

CONSULTANCY AGREEMENT NO.

EN002(C)-01

MODIFICATIONS TO MTRC TST STATION

ENVIRONMENTAL MONITORING AND AUDIT MANUAL

EP-113/2001



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October 2002

(Revision E)

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Position:

Independent Environmental Checker

Date:

24 October 2002

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Reference **R0424-1.01**

Client **Mass Transit Railway Corporation Limited**

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1. INTRODUCTION

1.1 Background

- 1.1.1 MTR Corporation Limited (MTRCL) identified the need to modify the existing MTR Tsim Sha Tsui (TST) Station as a result of the planned construction of the new KCRC East Tsim Sha Tsui (ETS) Station and associated pedestrian subways. The modifications, in the form of an approximately 80m southward concourse extension and an about 30m long pedestrian subway, to be built underneath Nathan Road, will accommodate the existing plant rooms and back-of-house accommodation at TST Station displaced by the future KCRC Mody Road Link, as well as provide a direct link from the TST Station concourse to the KCRC Middle Road Subway Link. Figure 1-1 shows the project location.
- 1.1.2 An EIA study has been conducted by CH2M HILL (China) Limited (formerly named as EHS Consultants Limited) for the proposed TST Station modification works. Based on the design of the modifications, no key environmental concerns were identified during the operational phase of the Project. No new structures which may pose an environmental impact on the surrounding landuses are planned aboveground. For the construction phase, sufficient control/ mitigation measures have been recommended in the EIA study to address the potential, transient dust and noise impact on the nearby sensitive receivers as well as to effect proper construction waste management.
- 1.1.3 Figure 1-2 shows the preliminary design of the TST Southern Concourse Extension and the pedestrian subway under Nathan Road.
- 1.1.4 As part of the Environmental Impact Assessment (EIA) study for the proposed southern extension, a Manual for guiding the set up of an Environmental Monitoring and Audit (EM&A) programme to check the implementation of the recommended environmental mitigation measures where necessary. The EM&A programme will be useful in providing a means to verify the effectiveness and adequacy of the mitigation measures recommended in the EIA such that additional mitigation measures or remedial action, if deemed necessary, can be formulated.
- 1.1.5 This Manual provides systematic procedures for the carrying out of the recommended EM&A activities. Mitigation measures recommended in the EIA Report for each key environmental aspects are also summarised and presented.
- 1.1.6 Environmental regulations currently enforced in Hong Kong pertaining to air quality, noise and waste, etc. and the recommendations given in the EIA Report for the proposed Southern Concourse Extension and pedestrian subway have been observed in the preparation of this Manual.

1.2 Objectives of this EM&A Programme

- 1.2.1 The main objectives of the EM&A programme include:
- (i) to provide a database on baseline environmental quality for subsequent checking of any short or long term environmental impacts arising from the project;
 - (ii) to provide information at an early stage for identification of potential problem areas and formulation of additional environmental mitigation measures where necessary should any of the environmental control measures or practices fail to achieve the target standards;
 - (iii) to monitor the performance of the project from an environmental viewpoint and the sufficiency and effectiveness of the implemented mitigation measures;
 - (iv) to verify the environmental impacts predicted in the EIA Study for the TST Station modifications;

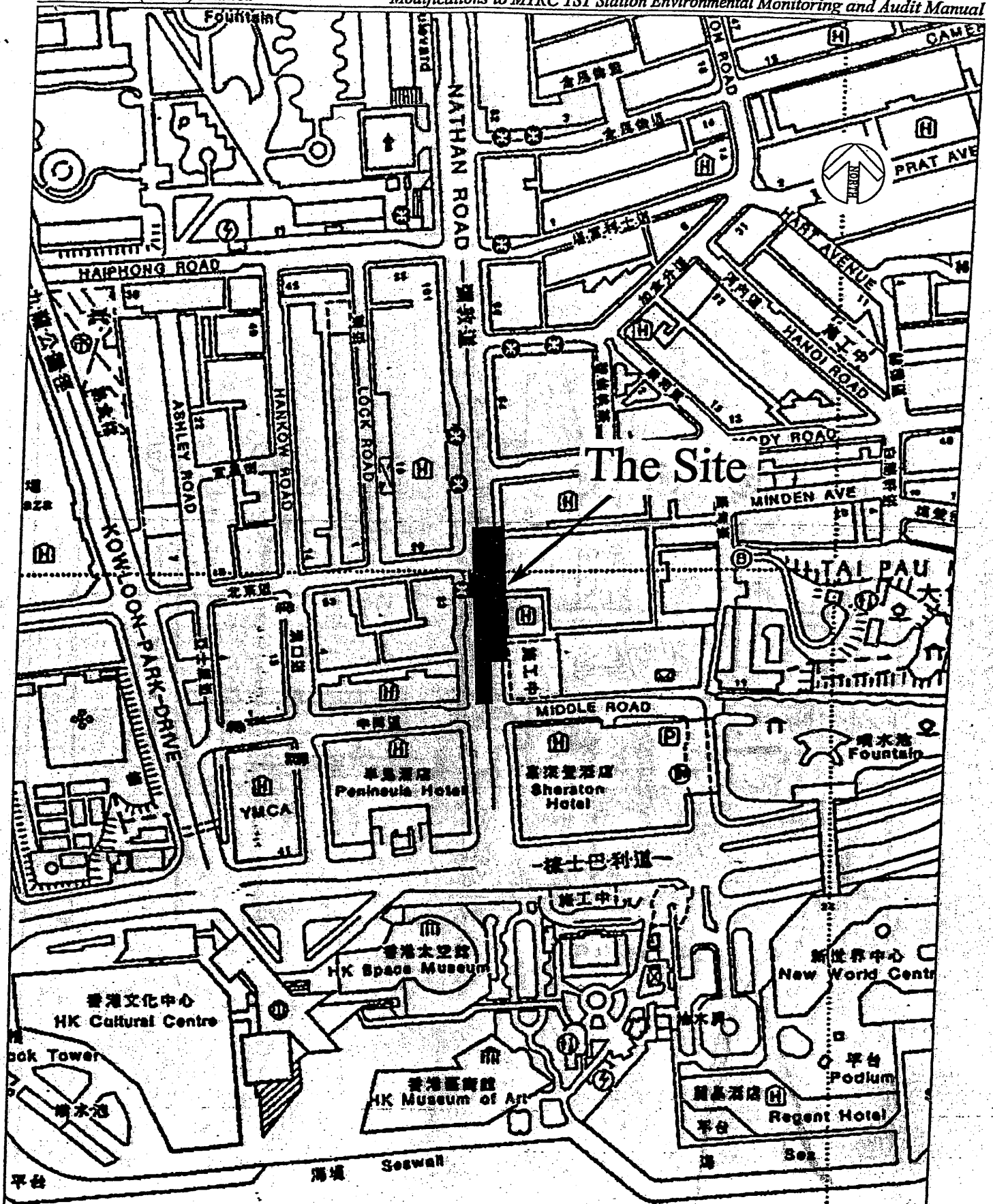
- (v) to determine project compliance with relevant regulatory standards, requirements and guidelines;
- (vi) to take remedial action should unexpected problems or unacceptable impacts be identified;
- (vii) to provide baseline and compliance monitoring data to assist the carrying out of effective environmental audits.

1.3 Content of this Manual

1.3.1 This Manual contains the following information:

- (i) duties of the Environmental Team (ET) in the environmental monitoring and audit programme; the role and the responsibility of the Independent Environmental Checker (IEC);
- (ii) information on project organisation, construction schedule and activities;
- (iii) information on the tentative construction programme and the necessary environmental monitoring and audit programme to track the varying environmental impacts;
- (iv) definition of Action and Limit levels, and establishment of Event and Action Plans;
- (v) requirements of reviewing pollution sources and work procedures in the event of non-compliance of the environmental criteria;
- (vi) requirements of presentation of environmental monitoring and audit data and appropriate reporting procedures;
- (vii) an Implementation Schedule (Appendix I) of the environmental mitigation measures recommended in the EIA Report for the southern extension;
- (viii) Record forms (Appendix II) to be adopted where applicable during the construction phase of the project.

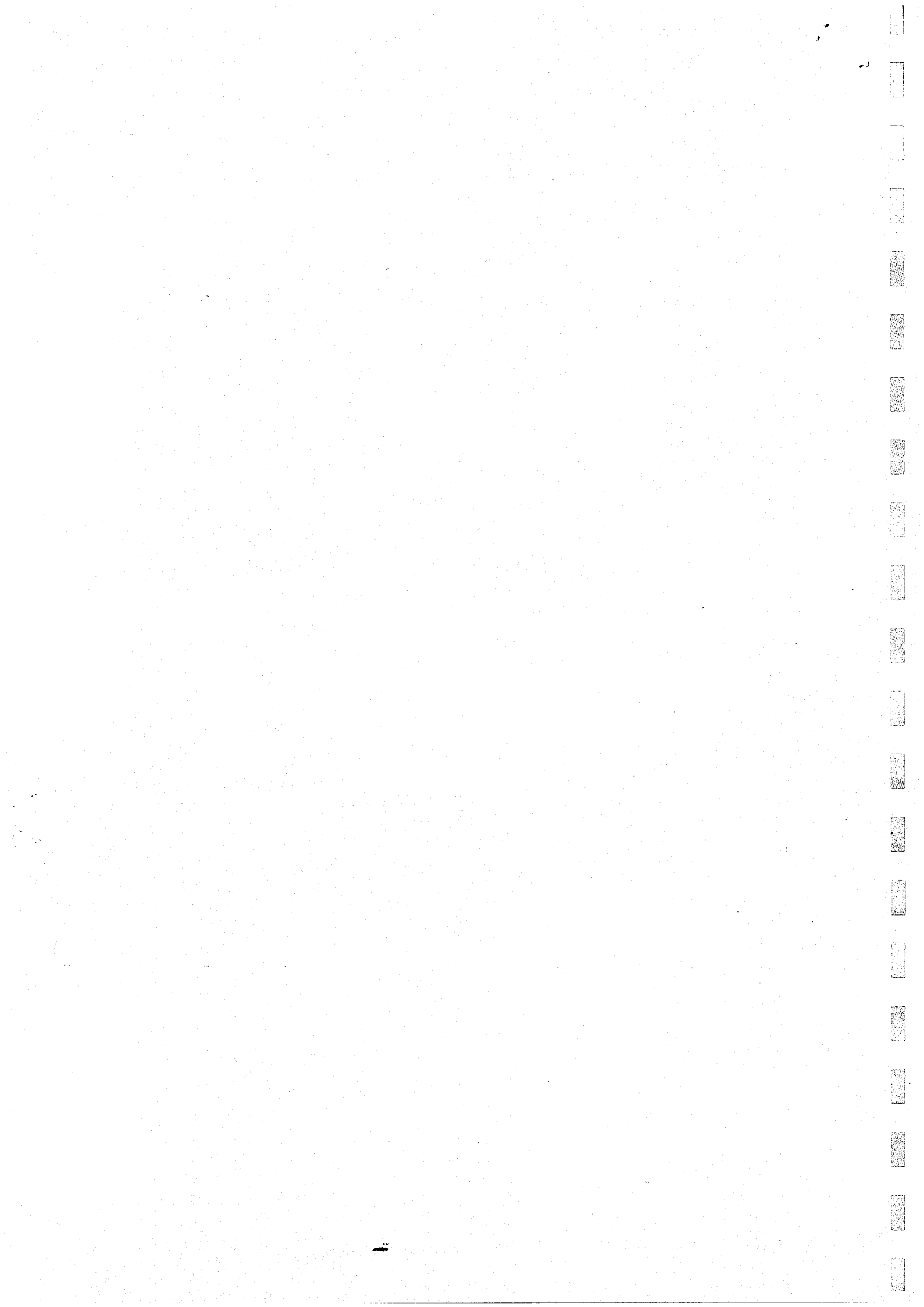
1.3.2 The EM&A Manual shall be regarded as an evolving document that should be updated when necessary in order to maintain its relevance during the detailed design stage and/or the construction phase (e.g. when alternative monitoring locations are proposed). The updated EM&A Manual shall be submitted to the ER and EPD for agreement.

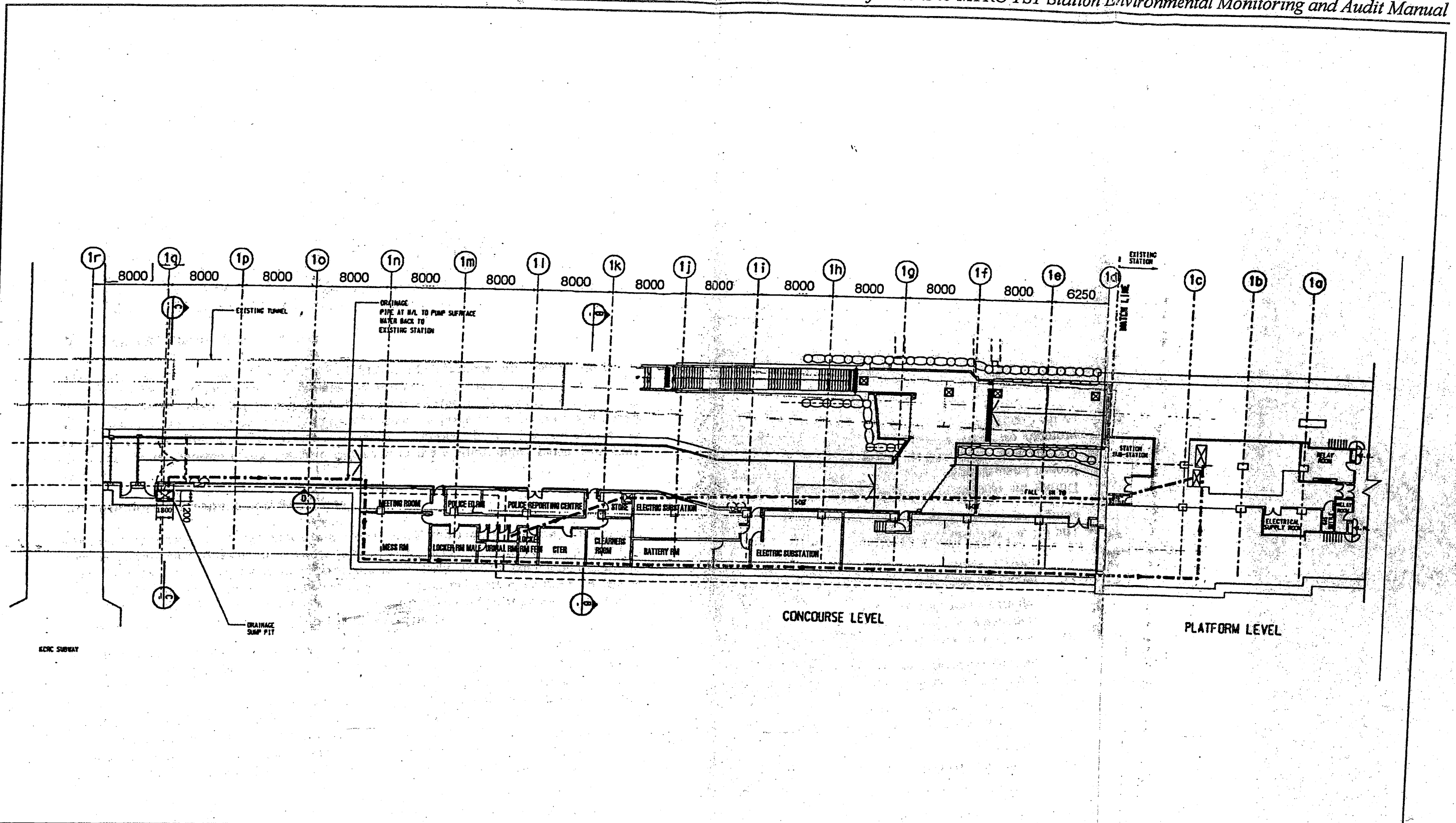


九龍公眾碼頭
Kowloon Public Pier

尖沙咀
TSIM SHA TSUI

<p>Title: Location of the Project Site</p>	<p>CH2M HILL (China) LIMITED</p>
<p>Project: Consultancy Agreement No. EN002(C)-01 Modifications to MTRC TST Station Environmental Monitoring and Audit Manual</p>	<p>Scale: NTS Figure: 1-1</p>





Title: Preliminary Design of the MTRC TST Southern Extension and Pedestrian Subway		CH2M HILL (China) Limited	
Project: Consultancy Agreement No. EN002(C)-01 Modifications to MTRC TST Station Environmental Monitoring and Audit Manual		Scale: NTS	Figure: 1-2

2. PROJECT DESCRIPTION

2.1 The Project Site & its Environs

- 2.1.1 The existing TST Station concourse is proposed to be extended to the south for about 80m along Nathan Road to provide additional space for accommodation of the plant rooms and back-of-house accommodation displaced by the KCRC Mody Road Link, and for connection with the planned KCRC Middle Road Link by an approximately 30m pedestrian subway along Nathan Road.
- 2.1.2 Situated in the vicinity of the work area are mostly hotels that are provided with central air conditioning and do not rely on openable windows for ventilation. These include, on the western side of the subject site, Peninsula Hotel, Kowloon Hotel and Hyatt Regency Hong Kong Hotel; and on the eastern side, Sheraton Hotel, Imperial Hotel, and Holiday Inn Hotel. Commercial buildings situated in the vicinity of the work area include Shui Hing House, Alpha House and Oterprise Square. Chungking Mansions situated to the east of the work area is mostly occupied by commercial uses and hostels equipped with window-type air conditioners. At ground level, there are shops along both sides of Nathan Road.

2.2 Proposed TST Station Modifications

- 2.2.1 Preliminary options on the design of the TST Station Modifications were developed by the Engineering Design Consultants and discussed with the Government in August 2000. The preliminary design was further developed into the "Preferred Option" following the base design to take into account the various site constraints. Figure 1-2 presents the adopted preliminary design of the TST Southern Extension and Pedestrian Subway. Figure 2-1 and Figure 2-2 illustrates the relationship of the southern extension to the existing bored Tsuen Wan Line tunnels.

2.3 Construction Programme and Sequence

- 2.3.1 A preliminary construction programme has been formulated with a target to minimise the impact from the construction works on the environment and traffic as high priorities of the project (see Figure 2-3). Site clearance is envisaged to commence in early 2002 for completion in 2004. Temporary decking would be constructed in 15 stages for the completion of the full road deck in early 2003. Nathan Road will be reinstated to its original condition near early 2004 after excavation works and the construction of the extended station box.
- 2.3.2 The construction works will commence with removal of the existing median strip. The existing concrete road pavement will be demolished in stages on a lane by lane basis such that impact on the traffic movement can be minimised. Locations of the existing utilities lying under Nathan Road have been taken account of as far as practicable in the design of the preferred layout plan. The target is to maximize the opportunities for the existing utilities to be hung above the under excavation site instead of having to be diverted, if possible such that the construction period and the associated environmental impact on the nearby sensitive receivers can be minimised. It is expected that the area requiring significant utility diversion will be the footpath on the east side of Nathan Road.
- 2.3.3 Temporary piles will be installed for temporary reinstating the traffic lanes and footpath with decking. Ultimately, a complete road deck flush with the existing road surface will be built to carry Nathan Road traffic while underground excavation works are carried out.
- 2.3.4 Excavation will be carried out beneath the deck proceeding layer by layer with regular monitoring of tunnel integrity. Excavated materials will be removed by gantry and hoist to trucks parked within the proposed noise enclosure at the opening near the middle strip of Nathan Road. It is envisaged that the roof and base slabs of the concourse extension will be constructed using a bottom-up construction method involving the installation of pipe piles for supporting the

road deck. Adopting the top-down construction method, nevertheless, will involve similar construction sequence with respect the site clearance and installation of the temporary road deck with the potential dust and noise impact mitigated by similar control techniques. The temporary road deck will be removed after the completion of the underground works and the road and utilities reinstated using again a lane-by-lane approach.

2.4 Proposed Construction Sequence

2.4.1 The key construction activities are expected to include the followings and in the sequence as described. It can be noted that in order to minimise the potential environmental (noise) and traffic impact, the construction work area will be limited and with significant phasing and sequencing of construction activities built into the programme.

Site Preparation:

- Demolish existing median strip;
- Divert and narrow existing footpath and one traffic lane on east side of Nathan Road;
- Divert utilities to create sufficient space for piling;

Demolition of Road Pavement and Installation of Temporary Road Deck

- Demolish existing concrete road pavement;
- Install temporary works (cofferdam, piling and road decking) for carrying out of excavation activities;
- Extend traffic deck for a second lane;
- Proceed lane by lane across Nathan Road to divert utilities and construct concourse extension walls and traffic deck;
- Reinstate Nathan Road traffic by the road deck and reserve sufficient area as construction site and for the opening leading to the underground work area;

Underground Works

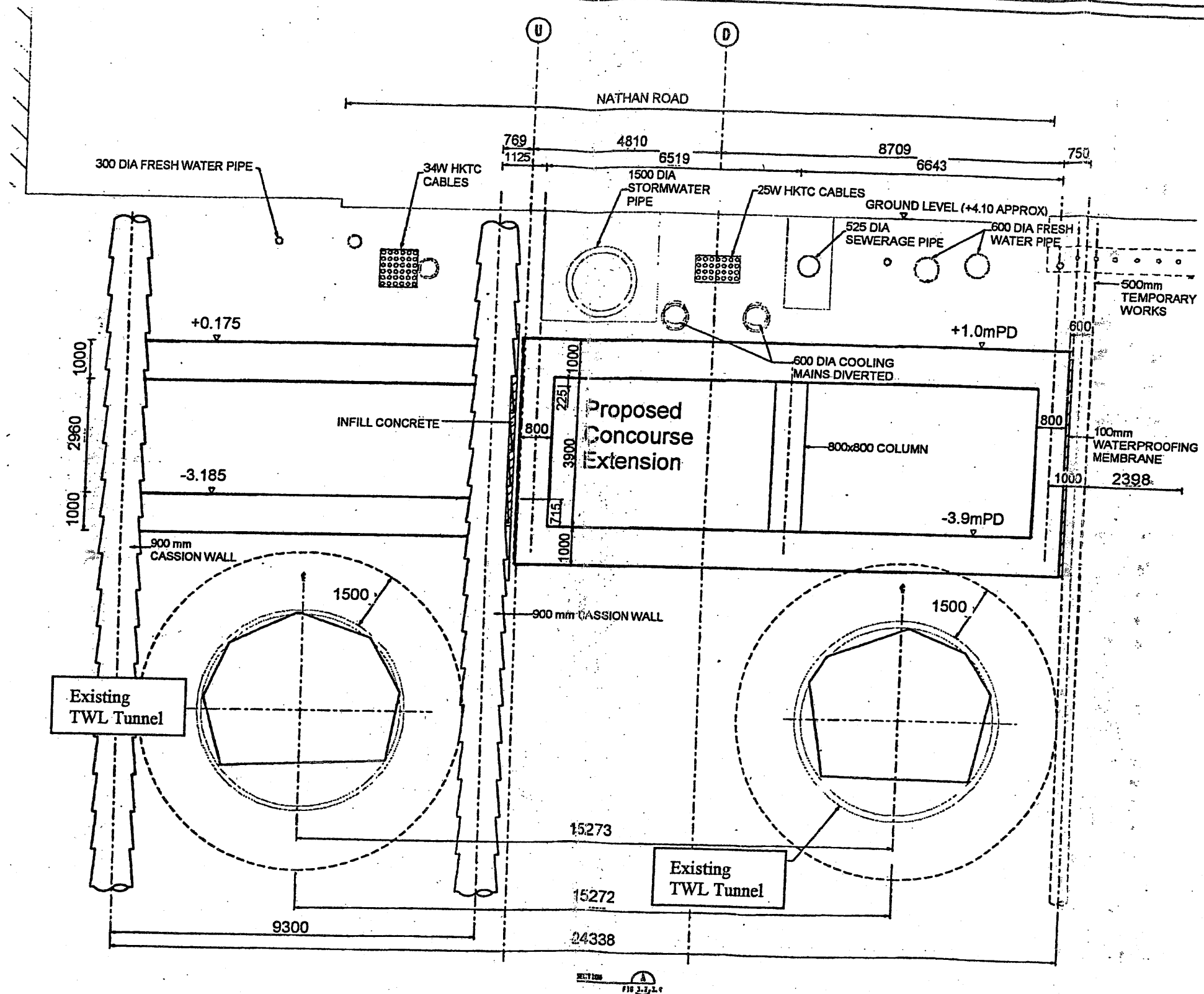
- Construct a noise enclosure to cover the opening near the middle strip of Nathan Road;
- Excavate beneath the road deck and proceed layer by layer with regular monitoring of tunnel integrity and potential deformations. Ground treatment and controlled dewatering will proceed in parallel with excavation in order to balance loads on existing MTR running tunnels. Excavated material to be removed by gantry and hoist to trucks parked within the noise enclosure;
- Grouting below excavation level to stabilize existing running tunnels if required;
- Construct roof and base slab of the concourse extension;

Backfilling and Reinstatement

- Remove deck, backfill and reinstate utilities and road pavement using again a lane-by-lane progressive approach.

Works within the Completed Structure

- Breakthrough existing station end wall;
- E&M fitout and relocation of plant;
- Demolish and make good existing areas in existing station;
- Architectural fitout to new station accommodation and existing areas of plantrooms.



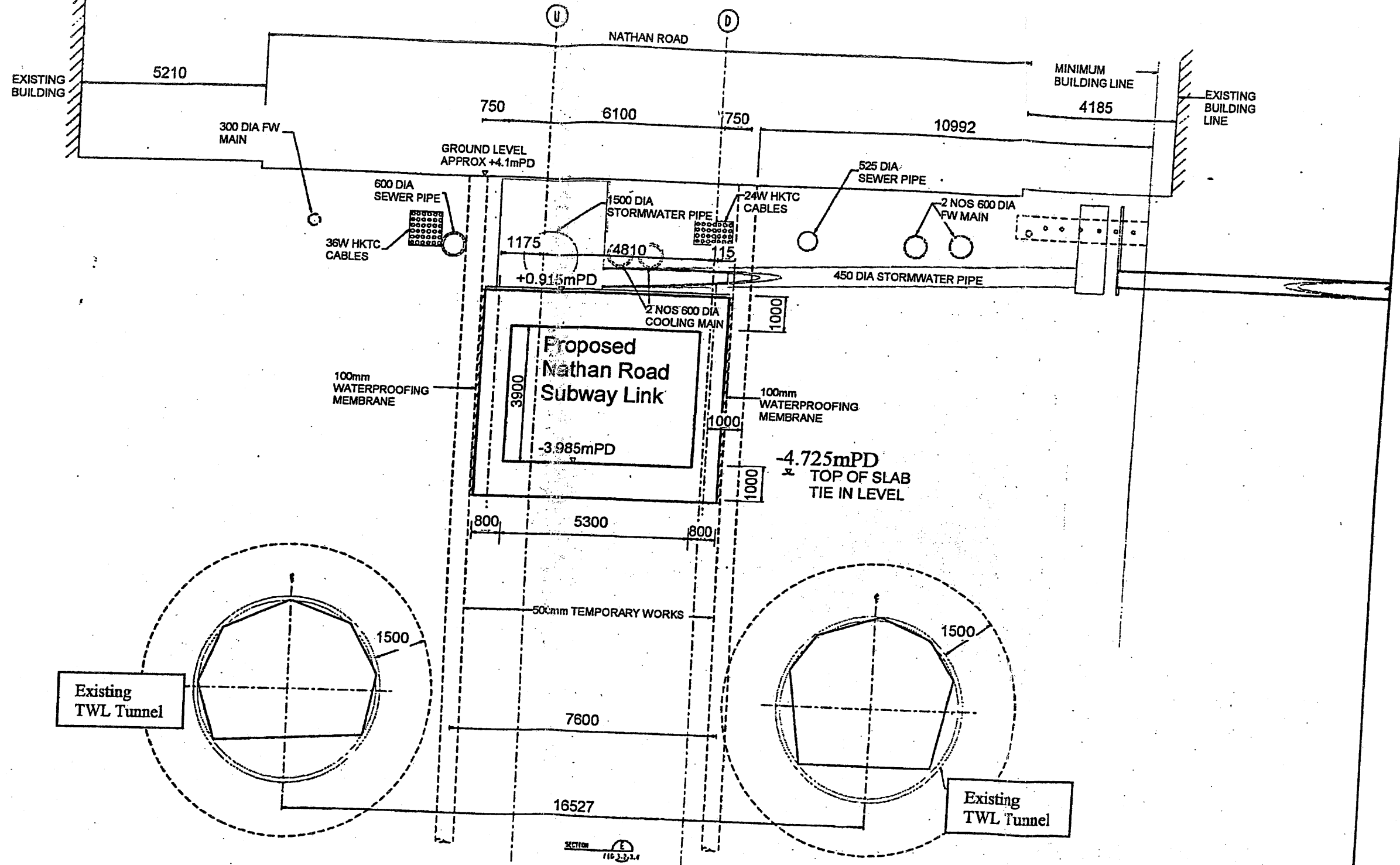
Title: Typical Cross Section of the Proposed Southern Concourse Extension

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Scale: NTS

Figure: 2-1



Title: Typical Cross Section of the Proposed Nathan Road Link

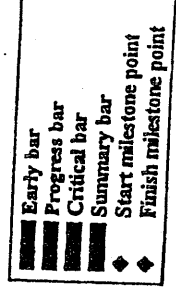
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Scale: NTS

Figure: 2-2

Activity ID	Description	Orig. Dur	Early Start	Early Finish
Site Establishment				
OPT E0100	Contract Award	0		31DEC01
OPT E1000	Site Clearance	31	01JAN02	31JAN02
Temporary Works & Excavation				
OPT E1010	Temporary Decking Stages 1-3	58	01FEB02	30MAR02
OPT E1020	Temporary Decking Stages 4-6	61	31MAR02	30MAR02
OPT E1030	Temporary Decking Stages 7-9	46	31MAY02	15JUL02
OPT E1040	Temporary Decking Stages 10-11	60	16JUL02	13SEP02
OPT E1050	Temporary Decking Stages 12-13	35	14SEP02	18OCT02
OPT E1060	Temporary Decking Stages 14-15	61	19OCT02	18DEC02
OPT E1070	Noise Enclosure	30	19DEC02	17JAN03
OPT E1080	Excavation	163	18JAN03	26JUN03
Extended Station Box Structure				
OPT E1090	Base Slab	60	01APR03	30MAY03
OPT E1100	Walls	82	01MAY03	31JUL03
OPT E1110	Roof Slab	62	01JUL03	31AUG03
OPT E1120	Breakthrough Station Box	30	01SEP03	30SEP03
Backfilling and Road Reinstatement				
OPT E1130	Backfilling & Removing Deck	61	01SEP03	31OCT03
OPT E1140	Reinstatement of Nathan Road	31	01NOV03	01DEC03
E&M Works				
OPT E1150	E&M Fitting Out	274	01SEP03	31MAY04
ABWF Works				
OPT E1160	ABWF for Concourse Extension	182	01JAN04	30JUN04
OPT E1170	ABWF for Existing Concourse	184	01JUL04	31DEC04



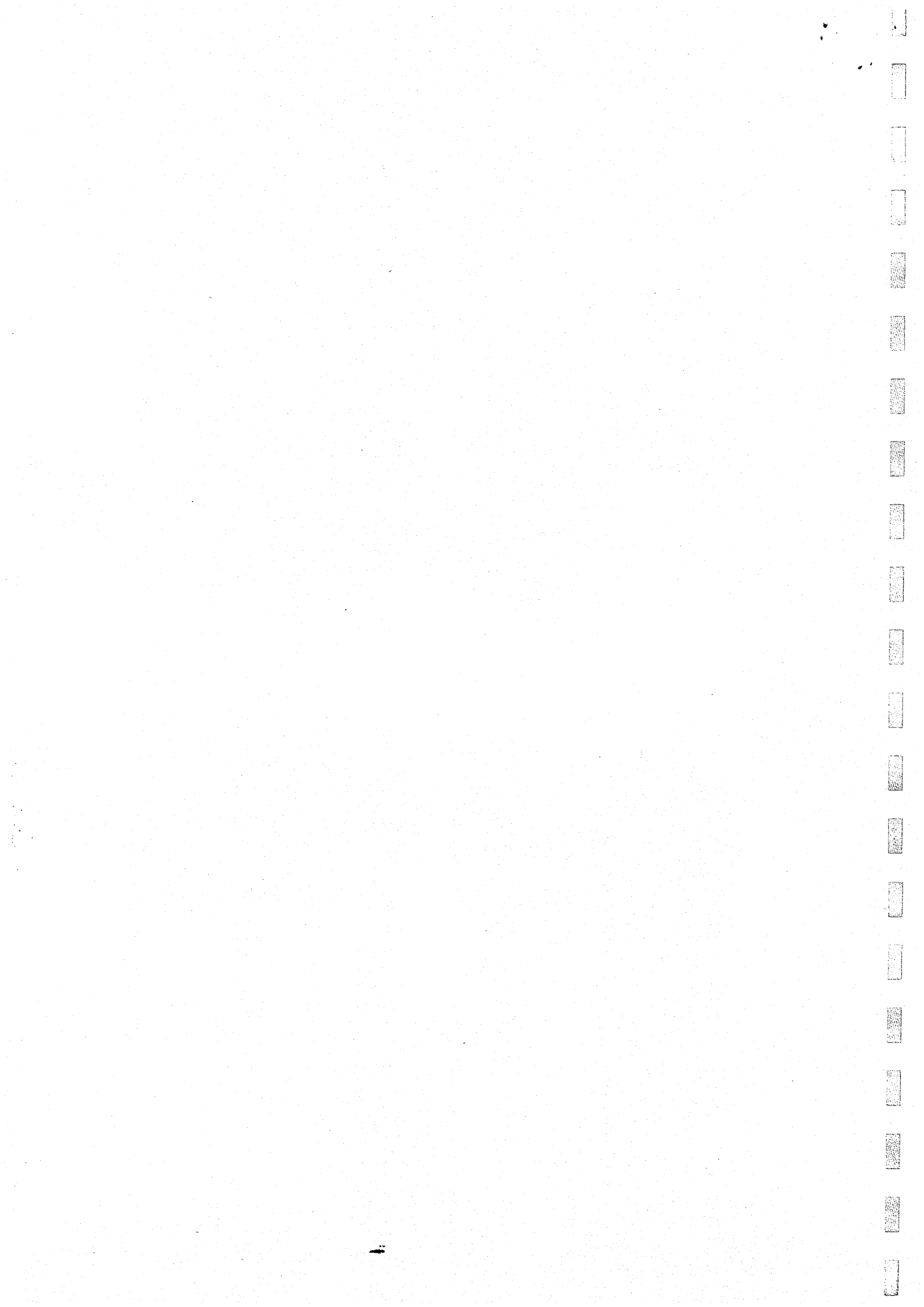
Title: Preliminary Construction Programme

Project: Consultancy Agreement No. EN002(C)-01
Modifications to MTRC TST Station Environmental Monitoring and Audit Manual

CH2M HILL (China) Limited

Scale: NTS

Figure: 2-3



3. SENSITIVE RECEIVERS

- 3.1.1 Sensitive receivers located in the vicinity of the project site that might be potentially affected by the construction works with respect to air quality and/or noise were identified in the EIA Report. These include:

Hotels & Hostels

- 3.1.2 Peninsula Hotel, Kowloon Hotel and Hyatt Regency Hong Kong Hotel are located along the western side of Nathan Road whereas Sheraton Hotel, Imperial Hotel, and Holiday Inn Hotel are lying on the eastern side. These hotel buildings have already been equipped with central air conditioning and do not rely on openable windows for ventilation. At ground level, there situated shopping facilities fronting Nathan Road.
- 3.1.3 Chungking Mansions situated to the east of the work area are partly occupied by hostels equipped with window-type air conditioning systems.

Commercial Uses

- 3.1.4 Commercial buildings situated in the vicinity of the work area include Prestige Tower, Alpha House, Oterprise Square and part of the Chungking Mansions. Centralised air conditioning systems were equipped without reliance on natural ventilation except for Chungking Mansions where part of the units is equipped with window-type air conditioning systems. There are shops located along Nathan Road at ground floor of these buildings.

4. PROJECT ORGANISATION

- 4.1.1 The key parties in an EM&A programme include the Contractor, the Project Engineer¹ or the Engineer's representative (ER)¹, the Independent Environmental Checker (IEC), the Environmental Team (ET), and the Environmental Protection Department (EPD). It is currently planned that roles of ER and ET will both be undertaken by MTRCL as in many other MTRCL's projects, involving its Project Engineers and the Corporation's Environmental Manager. It is envisaged that such organization structure will allow effective communication between the Project Engineers and the ET, and encourage the Contractor to perform with respect to the implementation of the required environmental mitigation measures to satisfy the project proponent's requirements.

Environmental Team

- 4.1.2 The Environmental Team (ET) will carry out an EM&A project for the TST modifications project. The ET shall not be an associated company of the Contractor. The ET leader² shall plan, organise and manage the implementation of the EM&A programme, and to ensure that the EM&A works are undertaken to the required standards. The ET leader shall have relevant professional qualification and sufficient experience in carrying out EM&A works.

¹ 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.

² The Environmental Team (ET) leader, who shall be responsible for and in charge of the ET, refers to the person delegated the role of executing the environmental monitoring and audit requirements.

- 4.1.3 Appropriately qualified staff shall be included in the ET. The ET shall be under the supervision of the ET Leader in fulfilling the EM&A duties specified in this Manual. The board categories of works of the ET comprise the followings:
- (i) To monitor the various environmental parameters as required in the EIA Report for Southern Extension;
 - (ii) To investigate and audit the Contractor's equipment and work methodologies with respect to pollution control and environmental mitigation, and anticipate environmental issues as far as practicable for proactive action before problems arise;
 - (iii) To audit and prepare audit reports on the environmental monitoring data and the site environmental conditions;
 - (iv) To report on the environmental monitoring and audit results, after being verified by the IEC, to the Contractor, the ER, and the EPD.

In the event of an exceedance of the relevant action/ limit levels, the ET shall immediately liaise with the Project Engineer and inform the Contractor so that appropriate remedial action can be executed by the Contractor promptly. The ET is also responsible for the preparation of the monthly EM&A reports verified by the IEC for submission to EPD and information for the Project Engineer and Contractor. The ET shall assist the Project Engineer and Contractor in formulating any needed corrective actions and/ or additional mitigation measures, if necessary, and will be the liaison platform with relevant Government Departments as appropriate on environmental related-matters in relation to the project.

The Contractor

- 4.1.4 The Contractor is responsible for providing requested information to the ET in the event of any exceedance in the environmental criteria specified in this Manual or other current environmental standards, and to rectify unacceptable practices. The Contractor shall also discuss with the ET and Project Engineer on any additional mitigation measures identified to be required by the ET and implement the agreed measures to alleviate any identified environmental impact to acceptable levels. The Contractor shall report to the ET on the actions taken targeting at environmental protection for inclusion in the monthly report to be prepared by the ET.

The Project Engineer or the Engineer's Representative

- 4.1.5 The Engineer, or the ER shall be responsible for overseeing the operations of the Contractor and in liaison with the ET. He shall advise, co-ordinate and give instruction when appropriate for efficient implementation of any specific environmental mitigation measures for implementation by the contractor, and/or outstanding EM&A works required to be carried out by ET.

The Independent Environmental Checker

- 4.1.6 The Independent Environmental Checker (IEC) is responsible to check, review, verify and validate the overall environmental performance of the project, including the implementation of all the environmental protection and mitigation measures, submissions relating to EM&A, and any other submissions required under the EP for the project.

The IEC is to provide independent, objective and professional advice on the environmental performance of the project. He or she is expected to audit the environmental performance in an independent, objective and professional manner in every aspect during construction, operation (and/or decommissioning) of the project.

5. CONSTRUCTION NOISE MONITORING

5.1 Noise Parameters

- 5.1.1 The construction noise level shall be measured in terms of A-weighted equivalent continuous sound pressure level (L_{Aeq}). $L_{Aeq}(30 \text{ min.})$ shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference.
- 5.1.2 MTRCL is planned to use its computer-based monitoring and audit software known as Environmental Quality Protection Management System (EQPMS) for data recording. The programme is well-established and have been successfully used before in some other recent MTRCL's projects, including Tseung Kwan O Extension and Quarry Bay Congestion Relief Works.

5.2 Monitoring Equipment

- 5.2.1 As referred to in the Technical Memorandum 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 1.0dB.
- 5.2.2 Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.
- 5.2.3 The ET is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled.

5.3 Monitoring Locations

- 5.3.1 The proposed locations (NTST1, NTST2 and NTST3) for noise monitoring during construction works are shown in Figure 5-0. The monitoring locations are selected to represent the nearest noise sensitive receivers that could be affected by the proposed construction works. Noise monitoring at NTST3 is only required when there are planned construction activities at a work location which would be visible from NTST3 taking into account its angle of view limited by the presence of nearby high-rise buildings.
- 5.3.2 The ET may find it appropriate at the detailed design stage to propose alternative monitoring locations based on consideration of the latest status, availability and/or accessibility of the various possible monitoring locations. Alternative monitoring locations proposed by the ET shall be agreed by EPD.
- 5.3.3 When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria:
- at locations close to the major site activities which are likely to have noise impacts;
 - close to the noise sensitive receivers; 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.
- 5.3.4 The monitoring station shall normally be at a point 1m from the exterior of the sensitive receivers building facade and be at a position 1.2m aboveground. 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 +3dB(A) shall be made to free field measurement data. The ET shall inform 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 as far as practicable.

5.4 Baseline Monitoring

- 5.4.1 Baseline noise monitoring shall be carried out by the ET in the absence of construction works that would have any potential to generate dust associated with the project at each of the selected monitoring stations. The baseline monitoring shall be carried out daily for a period of at least two weeks. For 0700-1900 hours, measurements of the L_{Aeq} , L_{A90} and L_{A10} noise levels shall be made over a 30-minute period.
- 5.4.2 The ET shall inform the Project Engineer the schedule on the baseline monitoring before commencement of the monitoring.
- 5.4.3 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with EPD to agree on an appropriate set of data to be used as a baseline reference and submit to the ER for approval.

5.5 Impact Monitoring

- 5.5.1 The nature of the activities is similar as the construction works proceed progressively along different lanes on Nathan Road. Upon completion of the road deck and provision of the noise enclosure, all construction works will be effectively located underground. Sufficient direct noise mitigation measures have been recommended to alleviate the potential construction noise impact to acceptable levels. These noise mitigation measures include use of quiet Powered Mechanical Equipment (PME), erecting temporary noise barriers, providing noise enclosure as well as implementation of good site practice and noise management. The contractor will be required to provide and establish these noise mitigation facilities at different stages of the works, where appropriate. The implementation of a regular noise monitoring programme with the event and action plan strictly followed taking into account the relevant action and limit levels will allow the provision and implementation of the noise mitigation measures by the Contractor be checked.
- 5.5.2 Noise monitoring shall be carried out by the ET at the selected representative noise monitoring stations. One set of noise measurement shall be obtained to gain $L_{Aeq(30min)}$ noise levels at each monitoring locations between 0700-1900 on normal working hours (i.e. Monday to Saturday). As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference.
- 5.5.3 In case of non-compliance with the construction noise criteria or when complaint is received, more frequent monitoring as specified in the Event Contingency Plan (ECP) in Section 5.6 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.

5.6 Event Contingency Plan for Construction Noise

5.6.1 The Action and Limit levels for construction noise are defined in Table 5-1. Should non-compliance of the criteria occurs, action in accordance with the Event Contingency Plan in Table 5-2, shall be carried out.

Table 5-1 Action and Limit Levels for Construction Noise

Monitoring Location	Time Period	Action	Limit
Chungking Mansion NTST1	0700-1900 hrs on normal weekdays	When one documented complaint is received	74 dB(A) (background corrected)
TST Station Exit C1 NTST2	0700-1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A) (background corrected)
Wing Lok House NTST3	0700-1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A) (background corrected)

Table 5-2 Event Contingency Plan for Construction Noise Monitoring

EVENT	ACTION			
	ET	ER	Contractor	IEC
<i>Action Level</i>	i. Notify IEC/ER ii. Carry out investigation iii. Report the investigation results to IEC / ER iv. Discuss with ER / Contractor and formulate the remedial measures for the analysed noise problem v. Increase monitoring frequency to check mitigation effectiveness	i. Notify Contractor ii. Require Contractor to propose noise mitigation proposals for the analysed noise problem iii. Ensure noise mitigation proposals are properly implemented	i. Submit noise mitigation proposals to ET / ER & IEC within 3 working days of notification ii. Implement noise mitigation proposals	i. Review ET's investigation results and Contractor's noise mitigation proposals and advise ER accordingly ii. Ensure the noise mitigation proposals implemented by Contractor properly

EVENT	ACTION			
	ET	ER	Contractor	IEC
<i>Limit Level</i>	i. Notify IEC / ER / EPD ii. Carry out investigation iii. Repeat measurement to confirm findings and report the investigation results to IEC / ER iv. Increase monitoring frequency v. Discuss with IEC / ER / Contractor and formulate the remedial measures for the analysed noise problem vi. Inform IEC, ER and EPD the causes & actions taken for the exceedances vii. Assess effectiveness of Contractor's mitigation proposals and keep IEC, EPD and ER informed of the results viii. If exceedance stops, cease additional monitoring	i. Notify Contractor ii. Require Contractor to propose mitigation proposals for the analysed noise problem iii. Discuss with ET / IEC / Contractor potential remedial actions iv. Ensure mitigation proposals are properly implemented v. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	i. Take immediate action to avoid further exceedance ii. Submit proposals for mitigation actions to ER/IEC/ET within 3 working days of notification iii. Implement the agreed proposals iv. Resubmit proposals if problem still not under control v. Stop the relevant portion of works as determined by the ER until the exceedance is abated vi. Report the event to ER / IEC / ET within 3 working days after effective measures applied	i. Review ET's investigation result ii. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise ER accordingly iii. Ensure the implementation of mitigation actions implemented properly

5.7 Noise Mitigation Measures

5.7.1 The EIA Report has recommended various construction noise control and mitigation measures. The Contractor shall be responsible for the design and implementation of these recommended measures.

Instead of the temporary noise barriers and machinery enclosure recommended in the EIA Report, the Contractor has proposed alternative mitigation measures which would be able to achieve the same noise control levels to various NSR's under Contractor Submission dated 30 August 2002 and the addendum dated 27 September 2002. MTRCL's VEP Application No. VEP-072/2002 enclosed with the Contractor Submission and addendum has been approved by the Environmental Protection Department on 4 October 2002 and a revised Environmental Permit No. EP-113/2001/A was issued.

5.7.2 Noise generated from construction sites can be minimised by adopting a number of practicable noise mitigation options, such as:

- ◇ Use of quiet PME with lower Sound Power Level;
- ◇ Erect temporary noise barriers and machinery enclosure;
- ◇ Provide Noise Enclosure at the traffic deck opening;
- ◇ Implement good site practice and noise management;

5.7.3 The requirements with respect to use of quiet PME, erection of temporary noise barriers, machinery enclosures and road deck opening noise enclosure are presented below:

Selecting Quiet PME

5.7.4 Silenced types of equipment for use in construction activities are available in Hong Kong. The contractor should diligently seek equivalent models of silenced PME that are quieter than the standard types given in the Technical Memorandum on Noise from Construction Works Other than Percussive Piling" (TM). Plants with lower noise levels than those given in the TM should be used wherever possible.

5.7.5 For the types of equipment presented in Table 5-3 that are likely required in the construction works, silenced plant with SWL that is similar or less than that presented shall be adopted as far as possible.

Table 5-3 Silenced Equipment Inventory

Powered Mechanical Equipment	SWL of silenced PME, dB(A)
Lorry	105
Excavator	103
Water Pumps	88
Concrete Lorry	105

Use of Temporary Noise Barriers & Machinery Enclosures

5.7.6 The erection of noise barriers between noise sources and NSRs will be effective in reducing the noise impact. Temporary barriers can be erected within a short distance from stationary plants, and at practicable distance from mobile plants to alleviate the potential construction noise impact on the affected NSRs. Details of the temporary noise barriers are provided in Figure 5-1, Figure 5-2 and Figure 5-3. The temporary noise barriers shall be maintained throughout the site establishment phase, traffic deck piling phase and road demolition phase of the project.

- 5.7.7 In addition to temporary noise barriers, the smaller and static equipment such as hand-held breaker, air compressor and electric water pump can be totally shielded by temporary machine enclosures provided with ventilation to be used by the Contractor in order to mitigate the noise generated from the construction areas. Details of the machine enclosure are shown on Figure 5-4 and Figure 5-5. The temporary machine enclosures shall be maintained throughout the site establishment phase, traffic deck piling phase and road demolition phase of the project.
- 5.7.8 The noise barriers and enclosures should be as such that no part of the noise source will be visible from the target NSRs to be protected. The guidelines given in the Booklet entitled "A Practical Guide for the Reduction of Noise from Construction Works" issued by EPD is recommended to be followed by the Contractor in the design of the temporary acoustic barriers and enclosures. Barriers should have no openings or gaps, and preferably have a superficial surface density of at least 10 kg/m². The locations of the temporary noise barriers and enclosures shall be adjusted where and when necessary taking into consideration the locations and type of PME involved and the NSRs intended to be protected.
- 5.7.9 To mitigate the noise impact from the piles installation of the construction works, quiet piling plants can be shielded with shroud made with noise insulating material and provided at the piling system and rig during operation. Details of the shroud are provided in Figure 5-6.

Use of Noise Enclosure

- 5.7.10 The erection of the noise enclosure at the openings of the traffic deck will reduce the noise impact from the relevant PME during bulk excavation and loading and unloading of construction and demolition materials inside the works area. Details of the temporary noise enclosure and road decks are provided in Figure 5-7.

Good Site Practices and Noise Management

- 5.7.11 To be prudent in the construction noise management, the following additional noise management measures and good site practices are recommended for implementation:

The Contractor shall comply with and observe the Noise Control Ordinance (NCO) and its current subsidiary regulation;

Before the commencement of any work, the Contractor shall submit to the Engineer for approval the method of working, equipment and sound-reducing measures intended to be used at the site;

Only well-maintained plants should be operated on-site;

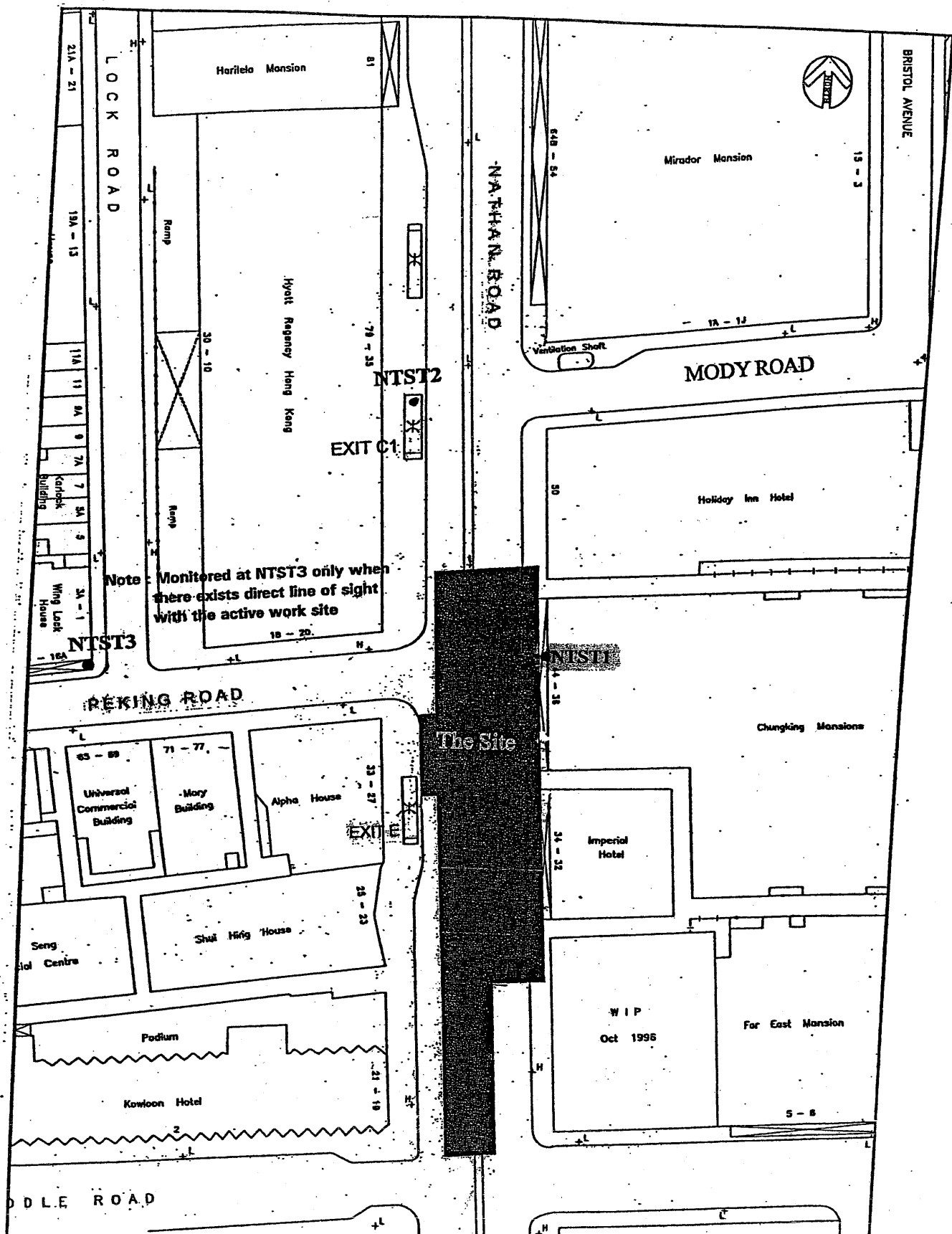
Plants should be serviced regularly during the construction programme;

Machines that may be in intermittent use should be shut down or throttled down to a minimum between work periods;

Silencer and mufflers on construction equipment should be utilised and should be properly maintained during the construction programme;

Noisy activities can be scheduled to minimise exposure of nearby NSRs to high levels of construction noise.

The Contractor shall carry out daily inspection on the noise control measures to be implemented on the construction sites and ensure their correct installation and proper maintenance as well as report any significant changes of their locations and designs. A log-book recording each daily inspection and any changes of location and design of temporary noise barriers, enclosures and quiet plant will be kept at the site office.

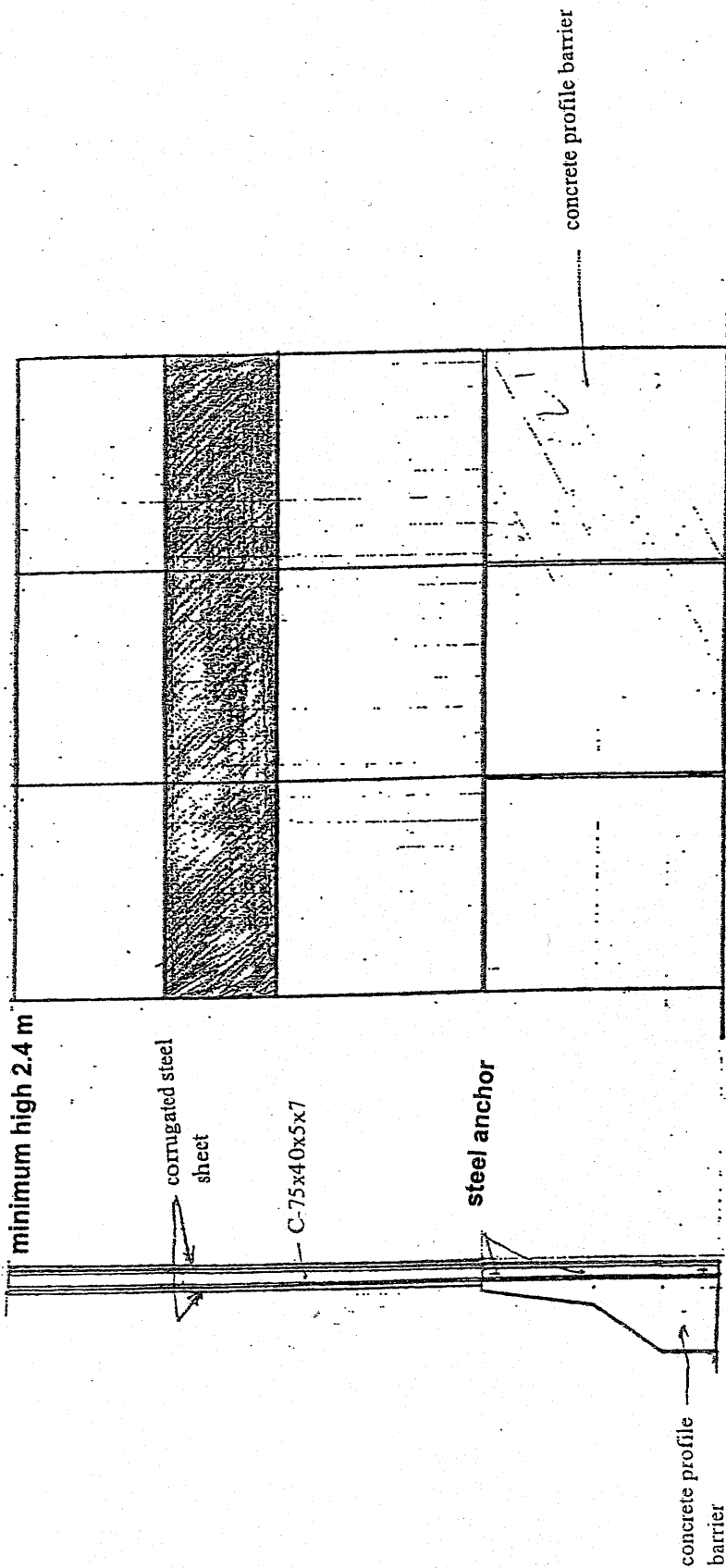



Title: Proposed Locations of the Noise Monitoring Stations


Project: Modifications to MTRC TST Station

Scale: NTS

Figure: 5-0




地鐵公司
 MTR CORPORATION
 27/F, No. 475, Queen's Road, Kowloon, Hong Kong
 TEL: 292 3111

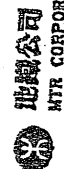
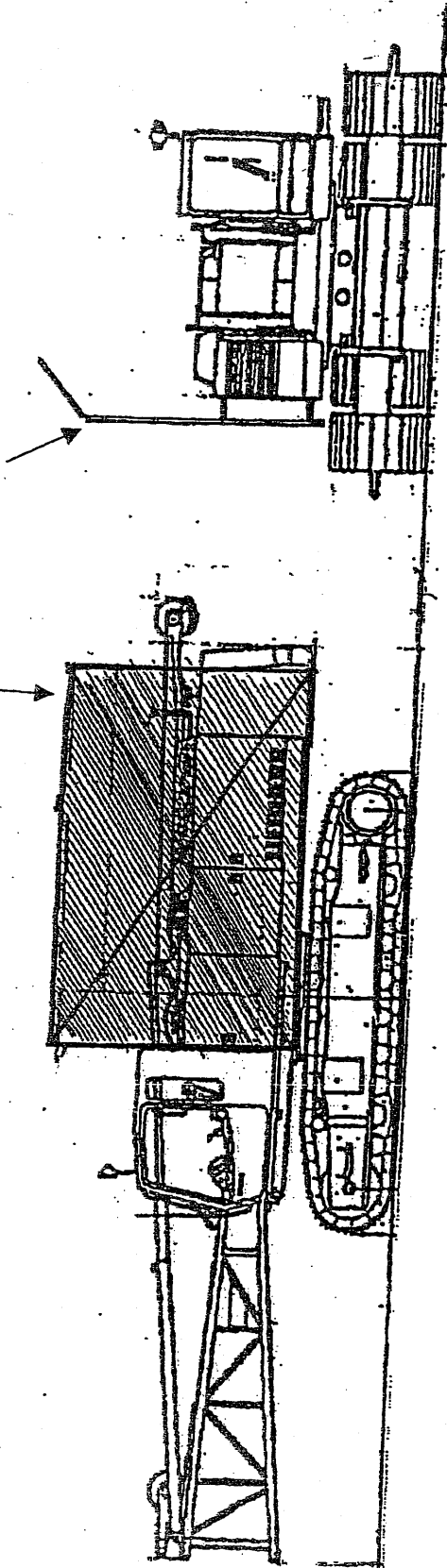
MAIN CONTRACTOR

KUMAGAI GUMI CO., LTD.
 37-7, No. 4th Street, Bldg.,
 Minami-Pocho, Nishi-Ku,
 Tokyo 162-0801

**TST/MOK/KOT STATION
 ENHANCEMENT PROJECT**
 CONTRACT: CONTRACT 4420
 TSM SHA TSUI STATION
 MODIFICATION

**NOISE BARRIER
 TYPE 1**

SCALE	As shown	CAD REF	A/C APPR
DATE	JAN 02	A/C DWG NO	-
DRAWN	BILLY	DESIGNED	FL
CHECKED	TY	APPROVED	KA
DRAWING NO			REV
FIGURE NO			FIGURE 5-1

Noise Insulative Barrier
to be provided



地鐵公司
MTR CORPORATION

NOT TO BE USED FOR ANY OTHER PROJECT WITHOUT THE WRITTEN PERMISSION OF THE CONTRACTOR



熊谷組
KUMAGAI GUMI CO., LTD.
1-1-1, HONJO, NAKAGYU-KU, TOKYO 100, JAPAN

**TST/MOK/KOT STATION
ENHANCEMENT PROJECT**

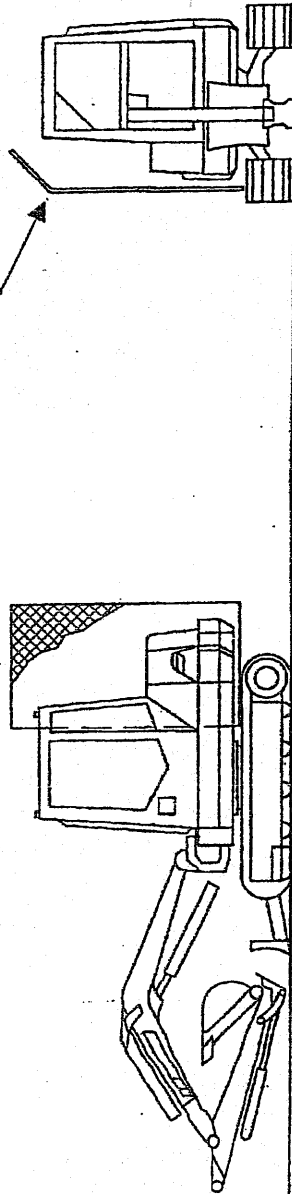
CONTRACT 4420
TSM SHA TSUI STATION
MODIFICATION


FIELD

**NOISE INSULATIVE BARRIER
FIXED TO CRANE COVERS
ENGINE AREA FROM WHICH
NOISE IS GENERATED**

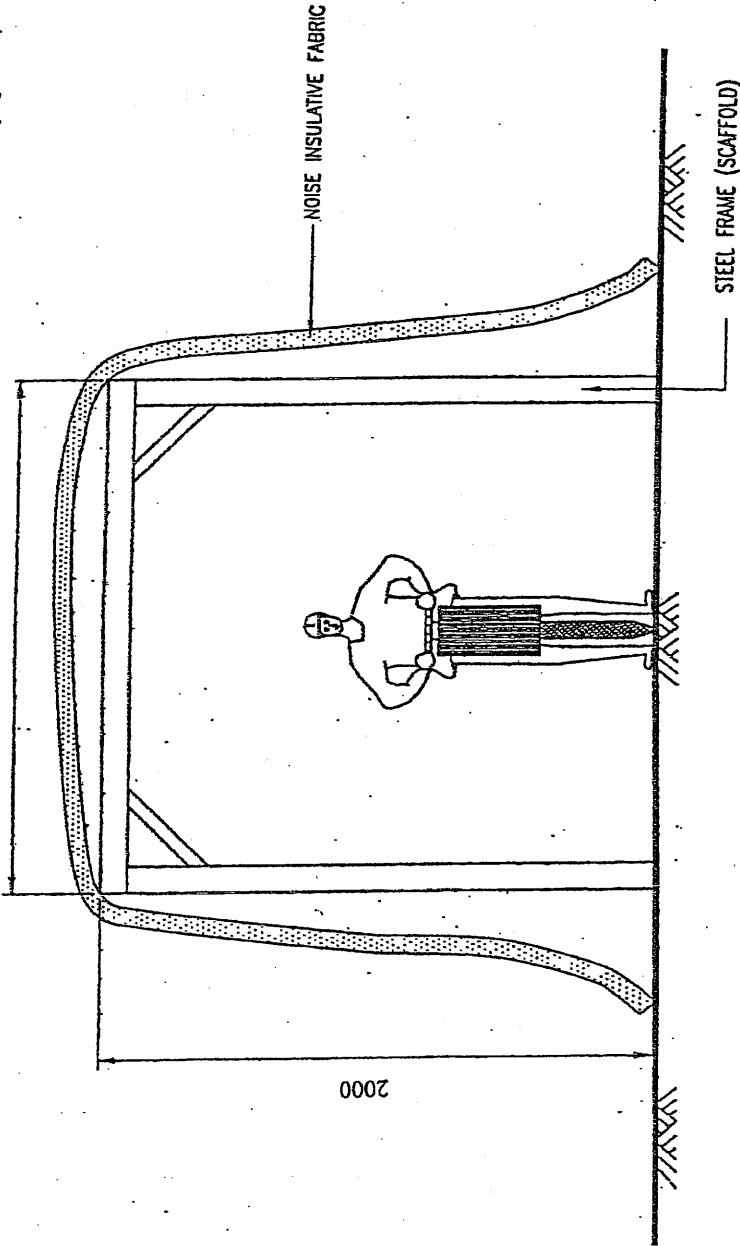
SCALE	As shown	CAD REF		I/C APPR
DATE	JAN 02	I/C DWG NO		
DRAWN	BILLY	DESIGNED	TL	DRAWING NO
CHECKED	TY	APPROVED	KA	REF
				FIGURE 5-2

Noise Insulative Barrier
to be provided





 地建公司 NTR CORPORATION 11010 W. 10th Ave., Suite 100 Denver, CO 80202 TEL: (303) 751-1111	TST/MOK/KOT STATION ENHANCEMENT PROJECT		NOISE INSULATIVE BARRIER FIXED TO EXCAVATOR ENGINE AREA FROM WHICH NOISE IS GENERATED		CAD REF A/C ENG NO -	A/C APPR
	CONTRACT: CONTRACT 4420 TSM SHA TSUI STATION MODIFICATION	SCALE DATE DRAWN CHECKED TY	AS SHOWN JAN 02 DESIGNED BILLY	APPROVED KA	DRAWING NO FIGURE 5-3	REV.
地建公司 NTR CORPORATION 11010 W. 10th Ave., Suite 100 Denver, CO 80202 TEL: (303) 751-1111	KUMAGAI GUMI CO., LTD. 1-1-1, Nishi-Shinjyuku Shinjyuku-Ku, Tokyo 163-0292, Japan TEL: (81) 3-334-1111					

2000 (size varies according to size of plant & equipment)

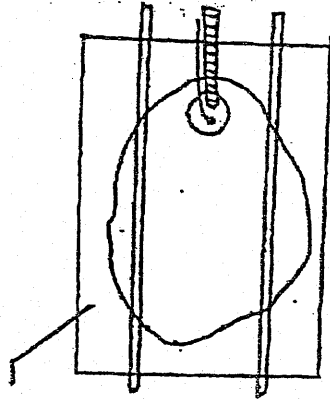
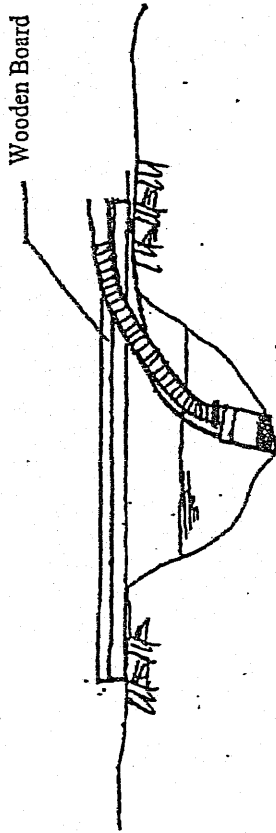


TYPICAL SECTION

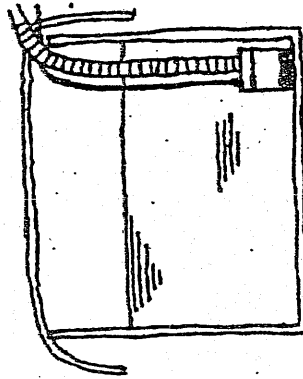
SCALE 1:40



 地鐵公司 MTR CORPORATION <small>418 SPICE TELEFONE KUALA LUMPUR 1040 TEL 919 3111</small>	TST/MOK/KOT STATION ENHANCEMENT PROJECT		NOISE ENCLOSURE TO BE PROVIDED AROUND LOCALISED WORK		A/C APPR
	CONTRACT: CONTRACT 4420 TSM SHA TSUI STATION MODIFICATION		TITLE		CAD REF
 地蔵公司 KUMAGAI GUMI CO., LTD. <small>227, 4th, 5th, 6th, 8th, 9th NORTH POINTE, HONG KONG</small>	SCALE As shown		CAO REF		DRAWING NO FIGURE 5-4
	DATE JAN '02		A/C DWG NO		
UHN CONTRACTOR		DRAWN CHECKED	DESIGNED APPROVED	EFL KA	TY

Wooden Board

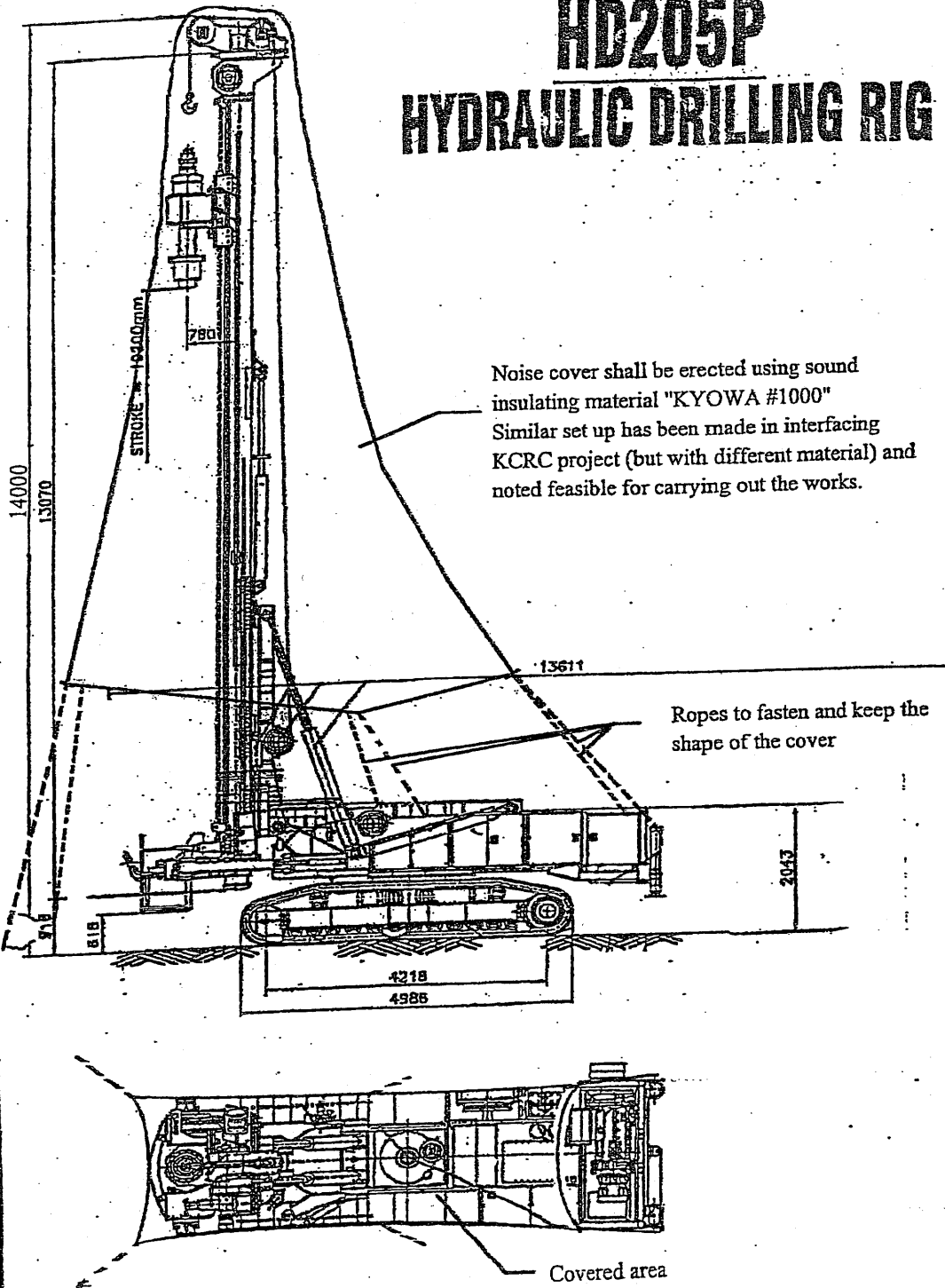


Noise Cover / Enclosure for Water Pump

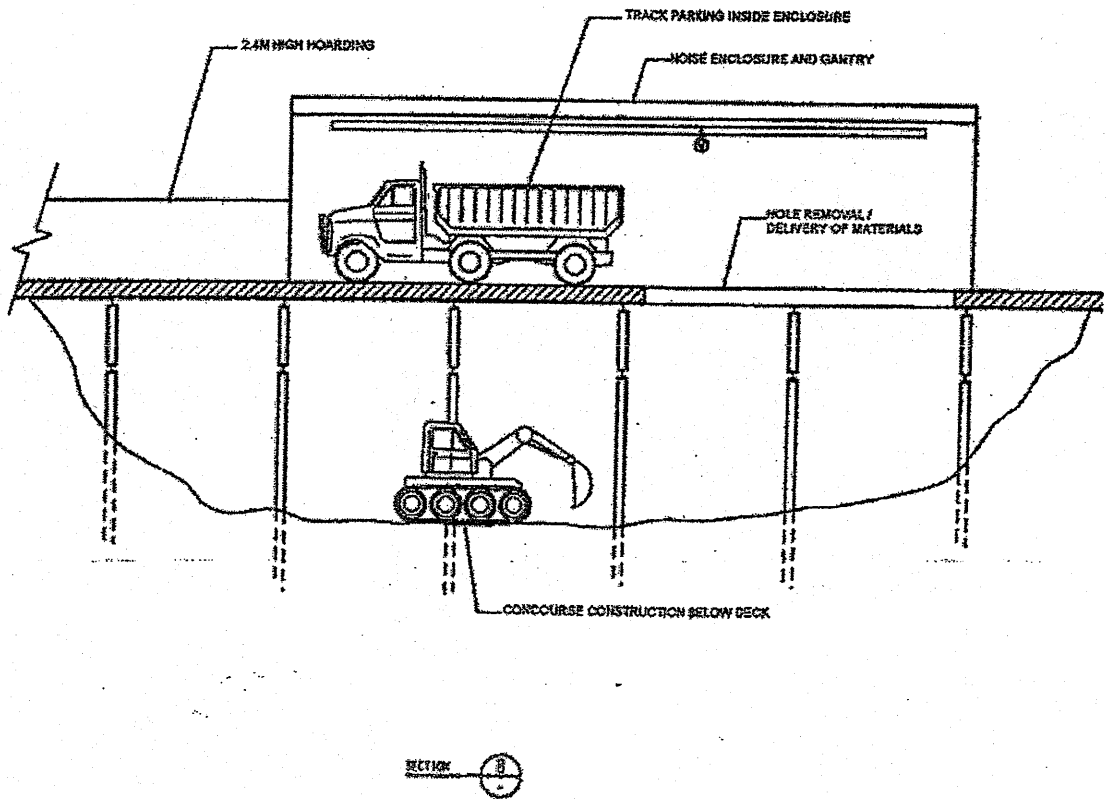
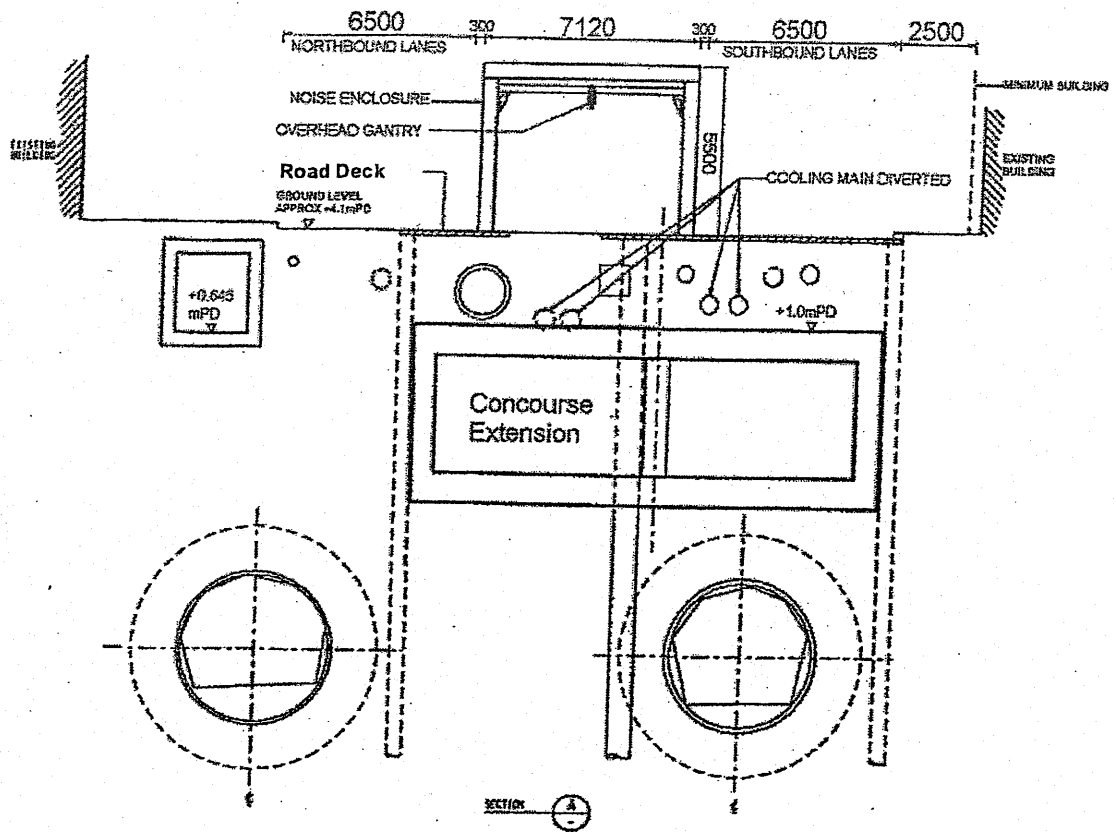


 地鐵公司 MTR CORPORATION	 KUMAGAI GUMI CO., LTD. <small>1177, 1st Fl. 2-2-1, Sakai, Osaka, Japan</small>	<small>4th Floor, 222, Des Voeux Road, East, Hong Kong</small> <small>TEL: 2522 1111</small>		TST/MOK/KOT STATION ENHANCEMENT PROJECT		<small>TITLE</small> NOISE COVER / ENCLOSURE FOR WATER PUMP		<small>SCALE</small> As shown		<small>CAD REF</small> A/C APPR	
		<small>MAIN CONTRACTOR</small> KUMAGAI GUMI CO., LTD.		<small>CONTRACT</small> CONTRACT 4420 TSM SHA TSUI STATION MODIFICATION		<small>DATE</small> JAN 02		<small>A/C DWG NO</small> -		<small>DRAWING NO</small> FIGURE 5-5	
				<small>DESIGNED</small> BILLY		<small>APPROVED</small> KA		<small>CHECKED</small> TY		<small>A/C APPR</small> -	

HD205P HYDRAULIC DRILLING RIG



SCALE		AS SHOWN	CAD REF	A/C APPR
DATE	JAN 02	A/C DWG NO		
DRAWN	BILLY	DESIGNED	FL	DRAWING NO
CHECKED	TY	APPROVED	KA	REV
NOISE ENCLOSURE TO HD 205P HYDRAULIC DRILLING RIG				
TST/MOK/KOT STATION ENHANCEMENT PROJECT		CONTRACT 4420 TSIK SHA TSUI STATION MODIFICATION		
MTR CORPORATION		KUMAGAI GUMI CO., LTD.		
MTR CONTRACTOR		KUMAGAI GUMI CO., LTD.		



地鐵有限公司尖沙咀站改建工程
Modifications to MTRC TST Station
 環境許可證 EP-113/2001/A
Environmental Permit number EP-113/2001/A

Note:
 Typical Noise
 Enclosure and
 Road Deck Extracted
 From Figure 3-3 of
 the EIA Report

Figure 5-7 : Typical Noise Enclosure and Road Deck

6. CONSTRUCTION DUST MONITORING

6.1 Air Quality Parameters

- 6.1.1 The Contractor is required under the *Air Pollution Control (Construction Dust) Regulation* to implement sufficient dust mitigation measures during the execution of the construction works to mitigate the dust impact on the nearby air sensitive receivers. To check for the implementation of these dust mitigation measures, the implementation of relevant EM&A activities is recommended.
- 6.1.2 Monitoring of Total Suspended Particulate (TSP) levels shall be carried out by the ET when aboveground construction activities are carried out, which will include site clearance, road & pavement demolition, pile installation and reinstatement, etc. to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.
- 6.1.3 24-hour Total Suspended Particulate (TSP) levels shall be measured according to the recommended programme. TSP levels shall be measured by following the standard high volume sampling method as set out in Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B.
- 6.1.4 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 down in details, where appropriate.
- 6.1.5 MTRCL is planned to use its computer-based monitoring and audit software known as Environmental Quality Protection Management System (EQPMS) for data recording. The programme is well-established and have been successfully used before in some other recent MTRCL's projects, including Tseung Kwan O Extension and Quarry Bay Congestion Relief Works.

6.2 Monitoring Equipment

- 6.2.1 The High volume sampler (HVS) used shall be in compliance with the following specifications or equivalence:
- 0.6-1.7 m³/min. (20-60 SCFM) adjustable flow range;
 - equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation;
 - installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
 - capable of providing a minimum exposed area of 406 cm² (63 in²);
 - flow control accuracy: +/- 2.5% deviation over 24-hr sampling period;
 - equipped with a shelter to protect the filter and sampler;
 - incorporated with an electronic mass flow rate controller or other equivalent devices;
 - equipped with a flow recorder for continuous monitoring;
 - provided with a peaked roof inlet;
 - incorporated with a manometer;
 - able to hold and seal the filter paper to the sampler housing at horizontal position;
 - easy to change the filter; and
 - capable of operating continuously for 24-hr period.

- 6.2.2 During the execution of the construction works, the ET is responsible for provision of the monitoring equipment. He shall ensure that the HVS with an appropriate calibration kit is available for the carrying out of baseline monitoring, regular impact monitoring and ad hoc monitoring.
- 6.2.3 The HVS shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. The calibration kit, filter papers, etc. shall be clearly labelled.
- 6.2.4 Initial calibration of the HVS 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 condition.
- 6.2.5 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.
- 6.2.6 Wind data monitoring equipment shall also be provided and set up at a conspicuous location for logging wind speed and wind direction near to the dust monitoring location. The location for equipment installation shall be proposed by the ET, taking into account the locations of other construction sites which may be in operation. For installation and operation of wind data monitoring equipment, the following points shall be observed:
- the wind sensors should be installed on masts at an elevated level 10m aboveground so that they are clear of obstructions or turbulence caused by the buildings;
 - the wind data should be captured by a data logger and to be downloaded for processing at least once a month;
 - the wind data monitoring equipment should be re-calibrated at least once every six months; and
 - wind direction should be divided into 16 sectors of 22.5 degrees each.
- 6.2.7 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon gaining agreement from EPD.

6.3 Laboratory Measurement / Analysis

- 6.3.1 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.
- 6.3.2 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 ET and the ER and the measurement procedures shall be witnessed by the ET and the ER.
- 6.3.3 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.
- 6.3.4 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.
- 6.3.5 All collected samples shall be kept in a good condition for 6 months before disposal.

6.4 Monitoring Location

- 6.4.1 Figure 6-1 shows the proposed dust monitoring locations (ATST1, ATST2). The monitoring locations were selected taking into account their accessibility and minimal disturbance to the public while located at a low level in the vicinity of the worksite.
- 6.4.2 The ET may consist it appropriate during the detailed design stage to propose an alternative monitoring location based on consideration of the latest status, availability and/or accessibility of the possible monitoring location. Alternative monitoring location proposed by the ET shall be agreed by EPD.
- 6.4.3 When an alternative monitoring location is proposed, the following criteria should be followed as far as practicable:
- a) at the site boundary or such location close to the major dust emission sources;
 - b) close to the sensitive receptors; and
 - c) take into account the prevailing meteorological condition.
- 6.4.4 The ET shall inform and 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) 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;
 - c) a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
 - d) a minimum of 2 metre separation from any supporting structure, measured horizontally is required;
 - e) no furnace or incinerator flue is nearby;
 - f) airflow around the sampler is unrestricted;
 - g) the sampler is more than 20 metres from the dripline;
 - h) any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
 - i) permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
 - j) a secured supply of electricity is needed to operate the samplers.

6.5 Baseline Monitoring

- 6.5.1 Baseline monitoring shall be carried out by the ET at the monitoring station for at least 14 consecutive days to obtain daily 24-hr TSP samples. Baseline monitoring shall be carried out before the commencement of any dusty construction activities at the project construction site.
- 6.5.2 In the unlikely circumstance that the baseline monitoring cannot be carried out at the designated monitoring location during the baseline monitoring period, the ET Leader shall carry out the monitoring at an alternative location which can effectively represent the baseline condition at the impact monitoring location. The alternative baseline monitoring location shall be agreed with EPD.

6.6 Impact Monitoring

- 6.6.1 The ET shall carry out impact monitoring at the designated dust monitoring station when aboveground construction works are carried out. For regular impact monitoring, a sampling frequency of at least one per week shall be followed at the selected monitoring station. The specific time to start and stop the 24-hr TSP monitoring shall be clearly defined and followed by the operator.
- 6.6.2 In case of non-compliance with the air quality criteria, more frequent monitoring exercise, as specified in the following section, shall be conducted within 24 hours after the laboratory result is obtained as appropriate. This additional monitoring shall be continued until the excessive dust emission or deterioration in air quality due to the construction works is rectified.

6.7 Event Contingency Plan for Air Quality

- 6.7.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with the relevant air quality criteria. Table 6-1 shows the air quality criteria, namely Action and Limit levels, to be used. Should non-compliance of the air quality criteria occurs, the ET/ ER and the Contractor shall undertake the relevant action in accordance with the Action Plan in Table 6-2.

Table 6-1 Action and Limit Levels for Air Quality

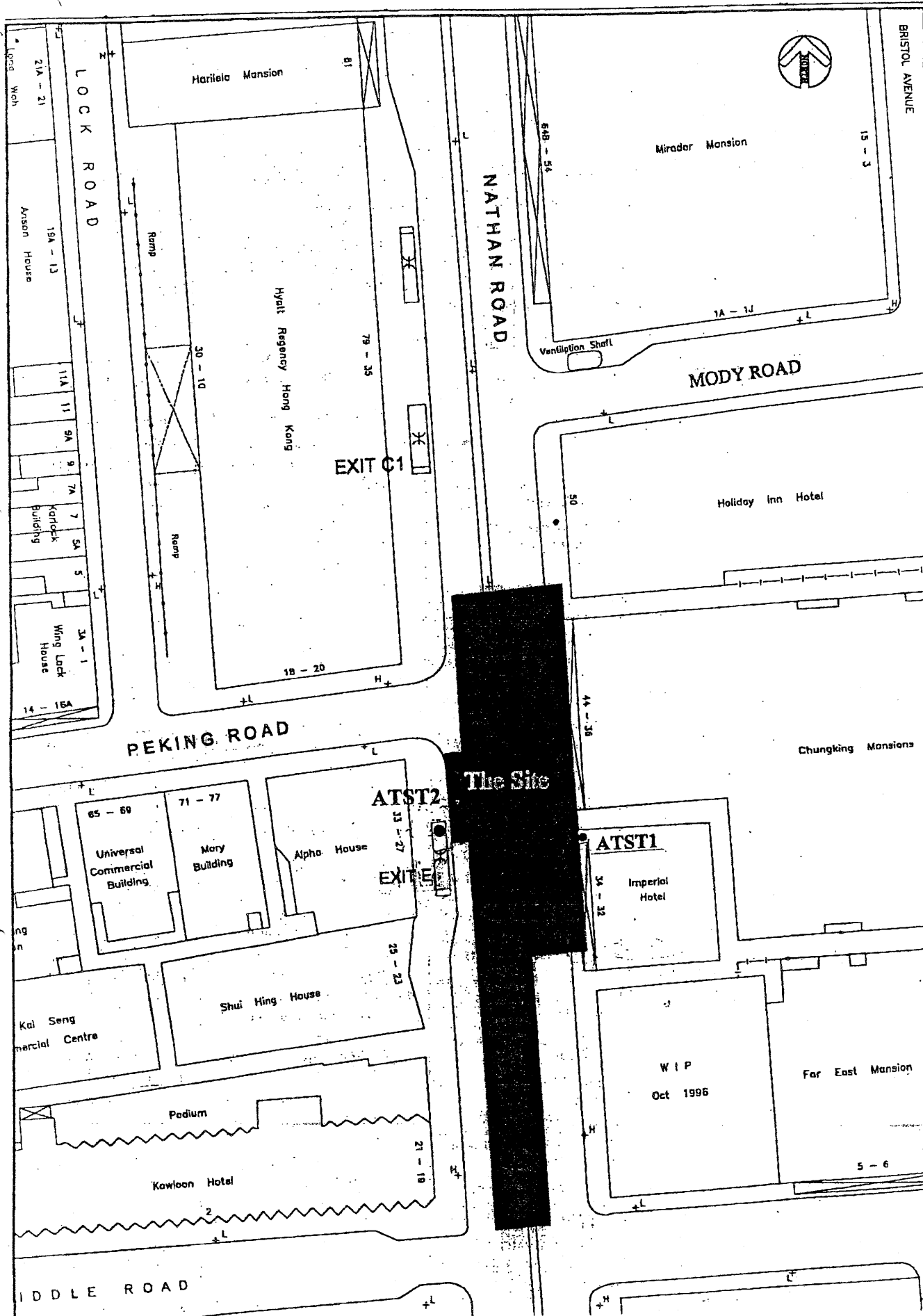
Parameters	Action	Limit
24 Hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $< 108 \mu\text{g}/\text{m}^3$, Action level = average of baseline level plus 30% and Limit level For baseline level $> 108 \mu\text{g}/\text{m}^3$ and baseline level $< 154 \mu\text{g}/\text{m}^3$, Action level = $200 \mu\text{g}/\text{m}^3$ For baseline level $> 154 \mu\text{g}/\text{m}^3$, Action level = 130% of baseline level	$260 \mu\text{g}/\text{m}^3$

- 6.7.2 The effectiveness of the dust control measures required to be implemented under the Air Pollution Control (Construction Dust) Regulation shall be checked by the EM&A programme. If the measures adopted and implemented by the contractor are found not sufficient to keep dust levels within acceptable levels, as reflected by the environmental monitoring programme, upon the advice of ET, the Contractor shall liaise with the ET and ER on implementation of some other possible mitigation measures.

Table 6-2 Event Contingency Plan for Air Quality

EVENT	ACTION			
	ET	ER	Contractor	IEC
<i>ACTION LEVEL</i>				
1.Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source 2. Inform IEC and ER 3. Repeat measurement to confirm finding 4. Increase monitoring frequency 	<ol style="list-style-type: none"> 1. Notify Contractor 2. Check and review Contractor's working methods 	<ol style="list-style-type: none"> 1. Rectify any unacceptable practice 2. Amend working methods if appropriate 	<ol style="list-style-type: none"> 1. Check Contractor's working methods & ET's monitoring datas
2.Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> i. identify source ii. inform ER / IEC iii. repeat measurements to confirm findings iv. Increase monitoring frequency v. Discuss with IEC / ER / Contractor for remedial actions required vi. Assess effectiveness of Contractor's mitigation proposal and advise ER / IEC vii. If exceedance stops, cease additional monitoring 	<ol style="list-style-type: none"> i. Notify Contractor ii. Review Contractor's working methods iii. Discuss with ET / IEC / Contractor on potential remedial actions iv. Ensure remedial actions properly implemented 	<ol style="list-style-type: none"> i. Submit proposals for remedial actions to ER / IEC / ET within 3 working days of notification ii. Implement the agreed proposals iii. Amend proposal if appropriate 	<ol style="list-style-type: none"> i. Check ET's monitoring datas and Contractor's working methods and remedial proposals and advise ER accordingly ii. Ensure the remedial proposals implemented by Contractor appropriately

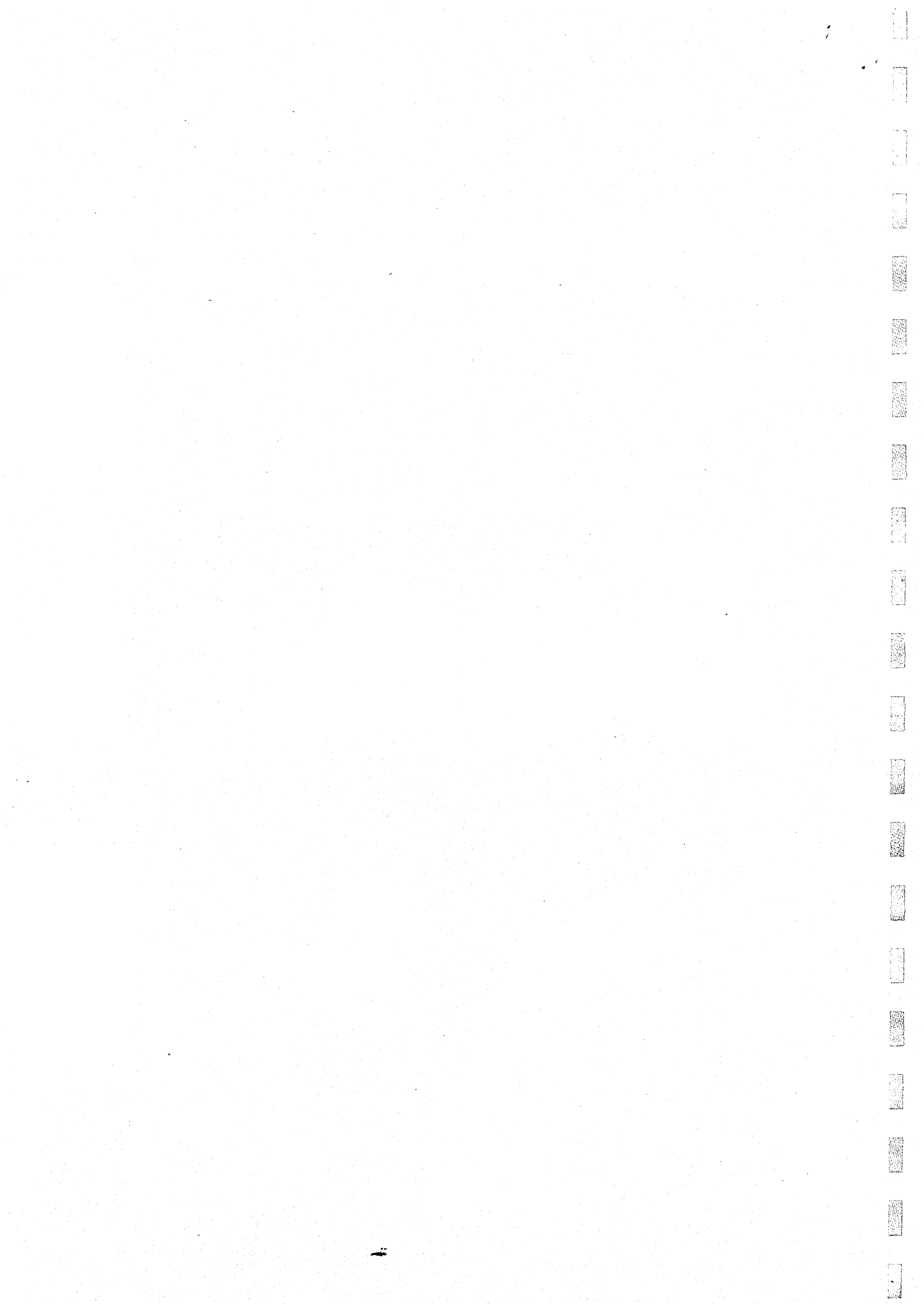
EVENT	ACTION			
	ET	ER	Contractor	IEC
<i>LIMIT LEVEL</i>				
1.Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source 2. Inform ER, IEC and EPD 3. Repeat measurement to confirm finding 4. Increase monitoring frequency if necessary 5. Assess effectiveness of Contractor's remedial actions and keep EPD, IEC and ER informed of the results 	<ol style="list-style-type: none"> 1. Notify Contractor 2. Check Contractor's working methods 3. Discuss with ET, IEC and Contractor potential remedial actions 4. Ensure remedial actions properly implemented 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to ER / ET / IEC 3. Implement the agreed proposals 4. Amend proposal if appropriate 	<ol style="list-style-type: none"> 1. Check ET's monitoring datas, Contractor's working methods and remedial proposals before implementation 2. Ensure the remedial proposals implemented by Contractor appropriately
2.Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> i. Identify source ii. Inform ER / IEC / EPD iii. Repeat measurement to confirm findings iv. Increase monitoring frequency if necessary v. Arrange meeting with Contractor/ ER / IEC to discuss the remedial actions to be taken vi. If exceedance continues, arrange meeting with IEC / ER / Contractor for further action vii. Assess effectiveness of Contractor's remedial actions and keep EPD, IEC and ER informed of the results viii.If exceedance stops, cease additional monitoring 	<ol style="list-style-type: none"> i. Notify Contractor ii. Check Contractor's working methods iii. Discuss amongst ET / IEC and the Contractor potential remedial actions iv. Ensure remedial actions properly implemented v. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until exceedance is abated 	<ol style="list-style-type: none"> i. Take immediate action to avoid further exceedance ii. Submit proposals for remedial actions to ER / ET / IEC within 3 working days of notification iii. Implement the agreed proposals iv. Resubmit proposals if problem still not under control v. Slow down or stop the relevant portion of works until the exceedance is abated vi. Report the event to ET / ER / IEC within 3 working days after effective measures provided 	<ol style="list-style-type: none"> i. Check ET's monitoring datas ii. Review Contractor's working methods and remedial proposals iii. Ensure the remedial proposals implemented by Contractor appropriately



Title: Proposed Location of the Air Quality Monitoring Station

Project: Modifications to MTRC TST Station

Scale: NTS
Figure: 6-1



7. CONSTRUCTION WASTE MANAGEMENT

7.1 Introduction

- 7.1.1 The Contractor is responsible for proper handling and disposal of construction and demolition material (C&DM), chemical waste and general refuse, and to implement measures to minimise waste generation and maximize reuse as far as practicable.

7.2 Mitigation Measures

- 7.2.1 The overall construction management strategy shall be the minimisation of waste generation, coupled with maximum reuse and recycling of construction and demolition materials as far as practicable. Contract requirements will include the responsibilities of the Contractor for waste collection and disposal.

7.3 Waste Management Plan

- 7.3.1 To ensure the appropriate handling of the C&DM, the Contractor shall develop and implement a Waste Management Plan (WMP) based on the recommended control and management measures and preliminary waste management plan presented in the EIA report.

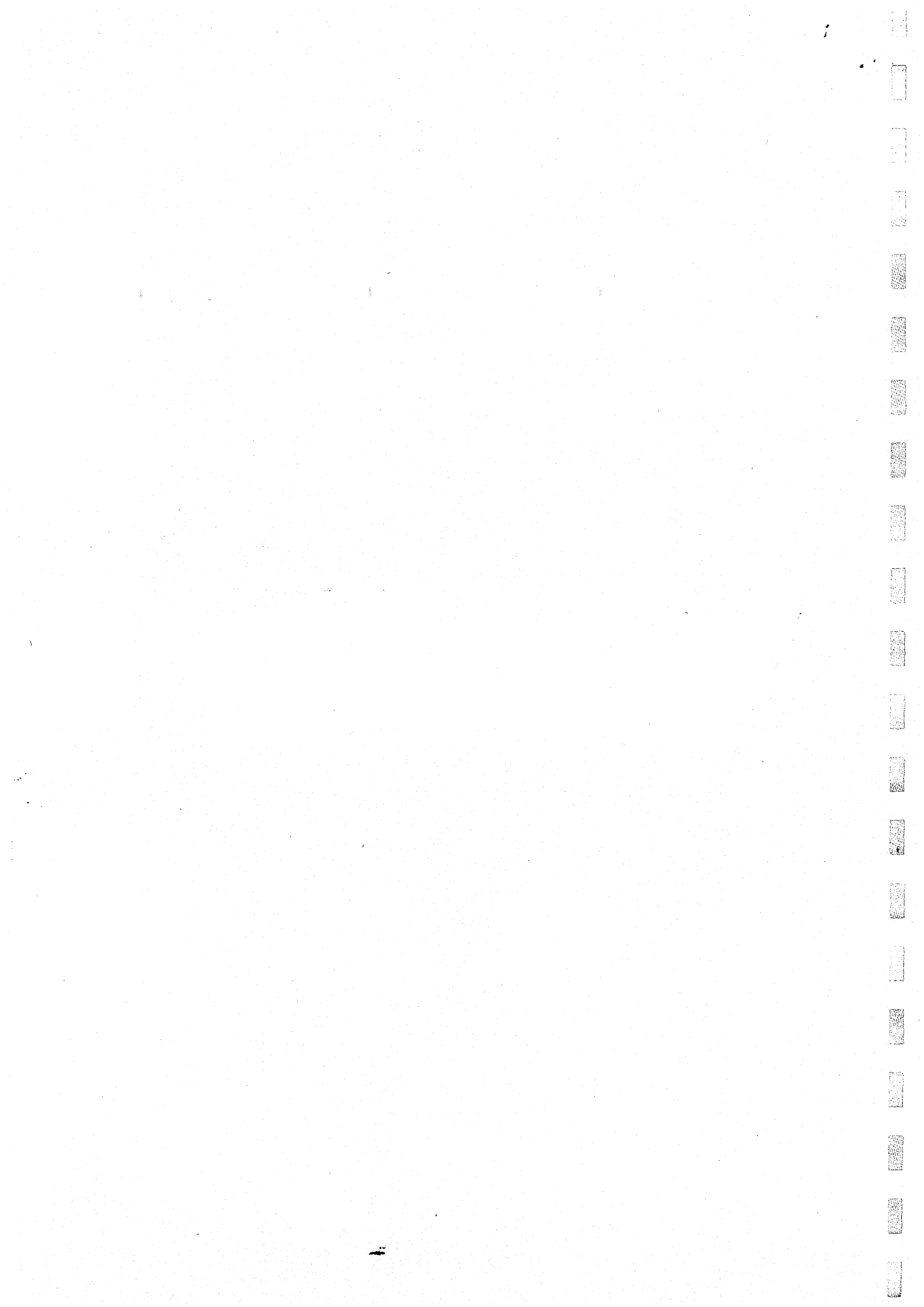
8. SITE ENVIRONMENTAL AUDIT

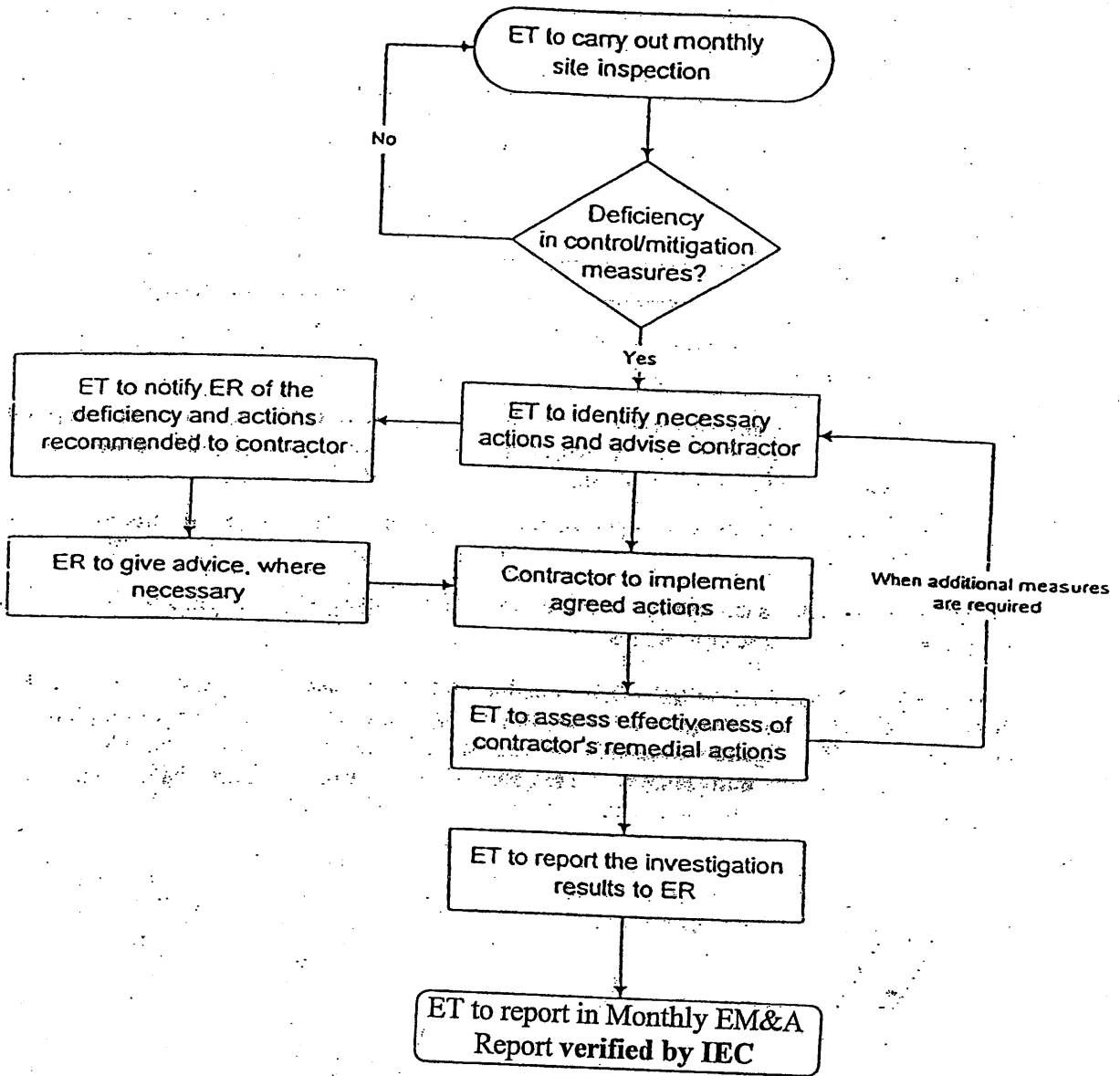
8.1 Site Inspections under the EM&A Works

- 8.1.1 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 by the Contractor. With well defined pollution control and mitigation specifications and a well established site inspection, deficiency and action reporting system, site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.
- 8.1.2 The ET is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspections under the EM&A works. A preliminary site inspection, deficiency and action reporting system in the form of a flow chart is prepared and is shown in Figure 8-1.
- 8.1.3 Regular site inspections shall be carried out at least once per month, especially during the construction period before the completion construction of the planned road deck. 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 may be affected, directly or indirectly, by the site activities. The ET shall make reference to the following information in conducting the inspection:
- a) the EIA recommendations on environmental protection and pollution control mitigation measures with regard to air quality, noise, and waste management;
 - 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.
- 8.1.4 The satisfactory implementation of relevant mitigation measures recommended in the EIA by the contractor shall be checked during the ET's regular site inspections among relevant phases of construction works.
- 8.1.5 The Contractor shall update with the ET all relevant information of the construction contract for him to carry out the site inspection. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be made known to the ER and the Contractor within 24 hours for reference, and for taking immediate action as appropriate. The Contractor shall follow the procedures and timeframe as stipulated in the Contract to report on any remedial measures subsequent to the site inspections.
- 8.1.6 Ad hoc site inspections shall also be carried out on situations when 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 Event Contingency Plan for environmental monitoring and audit.

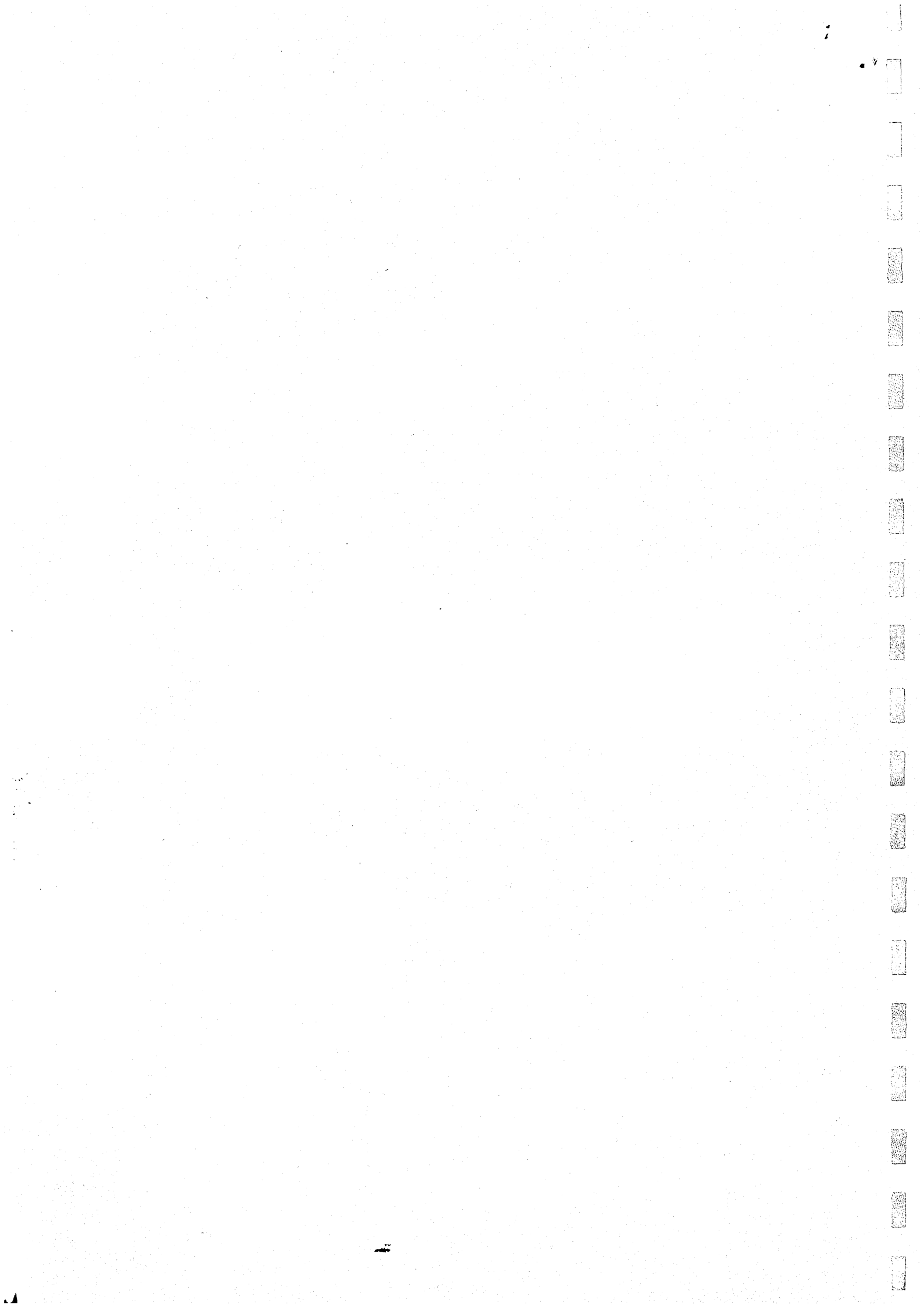
8.2 Environmental Complaints

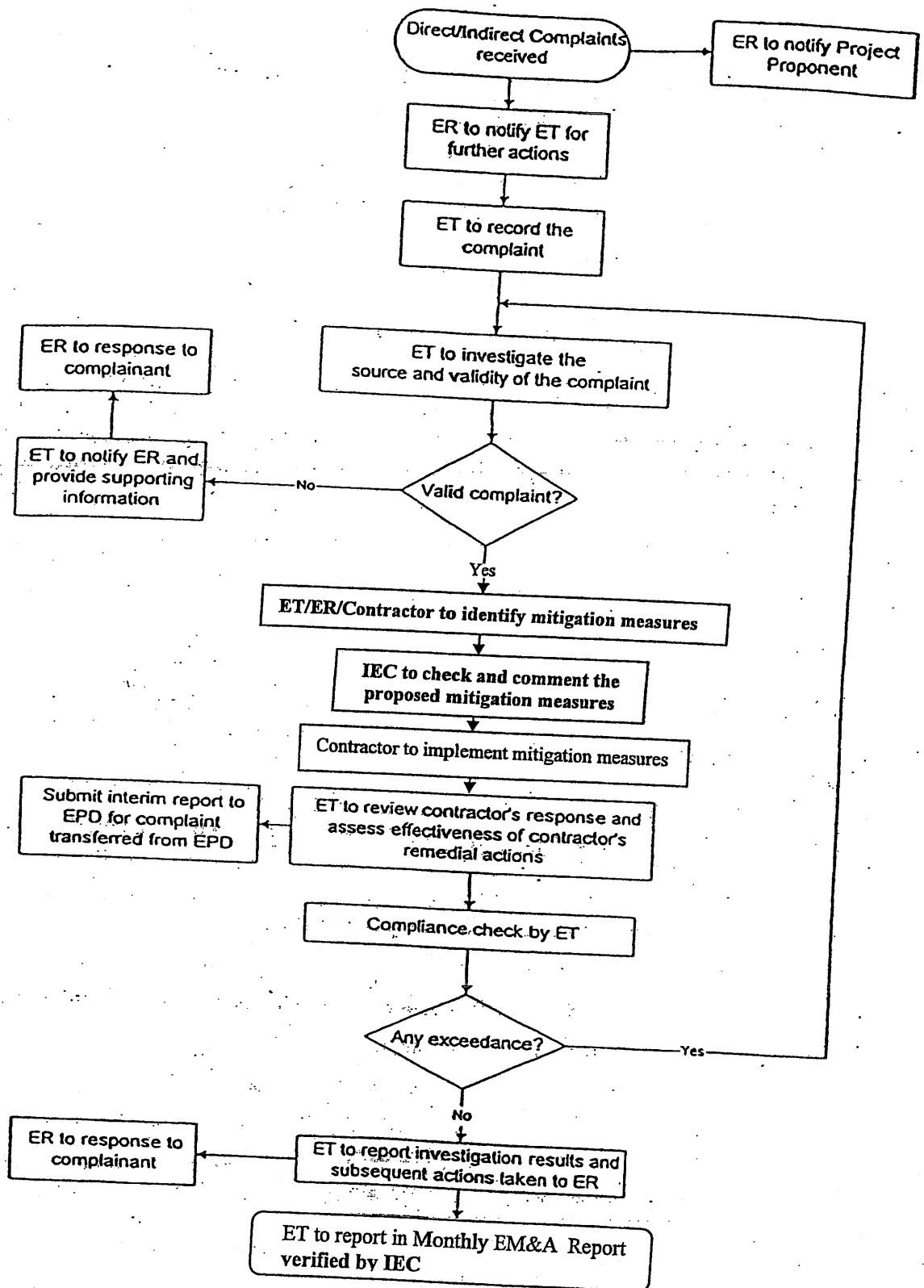
- 8.2.1 Complaints received on environmental issues shall be referred to the ET for carrying out complaint investigation procedure. The ET shall undertake the steps given below in a) to i) as appropriate upon receipt of the complaints. The complaint investigation procedures are also presented in the form of a flow chart in Figure 8-2 for easy reference.
- 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, discuss the measure details with ER / IEC / the Contractor for implementation;
 - 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 timeframe assigned by EPD;
 - g) undertake additional monitoring and audit to verify the situation if necessary, and review that any valid reason for complaint does not recur;
 - h) report the investigation results and the subsequent actions to the source of complaint for responding to complainant (If the source of complaint is EPD, the results should be verified by IEC and reported within the timeframe assigned by EPD); and
 - i) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports verified by IEC.
- 8.2.2 The ER or Contractor shall notify the ET of any complaints received liaise with him the actions being taken to settle these complaints.
- 8.2.3 During the complaint investigation work, the Contractor shall co-operate with the ET and ER 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 check that the measures have been carried out by the Contractor.





Title: Preliminary Site Inspection, Deficiency and Action Reporting System	CH2M HILL (China) LIMITED
Project: Consultancy Agreement No. EN002(C)-01 Modifications to MTRC TST Station Environmental Monitoring and Audit Manual	
Scale: NTS	
Figure: 8-1	





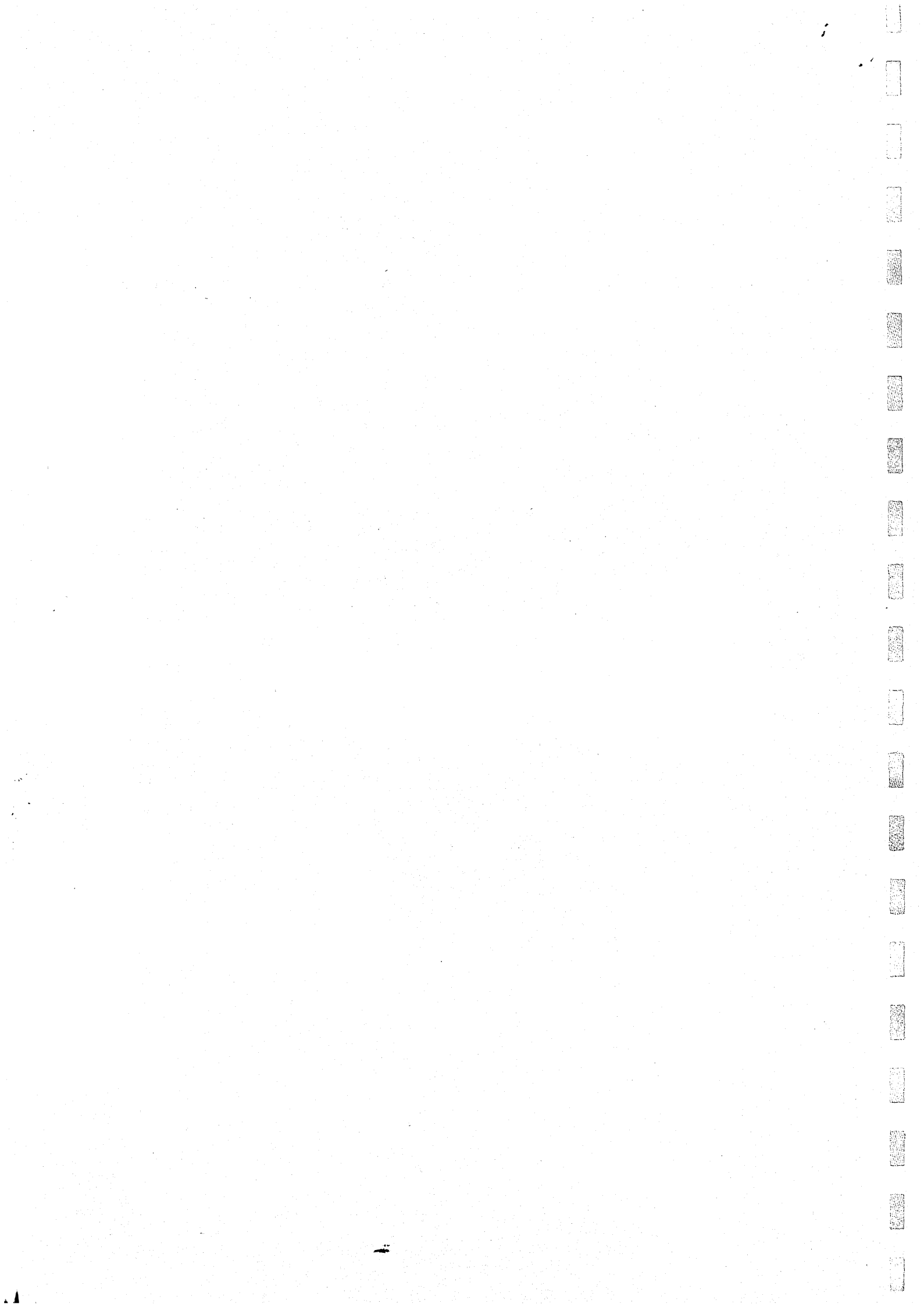
Title: Complaint - Response Procedures

Project: Consultancy Agreement No. EN002(C)-01
 Modifications to MTRC TST Station
 Environmental Monitoring and Audit Manual

CH2M HILL (China) LIMITED

Scale: NTS

Figure: 8-2



9. REPORTING

9.1 General

9.1.1 MTRCL is planned to use its computer-based monitoring and audit software known as Environmental Quality Protection Management System (EQPMS) for data recording. The reporting will be available in form of a website. The system and programme are well-established and have been successfully used before in some other recent MTRCL's projects, including Tseung Kwan O Extension and Quarry Bay Congestion Relief Works.

9.2 Baseline Monitoring Report

9.2.1 The ET shall prepare and submit a Baseline Environmental Monitoring Report verified by IEC before commencement of any major MTRCL construction work. The Baseline Environmental Monitoring Report shall be made available to each of the three parties: the Contractor, the ER, and EPD.

9.2.2 The baseline monitoring report is suggested to contain 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;
 - 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.

9.3 Monthly EM&A Reports

- 9.3.1 The EM&A report shall be prepared by ET and verified by IEC and submitted to EPD within 10 working days of the end of each reporting month, with the first report due in the month after construction commences.
- 9.3.2 The ET 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 surrounding environment and nature of works in progress.

9.4 First Monthly EM&A Report

- 9.4.1 The first monthly EM&A report is suggested to contain 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 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
 - monitoring date, time, frequency, and duration;
 - g) Graphical plots of trends of monitored parameters for the 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 non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - j) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;

- k) A description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;
- l) A summary record of all complaints received (written or verbal) for each medium, 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.

9.5 Subsequent EM&A Reports

9.5.1 The subsequent monthly EM&A reports are suggested to contain at least 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
 - 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 non-compliance and deficiency reporting
 - Recommendations (should be specific and target the appropriate party for action)
 - Implementation status of the mitigation measures and the corresponding effectiveness of the measures
- e) Future Key Issues
- f) 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:
 - 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
 - Monitoring schedule for the present and next reporting period
 - Cumulative complaints statistics
 - Details of complaints, outstanding issues and deficiencies

9.6 Quarterly EM&A Summary Reports

9.6.1 The quarterly EM&A summary report which should generally be around 5 pages (including about 3 pages of text and tables and 2 pages of figures) and suggested to 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 Report;
- d) Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA 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 non-compliance (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.

9.7 Forms to be Adopted

9.7.1 To facilitate the management of the EM&A programme for the construction works, the record forms presented in Appendix II or equivalence should be used. These forms are listed as follows:

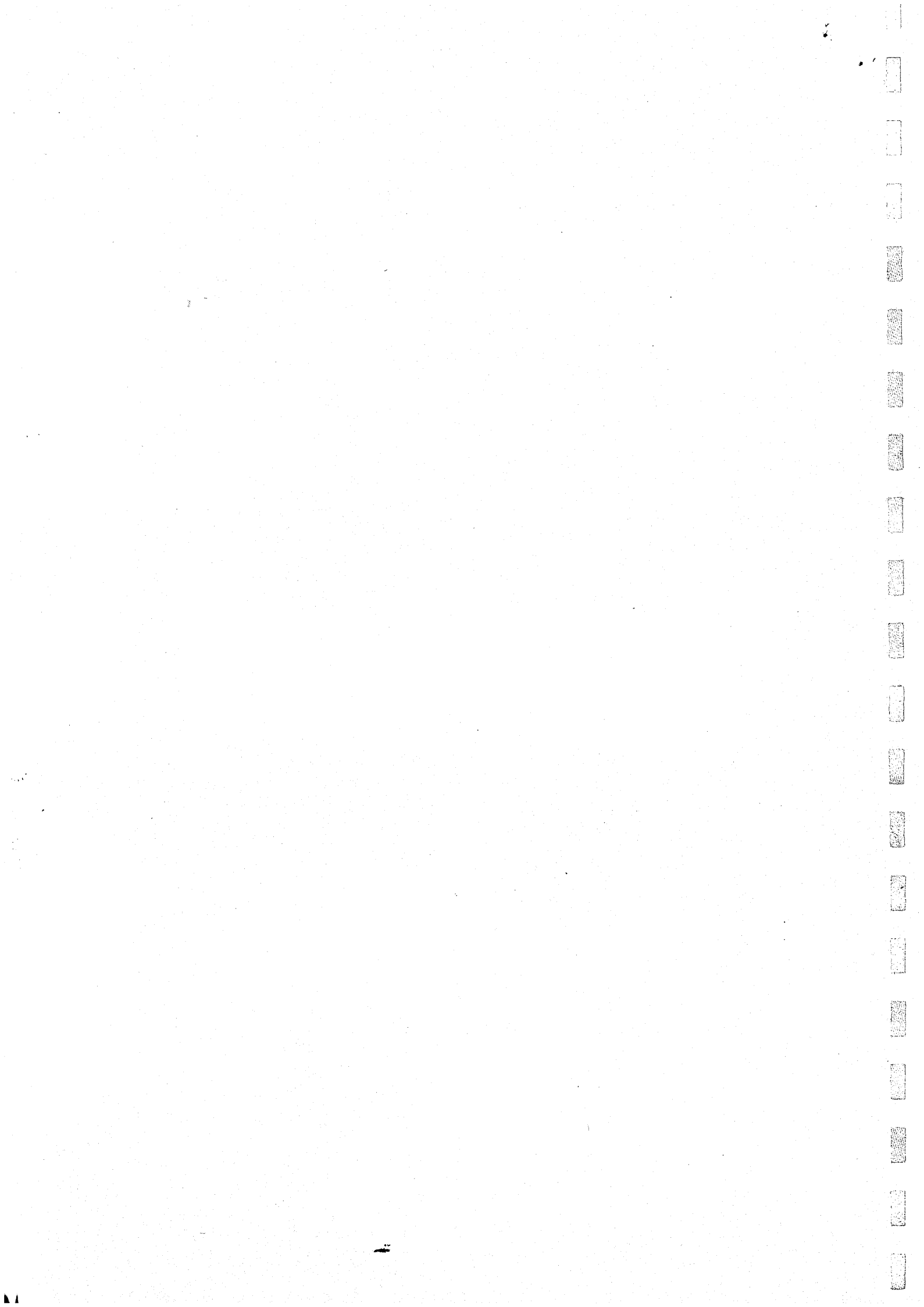
- Implementation Status Proforma;
- Data Recovery Schedule;
- Site Inspection Proforma;
- Proactive Environmental Protection Proforma;
- Regulatory Compliance Proforma;
- Compliant Log;
- Sample Template for Interim Notifications of Environmental Quality Limits Exceedances;
- High Volume Air Sampler Field Data Log Sheet; and
- Noise Measurement Record.

9.8 Data Keeping

9.8.1 The site document 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 ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. All the documents and data shall be kept for at least one year after completion of the construction contract.

9.9 Interim Notifications of Environmental Quality Limit Exceedances

9.9.1 With reference to the Event Contingency Plans presented in previous sections, when the environmental quality limits are exceeded, the ET shall immediately notify the ER, IEC & 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.



APPENDIX I
Implementation Schedule of
Recommended Environmental Mitigation Measures

Construction Phase Environmental Aspects	Mitigation Measures	Implementation Agent	Location	Implementation Stage	EIA Report Reference
Construction Noise	<p>Noise Mitigation Measures as recommended in the EIA Report:</p> <ul style="list-style-type: none"> ➤ Use of quiet PME with lower Sound Power Level; ➤ Erect temporary noise barriers; ➤ Provide Noise Enclosure at Traffic Deck Opening; and ➤ Implement good site practice and noise management 	Contractor	All construction work sites	All construction work stages	Section 3.8
Fugitive Dust Emission	<p>Dust Mitigation Measures as required under the Air Pollution Control (Construction Dust) Regulation as far as practicable, such as:</p> <ul style="list-style-type: none"> ➤ dusty vehicle loads transported to and from the work location should be covered by tarpaulin sheets and should not be overloaded; ➤ dusty material should be sprayed with water immediately prior to any loading, unloading or transfer operation to minimise dust emission, if needed ➤ routing of vehicles and positioning of dust generating construction plant at maximum possible separation distances from ASRs; ➤ watering of all dust emission sources, if necessary; ➤ side enclosure and covering, by impervious sheeting where practicable, of any aggregate or other dusty material storage piles, and/or sprayed with water or a dust suppression chemical so as to maintain the entire surface wet; ➤ drop height of excavated materials should be controlled to a minimum to limit fugitive dust generation from unloading as far as practicable; ➤ demoulded items shall be covered by impervious sheeting or placed in area sheltered on the top and the three sides within a day of demolition. ➤ instigation of a programme to monitor the construction process in order to enforce controls and modify methods of work if dusty conditions arise. 	Contractor	All construction work sites	All construction work stages	Section 4.8
Waste Management	<p>Overall Waste Management:</p> <ul style="list-style-type: none"> ➤ Implement a Waste Management Plan as detailed in the EIA based on the recommended waste control measures; ➤ Storage of different waste types - different types of waste should be segregated and stored in different containers, skips or stockpiles to enhance reuse or 	Contractor	All construction work sites	All construction work stages	Section 5.3

Construction Phase Environmental Aspects	Mitigation Measures	Implementation Agent	Location	Implementation Stage	EIA Report Reference
	<p>recycling of materials and their proper disposal. A temporary storage area equipped with required control measures (e.g. dust) should be provided for temporary storage of chemical waste;</p> <ul style="list-style-type: none"> ➤ Monitoring waste disposal – the Contractor shall propose the means by which he will monitor and record waste produced for agreement with MTRCL and on the advice of EPD; ➤ Records of Wastes - a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed; ➤ Training - training should be provided by the Contractor to workers in respect of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling, and avoid contamination of reusable C&DM, 				

APPENDIX II
Typical Record Forms

IMPLEMENTATION STATUS PROFORMA

Ref: _____

Ref**	Environmental Protection Measures*	Implementation Status

* All recommended and requirements resulted during the Course of E/IMEA Process, including ACE and/or accepted public comment to the proposal project
** EIA Ref/EM&A Log Ref/Design Document Ref

Signed by Environmental Team Leader: _____

Date: _____

Audited by Independent Checker (Environment): _____

Date: _____

DATA RECOVERY SCHEDULE

Ref: _____

Date	Air Quality Monitoring					Noise Monitoring					Water Quality Monitoring					
	Monitoring Station *					Monitoring Location *					Monitoring Location °					
	A1	A2	A3	A4	A5	N1	N2	N3	N4	N5	W1	W2	W3	W4	W5	
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
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20																
21																
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																
% of R																

Remark type of parameters

The percentage of Data Recovery is the actual monitoring over the scheduled monitoring

Signed by Environmental Team Leader: _____

Date: _____

Copy to Independent Checker (Environment)

SITE INSPECTION PROFORMA

Ref: _____

Date	Location	Req't Ref.*	Observation/Deficiency	Mitigation Action** (Responsible Agency)	Date*** of Confirmation

* EIA Ref/EM&A Log Ref/Design Document Ref/Environmental Protection Contract Clause
 ** Specific Environmental Mitigation Measures should be stated, such as, equipment, processes, systems, practices or technologies.
 *** The required completion date to confirm the specified Environmental Protection Action

This Proforma is an Environmental Protection Instruction for: _____ on _____
 Signed by Environmental Team Leader: _____ Date: _____
 Copy to Independent Checker (Environment) _____

PROACTIVE ENVIRONMENTAL PROTECTION PROFORMA

Ref: _____

Ref*	Proposed Construction Method**	Location / Working Period	Anticipated Impacts	Recommended Mitigation Measures

* EIA Ref/EM&A Log Ref/Design Document/ Ref
 ** Details of equipment, vehicles, plants, processes, technologies for the option of construction method

Reviewed by Environmental Team Leader: _____

Date: _____

Approved by Independent Checker (Environment): _____

Date: _____

REGULATORY COMPLIANCE PROFORMA

Ref: _____

Ref**	Environmental License/Permit*	Control Area/Facility/Location	Effective Date

* ** Name of Applicant, Business Corporation, relevant regulation and remark of license/permit conditions
 File reference of the license/permittee

Recorded by Environmental Team Leader: _____ Date: _____

Signed by Independent Checker (Environment): _____ Date: _____

COMPLAINT LOG

Ref: _____

Log Ref	Date/Location	Complainant/ Date of Contact	Details of Complaint	Investigation/Mitigation Action	File
					Closed

Filed by Environmental Team Leader:

Date: _____

FORM 002 HIGH VOLUME AIR SAMPLER FIELD DATA LOG SHEET

CONTRACT DESCRIPTION: _____

Date: _____

Location: _____

Sampler Code: _____

Last Cal. Date: _____

Sample I.D. ()		
Particulate Type: TSP		
Parameter	Initial	Final
Sampling Time (24 hr)		
Internal Clock (HOUR)		
Meter Reading (CFM)		
Actual Flow (CFM)		
Ambient Temperature (°C)		
Atmospheric Pressure (mb)		
Weather (Clear; Cloudy; Rainy)		
Wind Speed (m.s ⁻¹)		
Wind Direction		
Total Sampling Time (minute)		
Remarks		

Prepared by: _____

Date: _____

Sample retrieved by: _____

Date: _____

Checked by: _____

Date: _____

QBR/TKE
CONTRACT

Location: 1 -
2 -
3 -

NOISE MEASUREMENT RECORD

SUMMARY

Frequency weightings: dBA

Weather:

Recorded by:

Date	Location	Time/H Duration Min.	Comment/Source	L_{max}	L_{min}	L_{10}	L_{50}	L_{Aeq}