

Agreement No. CE 24/95
Pak Shek Kok Reclamation for Dumping, Stage
Independent Consultants for the Supervision
of the Environmental Monitoring and Audit Proce

Environmental Monitoring and Audit Manual
Document No. PSK/EMAM
(Issue 2)

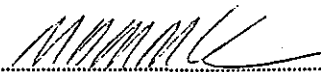
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Hong Kong Government
Civil Engineering Department

Agreement No. CE 24/95
Pak Shek Kok Reclamation for Dumping, Stage I
Independent Consultants for the Supervision
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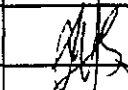


For and on Behalf of
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November 1996

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1. INTRODUCTION

1.1 Purpose of the Manual

- 1.1.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the setup of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme to be undertaken for the construction and operation of the Pak Shek Kok Reclamation for Dumping, Stage I. It aims to provide systematic procedures for monitoring, auditing and minimising of the environmental impacts associated with the construction and operation of the public dump.
- 1.1.2 Hong Kong environmental regulations for air and water quality, noise and waste, the Hong Kong Planning Standards and Guidelines, and recommendations in the EIA study final report on the Pak Shek Kok Reclamation - Public Dump have served as environmental standards and guidelines in the preparation of this Manual.
- 1.1.3 This Manual contains the following:
- (a) duties of the Independent Consultant (IC) and the contractor's environmental monitoring team with respect to the environmental monitoring and audit requirements during construction;
 - (b) information on project organisation and programming of construction activities for the project;
 - (c) requirements with respect to the construction schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
 - (d) definition of Action and Limit levels;
 - (e) establishment of event and action plans;
 - (f) requirements of reviewing pollution sources and working procedures required in the event of non-compliance of the environmental criteria;

- (g) requirements of presentation of environmental monitoring and audit data and appropriate reporting procedures.

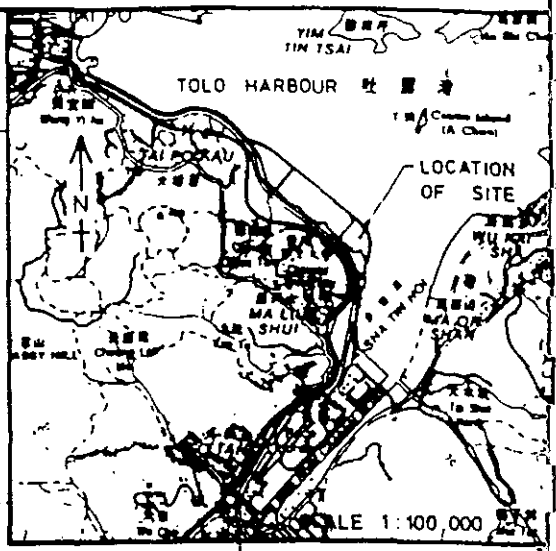
1.1.4 For the purpose of this Manual, the "Engineer" shall refer to the Engineer as defined in the Contract and the Engineer's Representative (ER), in cases where the Engineer's powers have been delegated to the ER, in accordance with the Contract. The IC shall refer to the Independent Consultant delegated the role of supervising the environmental monitoring and audit process.

1.2 Background

1.2.1 The proposed Pak Shek Kok Reclamation site is situated at the southern extremity of Tolo Harbour adjacent to the Tolo Highway (Figure 1.1). The proposed Stage 1 reclamation works involves:

- construction of a 1000 m long seawall;
- setting up a barging point at Ma On Shan;
- reclamation of approximately 14 ha of seabed using 0.6 million cu.m of public dump material transported to the site by barge from Ma On Shan; and
- carrying out environmental monitoring and implementation of environmental mitigation measures.


1.2.2 The question of environmental impacts from the reclamation has already been addressed by the commissioning of an environmental impact assessment (EIA) report (1). The EIA identified a number of sensitive receivers potentially subject to constructional and operational impacts. These are described in Table 1.1 and shown in Figures 1.2 and 1.3.

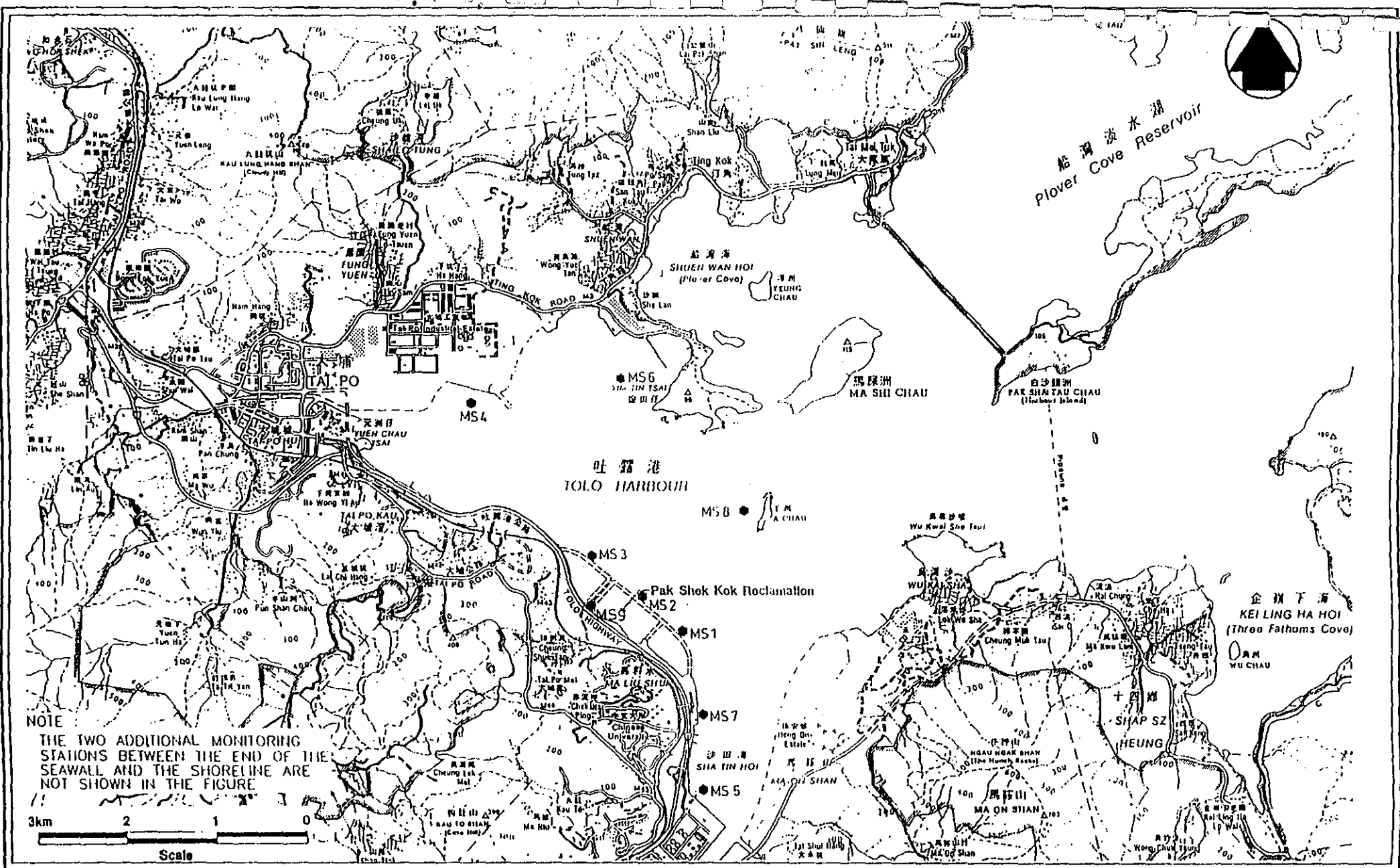


LEGEND :

- ⊙ 香港生物科技研究院
HONG KONG INSTITUTE OF BIOTECHNOLOGY
- ⊕ 中大海洋生物研究所
MARINE SCIENCE LABORATORY

P.W.P. No. 5405 CL

title 白石角填海—公眾傾卸區 及馬鞍山趸船卸泥站 PAK SHEK KOK RECLAMATION— PUBLIC DUMP AND BARGING POINT AT MA ON SHAN	drawn by <i>Chan Lin Chun</i> S. C. CHAN	date 27.2.95	Figure No. 1.1	scale 1:20 000
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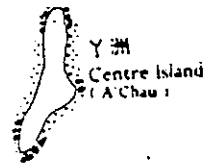


NOTE
 THE TWO ADDITIONAL MONITORING STATIONS BETWEEN THE END OF THE SEAWALL AND THE SHORELINE ARE NOT SHOWN IN THE FIGURE

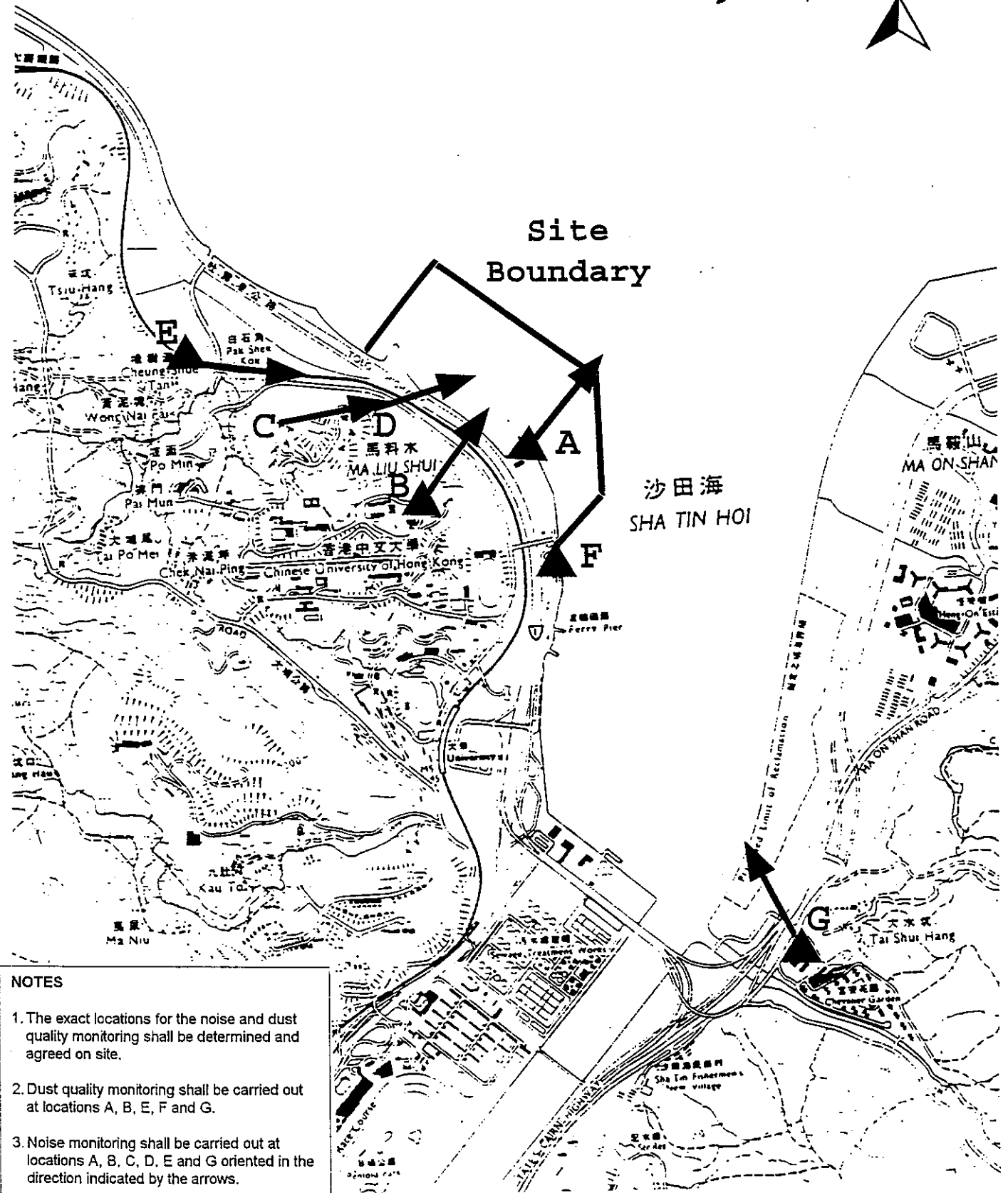
Water Quality Sensitive Receivers / Monitoring Stations

Figure No. **1.2**

TOLO HARBOUR



Site Boundary




NOTES

1. The exact locations for the noise and dust quality monitoring shall be determined and agreed on site.
2. Dust quality monitoring shall be carried out at locations A, B, E, F and G.
3. Noise monitoring shall be carried out at locations A, B, C, D, E and G oriented in the direction indicated by the arrows.

AGREEMENT NO. CE 24/95

Pak Shek Kok Reclamation for Dumping, Stage I
Independent Consultants for the Supervision
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 BINNIE CONSULTANTS LIMITED
賓尼工程顧問有限公司
ENGINEERS AND SCIENTISTS

Title :

Noise and Dust Sensitive Receivers /
Monitoring Stations

Figure No. 1.3

Revision 0

Reference No.

File Name

Prepared JW

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Date NOV 96

Scale NTS

Table 1.1
Sensitive Receivers/Monitoring Locations

Monitoring Location Code	Description	Impact Parameter
A	Staff accommodation adjacent to Hong Kong Institute of Biotechnology	Air, Noise
B	Chinese University of Hong Kong: Xuesi Hall	Air, Noise
C	Chinese University of Hong Kong: Residence No. 7	Noise
D	Chinese University of Hong Kong: Residence No. 10	Noise
E	Cheung Shue Tan Village	Air, Noise
F	Marine Science Laboratory	Air
G	Ma On Shan Tsung Tsin Secondary School	Air, Noise
MS4	Tai Po Seawater Pumping Station	Water
MS5	Shatin Seawater Pumping Station	Water
MS6	Yim Tin Tsai Mariculture Zone	Water
MS7	Marine Science Laboratory	Water

1.2.3 The EIA which was undertaken in respect of the Pak Shek Kok Reclamation for Dumping project as a whole (Stages 1,2 &3) identified the following major Environmental Impacts as a result of the works:

- 1 potential for higher than acceptable noise levels at the Hong Kong Institute of Biotechnology staff accommodation block primarily due to construction of the site access road and the combined noise of the seawall construction and site traffic noise from the access road;
- 2 potential for higher than acceptable 24-hour TSP levels at nearby sensitive receivers due primarily to construction and operation of the site access road at Ma Liu Shui and land based tipping operations; and
- 3 potential for dredging-induced elevated suspended solids concentrations reaching unacceptable levels at the Marine Science Laboratory sea water intake, under strong north or northwesterly wind conditions

1.2.4 For each of these impacts mitigation measures were recommended in the EIA which would reduce the impacts to acceptable levels.

1.2.5 In respect of dust and noise impacts a subsequent design change under the Stage 1 Contract has resulted in a significant reduction in potential impacts. There will now be no landbased access to the reclamation site, with all reclamation materials being brought in by barge from Ma On Shan. Thus, the major noise and dust impacts predicted in the EIA would be significantly reduced. Mitigation measures to ensure that noise and dust levels are kept within acceptable levels are nevertheless required. Such measures are presented in detail in this manual.

1.2.6 As a result of this design change there could be an intensification of activities at the Ma On Shan barging point including trucks off-loading onto barges and stockpiling. This could result in an increase in noise and dust levels at Ma On Shan Tsung Tsin Secondary School. A monitoring location for dust and noise has been established at this location to ensure that impacts associated with the works will be kept within acceptable limits.

1.2.7 In respect of potential water quality impacts, the EIA recommended that:

- ✓ (i) a sealed grab and silt screens be used during dredging to protect the MSL intake from elevated suspended solids levels.
- ✓ (ii) the seawall be maintained to above sea level for at least 100 m from the active face or barge dumping area to minimise the loss of fines.

1.2.8 The detailed design has provided an additional measure such that the MSL intake will be surrounded by a silt screen designed to ensure that the indrawn water shall contain less than 20 mg/l of suspended solids. An alternative measure to (ii) has also been documented such that a silt curtain will be provided if the length of seawall built ahead of filling is less than 100 m. Details of these and additional water quality mitigation measures are presented in this manual. *when needed*

1.2.9 It is a requirement of the Environmental Protection Department (EPD) that the project proponent, in this case the Civil Engineering Department (CED), undertakes an Environmental Monitoring and Audit (EM&A) Programme during the construction and operation of the project.

1.2.10 This programme should involve:

- monitoring the environmental performance of the project and the effectiveness of mitigation measures;

- verifying the environmental impacts predicted in the EIA;
 - determining project compliance with regulatory requirements and government policies;
 - ✓ • taking remedial action if unexpected problems or unacceptable impacts arise.
- 1.2.11 An EM&A Manual was prepared along with the EIA. The EM&A Programme included in the Manual relates to the monitoring and audit of the following parameters:
- noise;
 - air quality (dust);
 - marine water quality.
- 1.2.12 This Manual is a new document replacing the original EM&A Manual in the light of the detailed design and programme of works for the reclamation project and recent progress in general in EM&A in Hong Kong. It provides guidance to CED, the Contractor and other responsible persons in the effective implementation of the EM&A Programme.
- 1.3 Environmental Monitoring and Audit Requirements**
- Pre-construction Phase**
- 1.3.1 The EIA recommended that prior to any construction activities baseline monitoring should be carried out in respect of air, noise and marine water quality. This information will be used to determine the nature and ranges of natural variation in order to assess the short and long term environmental impacts of the project activities.
- Construction and Operation Phase**
- 1.3.2 During the construction and operation phase impact/compliance monitoring is to be undertaken on a routine basis. Such monitoring will determine:
- the impact of the activities and effectiveness of the environmental mitigation measures specified in the contract documents or recommended on site to remedy environmental problems arising; and
 - compliance with regulatory requirements and standards.

Post Project Phase

1.3.3 The EIA recommended that a post-project environmental monitoring and audit programme for marine water quality be instituted. The EIA assumed that this would take place at the completion of the whole reclamation (Stages 1, 2 & 3). Post-project monitoring has not been included in the Stage 1 works. It is recommended that the scope of the post-project monitoring programme be reviewed prior to tendering the Stage 3 contract.

1.4 Project Organization

1.4.1 The project organisation and lines of communication with respect to environmental protection works is shown in Figure 1.4. The Independent Consultant (IC) shall be responsible for undertaking the baseline monitoring programme and supervising the overall EM&A process. Impact and compliance monitoring undertaken during the construction and operation phase will be done by the Contractor under the supervision of the IC.

1.4.2 An Organisation Chart of the IC's core team is presented in Figure 1.5. The key duties of the IC's core team are as follows:

- (a) To undertake the baseline monitoring programme including preparation of the Baseline Monitoring Report and review of the EM&A Manual;
- (b) To supervise the Contractor's environmental monitoring works;
- (c) To investigate and audit the Contractors' equipment and work methodologies with respect to pollution control and environmental mitigation, and anticipate environmental issues for proactive action before problems arise;
- (d) To audit and prepare audit reports on the environmental monitoring data and the site environmental conditions;
- (e) To investigate complaints and recommend appropriate mitigation measures as required.

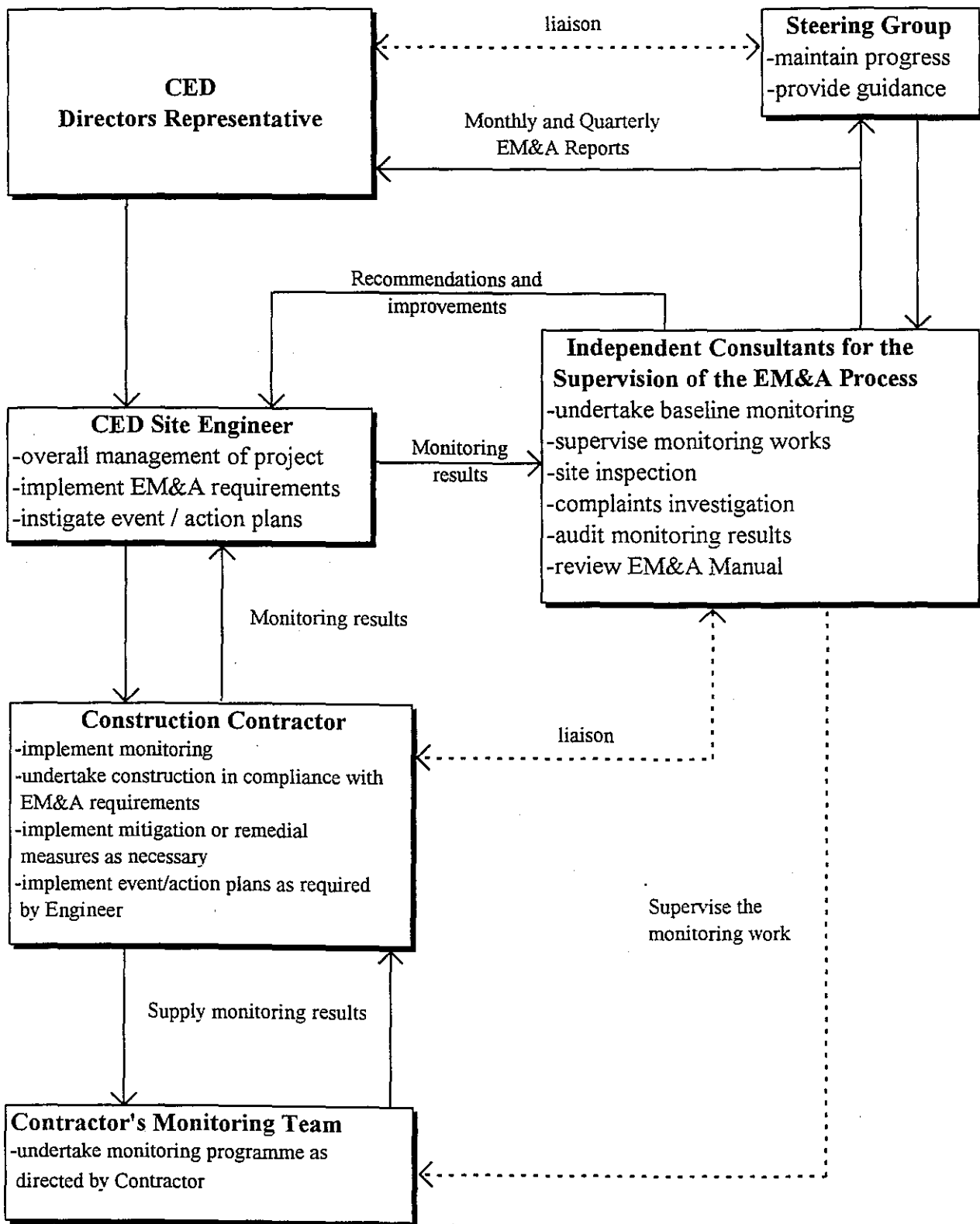


Figure 1.4 Project Organization, Responsibilities and Lines of Communication Between the Various Parties.

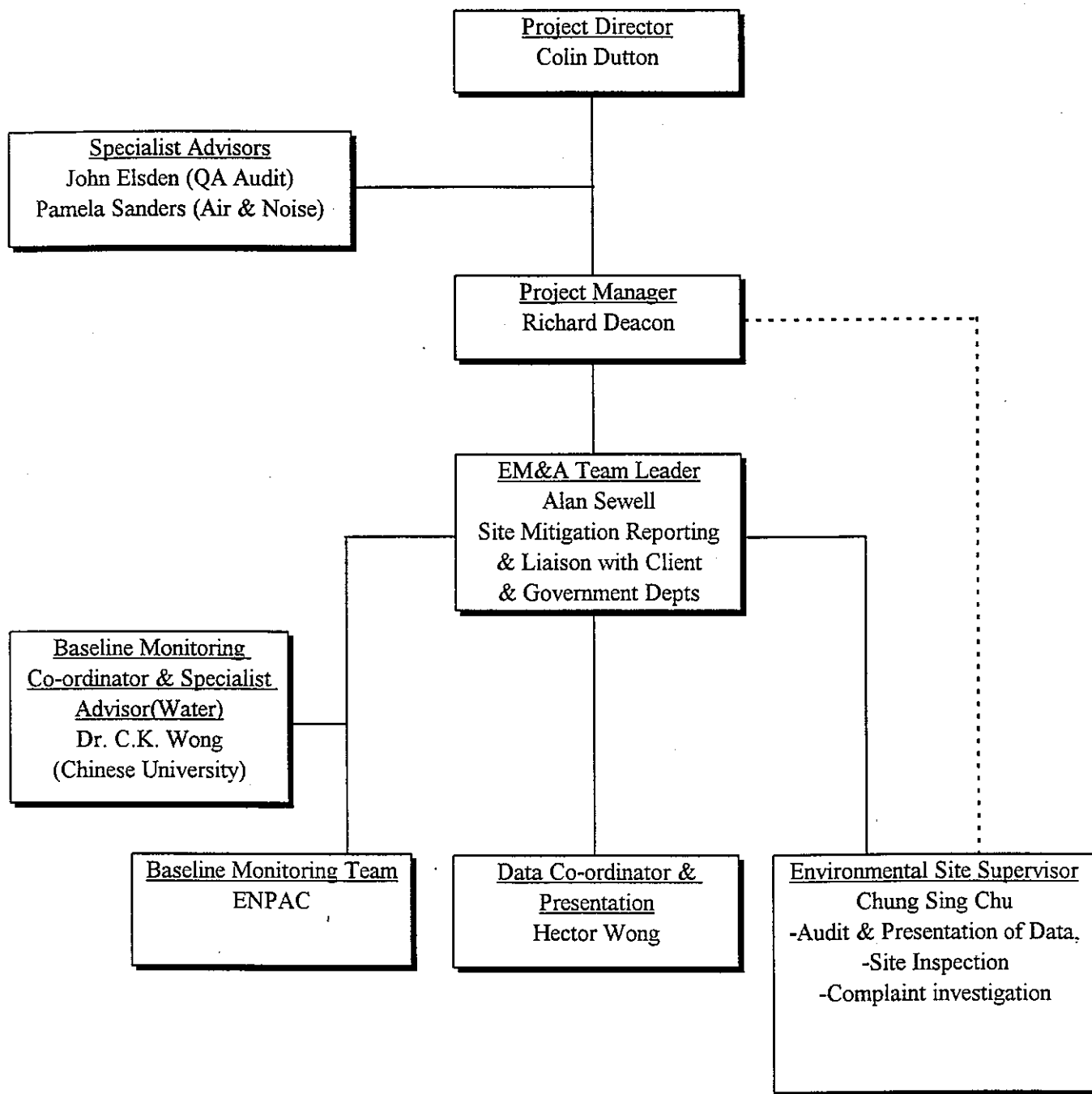


Figure 1.5 Organisation Chart of IC's Core Team

1.5 Construction Programme

1.5.1 The current works programme for the project is given in Figure 1.6 (not yet available, to be provided by Contractor/CED. (Note: This will be included in the EM&A Manual when it becomes available.) This programme will be updated from time to time by the Contractor and the IC will review the consequences on the EM&A programme on each occasion.

2. AIR QUALITY

2.1 Air Quality Parameters

2.1.1 Monitoring and audit of the Total Suspended Particulates (TSP) levels shall be carried out to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.

2.1.2 1-hour and 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon approval of the ER, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

2.1.3 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena and work progress of the concerned site etc. shall be recorded in detail. A sample data sheet is given in Appendix 2.

2.2 Monitoring Equipment

2.2.1 High volume samplers (HVS) in compliance with the following specifications shall be used for carrying out the 1-hr and 24-hr TSP monitoring:

- (a) 0.6-1.7 m³/min (20-60 SCFM) adjustable flow range;
- (b) equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation;
- (c) installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
- (d) capable of providing a minimum exposed area of 406 cm² (63 in²);
- (e) flow control accuracy: +/- 2.5% deviation over 24-hr sampling period;

- (f) equipped with a shelter to protect the filter and sampler;
 - (g) incorporated with an electronic mass flow rate controller or other equivalent devices;
 - (h) equipped with a flow recorder for continuous monitoring;
 - (i) provided with a peaked roof inlet;
 - (j) incorporated with a manometer;
 - (k) able to hold and seal the filter paper to the sampler housing at horizontal position;
 - (l) easy to change the filter; and
 - (m) capable of operating continuously for 24-hr period.
- 2.2.2 For Baseline monitoring the IC is responsible for provision of the monitoring equipment. For impact/compliance monitoring the Contractor is responsible for provision of the monitoring equipment. Sufficient number of HVSs with an appropriate calibration kit must be available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc. shall be clearly labelled.
- 2.2.3 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference. All the data should be converted into standard temperature and pressure conditions.
- 2.2.4 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded in the data sheet.
- 2.2.5 If the IC or Contractor proposes to use a direct reading dust meter to measure 1-hr TSP levels, he shall submit sufficient information to the ER to prove that the instrument is capable of achieving a comparable result as that the HVS and may be used for the 1-hr sampling. The instrument should also be calibrated regularly, and the 1-hr sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.
- 2.2.6 Wind data monitoring equipment shall also be provided and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall be proposed by the IC and agreed with the ER. For installation and operation of wind data monitoring equipment, the following points shall be observed:

- (a) the wind sensors should be installed on masts at an elevated level 10 m above ground so that they are clear of obstructions or turbulence caused by the buildings;
 - (b) the wind data should be captured by a data logger and to be downloaded for processing at least once a month;
 - (c) the wind data monitoring equipment should be re-calibrated at least once every six months; and
 - (d) wind direction should be divided into 16 sectors of 22.5 degrees each.
- 2.2.7 In exceptional situations, the IC may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from EPD.
- 2.3 Laboratory Measurement / Analysis**
- 2.3.1 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments, to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.
- 2.3.2 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the ER and the measurement procedures shall be witnessed by the ER. The ET Leader shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his reference.
- 2.3.3 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pin holes, and shall be conditioned in a humidity controlled chamber for over 24-hr and be pre-weighed before use for the sampling.
- 2.3.4 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper is then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.
- 2.3.5 All the collected samples shall be kept in a good condition for 6 months before disposal.

2.4 Monitoring Locations

- 2.4.1 The dust monitoring locations are shown in Figure 1.3 (A, B, E, F & G) and described in Table 1.1. The status and locations of dust sensitive receivers may change after issuing this manual. If such cases exist, the IC shall propose updated monitoring locations and seek approval from ER and agreement from EPD on the proposal.
- 2.4.2 When alternative monitoring locations are proposed, the following criteria, as far as practicable, should be followed:
- (a) at the site boundary or such locations close to the major dust emission source;
 - (b) close to the sensitive receptors; and
 - (c) take into account the prevailing meteorological conditions.
- 2.4.3 The IC shall agree with the ER on the position of the HVS for installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:
- (a) a horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
 - (b) no two samplers should be placed less than 2 meter apart;
 - (c) the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
 - (d) a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
 - (e) a minimum of 2 metre separation from any supporting structure, measured horizontally is required;
 - (f) no furnace or incinerator flue is nearby;
 - (g) airflow around the sampler is unrestricted;
 - (h) the sampler is more than 20 metres from the dripline;
 - (i) any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
 - (j) permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
 - (k) a secured supply of electricity is needed to operate the samplers.

2.5 Baseline Monitoring

- 2.5.1 The IC shall carry out baseline monitoring at all of the designated monitoring locations according to the Schedule of Environmental Monitoring Works as given in the project brief (Appendix 1).
- 2.5.2 During the baseline monitoring, there should not be any construction or dust generation activities in the vicinity of the monitoring stations.
- 2.5.3 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the IC shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the ER and agreed with EPD.
- 2.5.4 In exceptional case, when insufficient baseline monitoring data or questionable results are obtained, the IC shall liaise with EPD to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.
- 2.5.5 Ambient conditions may vary seasonally and shall be reviewed at three monthly intervals. If the IC considers that the ambient conditions have been changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be at times when the contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with EPD.

2.6 Impact Monitoring

- 2.6.1 The Contractor shall carry out impact monitoring during the course of construction works which could give rise to dust impacts. Impact/compliance monitoring shall be undertaken by the Contractor during the construction and operation phases of the project according to the Schedule of Environmental Monitoring Works given in the project brief (Appendix 1). Any proposed amendments to the schedule by the IC shall be approved by the ER and agreed with EPD.
- 2.6.2 In case of non-compliance with the air quality criteria, more frequent monitoring exercise, as specified in the Action Plan in Section 2.7, shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

2.7 Event and Action Plan for Air Quality

2.7.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The IC shall compare the impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hour TSP. Table 2.1 shows the air quality criteria, namely Trigger, Action and Limit levels to be used. Should non-compliance of the air quality criteria occur, the IC, the ER and the Contractor shall undertake the relevant action in accordance with the Action Plan in Table 2.2.

Table 2.1
Trigger, Action and Limit Levels for Air Quality

Level	Total Suspended Particulates	Respirable Suspended Particulates
Trigger	116 $\mu\text{g}/\text{m}^3$ (24 hour average) 222 $\mu\text{g}/\text{m}^3$ (1-hour average)	61 $\mu\text{g}/\text{m}^3$ (24 hour average)
Action	188 $\mu\text{g}/\text{m}^3$ (24 hour average) 361 $\mu\text{g}/\text{m}^3$ (1-hour average)	120 $\mu\text{g}/\text{m}^3$ (24 hour average)
Limit	AQO for TSP 260 $\mu\text{g}/\text{m}^3$ (24 hour average) or 500 $\mu\text{g}/\text{m}^3$ (1 hour average)	AQO for RSP 180 $\mu\text{g}/\text{m}^3$ (24 hour average)

2.8 Dust Mitigation Measures

2.8.1 The EIA report has recommended dust control and mitigation measures. The Contractor shall be responsible for the design and implementation of these measures. Most of the measures are included in the Particular Specifications of the Contract Document CV94/13. Reference should be made to the following clauses of that document: P1.21 (5); P1.22 (8)(a)(iii), (c)(iii), (d), (e); P1.24; and P26.03 (5)-(12). These are listed in Appendix 4.

2.8.2 Further recommendations in the EIA and not included in the contract document include:

- Wheel washing facilities shall be usable prior to the construction works;
- The Contractor shall provide a reasonable length of hard-surfaced road between the washing facility and the public road;

- Travel on unpaved or untreated road shoulders should be prevented. Dump tracks should be prevented from travelling over unpaved areas beside the road by provision of wide lanes, shoulders, kerbs and barriers;
- Use should be made of fast-growing vegetation to reduce dust emissions.

2.8.3 If the above measures are not sufficient to restore the air quality to acceptable levels upon the advice of the IC, the Contractor shall liaise with the IC on some other mitigation measures, propose to ER for approval, and implement the mitigation measures.

Table 2.2
Event/Action Plan for Air Quality

Event	IC/ER	Contractor
Trigger Level exceeded (one sample)	<ol style="list-style-type: none"> 1 Repeat measurement as soon as possible 2 Notify contractor 	<ol style="list-style-type: none"> 1 Identify source
Trigger Level exceeded (more than one consecutive sample)	<ol style="list-style-type: none"> 1 Repeat measurement as soon as possible 2 Notify contractor immediately 	<ol style="list-style-type: none"> 1 Identify source and impose necessary mitigation measures
Action Level exceeded (one sample)	<ol style="list-style-type: none"> 1 Repeat measurement as soon as possible 2 Notify contractor immediately 	<ol style="list-style-type: none"> 1 Identify source and impose necessary mitigation measures
Action Level exceeded (more than one consecutive sample)	<ol style="list-style-type: none"> 1 Daily monitoring is to be imposed 2 Notify contractor immediately 3 Require contractor to make additional proposals for dust suppression 	<ol style="list-style-type: none"> 1 Identify source 2 Review plant, equipment and working procedures 3 Submit proposals for reducing dust to Engineer 4 Implement remedial action to reduce dust emissions immediately 5 Notify Engineer of the action taken
Target Level exceeded (one sample)	<ol style="list-style-type: none"> 1 Daily monitoring is to be imposed 2 Notify contractor immediately 3 Require contractor to make additional proposals for dust suppression 	<ol style="list-style-type: none"> 1 Identify source 2 Review plant, equipment and working procedures 3 Submit proposals for reducing dust to Engineer 4 Implement remedial action to reduce dust emissions immediately 5 Notify Engineer of the action taken 6 Provide investigation report
Target Level exceeded (more than one consecutive sample)	<ol style="list-style-type: none"> 1 Daily monitoring is to be imposed 2 Notify contractor immediately 3 Require contractor to make additional proposals for dust suppression, and take immediate steps to reduce dust 	<ol style="list-style-type: none"> 1 Identify source 2 Review plant, equipment and working procedures 3 Submit proposals for reducing dust to Engineer 4 Implement remedial action to reduce dust emissions immediately 5 Notify Engineer of the action taken 6 Provide investigation report, which should include findings and suggestions to prevent such exceedance happening again 7 If exceedance is contributed by the Contractor's works, stop the relevant portion of works as necessary as determined by the Engineer until the problem is under control and the air quality is restored to an acceptable level

Note: If source of exceedance is clearly identified as being not works related no further action is necessary by any party.

3. NOISE

3.1 Noise Parameters

3.1.1 The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (Leq). Leq(30 min) shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, Leq(5 min) shall be employed for comparison with the NCO criteria.

3.1.2 As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. A sample data record sheet is given in Appendix 2.

3.2 Monitoring Equipment

3.2.1 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0 dB.

3.2.2 Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5 ms^{-1} or wind with gusts exceeding 10 ms^{-1} . The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

3.2.3 The IC and Contractor are responsible for the provision of the monitoring equipment for the baseline and regular compliance monitoring respectively. They shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring (IC), regular impact monitoring and ad hoc monitoring (contractor). All the equipment and associated instrumentation shall be clearly labelled.

3.3 Monitoring Locations

- 3.3.1 The noise monitoring locations are shown in Figure 1.3 (A, B, C, D, E & G) and described in Table 1.1. The status and locations of noise sensitive receivers may change after issuing this manual. If such cases exist, the IC shall propose updated monitoring locations and seek approval from ER and agreement from EPD on the proposal.
- 3.3.2 When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria:
- (a) at locations close to the major site activities which are likely to have noise impacts;
 - (b) close to the noise sensitive receivers (N.B. For the purposes of this section, any domestic premises, hotel, hostel, temporary housing accommodation, hospital, medical clinic, educational institution, place of public worship, library, court of law, performing art centre should be considered as noise sensitive receiver); and
 - (c) for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.
- 3.3.3 The monitoring station shall normally be at a point 1 m from the exterior of the sensitive receivers building facade and be at a position 1.2 m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall be made to the free field measurements. The IC shall agree with the ER on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

3.4 Baseline Monitoring

- 3.4.1 The IC shall carry out baseline noise monitoring prior to the commencement of the construction works according to the Schedule of Environmental Monitoring Works as given in the project brief (Appendix 1).

3.5 Impact Monitoring

3.5.1 Impact/compliance noise monitoring shall be undertaken by the Contractor during the construction and operation phases of the project according to the Schedule of Environmental Monitoring Works given in the project brief (Appendix 1). Any proposed amendments to the schedule by the IC shall be approved by the ER and agreed with EPD.

3.5.2 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in Section 3.6 shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

3.6 Event and Action Plan for Noise

3.6.1 The Trigger, Action and Limit levels for construction noise are defined in Table 3.1. Should non-compliance of the criteria occurs, action in accordance with the Action Plan in Table 3.2, shall be carried out.

Table 3.1
Trigger, Action and Limit Levels for Construction Noise

Time Period	Trigger	Action	Limit
0700-1900 hrs on weekdays	one independent complaint	more than one independent complaint	for Stations A, C, D, E L _{eq} (30 min) 75 dB(A)
0700-2300 hrs on holidays; and 1900-2300 hrs on all other days			for Stations B, G L _{eq} (30 min) 70 dB(A) (or L _{eq} (30 min) 65 dB(A) during examination period
2300-0700 hrs of next day			55 dB(A)
			40 dB(A)

Table 3.2
Event/Action Plan for Construction Noise

Event	Action		
	IC	ER	Contractor
Trigger Level (one independent complaint received)	Investigate complaint	Notify Contractor of complaint and findings of investigation report	Review noise source and working method
Action Level (more than one independent complaint received in a four week period)	Investigate complaint and provide report to ER with recommendations for remedial measures if necessary	Notify Contractor of complaints and findings of investigation report	<ol style="list-style-type: none"> 1. Review noise source and working method 2. Implement recommended mitigation measures
Limit Level exceeded	<ol style="list-style-type: none"> 1. Investigate cause of exceedance 2. Inform ER and EPD immediately in writing 3. Recommend mitigation measures and increased monitoring frequency to check their effectiveness 	<ol style="list-style-type: none"> 1. Notify contractor in writing 2. Request contractor to implement mitigation measures to reduce noise to acceptable levels 3. Request contractor to increase monitoring frequency as recommended by IC to check effectiveness of mitigation measures 4. If Limit continues to be exceeded invoke stop work Clause P26.02 (3) of contract 	<ol style="list-style-type: none"> 1. Review noise source and working method 2. Implement noise mitigation measures immediately to reduce noise to acceptable levels 3. Undertake additional noise monitoring as directed by ER to check effectiveness of mitigation measures

3.7 Noise Mitigation Measures

3.7.1 The EIA report has recommended construction noise control and mitigation measures. The Contractor shall be responsible for the design and implementation of these measures. Most of these measures are included in the Particular Specifications of the Contract Document CV94/13. Reference should be made to the following clauses of that document: P26.02 (5)-(11). These are listed in Appendix 4.

3.7.2 Further recommendations in the EIA which are not included in the Contract Document include:

- Noisy equipment and activities should be sited by the Contractor as far from sensitive receivers as is practical. Noisy activities can be scheduled to minimise exposure of these receivers to high levels of construction noise. For example, noisy activities can be scheduled for midday, or at times coinciding with periods of high background noise (such as during peak traffic hours). Prolonged operation of noisy equipment close to dwellings should be avoided.
- Idle equipment should be turned off or throttled down. Noisy equipment should be used as infrequently as possible.
- The power units of non-electric stationary plant and earth-moving plant can be quietened by vibration isolation and partial or full acoustic enclosures for individual noise-generating components.

3.7.3 If the above measures are not sufficient to restore the construction noise quality to an acceptable levels upon the advice the IC, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to ER for approval, and carry out the mitigation measures.

4. WATER QUALITY

4.1 Water Quality Parameters

4.1.1 Monitoring of the water quality parameters listed in Table 4.1 shall be carried out to ensure that any deteriorating water quality could be readily detected and timely action be taken to rectify the situation.

Table 4.1
 Water Quality Parameters

Group A	Group B
Temperature (°C)	Ammoniacal Nitrogen (mg/l)
Salinity (ppt)	Nitrite-Nitrogen (mg/l)
Dissolved Oxygen (mg/l)	Nitrate Nitrogen (mg/l)
Turbidity (NTU)	Total Kjeldahl N (mg/l)
Suspended Solids (mg/l)	Total PO ₄ (mg/l)
Total Lead (µg/l)	Total Copper (µg/l)
Total Zinc (µg/l)	Chlorophyll-a (µg/l)
	<i>E. coli</i> (cfu/100 ml)
	BOD (mg/l)

4.1.2 In association with the water quality parameters, the following data shall also be provided: monitoring location/position, time, water depth, weather conditions, sea conditions, tidal stage and any special phenomenon and work underway at the construction site.

4.1.3 Sample monitoring data record sheets are given in Appendix 2 for reference.

4.2 Monitoring Equipment

4.2.1 Dissolved oxygen and temperature measuring equipment

- (a) The instrument should be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and use a DC power source. It should be capable of measuring:
- a dissolved oxygen level in the range of 0-20 mg/l and 0-200% saturation; and
 - a temperature of 0-45 degree Celsius.
- (b) It should have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables should be available for replacement where necessary. (e.g. YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

4.2.2 *Turbidity Measurement Instrument*

The instrument should be a portable, weatherproof turbidity-measuring instrument complete with comprehensive operation manual. The equipment should use a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU and be complete with a cable (e.g. Hach model 2100P or an approved similar instrument).

4.2.3 *Suspended Solids, Lead, Zinc and all Group B parameters*

- (a) A water sampler comprising a transparent PVC cylinder, with a capacity of not less than 2 litres, and can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (e.g. Kahlsico Water Sampler or an approved similar instrument).
- (b) Water samples should be collected in high density polythene bottles, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory as soon as possible after collection.

4.2.4 *Water Depth Detector*

A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. This unit can either be handheld or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

4.2.5 *Salinity*

A portable salinometer capable of measuring salinity in the range of 0-40 mg/l shall be provided for measuring salinity of the water at each monitoring location.

4.2.6 *Location of the monitoring site*

A hand-held or boat-fixed type digital Global Positioning System (GPS) or other equivalent instrument of similar accuracy shall be provided and used during monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

- 4.2.7 All in-situ monitoring instrument shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.
- 4.2.8 For the on site calibration of field equipment, the BS 127:1993, "Guide to Field and on-site test methods for the analysis of waters" should be observed.
- 4.2.9 Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment some equipment is under maintenance, calibration, etc.

4.3 Laboratory Measurement/Analysis

- 4.3.1 Analysis of suspended solids, zinc, lead and all Group B parameters shall be carried out in a HOKLAS or other international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the various analyses. The standard methods to be used for testing are listed below:

<u>Item</u>	<u>Parameter</u>	<u>Method Used</u>
1	Suspended solids	APHA 17 ed 2540D
2	Lead	APHA 17 ed 3030E & 3111B
3	Zinc	APHA 17 ed 3030E & 3111B
4	NH ₄ -N	HACH Colorimetry
5	Nitrate-N	APHA 17 ed 4500 NO ₃ B
6	Nitrite-N	APHA 17 ed 4500 NO ₂ B
7	TKN	ASTM D3590-89 Method A
8	Total phosphorus	HACH Colorimetry
9	Total copper	APHA 17 ed 3030E & 3111B
10	Chlorophyll a	APHA 17 ed 10200H (Spectrophotometric Method)
11	E. coli	MPN and Membrane Filtration
12	BOD	APHA 17 ed 5210B

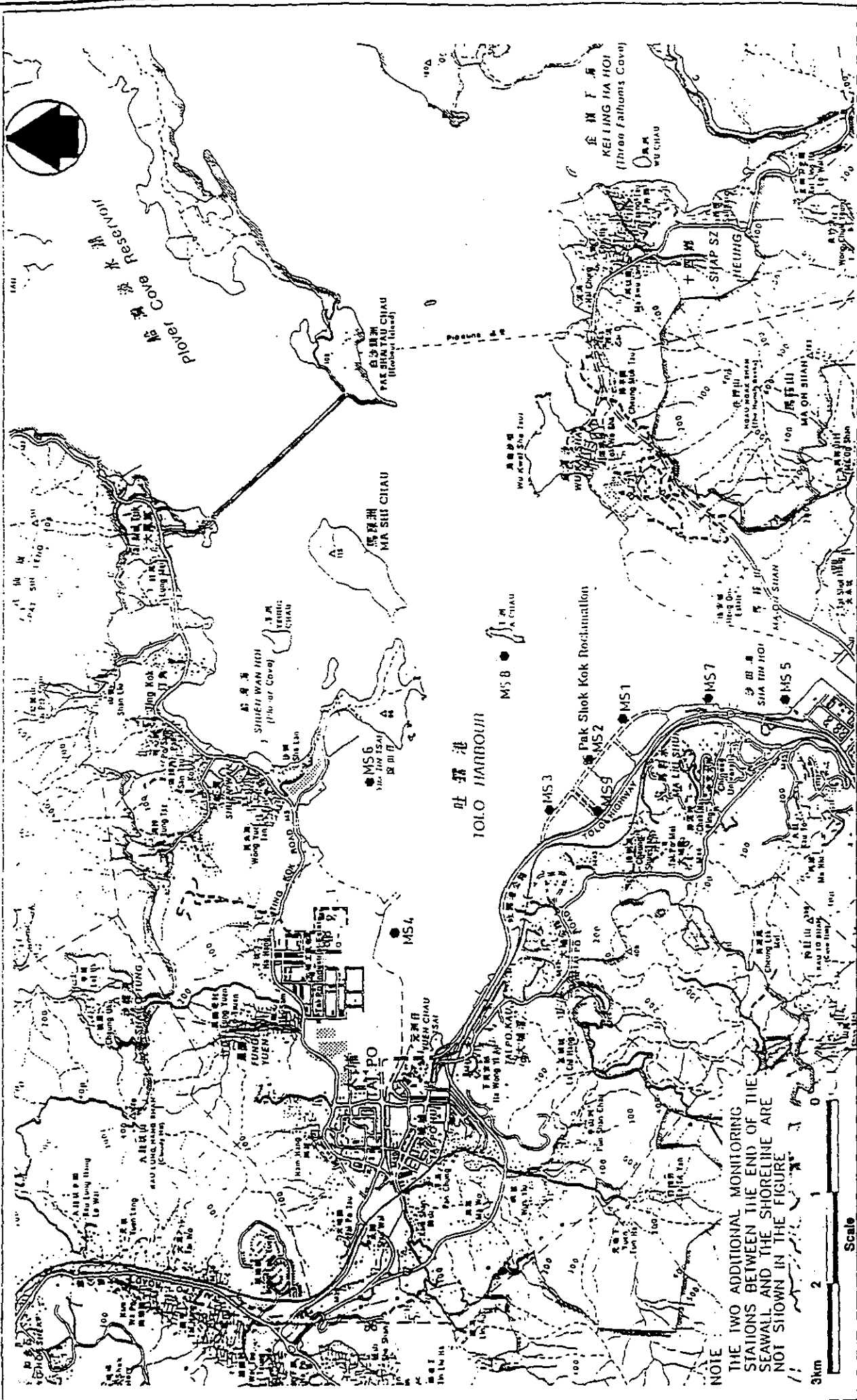
4.3.2 All sample testing should have comprehensive quality assurance and quality control programmes. The laboratory should prepare to demonstrate the programmes to DEP or his representatives when requested.

4.4 Monitoring Locations

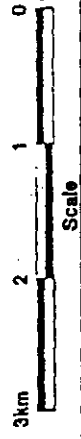
4.4.1 The water quality monitoring locations are shown in Figure 4.1 (Table 4.2). The status and locations of water quality sensitive receivers and the marine activities sites may change after issuing this manual. If such cases exist, the IC shall propose updated monitoring locations and seek approval from DEP.

4.4.2 Control stations are necessary to compare the water quality from potentially impacted sites with the ambient water quality. Control stations shall be located within the same body of water as the impact monitoring stations but should be outside the area of influence of the works and, as far as practicable, not affected by any other works.

4.4.3 Measurement shall be taken at 3 water depths, namely, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth less than 6 m, the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station will be monitored.



NOTE
 THE TWO ADDITIONAL MONITORING STATIONS BETWEEN THE END OF THE SEAWALL AND THE SHORELINE ARE NOT SHOWN IN THE FIGURE.



Water Quality Monitoring Stations

Table 4.2
Water Quality Monitoring Stations

Station Description	HK Metric Grid E	HK Metric Grid N	Code
50 m seaward of the centre of the Phase 1 Seawall	840220	831750	MS1
50 m seaward of the centre of the Phase 2 Seawall	839600	832330	MS2
50 m seaward of the centre of the Phase 3 Seawall	838970	832820	MS3
Sensitive Receiver Tai Po Seawater Pumping Station	837660	834540	MS4
Sensitive Receiver Shatin Seawater Pumping Station	840200	830300	MS5
Sensitive Receiver Yim Tin Tsai Mariculture Zone	839300	834800	MS6
Sensitive Receiver MSL	840200	831120	MS7
Reference Control Station within Tolo Harbour	840700	833800	MS8
Nullah outfall draining the Tai Po Mei and Cheung Shue Tan Rivers (only required during impact and compliance monitoring)	838900	832300	MS9
One location spaced between the end of the seawall and the shoreline (only required during impact and compliance monitoring)	Moveable as the wall is extended	Moveable as the wall is extended	MS10

4.5 Baseline Monitoring

4.5.1 Baseline conditions for water quality shall be established and agreed with DEP prior to the commencement of works. The purposes of the baseline monitoring are to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed impact, control and reference monitoring stations. The baseline conditions shall be established by measuring the water quality parameters specified in Section 4.1. The measurements shall be taken at all designated monitoring stations including control stations according to the details given (see also Appendix 1):

- Parameters

<u>Group A</u>	<u>#Group B</u>
* Temperature	NH ₄ -Nitrogen
* Salinity	Nitrate-Nitrogen
* Dissolved Oxygen	Nitrite-Nitrogen
* Turbidity	TKN
Suspended Solids	Total PO ₄
# Total Lead	Total Copper
# Total Zinc	Chlorophyll-a
	E. coli
	BOD

- * Parameters to be measured in-situ.

- # Equal volume of samples taken from the 3-depths will be combined following collection to produce a depth averaged sample.

- Frequency/Duration

<u>Group A</u>	<u>Group B</u>
4 days/week for 4 consecutive weeks within 6 weeks prior to construction, at mid flood and mid ebb.	2 days/week for 3 consecutive months within 14 weeks prior to construction at mid flood and mid ebb.

Samples should be taken 1 m below surface, mid depth and, 1 m above the seabed. If the total depth is less than 6 m the mid depth sample should be omitted. If the total depth is less than 3 m then the bottom sample may also be omitted.

For in-situ parameters, measurements will be made during descent and ascent of the sensor. If the difference between values is greater than 25% the measurements are repeated.

- Locations

- MS1 - MS8 (8 stations) as indicated in the Figure 4.1 and Table 4.2.

When sampling both parameter groups, sampling for both groups should be carried out at the same time.

The Dissolved Oxygen meter should be calibrated with respect to the ambient salinity of the seawater.

4.6 Impact Monitoring

4.6.1 During the course of marine works monitoring will be undertaken according to the details given below (see also Appendix 1):

- Parameters

-	<u>Group A</u>	<u>#Group B</u>
*	Temperature	NH ₄ -Nitrogen
*	Salinity	Nitrate-Nitrogen
*	Dissolved Oxygen	Nitrite-Nitrogen
*	Turbidity	TKN
	Suspended Solids	Total PO ₄
#	Total Lead	Total Copper
#	Total Zinc	Chlorophyll-a
		E. coli
		BOD

- * Parameters to be measured in-situ.

- # Equal volume of samples taken from the 3-depths will be combined following collection to produce a depth averaged sample.

- Frequency/Duration

-	<u>Group A</u>	<u>Group B</u>
	3 days/week for the construction and operation at mid flood and mid ebb.	1 day/week for the construction and operation at mid flood and mid ebb.

The time interval between any two sets of monitoring in either group should not be less than 36 hours.

Samples should be taken 1 m below surface, mid depth and, 1 m above the seabed. If the total depth is less than 6 m the mid depth sample should be omitted. If the total depth is less than 3 m then the bottom sample may also be omitted.

For in-situ parameters, measurements will be made during descent and ascent of the sensor. If the difference between values is greater than 25% the measurements are repeated.

- Locations

- (MS1 - MS10) (10 stations) as indicated in the Figure 4.1 and Table 4.2.

When sampling both parameter groups, sampling for both groups should be carried out at the same time.

As with Group B parameters, monitoring for lead and zinc are only required during dredging activities.

The dissolved oxygen meter should be calibrated with respect to the ambient salinity of the seawater.

4.7 Event and Action Plan for Water Quality

- 4.7.1 The water quality criteria, namely Trigger, Action and Limit levels are shown in Table 4.3. Should the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality criteria are exceeded, the actions in accordance with the Action Plan in Table 4.4 shall be carried out.

Table 4.3
Proposed Trigger, Action and Limit Levels for Water Quality Parameters

Parameters	Trigger	Action	Limit
DO (mg/l)	<u>Surface & Middle</u> 6.6 <u>Bottom</u> -	<u>Surface & Middle</u> 5.7 <u>Bottom</u> -	<u>Surface & Middle</u> 4 (5 for FCZ) <u>Bottom</u> 2
SS (mg/l)	9.7	11.1	21.3
Turbidity (NTU)	12.1	13.7	18.2
NH ₄ N (mg N/l)	running mean of 4 most recent samples < 0.27	running mean of 4 most recent samples < 0.37	running mean of 4 most recent samples < 0.54
Total Inorganic N (mg N/l)	running mean of 4 most recent samples < 0.78	running mean of 4 most recent samples < 0.89	running mean of 4 most recent samples < 1.24
TKN (mg/l)	running mean of 4 most recent samples < 0.81	running mean of 4 most recent samples < 0.98	running mean of 4 most recent samples < 2.31
PO ₄ (mg P/l)	running mean of 4 most recent samples < 0.15	running mean of 4 most recent samples < 0.17	running mean of 4 most recent samples < 0.25
Total Lead (µg/l)	running mean of 4 most recent samples < 46	running mean of 4 most recent samples < 56	running mean of 4 most recent samples < 85
Total Copper (µg/l)	running mean of 4 most recent samples < 30	running mean of 4 most recent samples < 36	running mean of 4 most recent samples < 48
Total Zinc (µg/l)	running mean of 4 most recent samples < 69	running mean of 4 most recent samples < 72	running mean of 4 most recent samples < 78
BOD ₅ (mg/l)	running mean of 4 most recent samples < 6.26	running mean of 4 most recent samples < 7.04	running mean of 4 most recent samples < 12.49
Chlorophyll-a (µg/l)	running mean of 4 most recent samples < 33.21	running mean of 4 most recent samples < 42.63	running mean of 4 most recent samples < 55.93
E.coli (cfu/100 ml)	N/A	N/A	running mean of 4 most recent samples ,610

Note:

- 1 Dissolved Oxygen
 Trigger and Action levels will be reviewed following completion of additional chlorophyll-a/DO testing scheduled for completion in December 1996.
- 2 Running mean of four most recent samples
 One sample is considered to be the depth averaged value measured on one tide at each station. One day of monitoring therefore gives rise to two samples (ebb and flood) for each parameter at each station. Thus four consecutive samples at each station are collected on two consecutive monitoring days.
- 3 E.coli
 As there will be no significant input of E.coli associated with the works we consider that Environmental Quality Performance Limits for this parameter in respect of this project are redundant. The WQO criteria has nevertheless been included.

Table 4.4
Event and Action Plan for Water Quality

Event	Action by IC/ER	Action by Contractor
One isolated non-compliant trigger value	1 Investigate non-compliant result 2 Inform Contractor	1 Identify cause of non-compliance
Two or more consecutive non-compliant trigger values or one non-compliant action value	1 Investigate non-compliant results 2 Inform Contractor 3 Increase frequency of monitoring	1 Identify cause of non-compliance 2 Review plant and working practice 3 Implement mitigation measures immediately
Two or more consecutive non-compliant action values	1 Investigate non-compliant result 2 Inform Contractor 3 Maintain increased frequency of monitoring until values below trigger value	1 Identify cause of non-compliance 2 Review plant and working practices 3 Report to ER cause and form of mitigation measures to be implemented 4 Implement measures immediately 5 Inform ER of actions
One Target value non-compliance	1 Investigate non-compliant result 2 Inform Contractor immediately 3 Maintain increased frequency of monitoring until results below trigger value	1 Identify cause of non-compliance 2 Review plant and working practices 3 Report to ER cause and form of mitigation measures to be implemented 4 Implement measures 5 Inform ER of actions 6 Supply ER with investigation report
Two or more consecutive non-compliant Target values	1 Investigate non-compliant result 2 Inform contractor immediately 3 Maintain increased frequency of monitoring until results below trigger value	1 Identify cause of non-compliance 2 Review plant and working practices 3 Report to ER cause and mitigation measures to be implemented 4 Implement measures immediately 5 Inform ER of actions 6 Supply ER with investigation report 7 If exceedance is contributed by the Contractor's works, stop the relevant portion of works as necessary as determined by the ER until the problem is under control and the water quality is restored to an acceptable level

Note:

- 1 AFD is to be informed immediately when the Limit level of 50 mg/L SS is exceeded at Station MS6. ✓
 - 2 It is recognised that natural variations in water quality may give rise to Trigger Action and Limit level exceedances that are unrelated to the works associated with this project. Thus prior to the initiation of any Action Plan the IC must be satisfied that the measured exceedances can be reasonably attributed to the works. This will be dependant on the following:
 - (i) comparison of monitoring results between those stations distant from the works (MS3, MS4, MS6, MS8, MS9) and those adjacent to the works (MS1, MS2, MS10) and at nearby sensitive receivers (MS5, MS7).
 - (ii) daily knowledge of the works in progress.
 - (iii) weather conditions. ✓
 - (iv) any potential influence from adjacent construction works. ✓
 - (v) review of recent data trends. ✓
 - (vi) Miscellaneous: not covered by (i) - (v). Discussion to be appended to Action Plan proforma (Appendix 3). Monitoring results should be audited continually in this way throughout the impact/compliance monitoring period.
- * EPD should be immediately notified of any Limit level exceedance and its relationship to the works using the proforma given in Appendix 3 (See Section 7.6).

4.8 Water Quality Mitigation Measures

- 4.8.1 The EIA report has recommended water quality control and mitigation measures. The Contractor shall be responsible for the design and implementation of these measures. These are included in the Particular Specifications of the Contract Document CV 94/13. Reference should be made to PS26.01 (9) - (14). These are listed in Appendix 4.
- 4.8.2 If the above measures are not sufficient to ensure that the water quality is maintained to an acceptable level upon the advice of the IC, the Contractor shall liaise with the IC on some other mitigation measures, propose to ER for approval, and carry out the mitigation measures.

5. WASTE MANAGEMENT

- 5.1 The Contractor is responsible for waste control within the construction site, removal of the waste material produced from the site and to implement any mitigation measures to minimise waste or redress problems arising from the waste from the site. The waste material may include any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the site onto any adjoining land, storm sewer, sanitary sewer, or any waste matter or refuse to be deposited anywhere within the site or onto any adjoining land.
- 5.2 In addition to those cited in 4.8.1 above, reference should be made to the following Particular Specifications of the Contract Document CV 94/13: P1.07 (7)(s); (8)(r); P6.03(7). These are listed in Appendix 4.
- 5.3 The Contractor shall also pay attention to the Waste Disposal Ordinance, the Dumping at Sea Ordinance, the Public Health and Municipal Services Ordinance and the Water Pollution Control Ordinance, and carry out the appropriate waste management work. The relevant licence/permit, such as the effluent discharge licence, the chemical waste producer registration, etc. shall be obtained. The Contractor shall refer to the relevant booklets issued by EPD when applying for the licence/permit.

- 5.4 During the site inspections and the document review procedures as mentioned in Sections 6.1 and 6.2 of this manual, the IC shall pay special attention to the issues relating to waste management, and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong.

6. SITE ENVIRONMENTAL AUDIT

6.1 Site Inspections

- 6.1.1 Site Inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They shall be undertaken routinely to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. With well defined pollution control and mitigation specifications and a well established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.
- 6.1.2 The IC is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. He shall submit a proposal on the site inspection, deficiency and action reporting procedures within 21 days of the construction contract commencement to the Contractor for agreement and to the ER for approval.
- 6.1.3 Regular site inspections shall be carried out at least once per week. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site; it should also review the environmental situation outside the site area which is likely to be affected, directly or indirectly, by the site activities. The IC shall make reference to the following information in conducting the inspection:
- (a) the EIA recommendations on environmental protection and pollution control mitigation measures;
 - (b) works progress and programme;
 - (c) individual works methodology proposals (which shall include proposal on associated pollution control measures);
 - (d) the contract specifications on environmental protection;
 - (e) the relevant environmental protection and pollution control laws; and
 - (f) previous site inspection results.

- 6.1.4 The Contractor shall update the IC with all relevant information of the construction contract for him to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the ER and the Contractor within 24 hours, for reference and for taking immediate action. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, deficiency and action reporting system formulated by the IC to report on any remedial measures subsequent to the site inspections.
- 6.1.5 Ad hoc site inspections shall also be carried out if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

6.2 Compliance with Legal and Contractual Requirements

- 6.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong which the construction activities shall comply with.
- 6.2.2 In order that the works are in compliance with the contractual requirements, all the works method statements submitted by the Contractor to the ER for approval shall be sent to the IC for vetting to see whether sufficient environmental protection and pollution control measures have been included.
- 6.2.3 The IC shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented.
- 6.2.4 The Contractor shall regularly copy relevant documents to the IC so that the checking work can be carried out. These documents shall at least include the updated Work Progress Reports, the updated Works Programme, the application letters and supporting calculations and Noise Labels for different licence/permits under the environmental protection laws, and all the valid licence/permit issued by EPD. The site diary shall also be available for the IC's inspection upon his request.
- 6.2.5 After reviewing these documents, the IC shall advise the ER and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the IC's review concludes that the current status on licence/permit application

and any environmental protection and pollution control preparation works may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he shall also advise the Contractor and the ER accordingly.

6.2.6 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall follow up to ensure that appropriate action has been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

6.3 Environmental Complaints

6.3.1 Complaints shall be referred to the IC for carrying out complaint investigation procedures. The IC shall undertake the following procedures upon receipt of the complaints:

- (a) log complaint and date of receipt onto the complaint database;
- (b) investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
- (c) if a complaint is valid and due to works, identify mitigation measures;
- (d) if mitigation measures are required, advise the Contractor accordingly;
- (e) review the Contractor's response on the identified mitigation measures, and the updated situation;
- (f) if the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;
- (g) recommend that the contractor undertake additional monitoring to verify the situation if necessary;
- (h) report the investigation results and the subsequent actions to the source of complaint subject to instruction from the ER (If the source of complaint is EPD, the results should be reported within the time frame assigned by EPD); and
- (i) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

6.3.2 During the complaint investigation work, the Contractor and ER shall cooperate with the IC in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor shall promptly carry out the mitigation. The ER shall ensure that the measures have been carried out by the Contractor.

7. REPORTING

7.1 General

7.1.1 The following reporting requirements are based upon a paper documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach.

7.2 Baseline Monitoring Report

7.2.1 The IC shall prepare and submit a Draft Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Following agreement with EPD in the baseline levels, copies of the Baseline Environmental Monitoring Report shall be submitted to each of the three parties: the Contractor, the ER and the EPD.

7.2.2 The baseline monitoring report shall include at least the following:

- (a) up to half a page executive summary;
- (b) brief project background information;
- (c) drawings showing locations of the baseline monitoring stations;
- (d) monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology;
 - equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and duration;
- (e) details on influencing factors, including:
 - major activities, if any, being carried out on the site during the period;
 - weather conditions during the period;
 - other factors which might affect the results;

- (f) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- (g) revisions for inclusion in the EM&A Manual; and
- (h) comments and conclusions.

7.3 Monthly EM&A Reports

7.3.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the IC. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month subject to the timely submission of the Contractor's monthly monitoring summary report, with the first report due in the month after construction commences. Ten copies of each monthly EM&A report shall be submitted to CED/PW.

7.3.2 The IC shall review the number and location of monitoring stations and parameters to monitor every 6 months or on as needed basis in order to cater for the changes in the surrounding environment and nature of works in progress.

First Monthly EM&A Report

7.3.3 The first monthly EM&A report shall include at least the following :

- (a) 1-2 pages executive summary;
- (b) basic project information including a synopsis of the project organisation, programme and management structure, and the work undertaken during the month;
- (c) a brief summary of EM&A requirements including:
 - all monitoring parameters;
 - environmental quality performance limits (Action and Limit levels);
 - Event-Action Plans;
 - environmental mitigation measures, as recommended in the project EIA study final report;
 - environmental requirements in contract documents;

- (d) advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule;
- (e) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (f) monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology
 - equipment used and calibration details
 - parameters monitored
 - monitoring locations (and depth)
 - monitoring date, time, frequency, and duration;
- (g) graphical plots of trends of monitored parameters over the past four reporting periods for representative monitoring stations annotated against the following:
 - major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors which might affect the monitoring results;
- (h) advice on the solid and liquid waste management status;
- (i) a summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (j) a review of the reasons for and the implications of noncompliance including review of pollution sources and working procedures;
- (k) a description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance;
- (l) a summary record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints; and
- (m) An account of the future key issues as reviewed from the works programme and work method statements.

Subsequent EM&A Reports

7.3.4 The subsequent monthly EM&A reports shall include the following :

- (a) Title Page
- (b) Executive Summary (1-2 pages)
 - Breaches of AL levels
 - Complaint Log
 - Reporting Changes
 - Future key issues
- (c) Contents Page
- (d) Environmental Status
 - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations
 - Summary of non-compliance with the environmental quality performance limits
 - Summary of complaints
- (e) Environmental Issues and Actions
 - Review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies)
 - Description of the actions taken in the event of noncompliance and deficiency reporting
 - Recommendations (should be specific and target the appropriate party for action)
 - Implementation status of the mitigatory measures and the corresponding effectiveness of the measures
- (f) Future Key Issues
- (g) Appendix
 - AL levels
 - Graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - i) major activities being carried out on site during the period;
 - ii) weather conditions during the period; and
 - iii) any other factors which might affect the monitoring results

- Monitoring schedule for the present and next reporting period
- Cumulative complaints statistics
- Details of complaints, outstanding issues and deficiencies

7.4 Quarterly EM&A Summary Reports

7.4.1 The quarterly EM&A summary report which should generally be around 5 pages (including about 3 of text and tables and 2 of figures) should contain at least the following information:

- (a) up to half a page executive summary;
- (b) basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;
- (c) a brief summary of EM&A requirements including:
 - monitoring parameters;
 - environmental quality performance limits (Action and Limit levels); and
 - environmental mitigation measures, as recommended in the project EIA study final report;
- (d) advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule;
- (e) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (f) graphical plots of the trends of monitored parameters over the past 4 months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:
 - the major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors which might affect the monitoring results;
- (g) advice on the solid and liquid waste management status;
- (h) a summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

- (i) a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- (j) a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- (k) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- (l) comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and
- (m) proponents' contacts and any hotline telephone number for the public to make enquiries.

7.5 Data Keeping

7.5.1 Site documents such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A reports for submission. However, the document shall be well kept by the IC and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. The monitoring data shall also be recorded in magnetic media form, and the software copy can be available upon request. The water quality data software format shall be agreed with EPD. All the documents and data shall be kept for at least one year after completion of the construction contract.

7.6 Interim Notifications of Environmental Quality Limit Exceedances

7.6.1 With reference to Event/Action Plans in Tables 2.2, 3.2 and 4.4, when the environmental quality limits are exceeded, the ET Leader shall immediately notify the ER & EPD, as appropriate. The notification shall be followed up with advice to EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is given in Appendix 3.

END OF TEXT

REFERENCES

- (1) (a) Pak Shek Kok Reclamation - Public Dump, Environmental Impact Assessment Study, Agreement No. CE 13/93. Final Report.
- (b) Pak Shek Kok Reclamation - Public Dump, Environmental Impact Assessment Study, Agreement No. CE 13/93. Environmental Monitoring and Audit Manual.
- (c) Pak Shek Kok Reclamation - Public Dump, Environmental Impact Assessment Study, Agreement No. CE 13/93. Practical Guide to Environmental Monitoring and Audit.

Appendix 1
Schedule of Environmental Monitoring Works

Schedule of Environmental Monitoring Works

This schedule summarises the baseline, impact & compliance monitoring works as recommended in the Environmental Monitoring and Audit Manual plus the monitoring works required for the additional monitoring station near the proposed Ma On Shan barging point :-

(1) Baseline Monitoring

(a) Noise :

24 hour continuous measurements shall be undertaken on typical weekdays. Hourly results of the monitoring period should also be reported.

<u>Parameter</u>	<u>Duration</u>	<u>No. of Measurement</u>	<u>No. of Location</u>
L ₁₀ , L _{eq} , L ₉₀	24hr, 14days	14	5
L ₁₀ , L _{eq} , L ₉₀	0700 - 1900 hrs, 7days	7	1 (Ma On Shan Tsung Tsin Secondary School)

(b) Dust :

<u>Parameter</u>	<u>Duration</u>	<u>No. of Measurement</u>	<u>No. of Location</u>
TSP	24hr, 14days	14	5
RSP	24hr, 14days	14	5
TSP	1hr, 3 times/day	42	5
RSP	1hr, 3 times/day	42	5
Wind S&D	continuously at one location	continuously for 2 wks	1

(c) Marine Water Quality :

<u>Parameter</u>	<u>Duration</u>	<u>No. of Samples</u>	<u>No. of Location</u>	<u>Depth</u>	<u>Bulk Sample</u>
Group A (Measurements will be made at mid flood and mid ebb):					
Temperature	4 wks, 4days/wk, 2/day	32	8	3	N/A
Salinity	4 wks, 4days/wk, 2/day	32	8	3	N/A
DO	4 wks, 4days/wk, 2/day	32	8	3	N/A
Turbidity	4 wks, 4days/wk, 2/day	32	8	3	N/A
SS	4 wks, 4days/wk, 2/day	32	8	3	3
Total lead(l.o.d. 2ppb)	4 wks, 4days/wk, 2/day	32	8	3	1
Total Zinc(l.o.d. 2ppb)	4 wks, 4days/wk, 2/day	32	8	3	1

<u>Parameter</u>	<u>Duration</u>	<u>No. of Samples</u>	<u>No. of Location</u>	<u>Depth</u>	<u>Bulk Sample</u>
Group B (Measurements will be made at mid flood and mid ebb):					
NH ₄ -N(l.o.d. 0.1mg/l)	3 mths,2days/wk,2/day	48	8	3	1
Nitrate-N(l.o.d. 0.01mg/l)	3 mths,2days/wk,2/day	48	8	3	1
Nitrite-N	3 mths,2days/wk,2/day	48	8	3	1
TKN	3 mths,2days/wk,2/day	48	8	3	1
Total PO ₄ (l.o.d. 0.01mg/l)	3 mths,2days/wk,2/day	48	8	3	1
Total Copper(l.o.d. 1ppb)	3 mths,2days/wk,2/day	48	8	3	1
Chlorophyll a	3 mths,2days/wk,2/day	48	8	3	1
E. coli	3 mths,2days/wk,2/day	48	8	3	1
BOD	3 mths,2days/wk,2/day	48	8	3	1

(2) Impact and Compliance Monitoring

(a) Noise :

<u>Parameter</u>	<u>Duration</u>	<u>No. of Measurement</u>	<u>No. of Location</u>
L ₁₀ ,L _{eq} ,L ₉₀	3 times/wk, 16 mths for 30 mins	207	5
L ₁₀ ,L _{eq} ,L ₉₀	once/wk, 10 mths for 1 hr	43	1 (Ma On Shan Tsung Tsin Secondary School)

(b) Dust :

<u>Parameter</u>	<u>Duration</u>	<u>No. of Measurement</u>	<u>No. of Location</u>
TSP	24hr,once/6days,16mths	81	4
RSP	24hr,once/6days,16mths	81	4
TSP	1hr,3 times/6days,16mths	243	4
RSP	1hr,3 times/6days,16mths	243	4
TSP	24hr,once/6days,10mths	50	1
RSP	24hr,once/6days,10mths	50	1
TSP	1hr,3 times/6days,10mths	150	1
RSP	1hr,3 times/6days,10mths	150	1

(Ma On Shan Tsung
Tsin Secondary School)

Wind S&D	continuously at one location	continuously	1
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(c) Marine Water Quality :

<u>Parameter</u>	<u>Duration</u>	<u>No. of Samples</u>	<u>No. of Location</u>	<u>Depth</u>	<u>Bulk Sample</u>
Group A (Measurements will be made at mid flood and mid ebb):					
Temperature	3days/wk,2/day,16mths	414	10	3	N/A
Salinity	3days/wk,2/day,16mths	414	10	3	N/A
DO	3days/wk,2/day,16mths	414	10	3	N/A
Turbidity	3days/wk,2/day,16mths	414	10	3	N/A
SS	3days/wk,2/day,16mths	414	10	3	3
Total lead(l.o.d. 2ppb)	3days/wk,2/day	*	10	3	1
Total Zinc(l.o.d. 2ppb)	3days/wk,2/day	*	10	3	1
Group B (Measurements will be made at mid flood and mid ebb):					
NH ₄ -N(l.o.d. 0.1mg/l)	1day/wk,2/day,16mths	138	10	3	1
Nitrate-N(l.o.d. 0.01mg/l)	1day/wk,2/day,16mths	138	10	3	1
Nitrite-N	1day/wk,2/day,16mths	138	10	3	1
TKN	1day/wk,2/day,16mths	138	10	3	1
Total PO ₄ (l.o.d. 0.01mg/l)	1day/wk,2/day,16mths	138	10	3	1
Total Copper(l.o.d. 1ppb)	1day/wk,2/day	*	10	3	1
Chlorophyll a	1day/wk,2/day,16mths	138	10	3	1
E. coli	1day/wk,2/day,16mths	138	10	3	1
BOD	1day/wk,2/day,16mths	138	10	3	1

- Notes :
1. For total lead, total zinc and all group B parameters, water samples at 3 depths will be bulked into a composite sample before analysis (Depth Averaged Concentration)
 2. * - Monitoring for lead, zinc and copper only required during dredging activities.
 3. As referred to (1)(c) & (2)(c) above, samples shall be taken 1m below surface, mid depth and, 1m above seabed. If the total depth is less than 6m the mid depth sample should be omitted. If the total depth is less than 3m then the bottom sample may also be omitted.
 4. For in-situ parameters (Group A), measurements will be made during the descending and ascending of the sensor. If the difference between the measured values is greater than 25%, the measurements are to be repeated.
 5. When sampling both parameter groups, sampling for both groups should be carried out at the same time.

Appendix 2
Sample Monitoring Data Sheets

Agreement CE 24/95
Pak Shek Kok Reclamation for Dumping Stage I
Independent Consultants for the Supervision of the
Environmental Monitoring and Audit Process

Impact / Compliance TSP / RSP Monitoring

Record Sheet

Monitoring location		
Weather conditions		
Site conditions		
Start of sampling	Date	
	Time	
Completion of sampling	Date	
	Time	
Duration of sampling (min)		
Flow rate	Initial	
	Final	
Average flow rate (m ³ /min)		
Total volume (m ³)		
Filter paper identification		
Initial weight of filter paper (g)		
Final weight of filter paper (g)		
Weight gain of filter (g)		
Dust level (μg/m ³ /)		
Remark		

	Name & Designation	Signature	Date
Field Operator			
Checked by			

BINNIE

Agreement CE 24/95
Pak Shek Kok Reclamation for Dumping Stage I
Independent Consultants for the Supervision of the
Environmental Monitoring and Audit Process

Impact / Compliance Noise Monitoring

Record Sheet

Monitoring location		
Date		
Weather conditions		
Wind speed (m/s)		
Calibration level	Before measurement	
	After measurement	
Time of measurement	Start	
	Completion	
Duration		
Results	L ₉₀ (dB(A))	
	L ₁₀ (dB(A))	
	L _{eq} (dB(A))	
Principal noise source(s)		
Remark		

Equipment:

	Name & Designation	Signature	Date
Field Operator			
Checked by			

BINNIE

Agreement CE 24/95
Pak Shek Kok Reclamation for Dumping Stage I
Independent Consultants for the Supervision of the
Environmental Monitoring and Audit Process

Compliance Water Quality Monitoring

Field Data Record

Monitoring location												
Date & time												
Weather conditions												
Tide	mid ebb / flood						mid ebb / flood					
Depth (m)	Surface:		Middle:		Bottom:		Surface:		Middle:		Bottom:	
Temperature (°C)												
Salinity (‰)												
Dissolved Oxygen (mg/l)												
Turbidity (NTU)												
Site observation												

	Name & Designation	Signature	Date
Field Operator			
Checked by			

Compliance Water Quality Monitoring

Laboratory Testing Data Record

Monitoring location						
Samling date & time						
Tide	mid ebb / flood		mid ebb / flood			
Group A						
Suspended Solids (mg/l)	Sur:	Mid:	Bot:	Sur:	Mid:	Bot:
Total lead (ppb)						
Total zinc (ppb)						
Group B						
NH ₄ -Nitrogen (mg/l)						
Nitrate (mg/l)						
Nitrite (mg/l)						
TKN						
Total PO ₄ (mg/l)						
Total Copper (ppb)						
Chlorophyll-a						
E-coli						
BOD ₅ (mg/l)						

Prepared by:

Date:

Checked by:

Date:

BINNIE

Appendix 3

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

Agreement CE 24/95
Pak Shek Kok Reclamation for Dumping Stage I
Independent Consultants for the Supervision of the
Environmental Monitoring and Audit Process

Incident Report on Action Level or Limit Level Non-compliance

Date & Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason(s) for Action / Limit Level Non-compliance	
Action taken / to be taken	
Remarks	

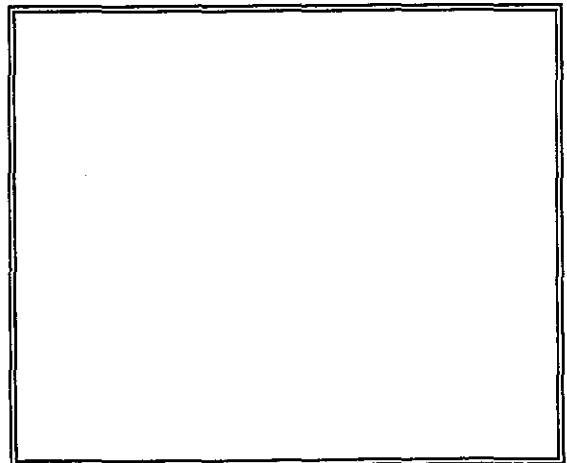
Location Plan

Prepared by :

Designation :

Signature :

Date :



BINNIE

Appendix 4

List of Dust, Noise, Water Quality and Waste Management Mitigation Measures Included in the Contract Document

Dust Mitigation Measures

Contract No. CV/94/13

Reference

PS1.21 (5) The Contractor shall limit the size of the active working area above sea level as far as practical. Areas reaching the final level shall be restored as soon as possible with hydroseeding in order to control dust generation.

PS1.22 (8)(a)(iii) The Contractor shall devise and install an overhead water spraying system, equipped with high pressure water streams and pumps, at the end of each off-loading ramp so that fresh water can be sprayed directly into the raised tipper of the dump truck during unloading of material onto the barge. Such installation is intended to help reducing dust nuisance as a result of the public dumping activities. The Contractor shall submit, for the Engineer's information, details of design and methods of construction for the proposed overhead water spraying system in conjunction with the off-loading ramp design submission.

(8)(c)(iii) The Contractor shall restrict all vehicles to a maximum speed of 8 Km per hour and confine haulage and delivery vehicles to the site access.

(8)(d) Wheel Washing Bays

The Contractor shall provide and maintain two wheel washing bays for cleaning of the dump trucks and site vehicles prior to returning to the public road, including high pressure water jetting for cleaning of wheels. The wheel washing bay shall include a perforated platform providing a clearance between the truck wheels and the bottom of the washing bay to collect the washed out sediments. The platform should be made of reinforcement bars and steelwork with sufficient strength for the running of dump trucks and heavy construction plant, and is easily removable for desilting purpose. The minimum length of wheel washing bay shall be 20 m. The Contractor shall submit details of the wheel washing bays to the Engineer for approval.

At least two labourers shall be employed to provide services at the washing bays. The Contractor shall devise means to stop the dump trucks for final wheel cleaning by water jets (e.g. lifting barrier).

The Contractor shall ensure that at least one wheel washing bay is in operation while carrying out cleaning and desilting of the other wheel washing bay. Such operation shall be carried out at least twice a day for each of the bays. The Contractor shall provide clear traffic signs for traffic diversion during the desilting operations.

If the volume of traffic is so heavy requiring the use of both wheel washing bays at all times, the Contractor shall carry out cleaning and desilting at the end of the daily operation and during lunch break.

8(e) Dust Control

The Contractor shall frequently clean and water the site access road and areas within the barging point. The Contractor shall regularly carry out water spraying at the loading ramps to minimize the fugitive dust emission while the dump trucks are unloading material onto the barges.

The Contractor shall install effective dust suppression equipment and/or take such other measures as may be necessary to ensure that at the barging point boundary and any nearby sensitive receiver the concentration of air-borne dust shall be within an acceptable limit.

P1.24 Site Cleanliness

The Contractor shall be responsible for ensuring that no earth, debris or rock is deposited on public or private rights of way as a result of the works, including any deposits arising from the movement of plant and vehicles.

P26.03 (5) The Contractor shall at his own cost and to the satisfaction of the Engineer install effective dust suppression equipment and take such other measures as may be necessary to ensure that at the site boundary and any nearby sensitive receiver the concentration of airborne dust shall not exceed 0.5 milligrams per cubic meter, at standard temperature (25°C) and pressure (1.0 bar) averaged over one hour, and 0.26 milligrams per cubic metre, at standard temperature (25°C) and pressure (1.0 bar) averaged over 24 hours.

(6) In the process of material handling, any material which has the potential to create dust shall be treated with water or wetting agent sprays, especially when dusty materials are being discharged to a vehicle from a barge at a fixed transfer point.

(7) Any vehicle with an open load-carrying area used for moving materials, and having the potential to create dust, shall have properly fitting side and tail boards. Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300 mm over the edges of the side and tail boards.

(8) Stockpiles of fill material greater than 20 m³ shall be enclosed on three sides, with walls extending above the pile and 2 metres beyond the front of the pile. In addition, water sprays shall be provided and used, both to dampen stored materials and when receiving fill material.

(9) The Contractor shall frequently clean and water the site to minimize the fugitive dust emissions.

The Contractor shall be responsible, during the course of dumping operation, to clean and water all sections of the site access road.

(10) The Contractor shall restrict all vehicles to a maximum speed of 8 km per hour and confine haulage and delivery vehicles to designated roadways inside the site.

- (11) Conveyor belts shall be fitted with windboards, and conveyor transfer points and hopper discharge areas shall be enclosed to minimize emission of dust. All conveyors carrying materials which have the potential to create dust shall be totally enclosed and fitted with belt cleaners.
- (12) Water Lorries
- (a) The Contractor shall provide one water lorry serving Portion A of the Site and areas in the vicinity of the Site as directed by the Engineer.
 - (b) The Contractor shall from the date of commencement of barging point construction provide one water lorry serving Portion B of the Site and areas in the vicinity of the barging point as directed by the Engineer.
 - (c) Each water lorry shall have a tank capacity of at least 5 cubic metres and be equipped with a high pressure cleaner. The high pressure cleaner shall have a minimum pressure of 2 bars and a minimum capacity of 50 litres/min. The water lorries shall be operated continuously for sprinkling water on active tipping bays, roads and other areas within the Site as directed by the Engineer.
 - (d) The Contractor shall ensure that at both Portion A and Portion B of the site there will be adequate water supply/storage to ensure that no longer than 15 minutes is required to fully recharge a water lorry.
 - (e) The Contractor shall ensure that the water lorries are operating efficiently at all times and that in the event of down time due to mechanical repairs or any other reason, the Contractor shall make provisions at his own expense for temporary replacement water lorries to be deployed.

Noise Mitigation Measures

Contract No. CV/94/13

Reference

- P26.02 (5) Before the commencement of any work, the Engineer may require the methods of working, equipment and sound-reducing measures intended to be used on the site to be made available for inspection and approval to ensure that they are suitable for the project.
- (6) The Contractor shall schedule the works, site the facilities, select quiet equipment and use purpose-built acoustic panels and enclosures so as to minimise noise impacts on the surrounding environment, and shall provide experienced personnel with suitable training to ensure that these methods are implemented.
- (7) The Contractor shall ensure that all plant and equipment to be used on site are properly maintained in good operating condition and noisy construction activities shall be effectively sound-reduced by means of silencers, mufflers, acoustic linings or shields, acoustic sheds or screens or other means to avoid disturbance to any nearby noise sensitive receivers.
- (8) Notwithstanding the requirements and limitations set out in Clause (3) above and subject to compliance with Clauses (6) and (7) above, the Engineer may upon application in writing by the Contractor, allow the use of any equipment and the carrying out of any construction activities for any duration provided that he is satisfied with the application which, in his opinion, to be of absolute necessity and adequate noise insulation has been provided to the educational institutions to be affected, or of emergency nature, and not in contravention with the Noise Control Ordinance in any respect.
- (9) No excavator mounted breaker shall be used within 125 m from any nearby noise sensitive receivers.
- (10) For the purpose of the above clauses, any domestic premises, hostel, temporary housing accommodation, medical clinic, educational institution, place of public worship, library, performing arts centre or office building shall be considered a noise sensitive receiver.
- (11) The Contractor shall, when necessary, apply as soon as possible for a construction noise permit in accordance with the Noise Control (General) Regulations, display the permit as required and copy to the Engineer. The Contractor is to note that neither the Authority nor its employees can influence the issue or terms of a construction noise permit.

Water Quality Mitigation Measures

Contract No. CV/94/13

Reference

- P26.01 (9) General Procedures for the Avoidance of Pollution During Dredging, Transporting, and Dumping of Marine Mud
- (a) All Construction Plant shall be designed and maintained to minimise the risk of silt and other contaminants being released into the water column or deposited in areas other than designated locations.
 - (b) Pollution avoidance measures shall include but are not limited to the following:-
 - (i) mechanical grabs shall be designed and maintained to avoid spillage and shall seal tightly while being lifted;
 - (ii) all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed and under water pipelines at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash or pipelines damaged;
 - (iii) the Works shall cause no visible foam, oil, grease, scum, litter or other objectionable matter to be present on the water within the Site or dumping grounds;
 - (iv) all barges shall be fitted with tight fittings seals to their bottom openings to prevent leakage of material;
 - (v) excess materials shall be cleaned from the decks and exposed fittings of barges before the vessels are moved; and
 - (vi) loading of barges shall be controlled to prevent splashing of dredged material to the surrounding water and barges shall not be filled to a level which will cause overflowing of material or polluted water during loading or transportation.
 - (c) The Engineer may monitor any or all vessels transporting material to ensure that no dumping outside the approved location takes place. The Contractor shall provide all reasonable assistance to the Engineer for this purpose.
 - (d) The Contractor shall ensure that all marine mud is to be disposed of at the approved locations. He will be required to ensure accurate positioning of vessels before discharge and will be required to submit and agree proposals with the Engineer for accurate position control at disposal sites before commencing dumping.

- (e) The Engineer may monitor any or all vessels transporting material to ensure that loss of material does not take place during transportation. The Contractor is to provide all reasonable assistance to the Engineer for this purpose.
- (f) The Contractor shall ensure that all unsuitable material is disposed of at the approved landfill or other designated location.

(10) Refuse Containment Booms and Floating Refuse

- (a) The Contractor shall provide and install refuse booms before commencing dumping of fill materials, and properly maintain the refuse booms to confine the floating debris arisen within the Site. The Contractor shall provide adequate sinker blocks and lit marker buoys to ensure that the booms are visible above the water line and are securely anchored. The lights on the marker buoys shall be quick flashing yellow lights visible all round the horizon at a distance at least 2 kilometres and details shall be submitted to the Engineer for approval. The maximum spacing between the flashing lights shall be 30 metres. The Contractor shall properly maintain and operate the booms to the satisfaction of the Engineer throughout the progress of the reclamation work and shall replace the same if necessary when they are under repair or beyond repair. The refuse containment booms shall revert to the Contractor upon the completion of all reclamation work or at such earlier date as the Engineer may instruct in writing.
- (b) The Contractor shall deploy sufficient sampans collecting floating refuse and preventing floating refuse within the Site from drifting into public waters. Floating refuse collected shall be removed to tip off Site by the Contractor.
- (c) The Contractor shall make due allowance in programming the reclamation work for the provision, installation, operation and maintenance of the refuse booms and the regular collection of the floating refuse throughout the progress of the reclamation work.
- (d) The Contractor's attention is drawn to Special Condition of Contract Clause No. 12 on the Employer's power to carry out work by person other than the Contractor if the Contractor shall fail to carry out any work required under this Particular Specification Clause.

(11) Designated Contaminated Marine Mud

Where quantities of the material to be dredged is contaminated with micro-pollutants, the locations and depths of the designated contaminated marine mud will be indicated on the drawings or directed by the Engineer on site. The Contractor is to ensure that the designated contaminated marine mud is dredged, transported and placed in approved special dumping grounds in accordance with the provisions of Clause (12) below and in such a manner to minimise the loss of material to the water column.

(12) Special Procedures for the Avoidance of Pollution During Dredging, Transportation and Disposal of Designated Contaminated Marine Mud

When dredging, transporting and disposing of designated contaminated marine mud, the Contractor shall implement additional special procedures for the avoidance of pollution which shall include but are not limited to the following:-

- (a) Dredging of designated contaminated marine mud shall only be undertaken by a suitable grab dredger using a close grab;
- (b) Transport of designated contaminated marine mud shall be by split barge of not less than 750 m³ capacity; well maintained and capable of rapid opening and discharge at the disposal site;
- (c) Discharge shall be undertaken rapidly and the hoppers shall then immediately be closed; any material adhering to the sides of the hopper shall not be washed out of the hopper and the hopper shall remain closed until the barge next returns to the disposal site.

(13) Protection of Water Quality at Water Intakes

When dredging or placing fill the Contractor shall surround the water intakes indicated on the Drawing with suitable silt screen to prevent excess silt contaminating the water drawn into the intakes. The silt screen shall be designed to ensure that the indrawn water shall contain less than 20 mg/l of suspended solids at the Marine Science Laboratory (MSL) intake.

(14) Silt Curtains

(a) General

Silt curtains shall be formed from tough, abrasion resistant, permeable membranes, suitable for the purpose, supported on floating booms in such a way as to ensure that the ingress of turbid waters to the enclosed waters shall be restricted.

The bottom of the curtain shall be formed and installed in such a way that tidal rise and fall are accommodated, and that the ingress of turbid waters is limited. The removal and reinstallation of such curtains during typhoon conditions shall be as agreed with the Engineer.

The Contractor shall regularly inspect the silt curtains and shall ensure that they are adequately moored and marked to avoid danger to marine traffic.

(b) Silt Curtains for Grab Dredging

The Contractor shall place a silt curtain around the immediate grabbing area extending downwards to the sediment so that the sediment losses should be confined and settled back over a relatively small area. The silt curtain should enclose an area of adequate space to allow operation of the grab (about 15 m x 20 m) or as proposed by the Contractor to suit his method of dredging. The Contractor shall be responsible for designing, agreeing with the Engineer and installing silt curtains, where required, to achieve the Water Quality Objective, and the protection of water quality at water intakes as described in Clause (13).

(c) Silt Curtains for Filling

The Contractor shall note the requirements for deposition of fill materials in PS Clause P21.11(8). In case PS Clause P21.11(8) cannot be complied with due to insufficient length of seawall built ahead of the filling, the Contractor shall provide silt curtains as preventive measure for water quality to such an extent as shown on the Drawing No. P20079. The Contractor shall be responsible for designing, agreeing with the Engineer, installing and operating the silt curtains.

The Contractor shall be responsible for re-positioning of the silt curtain to suit the seawall construction.

Waste Management

Contract No. CV/94/13

Reference

- P1.07 (7) (s) The Contractor shall not allow any waste water to flow from the site or allow any waste to be deposited within the site. The Contractor shall not discharge any waste water into any public sewer, drainage or any water course or sea without the prior written consent of the Director of Environmental Protection.
- P1.07 (8) (r) The Contractor shall not allow any waste water to flow from the site or allow any waste to be deposited within the site. The Contractor shall not discharge any waste water into any public sewer, drainage or any water course or sea without the prior written consent of the Direct of Environmental Protection.
- P6.03 (7) The Contractor shall cut up reinforcement bars and timbers to manageable size and remove such materials off site. The Contractor shall also collect and dispose of floating debris.

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