01/10/01	Contractor	31/03/01
	GW-UW0256-01	29/06/01	07/12/01	Contractor	29/0601
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 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:

- to prepare the CNP application for bored piling works;

- to continue with the preventive measures for noise exceedance and keep monitoring the performance;
- to review the monitoring results and to take actions, if necessary, to ensure acceptable sea water quality;
- to provide routine inspection and necessary maintenance for the silt curtains.

Concluding Remarks

Except the malfunction of the Automatic Self Monitoring Device installed in the contractor's hopper barges spotted by EPD on 7th July 2001 and addressed in EPD's letter to the contractor dated 8th August 2001, 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 (varied on 13th July 2001 as 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 July 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

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 1st to 31st July 2001 was 902,632m^3. 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 July 2001 was 902,632m^3. The contractor was informed by EPD (via a letter ref: ( ) in EP 60/G1/12-51 XI dated 6th July 2001) of the relocation of the Spoil Disposal Area with effect from 9th July 2001. Figure 1.2 and Figure 1.3 show dumping location for this project in July 2001. 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	**Water Quality** - The number of grab dredgers operating in the site and the total dredging rate are limited; - Silt curtain are installed on the eastern, southern and north western sides of the site; - Fully-enclosed watertight grabs are used and the descent speed are controlled; - All barges for transport of dredged materials are fitted with tight bottom seals. **Noise** - General noise mitigation measures are employed at all work sites throughout the construction phase. **Waste Management** - Waste Management Plan is submitted and implemented. **Dredging Waste** - All vessels for marine transportation of dredged sediment are fitted with tight fitting seals to their bottom openings to prevent leakage; - Dredged waste are disposed at Licensed site – South

		Cheung Chau; - Records of the quantities of waste generated and disposed off-site are taken. **Marine Ecology** - All construction related vessels approach the site from the designated route/channel to avoid disturbance to the finless porpoise.

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.

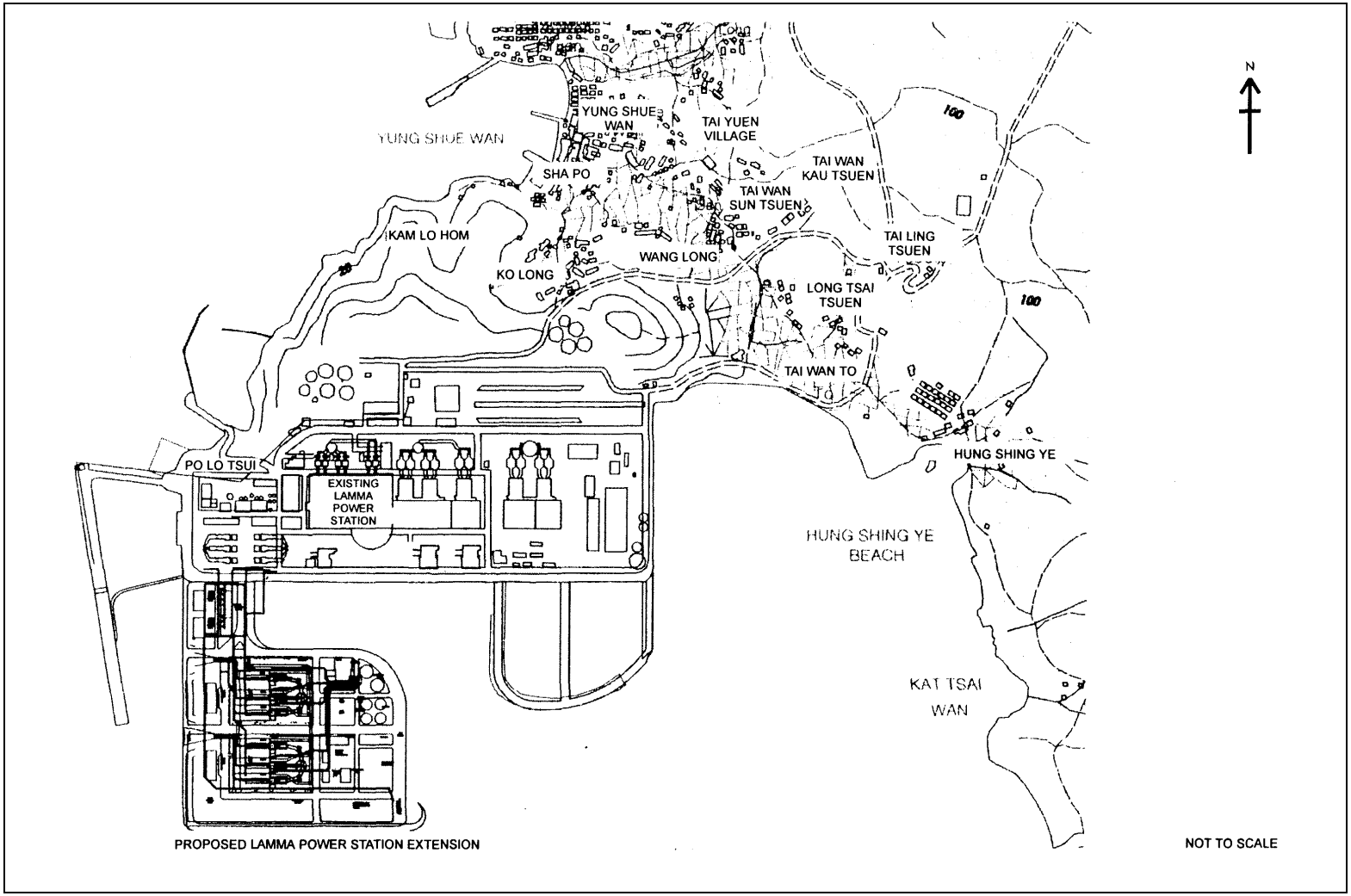


Figure 1.1 Layout of Work Site

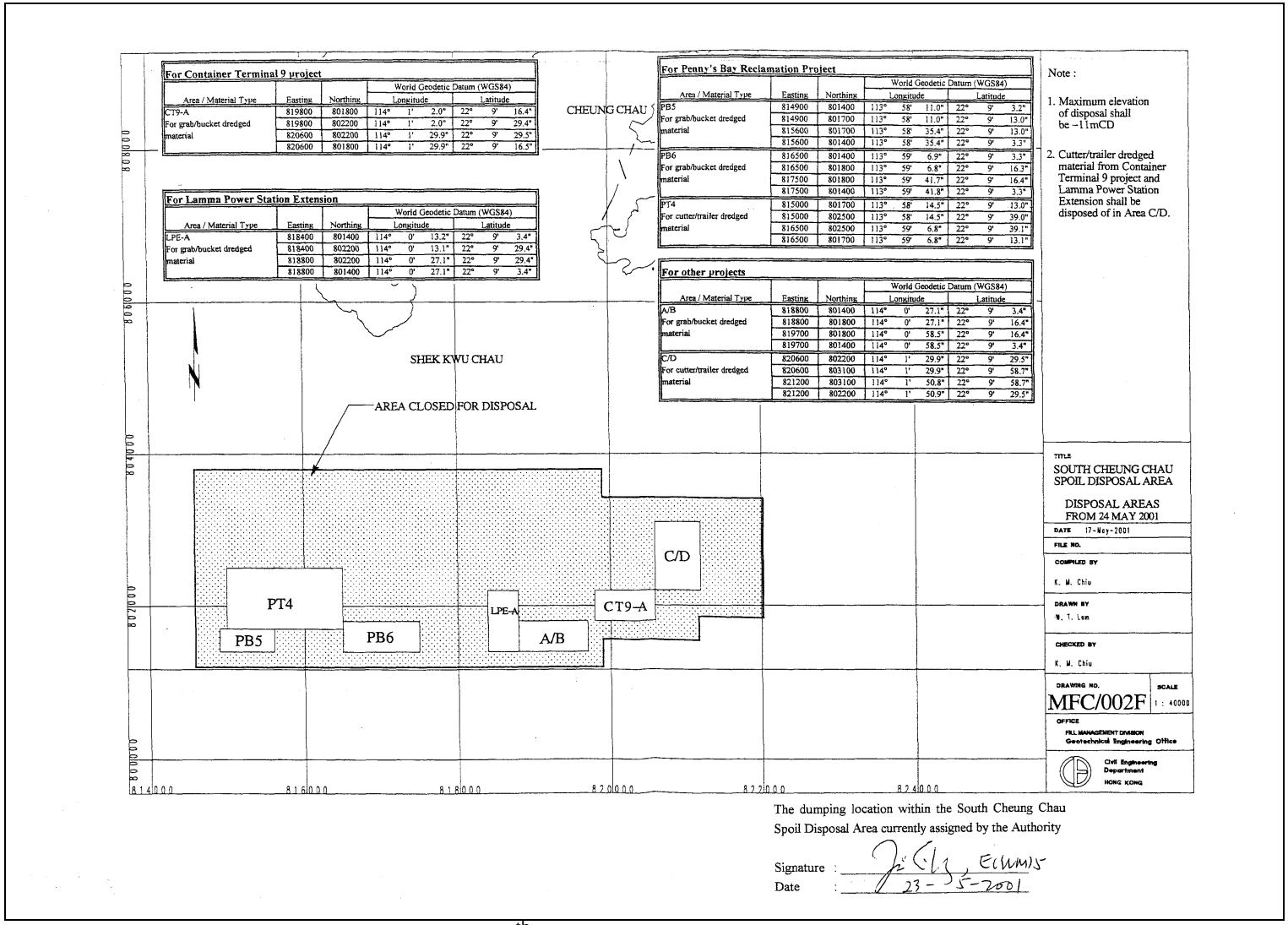


Figure 1.2 Location of Dumping Area (from 24th May 2001)

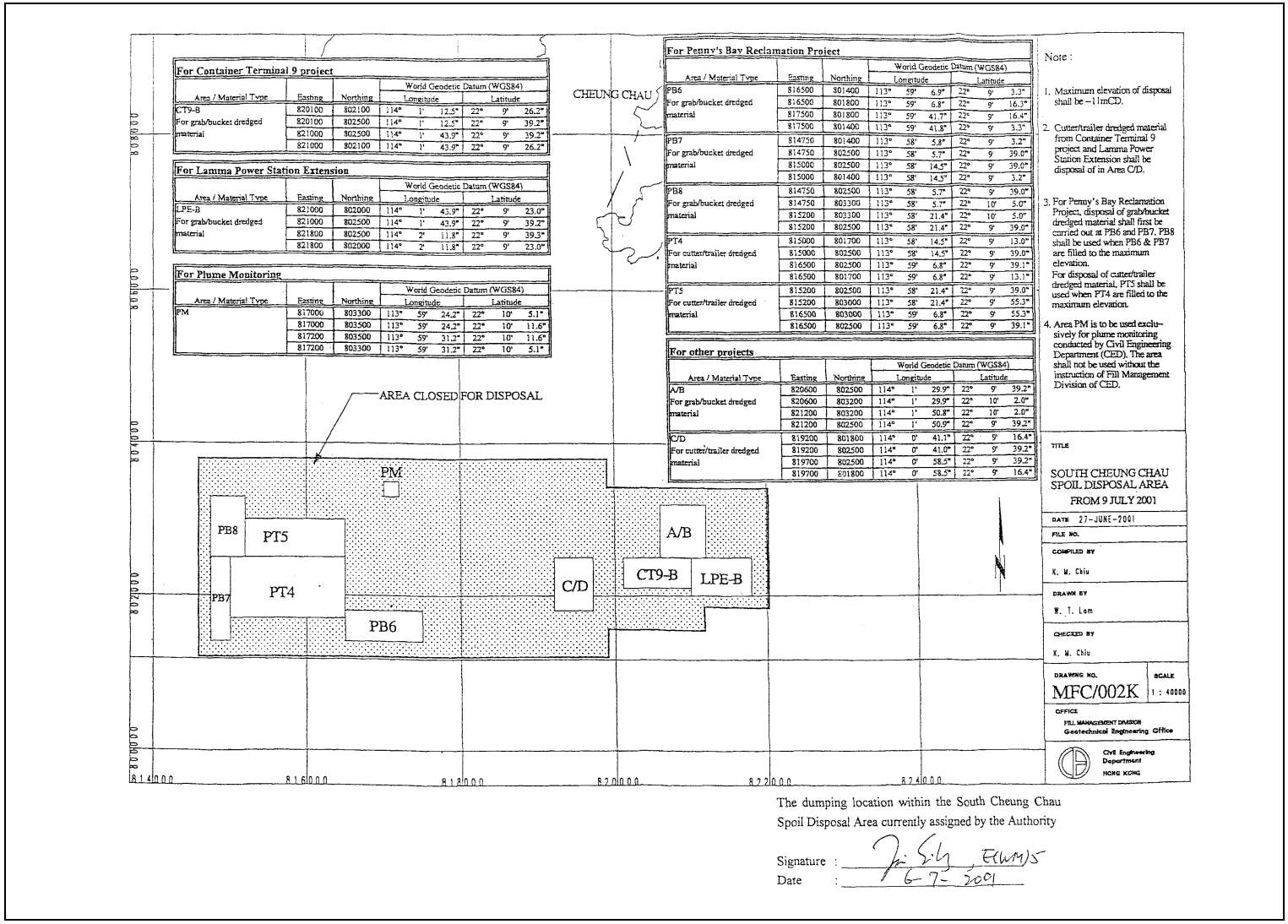


Figure 1.3 Location of Dumping Area (from 9th July 2001)

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) 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

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 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

Equipment	Model and Make
24-hour sampling:	
HVAS Sampler	Model GS2310 Anderson Instruments Inc.
Partisol Air Sampler	Partisol Model 2000 Rupprecht & Patashnick
MINIVOL Portable Sampler	AIRMETRICS
1-hour sampling:	
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

Monitoring Stations	Parameter	Duration	Frequency
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, ± 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

1 hour TSP sampling at AM1 (Reservoir Area) from 15:00 to 17:59 on 15th July 2001 was void due to power failure of the TEOM TSP monitor. It was rescheduled to 16th July 2001. Other than this, 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 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.

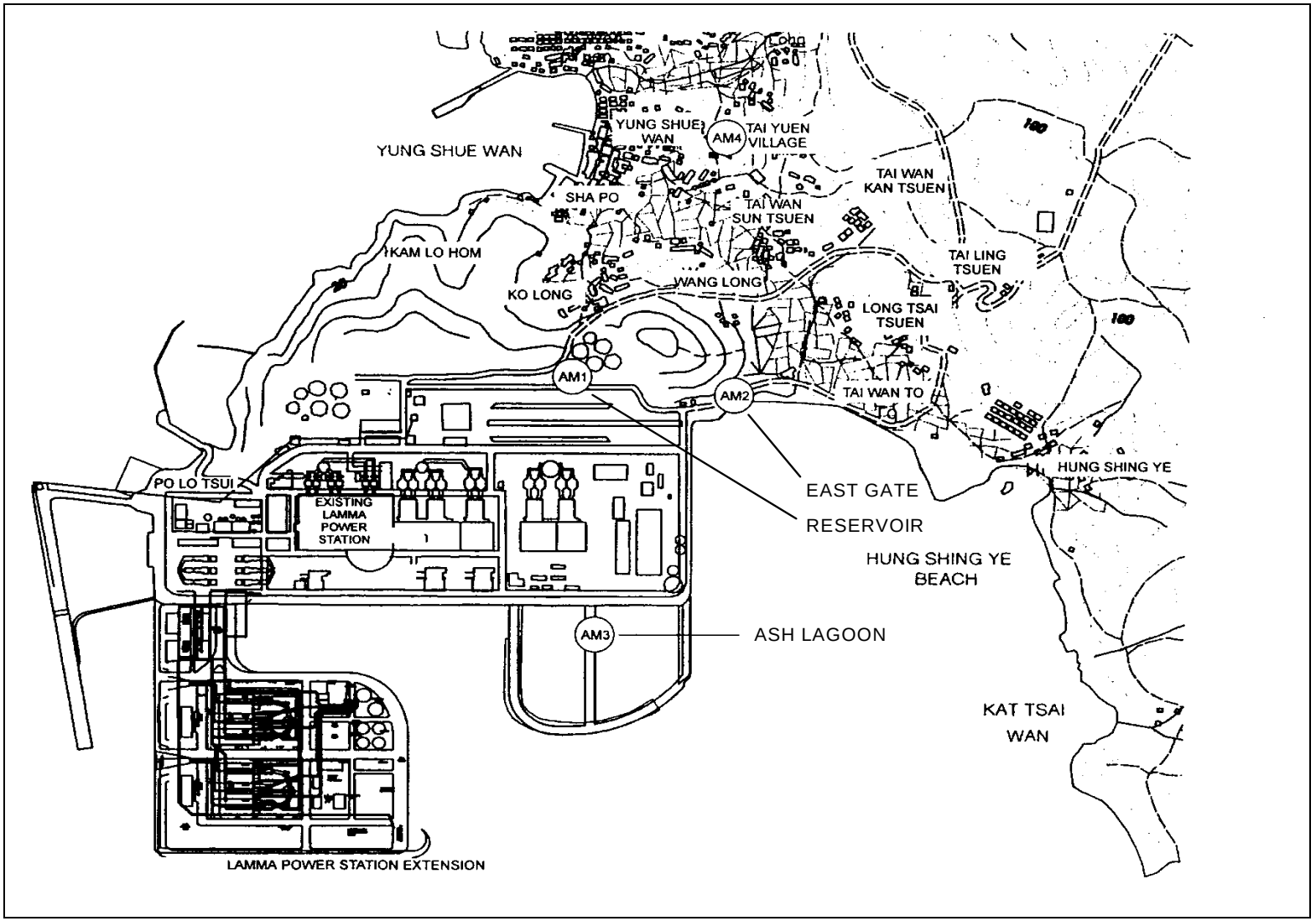


Figure 2.1 Location of Air Quality Monitoring Stations

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.

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

Purpose of noise monitoring	**Monitoring Location**
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
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 & holidays: 0700-2300 hrs on holidays; and 1900-2300 hrs on all other days	Evening-time & holidays: 5 minutes	5-min L_{Aeq}
	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

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 were verified by the manufacturer. Monthly calibration of the noise measuring equipment was carried out. Calibration details are 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.

No exceedance of noise Action/Limit Level was recorded in the month.

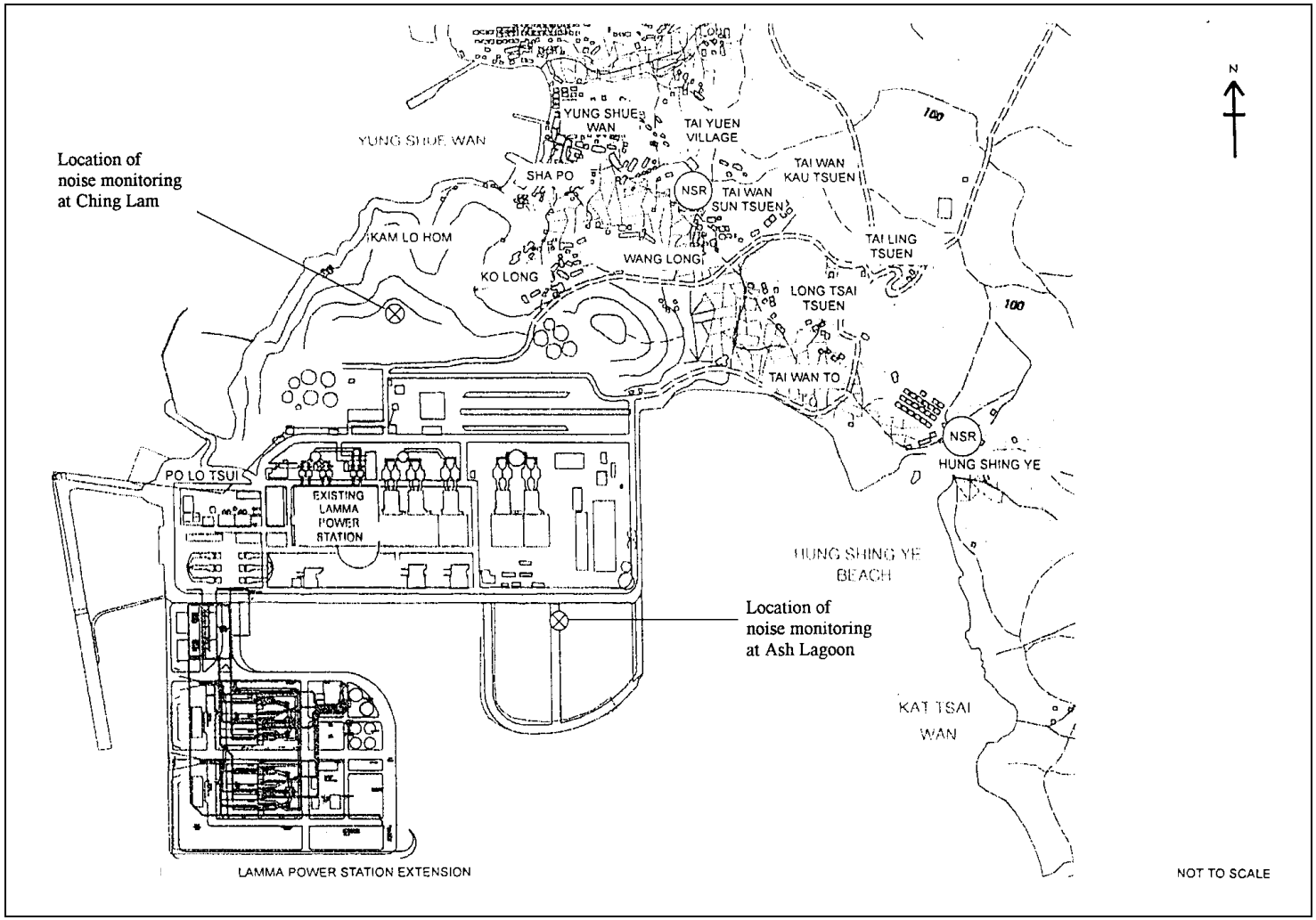


Figure 3.1 Location of Noise Monitoring Stations

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 deterioration of water quality, if any, would 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 (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 12 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)[1]	808 600 (808 592)[1]
	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 16th 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 6820 Water Quality Monitor	Temperature: -5 to 50 ^{0}C; +/- 0.15 ^{0}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
Leica GS5	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	• Depth, m • Temperature, ^{o}C • Salinity, ppt • DO, mg/L • DO Saturation, % • Turbidity, NTU • SS, mg/L • pH • Total inorganic nitrogen, mg/L • Un-ionised ammonia, mg/L	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 than packed in a cool-box (cooled to $4^{o}C$ 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 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

Parameter	**Method**	**Limit of Reporting (mg/L)**
Suspended Solids	APHA 17 ed 2540 D	1.0
Total Inorganic Nitrogen	APHA 18 ed 4500 NO_2 B & NO_3 E + APHA 17ed 4500-NH_3B, E	0.01
Ammoniacal Nitrogen (Un-ionized Ammonia)	APHA 17 ed 4500-NH_3 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 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 were conducted for at least 5% of samples. A total of 858 sets of samples (for Total Inorganic Nitrogen and Unionized Ammonia) and 936 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 a 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 digested sample 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

Due to adverse weather condition, three marine water quality monitoring works on 5th July 2001, 7th July 2001 and 25th July 2001 were rescheduled to 10th July 2001, 12th July 2001 and 31st June 2001 respectively. Other than these, 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 G. Key findings and observations are provided in the following tables:

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

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
3rd July	10 (SR1, SR2, SR4, SR5 and SR6 during ebb tide and flood tide)	0	Not related to site activities as the measurement results at SR4 and SR6 during ebb tide were as low as the upstream control station, suggesting the background DO level was already low. For the exceedances at SR1, SR2 & SR5 during ebb tide and SR1, SR2, SR4, SR5 and SR6 during flood tide, the said exceedances lay within the range of measurement results collected by EPD in 1999 (WM1 & SM5) suggesting that the low DO measurement might be due to background fluctuation.

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
9th July	11 (All stations except SR4 during ebb tide)	0	Not related to site activities as the measured results at SR1, SR2 & SR7 during ebb tide and flood tide and SR6 during flood tide lay within the range of measurement data collected by EPD in 1999 (WM1 & SM5) which indicated that the exceedances might be due to background fluctuation. For the exceedances at SR5 during ebb tide and flood tide, SR4 during flood tide and SR6 during ebb tide, the measurement results at upstream control stations were as low as the said measured results, suggesting that the background DO level was already low.
10th July	0	0	N. A.
11th July	2 (SR1and SR2 during flood tide)	0	Not related to site activities as by reviewing the literature data form EPD in 1999 (WM1), the said measured results lay within the ranges of measurement data, suggesting that the exceedances might be related to background fluctuation.
12th July	4 (SR1 during ebb tide and flood tide and SR2 during flood tide and SR7 during ebb tide)	0	Not related to site activities as the measurement results at the upstream control station is the same as of SR1 and even lower than SR7 during ebb tide suggesting that the background DO level was already low. For the measurement results at SR1 and SR2 during flood tide both lay within the range of measurement result collected by EPD in 1999 (WM1 & SM5) suggesting that the low DO measurement might be due to the background fluctuation.
13th July	1 (SR7 during flood tide)	0	Not related to site activities as the measurement results at upstream control station was even lower than the said measured result, suggesting that the background DO was already low.
16th July	9 (SR1, SR2 & SR7 during ebb tide and flood tide and SR4 & SR6 during ebb tide and SR5 during flood tide)	0	Not related to site activities as the measurement results at upstream control stations were lower than the monitored exceedances, suggesting that the background DO was already low.
18th July	0	0	N. A.
20th July	3 (SR1 during ebb tide and flood tide and SR2 during flood tide)	0	Not related to site activities as SR1 during ebb tide is located upstream as compared with the site area and therefore the low DO level might be due to offshore discharge at the vicinity of SR1. For the exceedance at SR1 and SR2 during flood tide both measurements lay within the range of measurement result collected by EPD in 1999 (WM1) suggesting the low DO measurement might be due to the background fluctuation.

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
23rd July	1 (SR1 during flood tide)	0	Not related to site activities as the said exceedance lay within the range of measurement results collected by EPD in 1999 (WM1), suggesting that the exceedances might be due to background fluctuation.
27th July	9 (SR5, SR6, SR7 during ebb tide and flood tide and SR1, SR2 and SR4 during flood tide)	3 (SR1, SR2 and SR4 during ebb tide)	Not related to site activities as the said exceedances were as low as the measurement results at upstream control stations, which indicated that the background DO level was already low.
30th July	2 (SR1 and SR7 during flood)	1 (SR2 during flood tide)	Not related to site activities since the measurement results at SR1 during flood tide and SR7 during flood tide lay within the measurement range collected by EPD in 1999 (WM1 & SM5) which indicated that low DO might be due to background fluctuation. For the exceedance at SR2, no noticeable activities were observed at the vicinity of the sampling location, which resulted in the low DO level. Further, the on-site measurement result at SR2 on 31st July indicated that the DO level has increased. Therefore the low DO measurement at SR2 might be due to possible background fluctuation and was not related to site activities.
31st July	5 (SR2 and SR7 during ebb tide and flood tide and SR1 during ebb tide)	0	Not related to site activities since SR1 and SR2 during ebb tide lay within the measurement range collected by EPD in 1999 (WM1) which indicated that low DO might be due to background fluctuation. Besides, by comparing the measurement results at upstream control stations, the recorded exceedances at SR2 during flood tide and SR7 during ebb and flood tide were even higher than the measurement results at upstream control stations.

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

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
3rd July	12 (All stations during ebb and flood tide)	0	Not related to site activities as the measurement results at the upstream control station were lower than the measurement results at SR2, SR4, SR5, SR6 & SR7 during ebb tide, suggesting that the background DO level was already low. For the exceedances at SR1 during ebb tide and SR1, SR2, SR4, SR5, SR6 & SR7 during flood tide the recorded values lay within the range of measurement results collected by EPD in 1999 (WM1 & SM5) suggesting that the low DO measurement might be due to background fluctuation.
9th July	12 (All stations during ebb tide and flood tide)	0	Not related to site activities as by reviewing the literature data form EPD in 1999 (WM1 & SM5), the measured results at SR1, SR2, SR7 during ebb tide and flood tide lay within the ranges of measurement data, suggesting that the exceedances might be related to background fluctuation. For the exceedances at SR4, SR5 and SR6 during ebb tide and flood tide, the measurement results at upstream control stations were as low as said records suggesting that the background DO level was already low.
10th July	7 (SR1 & SR7 during ebb tide and flood tide and SR2, SR5 & SR6 during flood)	0	Not related to site activities since the measurement results at upstream control stations were even lower than the measured results at SR5, SR6 & SR7 during flood tide and all exceedances during ebb tide, suggesting that the background DO was already low. For the exceedances at SR1 and SR2 during flood tide, all measurement results lay within the measurement range collected by EPD in 1999 (WM1) which indicated that low DO might be due to background fluctuation.
11th July	10 (SR1, SR2, SR4 & SR7 during ebb tide and flood tide and SR5 during ebb tide and SR6 during flood tide)	0	Not related to site activities as by reviewing the literature data form EPD in 1999 (WM1 & SM5), the measured results at SR1 and SR2 during ebb tide and flood tide and SR6 during flood tide lay within the ranges of measurement data, suggesting that the exceedances might be related to background fluctuation. For the exceedances at SR4 and SR7 during flood tide and all exceedances during ebb tide, the measurement results at upstream control stations were lower than the said exceedances suggesting that the background DO level was already low.

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
12th July	11 (SR1, SR2, SR5, SR6 & SR7 during ebb tide and flood tide and SR4 during ebb tide)	0	Not related to site activities since all exceedances during ebb tide and the measured results at SR5, SR6 and SR7 were as low as the measurement results at upstream control stations, suggesting that the background DO was already low. For the exceedances at SR1 and SR2 during flood tide, all measurement results lay within the measurement range collected by EPD in 1999 (WM1) which indicated that low DO might be due to background fluctuation.
13th July	10 (SR1, SR2, SR5, SR6 & SR7 during ebb tide and flood tide)	0	Not related to site activities as the measurement results at upstream control stations were as low as the said reported exceedances (except result at SR1 during ebb tide), suggesting the background DO was also low. By reviewing the literature data form EPD in 1999 (WM1), the measurement results at SR1 during ebb tide lay within the ranges of measurement data, suggesting that the exceedances might be related to background fluctuation.
16th July	12 (All stations during ebb tide and flood tide)	0	Not related to site activities as the all measured results were as low as the measurement results at upstream control, suggesting that the background DO level was already low.
18th July	6 (SR1 & SR7 during ebb tide and flood tide and SR2 and SR6 during flood tide)	0	Not related to site activities since the said exceedances lay within the measurement range collected by EPD in 1999 (WM1 & SM5) which indicated that low DO might be due to background fluctuation.
20th July	9 (SR1, SR4 & SR6 during ebb tide and flood tide and SR2, SR5 & SR7 during flood tide)	0	Not related to site activities since the said exceedances lay within the measurement range collected by EPD in 1999 (WM1 & SM5) which indicated that low DO might be due to background fluctuation.
23rd July	12 (All stations during ebb tide and flood tide)	0	Not related to site activities as the measurement results at upstream control stations were as low as the said exceedances (except the measurement result at SR1 during flood tide), suggesting the background DO was also low. For the exceedance at SR1 during flood tide, it lay within the range of measurement results collected by EPD in 1999, suggesting that the low DO might be due background fluctuation.

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
27th July	11 (SR1, SR2 SR4, SR5, SR6 during ebb tide and flood tide and SR7 during ebb tide)	0	Not related to site activities as by reviewing the literature data form EPD in 1999 (WM1 & SM5), all exceedances during flood tide lay within the ranges of measurement data, suggesting that the exceedances might be related to background fluctuation. Besides, all measured results during ebb tide were higher than the measurement results at upstream control station which suggested that the DO were already low at vicinity of study area.
30th July	8 (SR1 and SR7 during ebb tide and flood tide and SR4, SR5 and SR6 during flood tide)	0	Not related to site activities since all measured results lay within the measurement range collected by EPD in 1999 (WM1 & SM5) which indicated that low DO might be due to background fluctuation.
31st July	12 (All stations during ebb tide and flood tide)	0	Not related to site activities since the measurement results at SR2, SR4, SR5 and SR6 during ebb tide and flood tide and SR1 and SR7 during flood tide were as low as the measurement results at upstream control stations. For the exceedance at SR1 and SR7 during ebb tide, the measurement result at upstream controls were much lower than the corresponding Action Level which suggested that the exceedances might be due to background fluctuation.

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

Monitoring Dates	No. of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
3rd July	0	0	N. A.
9th July	0	0	N. A.
10th July	0	0	N. A.
11th July	0	0	N. A.
12th July	0	0	N. A.
13th July	0	0	N. A.
16th July	0	0	N. A.
18th July	0	0	N. A.
20th July	0	0	N. A.
23rd July	0	0	N. A.
27th July	0	0	N. A.
30th July	0	0	N. A.
31st July	0	0	N. A.

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

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
3rd July	1 (SR6 during flood tide)	1 (SR4 during flood tide)	Not related to site activities since SR6 located at the upstream to the site during the course of sampling therefore the elevated SS result might be associated with the marine water flowing from the Southwest of Lamma Island. For the exceedance at SR4, no noticeable sediment plume migrated from the site to the sampling location was observed which resulted in the exceedance. Further, the measurement result at SR4 on 9th July was below the Action level. Therefore the exceedance is considered not related to site activities. .
9th July	0	1 (SR1 during ebb tide)	Not related to site activities since SR1 located at the upstream to the site during the course of sampling and the marine water flowed from South to North during ebb tide. Therefore, the elevated result might be associated with the marine water flowing from North of Lamma Island.
10th July	0	0	N. A.
11th July	0	0	N. A.
12th July	0	0	N. A.
13th July	0	0	N. A.
16th July	0	0	N. A.
18th July	0	0	N. A.
20th July	0	0	N. A.
23rd July	0	1 (SR5 during flood tide)	Not related to site activities. Based on the observation made by the sampling team, no obvious plume was observed at the vicinity of study area which resulted in elevated result. Beside, SR1 located at the upstream to the site during the course of sampling therefore the elevated SS result might be associated with the marine water flowing from the Southern area of Lamma Island.
27th July	0	1 (SR2 during flood tide)	Not related to site activities. Firstly, based on the observation made by the sampling team, no obvious plume was observed at the vicinity of study area which resulted in elevated result. Secondly, the measurement result at SR2 during ebb tide (afternoon session) was below the Action Level suggesting that the elevated result recorded during flood tide (morning session) might be due to possible background fluctuation. Further, no action/limit level exceedance at SR2 was found on 30th July. Hence, the exceedance was considered not related to site activities.
30th July	0	0	N.A.
31st July	0	0	N.A.

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

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
3rd July	0	0	N. A.
9th July	6 (SR5, SR6 and SR7 during ebb tide and flood tide)	0	Not related to site activities since the measurement results of the upstream control stations were much higher than the impact station's results.
10th July	2 (SR5 & SR6 during flood tide)	0	Not related to site activities as the measurement results at the upstream control stations were as high as the impact monitoring results, suggesting that the background concentrations were already high.
11th July	0	0	N. A.
12th July	0	0	N. A.
13th July	1 (SR6 during flood tide)	0	Not related to site activities as by reviewing the literature data form EPD in 1999 (SM5), the exceedance lay within the ranges of measurement data, suggesting that the exceedances might be related to background fluctuation.
16th July	0	0	N. A.
18th July	0	0	N. A.
20th July	0	0	N. A.
23rd July	0	0	N. A.
27th July	6 (SR4, SR5, SR6 during ebb tide; SR5, SR6 and SR7 during flood tide)	0	Not related to site activities since the measurement results of the corresponding upstream control stations were as high as those impact monitoring stations, suggesting the background concentration was already high.
30th July	6 (SR5, SR6 and SR7 for both ebb tide and flood tide)	0	Not related to site activities since the measurement results of the corresponding upstream control stations were higher or as high as the SR5 during ebb tide as well as SR6 and SR7 during both ebb tide and flood tide suggesting the background concentration was already high. Further, the measurement result at SR5 during flood tide lay within the range of measurement data collected by EPD in 1999 (SM5) suggesting that the exceedances might be related to background fluctuation.

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
31st July	5 (SR4, SR6 and SR7 during ebb tide; SR5 during ebb tide and flood tide)	0	Not related to site activities since the measurement results of the corresponding upstream control stations were higher or as high as the SR5 during ebb tide and flood tide as well as SR6 and SR7 during ebb tide suggesting the background concentration was already high. For the exceedance at SR4 during ebb tide, the measurement result at SR4 during flood tide of the same sampling day (afternoon session) was below the Action Level suggesting that the said exceedance might be related to background fluctuation.

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

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
3rd July	1 (SR1 during flood tide)	11 (SR1 during ebb tide and SR2, SR4, SR5, SR6 & SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were higher than the results at SR4, SR5 and SR6 during ebb tide and flood tide and SR7 during ebb tide. For the exceedances at SR7 during flood tide, by reviewing the literature data form EPD in 1999 (SM5), the measured result lay within the ranges of measurement data, suggesting that the exceedances might be related to background fluctuation. For the exceedances at SR1 and SR2 during ebb tide, since SR1 and SR2 are located at upstream of the site during the course of sampling, suggesting that the elevated might be due to background fluctuation rather than site activities. Further, the exceedances at SR1 and SR2 were persistently recorded again during flood tide, suggesting that this might be a localized event.
9th July	1 (SR1 during ebb tide)	11 (SR1 during flood tide and SR2, SR4, SR5, SR6 & SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were higher than all measured results with limit exceedance during ebb tide and the exceedances at SR7 during flood tide. By reviewing the literature data form EPD in 1999 (SM5), the exceedances at SR4, SR5 and SR6 during flood tide lay within the ranges of measurement data, suggesting that the exceedances might be related to background fluctuation. Besides, the measurement results at upstream control stations were higher than the corresponding Limit Level at SR2. Therefore, the said exceedances might be due to background fluctuation. Further, the exceedance at SR1 was persistently recorded again during flood tide, suggesting that this might be a localized event. Therefore the said exceedance might be a localized event at vicinity of SR1 on the sampling day.

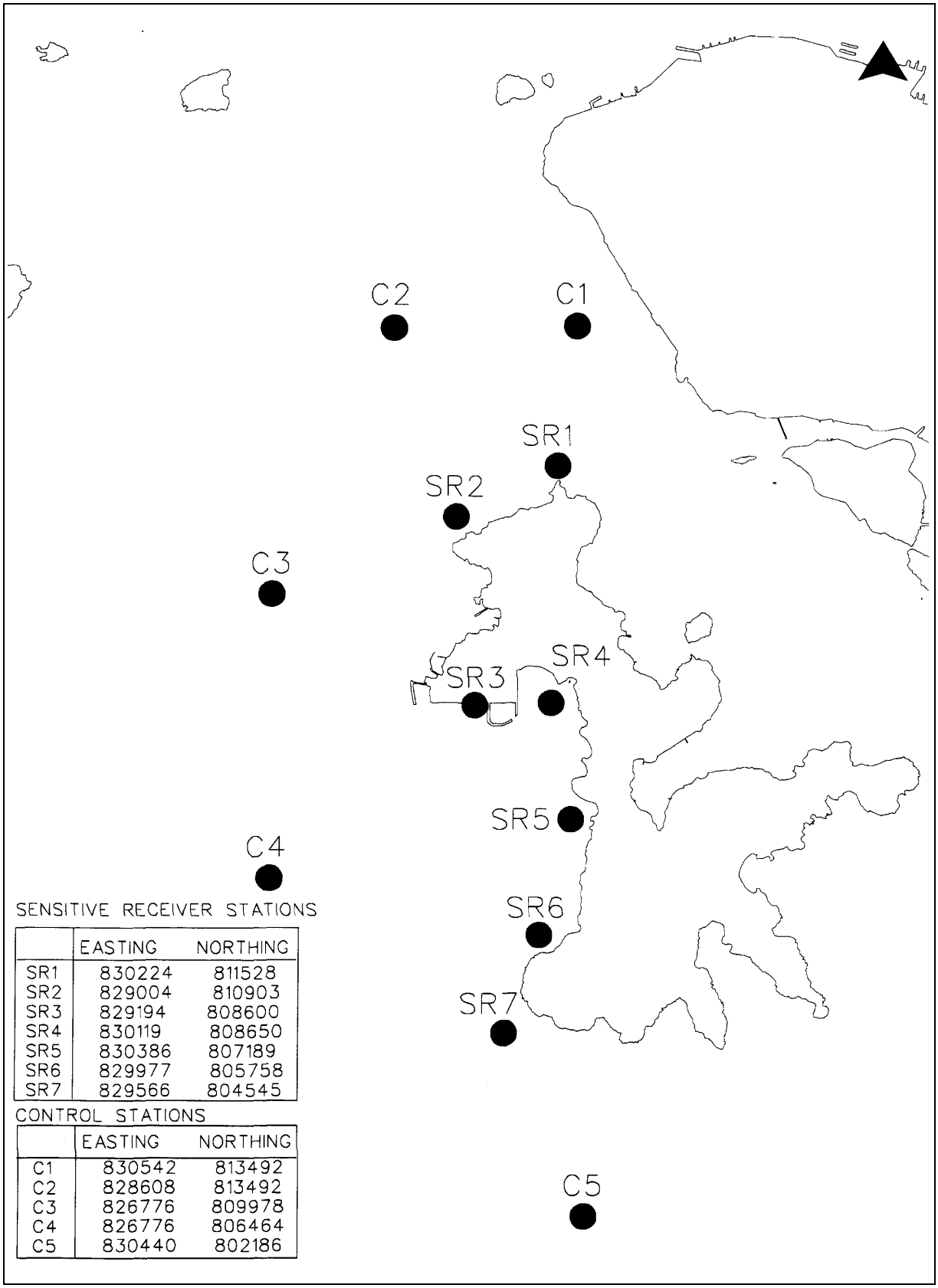
Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
10th July	1 (SR1 during flood tide)	11 (SR1 during ebb tide and SR2, SR4, SR5, SR6 & SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were higher than the exceedances except the exceedance at SR5 during flood tide. For the exceedance at SR5 during flood tide, the measurement results at upstream control stations were higher than the corresponding Limit Level. Therefore, the said exceedances might be due to background fluctuation.
11th July	1 (SR1 during flood tide)	11 (SR1 during ebb tide and SR2, SR4, SR5, SR6 & SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were higher than the exceedances except the exceedance at SR2 during ebb tide. For the exceedance at SR2 during ebb tide, the measurement results at upstream control stations were higher than the corresponding Limit Level. Therefore, the said exceedances might be due to background fluctuation.
12th July	1 (SR1 during ebb tide)	11 (SR1 during flood tide and SR2, SR4, SR5, SR6 & SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were higher than the results at SR1, SR4 and SR7 during ebb tide and flood tide and SR2 during ebb tide. For the exceedances at SR2 during flood tide, SR5 & SR6 during ebb tide and flood tide, the measurement results at upstream control stations were higher than the corresponding Limit Levels. Therefore, the said exceedances might be due to background fluctuation.
13th July	2 (SR1 during ebb tide and flood tide)	10 (SR2, SR4, SR5, SR6 and SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were as high as the measurement results at SR1, SR2, SR4 and SR7 during ebb tide and flood tide and SR5 during flood tide, which indicated that background TIN was already high. For the exceedance at SR6 during flood tide with marine water flowing from South to North, SR6 is located at the upstream of the site during the course of sampling. Further, the measurement results at upstream control stations were higher than the corresponding Limit Levels at SR5 and SR6 during ebb tide. Therefore, the said exceedances might be due to background fluctuation.
16th July	1 (SR1 during ebb tide)	11 (SR1 during flood tide and SR2, SR4, SR5, SR6 & SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were higher than the impact station's results.

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
18th July	0	12 (All stations during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were higher than all exceedances during flood tide and the exceedances at SR1, SR2 and SR7 during ebb tide. For the exceedances at SR4, SR5 and SR6 during ebb tide, the measurement results at upstream control stations were higher than the corresponding Limit Levels. Therefore, the said exceedances might be due to background fluctuation.
20th July	1 (SR1 during flood tide)	11 (SR1 during ebb tide and SR2, SR4, SR5, SR6 & SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were higher than the impact monitoring station's results.
23rd July	1 (SR1 during flood tide)	11 (SR1 during ebb tide and SR2, SR4, SR5, SR6 & SR7 during ebb tide and flood tide)	Not related to site activities since the measurement results of the upstream control stations were even higher than the results at SR4, SR5, SR6 and SR7 during ebb tide and flood tide and SR1 during flood tide. For the exceedances at SR2 during ebb tide and flood tide, the measurement results at upstream control stations were higher than the corresponding Limit Level. Therefore, the said exceedances might be due to background fluctuation. Further, SR1 is located at the upstream to the construction site during the course of sampling. Therefore, the elevated result at SR1 during ebb tide might be associated with the marine water flowing from Northern area of Lamma Island rather than the site activities.
27th July	3 (SR1 and SR7 during ebb tide; SR1 during flood tide)	9 (SR2, SR4, SR5 and SR6 during ebb tide; SR2, SR4, SR5, SR6 and SR7 during flood tide)	Not related to the site activities as the measurement results of the upstream control stations were higher than the results of SR1, SR2, SR4, SR5, SR6 and SR7 during ebb tide as well as SR4, SR5, SR6 and SR7 during flood tide suggesting that the background concentration was already high. Further, the measurement results at SR1 and SR2 during flood tide were almost as high as the data collected by EPD in 1999 (WM1). Therefore the elevated measurement results might be due to the possible background fluctuation.
30th July	1 (SR1 during flood tide)	11 (SR2, SR4, SR5, SR6 and SR7 during ebb tide and flood tide; SR1 during ebb tide)	Not related to the site activities as the measurement results of the upstream control stations exceeded the Action and/or Limit Levels of the corresponding monitoring stations (except SR1 during flood tide). Regarding the exceedance at SR1 during flood tide, the result of the upstream control station was higher than that at SR1 during flood tide. The said findings suggested the background concentration was already high.

Monitoring Dates	Number of Exceedances		Investigation Findings (if any)
	Action Level	Limit Level	
31st July	1 (SR1 during flood tide)	10 (SR2, SR4, SR5, SR6 and SR7 during ebb tide and flood tide)	Not related to the site activities as the measurement results of the upstream control stations exceeded the Action and/or Limit Levels of the corresponding monitoring stations suggesting the background concentration was already high.

There were two hundred and thirty-one (231) cases of Action level exceedance and one hundred and forty-eight (148) cases of Limit Level exceedance for water quality in the reporting month. 181 out of 379 cases of action/limit level exceedances were contributed by TIN and NH_3-N while 193 cases by DO. For these exceedances, comprehensive investigations have been carried out. It is found that similar measurement results were also obtained at the control stations during the monitoring period, suggesting that the background DO levels were already low and TIN & NH_3-N levels were already high. Furthermore, when compared with EPD's published monitoring data at monitoring locations close to Lamma Island, all the measurement results exceeding Action/Limit Levels lay within the range of EPD's data. This showed that the Action/Limit level as established by the baseline monitoring work which was carried out during cooler season, was not appropriate for the current water body condition.

Hence, all of these exceedances were considered not related to site activities and have been explained to the satisfaction of EPD. No further action was required. IEC and the construction contractor have been informed of the exceedances accordingly as per the requirements of the EM&A Manual. Nevertheless, HEC have started a dialogue with EPD on reviewing the impact-monitoring programme for water quality and would revise the criteria for establishing action and limit levels accordingly.



SENSITIVE RECEIVER STATIONS

	EASTING	NORTHING
SR1	830224	811528
SR2	829004	810903
SR3	829194	808600
SR4	830119	808650
SR5	830386	807189
SR6	829977	805758
SR7	829566	804545

CONTROL STATIONS

	EASTING	NORTHING
C1	830542	813492
C2	828608	813492
C3	826776	809978
C4	826776	806464
C5	830440	802186

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 July 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)	01/07/01-31/07/01	0	0	
2	Ambient TSP (1-hour)	01/07/01-31/07/01	0	0	
Noise					
1	Noise level at the critical NSR's predicted by the noise alarm monitoring system	01/07/01-31/07/01	0	0	
2	Manual noise monitoring at the Pak Kok Tsui residences	01/07/01-31/07/01	NA	NA	Construction of transmission system not yet commenced.
Water					
1	DO (Surface & Middle)	01/07/01-31/07/01	57	4	The exceedances were considered not related to the construction activities. 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	
2	DO (Bottom)	01/07/01-31/07/01	132	0	The exceedances were considered not related to the construction activities. Please refer to section 4 of the report for details.
3	SS	01/07/01-31/07/01	1	4	The exceedances were considered not related to the construction activities. Please refer to section 4 of the report for details.
4	Turbidity	01/07/01-31/07/01	0	0	
5	NH_3-N	01/07/01-31/07/01	26	0	The exceedances were considered not related to the construction activities. Please refer to section 4 of the report for details.
6	TIN	01/07/01-31/07/01	15	140	The exceedances were considered not related to the construction activities. Please refer to section 4 of the report for details.

Waste Management Records

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

Table 5.2 Estimated Amounts of Waste Generated in July 2001

Waste Type	Examples	Estimated Amount (m^3)
Dredged Materials	Marine Mud	902,632
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 902,632m^3. No filling took place.

5.3 Site Environmental Audit

Two warning letters from EPD was issued to the contractor on 5th July 2001 and 8th August 2001 about the malfunction of automatic self monitoring device installed in the barge No. 21648V (Hang Wo 9) and 21502V respectively. The contractor has been warned by HEC to take necessary actions to prevent them from happening again.

EPD enquired about the conditions of the installed silt curtains by letter to HEC ref: ( ) in L/M Ax (5) to EP2/N9/D/60 dated 1st August 2001. A response to EPD is being prepared.

Two EPD officials from the Water Policy and Planning Group have inspected the marine monitoring work on 11th July 2001. They were generally satisfied with the environmental performance of the monitoring consultant.

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 J.

5.4 Status of Environmental Licensing and Permitting

In view of practical difficulties in following the dredging scenarios stipulated in the EP (EP-071/2000/A) due to unavailability of trailer dredgers and more efficient grab dredgers that can achieve the dredging rates assumed in the EIA assessment, HEC has applied for variation of Environmental Permit on 19th June 2001. Despite the change in dredger configuration, the sediment loss to the surrounding water remains unchanged. The application was approved by EPD on 13th July 2001. 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/A	22/12/00	-	The whole construction work site.	Superseded by EP-071/2000/B
	EP-071/2000/B	13/07/01	-	The whole construction work site.	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	Superseded by GW-UW0256-01
	GW-UW0256-01	29/06/01	07/12/01	4 derrick barges, 5 dredger grabs and 6 tug boats before 2300 5 grab dredgers and 2 tug boats from 2300 to 0700 next day with a condition restricting the location of the grab dredger (CNP063)	Valid

Description	Permit No.	Valid Period		highlights	Status
		From	To		
Dumping Permit	EP/MD/01-174	07/04/01	06/10/01	Dumping at South Cheung Chau Disposal Area (Relocation of the Spoil Disposal Area with effective 24th May 2001 and 9th July 2001)	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 the requirements in the EM&A Manual.

5.7 Implementation Status of Environmental Complaint Handling Procedures

No environmental complaint against the construction activities was received in July 2001.

Table 5.4 Environmental Complaints / Enquiries Received in July 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:

Construction Noise Impact

- To estimate the noise level induced during the bored piling operation and to prepare the CNP application for the bored piling works in advance;
- To continue the preventive measures for noise exceedance and keep monitoring/ reviewing the performance.

Construction Water Impact

- To keep reviewing the monitoring results in order to take corresponding action to ensure the sea water quality;
- To provide routine inspection and necessary maintenance for the silt curtain.

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

Except three marine water monitoring works and one 1 hour TSP monitoring work which were rescheduled due to adverse weather conditions and power failure of monitoring equipment respectively, 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.

No Action/Limit level exceedance on noise was recorded in the reporting month.

A total of 379 cases of action/limit level exceedance on water quality parameters were recorded in the reporting month. As all the action/limit level exceedances were not related to construction activities, no further action is required.

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

Except the malpractice of the contractor spotted by EPD on 7th July 2001, the environmental performance of the Project was generally satisfactory.