Project No.: TCS/00310/06

Issue No.: 2

Drainage Services Department (DSD)
Contract No. DC/2005/02

Construction of Sewers, Rising Mains & Sewage Pumping Station at Kam Tin, Nam Sang Wai and Au Tau in Yuen Long

Updated Environmental Monitoring and Audit (Designated Projects) Manual

Prepared For

Leader Civil Engineering Corporation Ltd

AUES

安順聯合環境服務及顧問

Action-United Environmental Services & Consulting

O/B Ford Business International Limited

EP-220/2005

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DRAINAGE SERVICES DEPARTMENT (DSD)
CONTRACT NO. DC/2005/02

CONSTRUCTION OF SEWERS, RISING MAINS
& SEWAGE PUMPING STATION AT KAM TIN, NAM SANG WAI
AND AU TAU IN YUEN LONG

Updated Environmental Monitoring and Audit (Designated Projects) Manual

PREPARED FOR

Leader Civil Engineering Corporation Ltd

Quality Index

Date	Reference No.	Prepared by	Certified By	Verified By
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Table of Contents

List of Tables

List of Annexes

1 INTRODUCTON

1.1 PURPOSE OF THE MANUAL

This updated Environmental Monitoring and Audit (EM&A) Manual has been prepared to update the approved EM&A (DE) Manual (May 2002) which was prepared as a supplementary document of the Agreement No. CE 31/99 Yuen Long and Kam Tin Sewerage and Sewerage Disposal Stage 1 Sewers, Rising Mains and Ancillary Pumping Stations Environment Impact Assessment and Traffic Impact Assessment - (Designated and Potentially Designated Elements (DE) Report).

The purpose of this Updated EM&A (DE) Manual is to cover the proposed works covered under the Environmental Permit (EP) No. EP-220/2005 for Contract No. DC/2005/02 – Construction of Sewers, Rising Mains, and Sewage Pumping Stations at Kam Tin, Nam Sang Wai and Au Tau in Yuen Long, which was awarded by the Drainage Services Department (DSD) in December 2005.

The purpose of the updated EM&A Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking environmental monitoring and auditing work during the construction phase of the Designated Elements of the Project (EIA(DE) Study). It provides systematic procedures for the monitoring and auditing of potential environmental impacts that may arise from the works.

1.2 BACKGROUND TO THE STUDY

The Study commenced in December 1999 having been commissioned by the Drainage Services Department (DSD). The Project is part of the *Yuen Long and Kam Tin Sewerage and Sewage Disposal* (YLKTSSD) scheme. The overall scheme provides for the phased development of the sewerage system to cater for the existing and additional developments in the NWNT area up to the year 2016. The scheme was recommended under the *Review of Yuen Long and Kam Tin Sewerage and Sewage Treatment Requirements* completed in January 1999 by the Environmental Protection Department (EPD) (the *Review Report*). The Project area for the approved EIA is presented in ***Figure 1.2a (Annex A)***, whilst the project area covered under this Updated EM&A Manual is presented in ***Figure 1.2b (Annex A)***.

As part of the Study requirements, this Project specific EM&A Manual has been prepared to provide further details of the specific EM&A requirements that have been recommended during the construction of EIA(DE) Study. In particular, the requirements for ensuring compliance with the mitigation measures specified for noise, dust, water quality, waste management, land contamination, ecology, fisheries, cultural heritage and landscape and visual impacts are defined.

1.2.1 PROPOSED WORKS

The scope of the EIA Study includes the Designated and Potentially Designated Elements of the Project that includes the construction and operation of approximately 10km of trunk sewerage system with five sections of sewers/rising mains and seven associated pumping stations.

Under the Environmental Impact Assessment Ordinance (EIAO), Environmental Permits (EPs) are issued prior to the construction of a Designated Project (DP). A DP is a project that is deemed to require a detailed environmental assessment prior to the approval from the Environmental Protection Department (EPD). The designated works covered under this Updated EM&A Manual are shown in ***Table 1.2***. The alignment of the Project is largely along existing roads or maintenance access roads for the Kam Tin Main Drainage Channel.

Table 1.2 Designated Works Under Environmental Permit (EP-220/2005)

Items	Locations
S4	Sewers/rising mains between Kam Tin sewage pumping station (KTPS) and Nam Sang Wai sewage pumping station (NSWPS) [2.8km 8km running along maintenance access road of Kam Tin MDC with one crossing beneath the MDC].
S6	Sewers/rising mains from NSWPS to Yuen Long sewage treatment works (YLSTWs) [3km running along maintenance access road of Kam Tin MDC with two crossings beneath the MDC].
P1	Kam Tin Sewage Pumping Station (KTPS) [Design Flow = 54,005 m^3 day^{-1}]. (by virtue of Item F3 (b) of the Schedule 2, Part 1 of the EIAO)
P2	Sha Po Sewage Pumping Station (SPPS) [Design Flow = 25,711 m^3 day^{-1}]. (by virtue of Item F3 (b) of the Schedule 2, Part 1 of the EIAO)
P3	Nam Sang Wai Sewage Pumping Station (NSWPS) [Design Flow = 94,459 m^3 day^{-1}].

1.3 PROJECT CONSTRUCTION

The construction works for the scope of the EIA study will fall under separate work packages of 1A-1T and 1B-1T. This updated EM&A Manual presents the EM&A works for the package 1A-1T (DSD Contract DC/2005/02), as presented in ***Table 1.3a***.

Table 1.3a Construction Period

Packages	Construction Periods
1A-1T Kam Tin Trunk Sewerage Phase 1	*Apr 2006 - Dec 2008*
• **(S4) Sewers/rising mains between KTPS and NSWPS.**	
• **(S6) Sewers/rising mains from NSWPS to YLSTWs.**	
• **(P1) KTPS.**	
• **(P2) SPPS.**	
• **(P3) NSWPS.**	

The construction of pumping stations varies in duration from 12 to 24 months and will be undertaken simultaneously. The construction time for the sewers and rising mains varies from 24 to 36 months and the Temporary Traffic Measures recommended by *Traffic Impact Assessment* (TIA) Study will also have implications for the construction programme. The normal working hours are from 7am to 7 pm, Monday to Saturday (except Public Holidays). No construction works outside the normal working hours are envisaged.

1.4 STUDY AREA

The Project is located in the Sub-urban area of Yuen Long and Kam Tin. According to the definitions described in the *Study Brief*, study areas in relation to specific environmental aspects are as defined in ***Table 1.4a*** and are shown graphically in ***Figure 1.2c (Annex A).***

Table 1.4a Study Area for Specific Environmental Aspects

Environmental Aspects	Construction Periods
Construction dust impact	Within 500m of the Project boundary.
Noise impact	Within 300m of the Project boundary
Water quality impact	Within 300m of the Project boundary
Waste management	Within 500m of the Project boundary
Land contamination	Area within Project boundaries
Ecological impact (both aquatic and terrestrial)	500m from either side and along the full stretch of the Project boundary and adjacent areas likely to be affected by the Project.
Fisheries impact	500m from either side and along the full stretch of the Project boundary and adjacent areas likely to be affected by the Project.
Cultural heritage	150m from either side and along the full stretch of the Project boundary and adjacent areas likely to be affected by the Project.
	All areas within a 500m distance from the proposed Project for landscape impact assessment and a 8 km radius visual envelope for visual impact assessment.

1.5 OBJECTIVES OF THE ENVIRONMENTAL MONITORING AND AUDIT PROGRAMME

The construction impacts resulting from the implementation of the Project are specified in the main content of the *EIA (DE) - Final Report*. The Report also specifies the mitigation measures that need to be implemented to ensure compliance with the required environmental criteria; these mitigation measures and their implementation requirements, are presented in an Implementation Schedule. In order to ensure that these mitigation measures are fully and effectively implemented, the EIA recommends that EM&A should be undertaken for air, noise, water, waste, land contamination, ecology, fisheries, cultural heritage and landscape and visual issues where appropriate.

This Manual provides details of those EM&A requirements that have been recommended to ensure compliance with the mitigation measures specified in the EIA (DE). As the Project comprises of Designated Elements (DP's) and Potentially Designated Elements, this updated EM&A Manual has been compiled in such a manner so that each works package comprising of Designated and Potentially Designated Elements can be implemented independently of each other, as outlined in ***Table 1.3a***. This EM&A Manual provides EM&A requirements for the Designated Elements for the Package 1A-1T (ie. Contract DC/2005/02).

The main objectives of the EM&A programme are:

- to provide a database against which any short or long term environmental impacts of the project can be determined;
- to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- to monitor the performance of the project and the effectiveness of mitigation measures;
- to verify the environmental impacts predicted in the EIA Study;
- to determine project compliance with regulatory requirements, standards and government policies;
- to take remedial action if unexpected problems or unacceptable impacts arise; and
- to provide data against which environmental audits may be undertaken.

1.6 SCOPE OF THE ENVIRONMENTAL MONITORING AND AUDIT PROGRAMME

The scope of this EM&A programme is to:

- establish baseline noise, air and water quality levels at specified locations and review these baseline levels every six months;
- implement monitoring and inspection requirements for noise, air and water quality impact monitoring programmes;
- implement inspection and audit requirements for waste management, landscape and visual, ecology and fisheries issues;
- liaise with, and provide environmental advice (as requested or when otherwise necessary) to construction site staff on the comprehension and consequences of the environmental monitoring data;
- Identify and resolve environmental issues and other functions as they may arise from the works;
- check and quantify the Contractor's overall environmental performance, implementation of Event and Action Plans (EAPs), and remedial actions taken to mitigate adverse environmental effects as they may arise from the works;
- conduct monthly reviews of monitored impact data as the basis for assessing compliance with the defined criteria and to ensure that necessary mitigation measures are identified and implemented, and to undertake additional *ad hoc* monitoring and auditing as required by special circumstances;
- evaluate and interpret all environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards, and to verify the environmental impacts predicted in the EIA;
- manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction process;
- conduct regular site inspections of a formal or informal nature to assess:
  - the level of the Contractor's general environmental awareness;
  - the Contractor's implementation of the recommendations in the EIA;
  - the Contractor's performance as measured by the EM&A;
  - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed; and
  - to advise the site staff of any identified potential environmental issues.
- submit monthly EM&A reports which summarise project monitoring and auditing data, with full interpretation illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures.

1.7 STRUCTURE OF THE UPDATED EM&A MANUAL

Following this introductory Section, the remainder of the Updated Manual is set out as follows:

- *Section 2* outlines the wider aspects of Environmental Management which should be employed during construction to minimise environmental impacts;
- *Section 3* presents the organisation and structure of the Environmental Team, outlines the various parties involved in the EM&A process, the responsibilities and contact details of key individuals;
- *Section 4* sets out the EM&A general requirements;
- *Section 5* details the requirements for baseline and impact monitoring for air quality, and lists relevant monitoring equipment, compliance and EAPs;
- *Section 6* details the requirements for baseline and impact monitoring for noise, and lists relevant monitoring equipment, compliance and Event and Action Plans (EAP);
- *Section 7* details the requirements for baseline and impact monitoring for water quality, and lists relevant monitoring equipment, compliance and EAPs;
- *Section 8* details the audit procedures with regard to waste management issues;
- *Section 9* details the audit procedures with regard to land contamination issues;
- *Section 10* details the audit procedures with regard to ecology issues;

- *Section 11* details the audit procedures with regard to fisheries issues;
- *Section 12* details the audit procedures with regard to cultural and heritage issues;
- *Section 13* details the audit procedures with regard to landscape and visual issues;
- *Section 14* describes the scope and frequency of site auditing; and
- *Section 15* details the EM&A reporting requirements.

The EM&A Manual is an evolving document that should be updated to maintain its relevance as the Project progresses. It is suggested that the first revision to the EM&A Manual takes place when the monitoring locations have been agreed with the Engineer, IEC and EPD, and when the proposed work processes and activities have been determined following any supplementary environmental reviews which may be required. The focus for these reviews of the EM&A Manual will be to ensure that the impacts predicted and the recommended mitigation measures remain consistent and appropriate to the manner in which the works are to be carried out.

2 AN ENVIRONMENTAL MANAGEMENT SYSTEM FOR THE CONSTRUCTION

2.1 INTRODUCTION

This section sets out the proposed environmental management system approaches that will be implemented to ensure that the recommendations of the EIA are fully and effectively implemented during the construction phase of the Designated Elements.

2.2 GENERAL

2.2.1 Yuen Long and Kam Tin Sewerage and Sewerage Disposal Stage 1 EIA

The EIA (DE) report provides an assessment of the predicted scope and extent of likely environmental impacts resulting from the construction and operation of the Project. Mitigation recommendations have been developed to ensure that the environmental quality objectives are met. The recommendations from the EIA are summarised in the form of an Implementation Schedule (IS) in ***Annex B***. The IS provides the primary means by which the EIA recommendations are transferred from the planning phase to the construction and later the operational phase of the project.

An integral part of these recommendations is the requirement to undertake an EM&A programme to verify the level of environmental performance achieved and the effectiveness of the recommended mitigation measures.

2.2.2 THE EM&A MANUAL

The EM&A programme provides the means by which feedback on the project's compliance with the recommended mitigation measures and the environmental monitoring programme provided to the Contractor, the Client and the Environmental Protection Department (EPD).

This Updated EM&A Manual provides an outline of the likely monitoring and auditing protocols and requirements which will be necessary to achieve the objectives of the EM&A programme. For the construction phase, this Updated Manual provides a general description of the organisational arrangements required for the EM&A programme, the monitoring parameter (e.g. $L_{Aeq,30min}$, Total Suspended Particulates, Suspended Solids, etc.), frequency of monitoring and the actions to be taken in the event of exceedances of the environmental criteria. In addition, the Updated Manual provides details of the specific monitoring requirements (e.g. noise, air, and water quality) for the designated elements. This EM&A programme also outlines guidelines for site inspections as a means of identifying and resolving problems, and the associated reporting requirements.

2.2.3 CONTRACTUAL DOCUMENTATION

A key element to be included in the contractual documentation will be the requirement to prepare, implement and maintain an Environmental Management Plan (EMP). The EMP places a contractual responsibility for on-site environmental management with the Contractor.

2.3 CONSTRUCTION PHASE

The management of the construction phase of the Project will be undertaken in line with an EM&A procedure which has been agreed with Government. The EM&A process will seek to ensure that the works are carried out in a manner which meets all legal, contractual and environmental commitments.

Past experience with projects of this nature has revealed that the implementation of EM&A procedures tends to result in an over-reliance on the process, and on mitigating impacts *after* they are identified. To complement the EM&A process, a level of proactivity is required which seeks to minimise the incidence of environmental problems. This can be referred to as an Environmental Management System (EMS) approach and is based upon the specification of a number of management mechanisms, processes and organisational arrangements including the EM&A programme. A wider environmental management system approach, if adopted, should draw upon all available documentation and particularly the following:

- previous environmental reports, assessments and reviews of the Project area;
- the Contracting Organisations ISO 9000 and 14000 (where appropriate) Standards;
- a project-specific Environmental Management Plan;
- the results of Environmental Performance Reviews and Site Inspections;
- the Construction Method Statements to be submitted to the Engineer for review prior to carrying out of works processes; and
- Contractual Documentation relating to the civil works packages.

Each of these elements is further discussed below and its role in the environmental management function is described.

2.3.1 CONSTRUCTION PHASE EM&A MANUAL

This Updated EM&A Manual should be considered a dynamic document that will be reviewed and updated (as necessary) during the later stages of the Project.

To ensure that this Updated EM&A Manual remains current, it is recommended that it is initially up-dated at the commencement of the construction phase to include contract details of the Contractor's management staff together with details of the monitoring locations that are agreed with the Engineer, IEC and the EPD. This revision exercise should also update and clarify, as necessary, any information which may alter during the Project's development.

It is envisaged that the Contractor or his Environmental Team will update the construction phase EM&A Manual.

2.3.2 ENVIRONMENTAL MANAGEMENT PLAN

In order to ensure the effective implementation and reporting on compliance with the stated mitigation measures, as well as the monitoring and auditing requirements and remedial actions defined in the EIA, an appropriate contractual and supervisory framework needs to be established. The basis of the framework within which implementation should be managed overall is through the preparation of Environmental Management Plans (EMPs) by the Contractor.

An EMP is similar in nature to a quality plan and provides details of the means by which the Contractor (and all subcontractors working to the Contractor) will implement the recommended mitigation measures and achieve the environmental performance standards defined in Hong Kong environmental legislation, the contract and in the EIA documentation. The primary reason for adopting the EMP approach is to make the Contractor aware of his environmental responsibilities and to be pro-active about the commitment to achieve the standards specified, rather than relying on the EM&A programme.

The EMP also provides opportunities for the Contractor to draw upon the strength of other institutional processes such as ISO 9000/14000 to ensure that the achievement of the required standards and fulfilment of commitments are documented.

It is envisaged that the provision of an EMP will be a contractual requirement, and that they will be approved by the Engineer following review/comment from the IEC.

The contractual requirement for an EMP would generally comprise appropriate extracts from (and references to) the Project EIA (DE) Report and EM&A Manual, and include such typical elements as the relevant statutory environmental standards, general environmental control clauses and specific environmental management clauses, as well as an outline of the scope and content of the EMP. In drafting the documentation, due consideration should be given to the predictive nature of the EIA process and the consequent need to manage and accommodate the actual impacts arising from the construction process. In particular, the Contractor must be placed under a clear obligation to identify and control any implications arising from changes to the working methods assumed in the EIA (DE) Report, or to the progress rates and other estimates made during the preliminary design phase.

2.3.3 Environmental Performance Reviews

The environmental performance review programme comprises the regular assessment of the effectiveness of the EMPs, site practices and procedures to ensure that the required mitigation measures are routinely implemented and that they are being effective in achieving the required environmental standards.

The criteria against which the review should be undertaken should be derived from the following:

- the approaches, procedures and commitments given by the Contractor in the EMP;
- the clauses contained within the Contractor's Contractual Documentation; and
- those parts of the Contractor's method statement which relate to the minimisation of environmental impacts or other specified environmental protection measures.

The reviews should focus on the effectiveness of the implemented measures to achieve the purpose, not simply the fact that a measure has been implemented. Review protocols should be developed prior to the commencement of works and it is suggested that the protocols should include inspection and auditing of the following:

- the allocation of responsibility for fulfilling environmental requirements and the effectiveness of lines of communication with regard to environmental issues;
- compliance with procedures established to enable an effective response to environmental incidents, exceedances or non-compliances;
- the extent and accuracy of record-keeping related to environmental performance indicators;
- the effectiveness of staff training in ensuring high levels of awareness with regard to environmental requirements; and
- the effectiveness of environmental management activities.

The protocols should comprise checklists of environmental requirements and should be amended, throughout the construction phase as necessary, to focus on areas of frequent non-compliance and to reflect the potential impacts associated with specific activities within the construction programme.

2.3.4 Construction Method Statement

It is common practice for the Contractor to submit details of forthcoming works to the Engineer to seek approval for the commencement of the works as well as the methodology and equipment proposed to be used.

It is recommended that this process be expanded, in line with the adoption of the Contractor's EMP, to require the signature of the Contractor's Environmental Manager who shall comment on deviations of the specific works from that assumed in the project EIA and advise on the implications of the changes in construction methods for achieving the environmental performance criteria set out in the EIA (DE) documentation and the EMP.

This ongoing requirement for the Contractor to review proposed working methods, in terms of their potential to impact upon the environment, will reduce the time taken to implement the necessary environmental control measures and reduce the number of iterations a measure may have to go through before becoming effective.

Any changes in construction methods will need to be reflected in a revised EMP or the Contractor will be required to demonstrate the manner in which the existing EMP shall accommodate the proposed changes.

2.3.5 ELECTRONIC QUALITY PERFORMANCE MONITORING SYSTEM

Not Applicable.

2.4 SUMMARY

The environmental management concepts described above have evolved from previous experiences in implementing large scale EM&A's in Hong Kong. These experiences have shown that in order to harness the full potential of the EM&A process, a number of complementary procedures and tools should be adopted in order to fulfil the wider objectives of the process which include the preservation of the environment.

The uptake and specification of these procedures within the appropriate documents would facilitate a greater level of environmental management and responsibility to be achieved, however, the adoption of some or all of these practises must ultimately be directed by the Client before they can form part of the proposed EM&A programme.

3 ORGANISATION AND STRUCTURE OF THE EM&A

3.1 GENERAL

The appointed Contractor for the Designated Projects shall appoint an Environmental Team (ET) to conduct the monitoring and auditing works and to provide specialist advice to the Contractor on the undertaking and implementation of his environmental responsibilities.

The ET shall have previous relevant experience with managing similarly sized EM&A programmes and the Environmental Team Leader (ET Leader) shall be a recognised environmental professional, preferably with a minimum of seven years relevant experience in impact assessments and impact monitoring programmes.

To maintain strict control of the EM&A process, the Engineer shall appoint independent environmental consultants to act as an "Independent Environmental Checker" (IEC) to verify and validate the environmental performance of the Contractor and his Environmental Team.

3.2 PROJECT ORGANISATION

The roles and responsibilities of the various parties involved in the EM&A process outlined above are further expanded in the following sections.

For the purpose of this Updated Manual, the "Engineer" shall refer to the role undertaken by the "Engineer" and the "Engineer's Representative" (ER) as defined in the Contract. The ET Leader shall be responsible for and in charge of the Environmental Team (ET), and shall be the person responsible for executing the environmental monitoring and audit requirements.

3.2.1 CONTRACTOR – LEADER CIVIL ENGINEERING CORPORATION LTD

Reporting to the Engineer, the Contractor shall:

- work within the scope of the construction contract and other tender conditions;
- employ an ET (as necessary) to undertake the monitoring, laboratory analysis and reporting of the environmental monitoring and audit requirements outlined in this Manual;
- provide assistance to the ET in conducting the required environmental monitoring;
- participate in the site inspections undertaken by the ET and the IEC, as required, and undertake any corrective actions instructed by the Engineer;
- provide information/advice to the ET or IEC regarding works activities which may contribute, or be contributing to the generation of adverse environmental conditions;
- implement measures to reduce impact where Action and Limit levels are exceeded; and
- take responsibility and strictly adhere to the guidelines of the EM&A programme and complementary protocols developed by their project staff.

3.2.2 ENGINEER OR ENGINEER'S REPRESENTATIVE – BABTIE ASIA LTD

The Engineer or Engineer's Representative (ER) shall:

- monitor the Contractor's compliance with contract specifications, including the effective implementation and operation of environmental mitigation measures and other aspects of the EM&A programme;
- comply with the agreed Event and Action Plan in the event of any exceedance;
- instruct the Contractor to follow the agreed protocols or those in the Contract Specifications in the event of exceedances or complaints.

3.2.3 ENVIRONMENTAL TEAM – ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING

The duties of the Environmental Team (ET) and Environmental Team Leader (ET Leader) are:

- to monitor the various environmental parameters as required by this or subsequent revisions to the EM&A Manual;
- assess the EM&A data and review the success of the EM&A programme determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions as well as identify any adverse environmental impacts before they arise;
- to conduct weekly site inspections and to investigate and inspect the Contractor's equipment and work methodologies with respect to pollution control and environmental mitigation, and to anticipate environmental issues that may require mitigation before the problem arises;
- to audit the environmental monitoring data and report the status of the general site environmental conditions and the implementation of mitigation measures resulting from site inspections;
- to report on the environmental monitoring and audit results and the wider environmental issues and conditions to the IEC, Contractor, Engineer and the EPD; and
- adhere to the agreed protocols or those in the Contract Specifications in the event of exceedances or complaints.

3.2.4 INDEPENDENT ENVIRONMENTAL CHECKER – MOTT CONNELL LTD

An Independent Environmental Checker (IEC) shall be appointed to independently audit and verify the overall environmental performance of the works and to assess the effectiveness of the ET in their duties. The main objectives will be to:

- monitor the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- arrange and conduct monthly 'independent' site inspections/audits of the works;
- provide specialist advice to the Engineer and/or the Client on environmental matters;
- check that the necessary mitigation measures recommended in the EIA and Contract documents, or as subsequently required, are effectively implemented, and
- report the findings of site inspections/audits and other environmental performance reviews to the Engineer and the EPD. .

3.2.5 CONSTRUCTION PROGRAMME

The construction work for the Package 1A-1T Kam Tin Trunk Sewerage Phase 1 (ie. Contract DC/2005/02) is to commence in April 2006 and complete in Dec 2008.

4 EM&A GENERAL REQUIREMENT

4.1 INTRODUCTION

In this section, the general requirements of the EM&A programme for the construction of Designated Elements are presented. The recommended mitigation measures and schedule for their implementation are detailed in the Implementation Schedule.

4.2 CONSTRUCTION PHASE EM&A

4.2.1 General

The environmental issues associated with the construction phase of the Project which were identified during the EIA (DE) process will be addressed through the monitoring and controls specified in the EM&A Manual and construction contract.

During the construction phase, dust, noise, water, waste, land contamination, ecology, cultural heritage and landscape and visual issues will be subject to EM&A, with environmental monitoring for the Project being undertaken for noise, dust, and water quality.

The monitoring of the effectiveness of the mitigation measures will be achieved through the environmental monitoring programme as well as through site inspections. The inspections will include within their scope, mechanisms to review and assess the Contractor's environmental performance, ensuring that the recommended mitigation measures have been properly implemented, and that the timely resolution of received complaints are managed and controlled in a manner consistent with the recommendations of the EIA (DE) Report.

4.2.2 ENVIRONMENTAL MONITORING

The monitoring of environmental impacts shall be carried out by the Contractor's Environmental Team; the monitoring work will comprise the quantitative assessment of noise, air, and water quality impacts at representative sensitive receivers in the vicinity of the works.

4.2.3 ACTION / LIMIT LEVELS

Action and Limit (A/L) Levels are defined levels of impact recorded by the environmental monitoring activities which represent levels at which a prescribed response is required. These levels are quantitatively defined later in the relevant sections of this manual and described in principle below:

- *Action Limits:* beyond which there is a clear indication of a deteriorating ambient environment for which appropriate remedial actions are likely to be necessary to prevent environmental quality from falling outside the *Limit Levels*, which would be unacceptable; and
- *Limit Levels:* statutory and/or agreed contract limits stipulated in the relevant pollution control ordinances, HKPSG or *Environmental Quality Objectives* established by the EPD. If these are exceeded, works should not proceed without appropriate remedial action, including a critical review of plant and working methods.

4.2.4 EVENT AND ACTION PLANS

The purpose of the Event and Action Plans (EAPs) is to provide, in association with the monitoring and audit activities, procedures for ensuring that if any significant environmental incident (either accidental or through inadequate implementation of mitigation measures on the part of the Contractor) does occur, the cause will be quickly identified and remediated, and the risk of a similar event recurring is reduced. This also applies to the exceedances of A/L criteria identified in the EM&A programme.

4.2.5 SITE INSPECTIONS

In addition to monitoring noise, air and water quality levels as a means of assessing the ongoing performance of the Contractor, the ET shall undertake weekly site inspections and audits of on-site practices and procedures. The primary objective of the inspection and audit programme will be to assess the effectiveness of the environmental controls established by the Contractor and the implementation of the environmental mitigation measures recommended in the EIA (DE) Report.

Whilst the audit and inspection programme will undoubtedly complement the monitoring activity with regard to the effectiveness of dust suppression, noise attenuation measures and water quality control, the criteria against which the audits shall be undertaken shall be derived from the clauses within the Contract Documents which seek to enforce the recommendations of the EIA (DE) Study and the established management systems.

The findings of site inspections and audits shall be made known to the Contractor at the time of the inspection to enable the rapid resolution of identified non-compliance's. Non-compliance's, and the corrective actions undertaken, shall also be reported in the monthly EM&A Reports.

Section 14 of this Updated Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols should be designed to address.

4.2.6 ENQUIRIES, COMPLAINTS AND REQUESTS FOR INFORMATION

Enquiries, complaints and requests for information can be expected from a wide range of individuals and organisations including members of the public, Government departments, the press and television media and community groups. During the construction phase, the vast majority of such correspondence is likely to be received directly by the Engineer.

All enquiries concerning the environmental effects of the works, irrespective of how they are received, shall be reported to the Engineer and directed to the Contractor who shall set up procedures for the handling, investigation and storage of such information. The following steps shall then be followed:

(1) The ET Leader shall notify the Engineer of the nature of the enquiry;

(2) An investigation shall be initiated to determine the validity of the complaint and to identify the source of the problem;

(3) The Contractor shall undertake the following steps, as necessary:

- investigate and identify the source of the problem;
- if considered necessary by the Engineer following consultation with the IEC, undertake additional monitoring to verify the existence and severity of the alleged complaint;
- liaise with the IEC to identify remedial measures;
- implement the agreed mitigation measures;
- repeat the monitoring to verify the effectiveness of the mitigation measures; and
- if the repeat monitoring results continue to substantiate the complaint, repeat review procedures to identify further possible areas of improvement.

(4) The outcome of the investigation and the action taken shall be documented on a complaint proforma. A formal response to each complaint received shall be prepared, by the Contractor, within a maximum of five working days and submitted to the Engineer in order to notify the concerned person(s) that action has been taken.

(5) All enquiries which trigger this process shall be reported in the monthly reports which shall include results of inspections undertaken by the contractor, and details of the measures taken, and additional monitoring results (if deemed necessary). It should be noted that the receipt of complaint or enquiry will not be, in itself, a sufficient reason to introduce additional mitigation measures.

In all cases the complainant shall be notified of the findings, and audit procedures shall be put in place to ensure that the problem does not recur.

4.2.7 REPORTING

Monthly, annual and bi-annual reports shall be prepared by the Environmental Team. These shall be submitted to the Engineer and EPD. The monthly reports shall be prepared and submitted within 10 working days of the end of each calendar month. Additional details on reporting protocols are presented in *Section 15.*

4.2.8 CESSATION OF EM&A

The ET and the IEC shall continue to carry out environmental monitoring and site inspections until the completion of the construction works and confirmation from EPD.

5 AIR QUALITY MONITORING

5.1 INTRODUCTION

In this section, the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of air quality impacts during the construction of the Designated Elements are described below.

5.2 CONSTRUCTION MONITORING

5.2.1 INTRODUCTION

The objectives of the air quality monitoring for Total Suspended Particulates (TSP) shall be:

- to identify the extent of construction dust impacts on sensitive receivers;
- to determine the effectiveness of mitigation measures to control dust from construction activities;
- auditing the compliance of the Contractor with regard to dust control, contract conditions and the relevant dust impact criteria;
- to recommend further mitigation measures if found to be necessary; and
- to comply with Action and Limit (AL) Levels for air quality as defined in this Manual.

5.2.2 METHODOLOGY AND CRITERIA

Monitoring and audit of the Total Suspended Particulates (TSP) levels shall be carried out by the ET to ensure that any deterioration in air quality can be readily detected and timely actions taken to rectify the situation.

The criteria against which air quality (measured as TSP) monitoring shall be assessed are:

- The Hong Kong Air Quality Objectives (AQOs) for TSP, 24-Hr TSP levels of 260 $\mu g\ m^{-3}$; and
- The statutory 1-Hr TSP limit of 500 $\mu g\ m^{-3}$

These levels are not to be exceeded at the designated Air Monitoring (AM) stations.

The 1-hour and 24-hour TSP levels shall be measured to indicate the impacts of construction dust. The TSP levels shall be measured by following the standard high volume sampling method as set out in *High Volume Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA*.

24-hour average TSP concentrations should be measured by drawing air through a high volume sampler (HVS) fitted with a conditioned, pre-weighed filter paper, at a controlled rate. After sampling for 24-hours, the filter paper with retained particles is collected and returned to the laboratory for drying in a desiccator followed by accurate weighing. 24-hour average TSP levels are calculated from the ratio of the mass of particulates retained on the filter paper to the total volume of air sampled. The analysis process normally takes about 2-3 days to complete.

1-hour average TSP concentrations can be measured preferably by using the same monitoring method as 24-hour average TSP or, with prior agreement from the Engineer, a real-time airborne particulate measurement can be undertaken using a direct reading meter such as the MIE Data-Ram Portable Real Time Aerosol Monitor (MIE). 1-hour average TSP concentrations measured by a hand held real-time aerosol monitor require no laboratory analysis and will give an instant reading of the dust levels. Air samples are drawn through the optically-sensitive area of the monitor for a continuous period of 1-hour and the monitor will calculate the time-average dust levels.

Despite the advantages of using a real time monitor to measure particulate concentrations such as in response to dust complaints, results are not comparable with 24-hour HVS data. Therefore, whichever method is to be used for 1-hour TSP monitoring, both baseline and *ad hoc* measurements must be carried out by the same method, upon approval from the Engineer.

All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of 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 detail.

5.2.3 MONITORING EQUIPMENT

A high volume sampler (HVS) in compliance with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:

- 0.6 - 1.7 m^3 min^{-1} (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 cm^2 (63 in^2);
- flow control accuracy: +/- 2.5% deviation over 24-hour sampling period;
- 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.

The ET shall ensure that sufficient number of HVSs with an appropriate calibration kit are available for carrying out the baseline, regular impacts 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, in accordance with requirements stated in the manufacturers operating manual and as described below. All the equipment, calibration kit, filter papers, etc shall be clearly labelled.

The flow rate of each HVS with mass flow controller shall be calibrated using an orifice calibrator. Initial calibration of the dust monitoring equipment shall be conducted upon installation and prior to commissioning. One point flow rate calibration will be carried out every two months. Five point calibration will be carried out every six months.

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 down on the data sheet.

Alternately, if the ET Leader proposes to use a direct reading dust meter to measure 1-hour TSP, sampling in the range of 0.1-100 $\mu g \cdot m^{-3}$, he shall submit sufficient information to the Engineer to prove that the instrument is capable of achieving a comparable result as that the HVS and may be used for the 1-hour sampling. The instrument shall also be calibrated regularly, and the 1-hour sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.

Wind 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 location of the equipment shall be determined by the ET Leader and agreed with the Engineer. For installation and operation of the wind data monitoring equipment, the following points shall be observed:

- the wind sensors should be installed on masts at an elevated level 10 metres above the ground, so that they are clear of obstructions or turbulence caused by building(s);

- 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.

In exceptional situations, the ET Leader may propose alternative methods to obtain representative wind data upon approval from the Engineer and agreed with EPD.

5.2.4 LABORATORY MEASUREMENT/ANALYSIS

A clean laboratory with constant temperature and humidity control, and equipped with the necessary measuring and conditioning instruments to handle the dust samples, shall be available for sample analysis and equipment calibration and maintenance. The laboratory shall be either HOKLAS accredited or another internationally accredited laboratory.

If a site laboratory or a non-HOKLAS accredited laboratory is used, the laboratory equipment and measurements shall meet with the satisfaction of the Engineer in consultation with the IEC. The IEC shall conduct regular audits to determine the accuracy of the measurement results. The ET Leader shall provide the Engineer with one copy of the *Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B* for reference.

5.2.5 MONITORING LOCATIONS

The air quality monitoring locations as per the project EP are presented in Table 5.2a and the figures showing the station locations are shown in ***Annex C.***

Table 5.2a Air Quality Monitoring Stations

Air Quality (3 Stations)	
AM1	Worksite boundary facing scattered house in Nam Sang Wai
AM5*	Worksite Boundary facing Fung Kat Heung
AM6*	Worksite Boundary facing scattered house near Route 3
AM7	Worksite boundary facing scattered house in Nam Sang Wai

Remark: Monitoring at AM5 and AM6 will commence upon land resumption in mid-late 2006.

Prior to the commencement of the EM&A programme, the proposed air quality monitoring stations shall be discussed and agreed with the Engineer, IC(E) and EPD. When positioning the samplers, the following points shall be noted.

- a horizontal platform with appropriate support to secure the samples against gusty wind shall be provided;
- no two sampler shall be placed less than 2 metres apart;
- 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;
- a minimum of 2 metres separation from walls, parapets and penthouses is required for rooftops samplers;
- a minimum of 2 metres separation from any supporting structure, measures horizontally is required;
- no furnace or incinerator flue is nearby;
- airflow around the sampler is unrestricted;
- the sampler is more than 20 metres from the dripline;
- any wire fence and gate to protect the sampler, shall not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and;
- a secured supply of electricity is needed to operate the samplers.

5.2.6 BASELINE MONITORING

Baseline monitoring shall be carried out at all designated monitoring stations, to be approved by the Engineer and IEC, to determine the ambient 24-hour TSP and 1-hour levels at the monitoring locations prior to the commencement of the construction works. During the baseline monitoring, there shall not be any construction or dust generating activities in the vicinity of the monitoring stations. Before commencing the baseline monitoring, the ET Leader shall inform the IEC of the impact monitoring programme such that the IEC can conduct an on-site audit to ensure the accuracy of the impact monitoring results.

Baseline monitoring shall be carried out 1 month before the commencement of the construction works. The monitoring should be conducted for a continuous period of at least two weeks (14 days) under typical weather conditions with the 24-hour and three 1-hour ambient measurements taken daily at each monitoring location. As noted above, monitoring results of HVS and direct reading methods are not directly comparable and the same instrument must therefore be used for both baseline and impact monitoring in the case of 1-hour TSP. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources shall also be recorded throughout the baseline monitoring period.

The baseline monitoring will provide data for the determination of the appropriate Action levels with the Limit levels set against statutory or otherwise agreed limits

Baseline checking of ambient dust levels shall be carried out every six months at each monitoring location, when no dusty works activities are in operation. If the ET Leader considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels and air quality criteria, after consultation and agreement with the Engineer, IEC and EPD.

5.2.7 IMPACT MONITORING

24-hour TSP concentrations should be measured by the High Volume Method for Total Suspended Particulates, *Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA*. It is considered that this form of impact monitoring should be undertaken at the proposed monitoring locations once every 6 days.

Due to the lengthy delay between sampling time and result availability for 24-hour sampling, 1-hour TSP sampling should also be conducted in response to any complaints about construction dust. 1-hour TSP levels, while assessed under different criteria, are considered to be indicative of the 24-hour results conducted on the same day. In this way expedient remedial actions, should they be required, may be undertaken based on the 1-hour data, before the 24-hour results become available.

1-hour sampling, providing real time airborne particulate measurement, can be undertaken using a direct reading dust meter. Despite the advantages of using a real time monitor to measure particulate concentrations such as in response to dust complaints, results are not comparable with 24-hour HVS data. Therefore, if the use of a direct reading monitor is agreed for 1-hour TSP sampling both baseline and impact monitoring must be carried out by the direct reading method.

Specific dust control measures and the monitoring during construction phase should be included as part of the works contracts. Regular compliance checking by IEC and ER at site and as well as at the sensitive receivers should be conducted.

5.2.8 COMPLIANCE ASSESSMENT

Action and Limit (A/L) levels provide an appropriate framework for the interpretation of monitoring results. The air quality monitoring data shall be checked against the agreed A/L levels as listed in ***Table 5.2b***:

Table 5.2b Derivation of Action & Limit Levels for Air Quality Monitoring

Level	TSP Level in μg /m^3	
	24-Hr TSP	1-Hr TSP
Baseline	Numerical average of physical measurements prior to construction commencement	
Action	If baseline ≤**200** μg/m^3, Action Level = (Baseline Level x 1.3 + Limit Level)/2 If baseline **>200** μg/m^3, Action Level = Limit Level	If baseline ≤**384** μg/m^3, Action Level = (Baseline Level x 1.3 + Limit Level)/2 If baseline **> 384** mg/m^3, Action Level = Limit Level
Limit	AQO for 24-Hr TSP: 260 μg/m^3	EIAO for 1-Hr TSP: 500 μg/m^3

5.2.9 EVENT AND ACTION PLAN

The principle upon which the Event and Action Plan (EAP) is based is the prescription of procedures and actions associated with the measurement of certain defined levels of air pollution recorded by the environmental monitoring process and defined in the tables above. The ET Leader shall compare the impact monitoring results with the air quality criteria set up for 24-hour TSP and 1-hour TSP. In cases where exceedance of these criteria occurs, the ET Leader, the Engineer and Contractor shall strictly observe the relevant actions of the EAP shown in ***Annex D***.

5.2.10 MITIGATION MEASURES

The EIA (DE) Report has recommended dust control and mitigation measures. The Contractor shall be responsible for reviewing the effectiveness of the following measures and for proposing, designing and implementing alternative measures as appropriate. A full list of the mitigation measures is detained in ***Annex B***.

- Where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of not less than 2.4 m high from ground level should be provided along the boundaries of the seven pumping stations sites;
- The portion of any road leading only to a construction site that is within 30 m of a discernible or designated vehicle entrance or exit should be kept clear of dusty materials;
- Any stockpile of dusty materials should be either covered entirely by impervious sheeting, placed in an area sheltered on the top and the 3 sides or sprayed with water so as to maintain the entire surface wet;
- All dusty materials should be sprayed with water immediately prior to any loading and unloading so as to maintain the dusty materials wet;
- Every vehicle should be washed to remove any dusty materials from its body and wheels immediately before leaving a construction site;
- Where a vehicle leaving a construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle;
- Water should be continuously sprayed on the surface where any mechanical breaking operation that causes dust emission is carried out, unless the process is accompanied by the operation of an effective dust extraction and filtering device;

- The working area of excavation should be sprayed with water immediately before, during and immediately after the operation so as to maintain the entire surface wet;
- Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the SPS; and
- Any skip hoist for material transport should be totally enclosed by the impervious sheeting.

6 CONSTRUCTION NOISE MONITORING

6.1 INTRODUCTION

In this section, the general requirements, methodology, equipment, and mitigation measures for the monitoring and audit of noise impacts associated with the construction of the Designated Elements are described below.

6.2 CONSTRUCTION PHASE EM&A

6.2.1 MONITORING METHODOLOGY AND CRITERIA

Noise level measurements shall be carried out using the methodology set out in *Sub-section 3* of the *Annex - General Calibration and Measurement Procedures*, as stated in the *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (GW-TM).

The appropriate parameter for measuring construction noise impacts shall be the A-weighted equivalent continuous sound pressure level (L_{Aeq}) measured in decibels (dB). The two statistical sound levels L_{10} and L_{90}; the levels exceeded for 10 and 90 percent of the time respectively, shall also be recorded during the monitoring for reference.

Noise impact arising from general construction works during normal working hours (i.e. 0700 to 1900 hours on any day not being on a Sunday or public holiday) at the operable windows of noise sensitive uses, is guided by the EIAO-TM. The recommended standards are presented in ***Table 6.2a***.

Table 6.2a EIAOTM Standard - General Construction Works

Uses	Noise Standards, dB(A)
Domestic Premises	75
Educational Institutions (Normal Periods)	70
Educational Institutions (During Examination Periods)	65

With reference to the *EIAO-TM*, there is no recommended construction noise standard currently provided for places of public worship. Therefore, a comparable type of land use criterion, those specified for educational institutions (non-exam period), has been applied as an indication of potential noise impacts. In this Study, the $L_{eq,\ 30min}$ 70 dB(A) daytime construction noise criterion will be adopted for places of public worship.

The *NCO* provides statutory controls on general construction works during the restricted hours (i.e. 1900 to 0700 hours Monday to Saturday and at any time on Sundays and public holidays). The use of powered mechanical equipment (PME) for the carrying out of construction works during the restricted hours will require a CNP. The EPD is guided by the *GW-TM* when vetting such an application.

The NCO provides statutory controls on general construction works during restricted hours (i.e. 1900-0700 hours Monday to Saturday and at any time on Sundays and public holidays). The Acceptable Noise Levels (ANLs) for evenings (1900-2300) and holidays and for night-time (2300-0700) are dependent on the Area Sensitivity Rating (ASR) at the NSR. The relevant ANLs are provided in ***Table 6.2b***.

Table 6.2b Acceptable Noise Levels (ANLs)

Time Period	Area Sensitivity Rating (ASR)		
	A	B	C
All days during the evening (1900-2300 hours) and general holidays (including Sundays) during the day and evening (0700-2300 hours)	60	65	70
All days during the night-time (2300-0700)	45	50	55

6.2.2 MONITORING EQUIPMENT

The ET shall be responsible for providing and maintaining a sufficient number of sound level meters to conduct the necessary baseline monitoring, regular impact monitoring and *ad hoc* monitoring at the agreed monitoring locations.

Sound level meters and calibrators shall comply with the International Electrotechnical Commission (IEC) Publication 651: 1979 (Type 1) and 804: 1985 (Type 1) specification as referred to in the GW-TM. The sound level meters shall be supplied and used with the manufacturers recommended wind shield and with a tripod.

The calibration of the sound level meters shall be carried out in accordance with the manufacturer's requirements. The sound level meters, including the calibrators, shall be verified by the manufacturers once every two years to ensure that they perform to the same level of accuracy as stated in the manufacturers specifications. Calibrated hand-held anemometers capable of measuring the wind speed in ms^{-1} shall also be supplied for the measurement of wind speeds during noise monitoring periods. The anemometers shall be used and calibrated in accordance with the manufactures recommendations if any.

Sound level meters shall be calibrated using a portable calibrator before and after each measurement. The calibration levels shall be noted with the measurement results and where the difference between the calibration levels is greater than 1 dB(A) the measurement shall be repeated.

The ET shall ensure the equipment shall be kept in a good state of repair in accordance with the manufacturer's recommendations and maintained in proper working order with sufficient spare equipment available in the event of breakdown to maintain the planned monitoring programme.

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 the hand-held anemometers.

6.2.3 MONITORING LOCATIONS

The construction noise monitoring locations as per the project EP are presented in **Table 6.2c** and the figures showing the station locations are shown in ***Annex C.***

Table 6.2c Construction Noise Monitoring Stations

Construction Noise (6 Stations)	
NM3	Village House in Nam Sang Wai
NM4	Village House in Nam Sang Wai
NM6*	Scattered House near Route 3
NM7*	Fung Kat Heung

Remark: Monitoring at NM6 and NM7 will commence upon land resumption in mid-late 2006.

Prior to the commencement of the EM&A Programme, the proposed noise monitoring locations will be discussed and agreed with the Engineer, IC(E) and the EPD. If, for example, there are difficulties obtaining access to the proposed noise monitoring locations, alternative monitoring locations may be proposed. The selection of these alternative monitoring locations shall be chosen on the following criteria:

- at locations close to the major site activities which are likely to have noise impacts;
- close to the NSRs (any domestic premises, hotel, hostel, temporary housing accommodation, hospital, medical clinic, educational institution, place of public worship, library, court of law, performing arts centre shall be considered as a NSR); and
- for monitoring locations located in the vicinity of the NSRs, care shall be taken to cause minimal disturbance to the occupants during monitoring.

The monitoring station shall normally be at a point 1 m from the exterior of the sensitive receiver building façade and at a height approximately 1.2 m above the ground or at the height that has the least obstructed view of the construction activity in relation to the receiver. If there is a 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 ET Leader shall agree with the IC(E) and EPD on the monitoring positions and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and impact monitoring shall be carried out at the same positions.

6.2.4 BASELINE MONITORING

The ET shall carry out the baseline noise monitoring prior to the commencement of the construction works. To obtain fully satisfactory baseline results, a waterproof sound level meter and noise logger shall be used. Baseline noise levels shall be measured over one consecutive 7-day calendar week at a minimum logging interval of 15 minutes. The L_{Aeq}, L_{10} and L_{90} shall be recorded at the specified interval. The survey period shall be selected prior to the commencement of construction activities and so as to avoid other atypical noise sources. The proper functioning of the logger shall be ensured during this period and shall be visited for a period of not less than one hour every two days to ensure its continued operation and to detail specifics of audible noise sources at the monitoring locations. The calibration of the logger kit shall be as recommended by the manufacturer. Measurements shall be recorded to the nearest 0.1 dB.

Checking for changes in the baseline noise levels throughout the construction phase shall be carried out by taking "sample" noise measurements every six months, when no noisy construction activities are in progress. If significant changes that can be validated are observed to have arisen, the baseline may be adjusted accordingly after consultation and agreement with the Engineer, IEC and EPD.

6.2.5 IMPACT MONITORING

During normal construction working hours (0700-1900 Monday to Saturday), monitoring of $L_{Aeq,\ 30min}$ noise levels (as six consecutive $L_{Aeq,\ 5\ min}$ readings) shall be carried out at the agreed monitoring locations once every six days in accordance with the methodology in the GW-TM. The six consecutive $L_{Aeq,\ 5\ min}$ readings shall be used to calculate the $L_{Aeq,\ 30\ min}$ noise level and this shall be compared to the $L_{Aeq,\ 30\ min}$ noise criteria and reported against.

If restricted hours works are undertaken, monitoring of $L_{Aeq,\ 5min}$ noise levels shall be carried out at the agreed monitoring stations at the same frequency as specified for normal working hours. Three consecutive $L_{Aeq,\ 5\ min}$ readings shall be taken to ensure the validity of the results. Each of the $L_{Aeq,\ 5min}$ noise readings shall be compared to the $L_{Aeq,\ 5min}$ noise criteria and reported against.

In relation to the monitored noise levels, other noise sources such as road traffic may make a significant contribution to the overall noise environment. Therefore, the results of the noise monitoring activities will take into account any such influencing factors which were not present during the baseline monitoring period. All measurements shall be recorded to the nearest 0.1 dB.

6.2.6 COMPLIANCE ASSESSMENT

Action and Limit (A/L) Levels provide an appropriate framework for the interpretation of monitoring results. The noise impact monitoring data shall be checked against the agreed A/L Levels as listed in ***Table 6.2d***:

Table 6.2d Derivation of Action & Limit Levels for Construction Noise Monitoring

Time Period	Action Level	Limit Level
0700-1900 hrs on normal weekdays	When one or more documented complaints are received	• 75 dB(A) • 70 dB(A) for schools and 65 dB(A) during examination periods
0700-2300 hrs on holidays; and 1900-2300 hrs on all other days	When one or more documented complaints are received	• 60 dB(A) for Areas Sensitively Rating "A" • 65 dB(A) for Areas Sensitively Rating "B" (Except schools) • 70 dB(A) for Areas Sensitively Rating "C"
2300-0700 hrs of next day	When one or more documented complaints are received	• 45 dB(A) for Areas Sensitively Rating "A" • 50 dB(A) for Areas Sensitively Rating "B" (Except schools) • 55 dB(A) for Areas Sensitively Rating "C"

To account for cases where ambient noise levels, as identified by baseline monitoring, approach or exceed the stipulated Limit Level prior to commencement of construction, a Maximum Acceptable Impact Level, which incorporates the baseline noise level and the identified construction noise Limit Level, may be defined upon agreement with the EPD. This amended level will, therefore, be greater than 75 dB(A) and will represent the maximum acceptable noise level at a specific monitoring station. Correction factors for the effects of acoustic screening and / or architectural features of NSRs may also be applied for, from the EPD, as specified in the GW-TM.

For the purposes of compliance checking, after taking into account any adjustments agreed with EPD, comparison with either the Limit or the Maximum Acceptable Impact Level shall represent the governing criteria for noise impact assessment during the Project EM&A.

6.2.7 EVENT AND ACTION PLAN

The principle on which the EAP is based is the prescription of procedures and actions associated with the measurement of defined levels of noise impact recorded by the environmental monitoring process and defined in the table above. In cases where exceedance of these criteria occurs, the ET Leader, IEC, the Engineer and the Contractor shall strictly observe the relevant actions of the EAP shown in ***Annex D***.

6.2.8 MITIGATION MEASURES

The EIA (DE) Report has recommended noise control and mitigation measures. The Contractor shall be responsible for reviewing the effectiveness of the following measures and for proposing, designing and implementing alternative measures as appropriate. A full list of the mitigation measures is detained in ***Annex B***.

- Using quieter powered mechanical equipment (PME);
- Only well-maintained plant shall be operated on-site and plant shall be serviced regularly during the construction program;
- Machines and plant (such as trucks and cranes) that may be in intermittent use shall be shut down between work periods or should be throttled down to a minimum;
- Silencers or mufflers on construction equipment shall be utilised and be properly maintained during the construction works;
- Mobile plant shall be sited as far away from NSRs as possible;
- Material stockpiles and other structures shall be effectively utilised, where practicable, to screen noise from on-site construction activities; and
- Restrictions on the types of PME used concurrently.

A summary of the recommended mitigation measures for each of the construction activities is presented in ***Table 6.2e.***

Table 6.2e Summary of Proposed Mitigation Measures for Construction Noise Assessment

Activity	Description	Mitigation Measures
101	General Site Clearance	• Use of quiet PME • Site hoarding along site boundary of the pumping station sites
102-P1 102-P2 102-P3	/Demolition work Construction of Sewage Pumping Stations P1, P2 & P3	• Use of quiet PME • Site hoarding along site boundary of the pumping station sites
103	Sewers and Rising Mains using Open Trench Method	• Use of quiet PME • Replacing excavator mounted breakers with handheld breakers during the initial road opening activities • Use of movable noise barrier or enclosures during the initial road opening activities where there are NSRs located within 50m of the works area
104	Sewers and Rising Mains using Pipe Jacking Method	• Use of quiet PME
105	Road Pavement and Finishes	• Use of quiet PME

If the mitigation measures are not sufficient, upon the advice of the ET Leader, the Contractor shall liaise with the ET Leader to agree further mitigation measures, propose the recommended measures to the Engineer for approval, and then implement the mitigation measures.

7 WATER QUALITY MONITORING

7.1 INTRODUCTION

This section presents the EM&A recommendations for auditing the water quality mitigation measures during the construction of the Designated Elements of the Project.

7.1.1 CONSTRUCTION PHASE

As stated in the EIA (DE) report, no water quality monitoring is required for the construction phase. However, as part of the regular audit procedures, it is recommended that ET Leader confirms that the Contractor has implemented the mitigation measures, as described in *Section 5.7.1* of the EIA (DE) Report.

In addition to implementing the specified mitigation measures, the Contractor will also be required to obtain a *WPCO* discharge licence should any wastewater discharges be released from the site. This may require the Contractor to undertake monitoring of the quality/quantity of the discharges to show compliance with the conditions of the licence; however, at this stage, this does not form part of the EM&A programme.

8 WASTE MANAGEMENT

8.1 INTRODUCTION

This section sets out the handling, recycling, storage, transportation and disposal measures which are recommended to avoid or minimise potential adverse impacts associated with waste arising from the construction of the Designated Elements.

8.2 WASTE MANAGEMENT PRACTICES

The Contractor should incorporate these recommendations into a Waste Management Plan (WMP) for the construction phase of the Project. Such a management plan should incorporate site specific factors, such as the designation of areas for the segregation and temporary storage of reusable and recyclable materials.

Possible waste arising during the construction phase will include dredged/excavated sediment, construction waste, chemical waste and general refuse.

The Implementation Schedule, provides details on the appropriate mitigation measures for avoiding and minimising potential adverse impacts associated with waste arising from the construction of the Project and the associated developments. The WMP should be refined and updated as more detailed information is generated on the volume of dredged/excavated sediment. Similarly, it should be regularly reviewed, and updated as appropriate, throughout the course of the construction works to ensure that it remains current with the latest detailed information and works practices.

It is the Contractor's responsibility to ensure that only approved licensed waste collectors are used and that appropriate measures to minimise adverse impacts, including windblown litter and dust from the transportation of these wastes are employed. In addition, the contractor must ensure that all the necessary waste disposal permits are obtained and complied with.

The Waste Management Plan should also outline the requirements for a waste audit programme to ensure the measures outlined in the plan are effectively implemented and adhered too.

8.3 EM&A RECOMMENDATIONS

In order to ensure that the Contractor has implemented the recommendations of the EIA, the IEC shall conduct regular site audits of each of the waste streams, to determine if wastes are being managed in accordance with the approved procedures and the site waste management plan. The scope of the waste management audits is presented below.

8.3.1 OBJECTIVES OF THE WASTE AUDIT

The aims of the waste management audit will include, but are not limited to, the following:

- ensuring that the wastes arising from works are handled, stored, collected, transferred and disposed of in an environmentally acceptable manner and comply with the relevant requirements under the *Waste Disposal Ordinance* (*WDO*) and its regulations;
- ensuring that the Contractor properly implements the appropriate environmental protection and waste pollution control mitigation measures, as outlined in the Implementation Schedule to minimise and control the potential for waste impacts;
- ensuring the effective implementation of the Contractor's Environmental Management System (EMS) and waste management plan;
- ensuring the Contractor(s) enforce strict application of the public fill license and monitor the material placed in the reclamation and barges to control disposal of unauthorised material. Also to ensure the Contractor provide floating booms and collect any floating materials on a daily basis at the public filling area;

- monitoring the disposal of construction and demolition material and solid wastes at public filling facilities and landfills, and to control fly-tipping, a trip-ticket system should be included as one of the contractual requirements and implemented by the Environmental Team during the EM&A programme. The IEC should be responsible for auditing the result of the system; and
- encouraging the reuse and recycling of materials.

8.3.2 METHODOLOGY AND CRITERIA

The Contractor should ensure that the necessary waste disposal permits or licences are obtained from appropriate authorities in accordance with the various Ordinances. In addition to the IEC audits, the Contractor and his ET Leader should also regularly inspect and audit the waste management practices on site with reference to the recommendations given in the Implementation Schedule.

General Legislation for Waste Management

- Waste Disposal Ordinance (Cap 354);
- Waste Disposal (Chemical Waste) (General) Regulation (Cap 354);
- Waste Disposal (Charges for Disposal of Construction Waste) Regulation under WDO;
- Land (Miscellaneous Provisions) Ordinance (Cap 28);
- Public Health and Municipal Services Ordinance (Cap 132) - Public Cleansing and Prevention of Regulation;
- Dumping at Sea Ordinance (1995); and,
- The storage, handling and disposal of chemical waste should be audited with reference to the requirements of the Code of Practice on the Package, Labelling and Storage of Chemical Wastes published by the EPD.

Other Relevant Guidelines

- Waste Disposal Plan for Hong Kong (December 1989), Planning, Environment and Lands Branch Government Secretariat;
- Environmental Guidelines for Planning In Hong Kong (1990), Hong Kong Planning and Standards Guidelines, Hong Kong Government;
- New Disposal Arrangements for Construction Waste (1992), Environmental Protection Department & Civil Engineering Department;
- Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes (1992), Environmental Protection Department;
- Works Branch Technical Circular, 32/92, The Use of Tropical Hard Wood on Construction Site; Works Branch, Hong Kong Government;
- Works Branch Technical Circular Nos. 2/93, 2/93B, Public Dumps, Works Branch, Hong Kong Government;
- Works Branch Technical Circular No. 16/96, Wet Soil in Public Dumps; Works Branch, Hong Kong Government;
- Works Bureau Technical Circular Nos. 4/98, 4/98A, Use of Public Fill in Reclamation and Earth Filling Projects; Works Bureau, HK SAR Government;
- Works Bureau Technical Circular No 5/98, On-site Sorting of Construction Waste on Demolition Site; Works Bureau, HK SAR Government;
- Waste Reduction Framework Plan, 1998 to 2007, Planning, Environment and Lands Bureau, Government Secretariat, 5 November 1998;
- Works Bureau Technical Circular Nos. 5/99, 5/99A Trip-ticket System for Disposal of Construction and Demolition Material; Works Bureau, HK SAR Government;
- Works Bureau Technical Circular No 19/99,Metallic Site Hoardings and Signboards; Works Bureau, HK SAR Government;
- Work Bureau Technical Circular Nos. 25/99, 25/99A, 25/99C Incorporation of Information on Construction and Demolition Material Management in Public Works Sub-committee Papers; Works Bureau, HK SAR Government;

- Works Bureau Technical Circular No. 12/2000, Fill Management; Works Bureau, HKSAR Government;
- Works Bureau Technical Circular No 29/2000, Waste Management Plan. Works Bureau, Hong Kong SAR Government; and
- Works Bureau Technical Circular No 31/2000, Specification Allowing the Use of Recycled Inert Construction and Demolition Material. Works Bureau, Hong Kong SAR Government.

8.4 MITIGATION MEASURES

Details of the recommended mitigation measures are included within the Implementation Schedule.

9 LAND CONTAMINATION

The effective management of land contamination during the construction phase will be monitored through the site audit program.

Potential impacts associated with the handling, storage and disposal of contaminated soils and groundwater, through not expected; can be mitigated by adopting the following measures:

- The use of bulk earth-moving excavator equipment should minimise the potential interface of contaminated materials with construction workers;
- Exposure to any contaminated materials should be minimised by the wearing of appropriate clothing and personal protective gear such as gloves (when interacting directly with contaminated material), providing adequate hygiene and washing facilities, and preventing smoking and eating during such activities;
- Where excavated material is suspected to be contaminated, preliminary analysis of representative samples should be performed to enable options for disposal of contaminated materials to be properly evaluated (based on soil classification) and to allow the volume of such materials to be estimated before agreement or approval is sought from the relevant authorities;
- Vehicles containing contaminated materials should be suitably covered to limit potential dust emissions or contaminated wastewater runoff, and truck bodies and tailgates should be sealed to prevent any discharge during transport or during wet conditions;
- Contaminated soils should not be stockpiled on site. However, in the event that this is necessary in the short-term, any stockpiled contaminated sediments should be covered with plastic sheeting or tarpaulin, especially during heavy rainstorms;
- Only licensed waste hauliers should be used to collect and transport contaminated material to an appropriate disposal site and procedures should be developed to ensure that illegal disposal of wastes does not occur;
- Prior agreement should be sought with the appropriate authorities regarding the acceptability of disposal of contaminated sediments to East Sha Chau Marine Borrow Area or to landfill, following any sampling and analysis program conducted. Although, not officially designated, the only landfill in Hong Kong that is likely to be able to accept small amounts of contaminated sediments is the WENT landfill;
- The necessary waste disposal permits should be obtained from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste)(General) Regulation (Cap 354), as required;
- Records of the quantities of wastes generated and disposed of should be maintained;
- In accordance with good construction practice, silt traps should be used to reduce the impact to drainage caused by suspended solids (SS) arising from the disturbed ground, or any construction materials such as cement and gravel. Groundwater should be disposed of in accordance with the Water Pollution Control Ordinance (WPCO);and,
- Surface water should be diverted around any areas currently being worked, or materials being stockpiled, to minimise potential runoff into excavations, as runoff would increase the volume of contaminated groundwater requiring disposal and suspended solids in the wastewater stream.

10 ECOLOGICAL RESOURCES

Potential ecological impacts associated with the construction of the sewerage system and pumping stations have been identified in the EIA(DE) Report. It is envisaged that the impacts can be effectively mitigated by pursuing an approach of avoidance, minimisation, on-site compensation, and off-site compensation, in that order. At each stage, residual impacts are to be re-assessed to determine whether there is a need to proceed to the next stage of mitigation. The following measures have been developed in accordance with this approach to mitigate the identified impacts.

10.1 AVOIDANCE

10.1.1 Mitigation Measures Adopted

All of the proposed sewers, rising mains and pumping stations will be located in areas classified as of low ecological value. In this way impacts to ecologically important habitats will be avoided.

10.1.2 Further Recommendations

No construction works along a section of the proposed sewerage alignment, which fall within the Deep Bay Wetland Conservation Area and the Deep Bay Wetland Buffer Area (WCA and WBA) and close to the locations of ecologically sensitive species (including Intermediate Egret, Black-faced Spoonbill, Buzzard, Imperial Eagle and Avocet) are recommended during the winter season (November to March). Regular inspections (at least twice a month) should be carried out during the winter season to ensure proper implementation of this restriction.

10.2 MINIMIZATION

10.2.1 Mitigation Measures Adopted

Where the sewers and rising mains crossover the existing MDC within the WCA and WBA, the pipe jacking method will be adopted instead of dredging. It is expected that the construction noise will be restricted to the pit area only, as noisy powered mechanical equipment such as the hydraulic jack will mainly be underground. Therefore the noise impact and disturbance to the MDC will be greatly reduced.

The use of temporary noise barriers, in the form of site hoarding, along the boundary of the pumping station site is considered to be a practicable and an effective mitigation measure to further reduce the noise impacts associated with the construction of the pumping station

10.2.2 Further Recommendations

For construction activities of the remaining sections of the proposed sewerage alignment (including parts of S4, S5 and S6) within the WCA and WBA during winter, regular inspections by ET (at least twice a month) should be carried out during the winter season (November to March) to check the number of work fronts and proper implementation of mitigation measures such as erection of movable noise barriers. Details of the inspection results should be reported in the Monthly EM&A Report. The IEC should review the regular inspections of the ET and the Contractor is responsible to ensure the proper implementation of the recommended mitigation measures.

10.3 COMPENSATION

With the implementation of the mitigation measures proposed below (and in *Sections 8.7.1 & 8.7.2* of the EIA (DE) Report), and given that only a small area will be lost due to the Project and the impact is generally considered as low, no habitat compensation is required.

10.4 MONITORING AND AUDIT

Since no construction works within the sections of the sewerage alignment which unavoidably fall within the Deep Bay Wetland Conservation Area and the Deep Bay Wetland Buffer Area (WCA and WBA) and those sections close to the location of ecologically sensitive species (including Intermediate Egret, Black-faced Spoonbill, Buzzard, Imperial Eagle and Avocet) (*Figure 8.7a*) are recommended during the winter season (November to March), regular inspections (at least twice a month) should be carried out during the winter season to ensure proper implementation of such requirement.

For the unavoidable schedule of the remaining sections of the proposed sewerage alignment (including parts of S4, S5 and S6) within the WCA and WBA during winter, regular inspections by ET (at least twice a month) should be carried out during the winter season (November to March) to check the number of work fronts and proper implementation of mitigation measures such as erection of movable noise barriers. Details of the inspection results should be reported in the Monthly EM&A Report. The IEC should review the regular inspections of the ET and the Contractor is responsible to ensure the proper implementation of the recommended mitigation measures.

In order to ensure that the Contractor has implemented the recommendations of the EIA (DE) Report, the IEC shall be responsible for checking the effectiveness of the Contractors working practices and implementation of mitigation measures as outlined in this section (this should form part of the regular IEC audit program). In particular, the site audits should review the working practices of the Contractor at the WCA/WBA during the construction phase of the Project.

10.5 CONSTRUCTION PRACTICE

The following ecological mitigation measures are recommended to minimise disturbance to the surrounding habitats.

- Use of quiet construction plant and equipment for the construction (refer to IS) of pumping station (P3) and sewerage alignments (S4, S5 and S6) located within the Deep Bay Wetland Conservation Area and the Deep Bay Wetland Buffer Area, as well as pumping station P2 located beside Sha Po marsh to minimise the noise impact to the wildlife, particularly rare birds.
- Erect fences along the boundary of pumping station construction sites (P1 to P7) before the commencement of works to prevent tipping, vehicle movements, and encroachment of personnel into adjacent areas; particularly at sites close to the Humped Fig Tree Ficus tinctoria subsp. gibbosa (pumping station P7, refer to Figure 8.4b in the EIA(DE) Report and P2) to avoid disturbance to the remaining pond areas (0.7a).
- Avoid any disturbance, particularly filling and illegal dumping, to the remaining abandoned fishpond where pumping station P2 is to be constructed.
- Prevent stream and pond (P2) sedimentation during construction, particularly during the construction of pumping stations (P1 to P7), through the erection of sediment barriers and operation of siltation traps in streams which could potentially be affected.
- Treat any damage that may occur to individual major trees in the adjacent area with surgery.
- Reinstate temporary work sites/disturbed areas immediately after completion of the construction works, i.e. through on-site tree/shrub planting. Tree/shrub species used for reinstatement works should compliment those species in surrounding area.
- Regularly check the work site boundaries to ensure that they are not exceeded and that no damage occurs to surrounding areas, particularly at the location of pumping station P2.
- Prohibit and prevent open fires within the site boundary during construction and provide temporary fire fighting equipment in the work areas.

11 FISHERIES RESOURCES

The EIA(DE) Report has identified that as the proposed construction and operation of the sewerage system and pumping stations are not predicted to have a significant or unacceptable impacts on aquaculture fisheries resources and operations in the Study Area, no fisheries specific mitigation measures are required.

12 HERITAGE RESOURCES

This Section is not applicable for Contract DC/2005/02.

13 LANDSCAPE AND VISUAL IMPACTS

The EIA(DE) Report predicts that the construction and operation of the sewerage system and pumping station will have a number of low level landscape impacts and visual impacts of varying levels. In order to mitigate these impacts, a number of on-site landscape mitigation measures are recommended for incorporation into the Project, subject to further studies during the detailed design. The mitigation measures are summarised in the following paragraphs, and detailed in the Implementation Schedule.

- Erection of temporary hoarding;
- Advanced transplantation and planting works;
- Careful positioning of pumping stations;
- Use of visually recessive materials and colours for the exterior of pumping stations;
- Reinstatement of planting on disturbed land and compensatory planting; and,
- Restoration of construction area for the proposed works to a standard equivalent to the existing surrounding land.

14 ENVIRONMENTAL AUDITING

14.1 SITE INSPECTIONS

Site inspections provide a direct means to track and ensure the enforcement of specified environmental protection and pollution control measures. The inspections should be undertaken weekly by the ET to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Additionally, the ET Leader shall be responsible for defining the scope of the inspections, detailing any deficiencies that are identified, and reporting any necessary action or mitigation measures that were implemented as a result of the inspection; the results of the inspections shall be made available to the IEC when conducting his Environmental Performance Reviews.

Site inspections shall be carried out at least once per week by the ET. The areas of inspection should include the general environmental conditions in the vicinity of the site and pollution control and mitigation measures within the site; it should also review the environmental conditions outside the site area, which are likely to be affected, directly or indirectly, by site activities. The ET shall make reference to the following information in conducting the inspections:

- The EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
- Ongoing results of the EM&A program;
- Works progress and program;
- Individual works method statements which shall include proposals on associated pollution control measures;
- The contract specifications on environmental protection;
- The relevant environmental protection and pollution control laws; and
- Previous site inspection results and the results of Environmental Performance Reviews undertaken by the IEC.

The ET's inspection results and their associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the IEC and the Contractor within 24 hours, for reference and for taking immediate action. They shall also be presented, along with the remedial actions taken, in the monthly EM&A report. The Contractor shall follow the procedures and time-frames stipulated in the environmental site inspection for the implementation of mitigation proposals and the resolution of deficiencies in the Contractor's EMS. An action reporting system shall be formulated and implemented to report on any remedial measures implemented subsequent to the site inspections.

Ad hoc site inspections shall also be carried out by the ET if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the associated investigation work.

14.2 COMPLIANCE WITH LEGAL AND CONTRACTUAL REQUIREMENTS

There shall be contractual environmental protection and pollution control requirements as well as Hong Kong's environmental protection and pollution control laws which the Contractor shall comply with.

The ET Leader shall 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.

The Contractor shall also regularly copy relevant documents to the ET Leader so that the checking work can be carried out. The relevant documents are expected to include the updated Work Progress Reports, the updated Works Program, the application letters for different licences/permits under the environmental protection laws, and all the valid licences/permit. The site diary shall also be available, upon request, to the ET during site inspection.

After reviewing the documentation, the ET Leader shall advise the Engineer 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 ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works is incompatible 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 Engineer accordingly.

Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The Engineer 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.

14.3 ENVIRONMENTAL COMPLAINTS

Complaints shall be referred to the ET Leader and passed onto the Contractor for carrying out complaint investigation procedures. The ET Leader shall undertake the following procedures upon receipt of the complaints:

- Log complaint and date of receipt onto the complaint database;
- Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
- If considered necessary by the Engineer following consultation with the IEC, undertake monitoring to verify the existence and severity of the alleged complaint;
- If a complaint is valid and due to works, identify mitigation measures;
- If mitigation measures are required, advise the Engineer and Contractor accordingly;
- Review the Contractor's response on the identified mitigation measures, and the updated situation;

- If the complaint is transferred from the EPD, submit interim report to the EPD on status of the complaint investigation and follow-up action within the time frame assigned by the EPD;
- Undertake additional audits and/or inspections' as necessary, to verify the effectiveness of the mitigation measures;
- Report the investigation results and the subsequent actions to the source of complaint for responding to the complainant (if the source of complaint is EPD, the results should be reported within the time frame assigned by EPD); and
- Record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports and filing system.

During the complaint investigation work, the Contractor and Engineer shall co-operate with the ET Leader 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 works. The Engineer shall ensure that the measures have been carried out by the Contractor.

A flow chart of the complaint response procedures is shown in ***Annex E***.

15 REPORTING

15.1 INTRODUCTION

The primary reporting function, undertaken within the EM&A programme, will be the issuance of formal exceedance notifications, corrective actions and ongoing feedback between the ET Leader, the Contractor and the Engineer. Reporting will be driven by the results of the monitoring and audit programme and will be recorded through written correspondence, site inspections and minutes and notes of meetings.

In addition, periodic reviews of the EM&A process and subsequent revisions to the EM&A Manual, as appropriate, will be prepared and circulated to relevant personnel within the Contractor's Project Team as a means of gauging site staff and contractor performance. The periodic reviews will comprise Monthly, Biannual and Annual EM&A Reports; these reports will be copied to the EPD for comment. The exact details of the frequency, distribution and time frame for submission shall be agreed with the EPD prior to the commencement of the works.

The following reporting requirements are based upon a paper documented approach. However, the same information could, upon agreement with the Engineer, the IEC, and EPD, be provided using an electronic medium. All the monitoring data (baseline and impact) shall also be submitted on diskettes in an agreed format.

15.2 BASELINE MONITORING REPORT

The ET shall prepare and submit a draft Baseline Environmental Monitoring Report within 10 working days of the completion of the baseline monitoring. Copies of the Baseline Report shall be submitted to all parties for agreement; the Contractor, IEC, Engineer and the EPD. The exact number of copies required by each party will be established through liaison. The draft report will be supported by the baseline monitoring data in electronic format, along with information covering the monitoring locations and conditions, equipment and protocols. The agreed baseline report will then be reissued as a stand-alone report.

The form and content of the report and the representation of baseline monitoring data shall be in a format to the satisfaction of EPD and include, but not limited to 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.) An updated construction program with milestones of environmental protection/ mitigation activities annotated;
e.) Monitoring results (in both hard and diskette copies) together with the following information
   - Monitoring methodology;
   - Name of laboratory and types of equipment used and calibration details;
   - Parameters monitored;
   - Monitoring locations;
   - Monitoring date, time, frequency and duration; and
   - QA/QC results and detection limits.
f.) 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;
g.) Determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data; the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored;
h.) Revisions for inclusion in the EM&A Manual; and
i.) Comments and conclusions.

15.3 MONTHLY EM&A REPORTS

The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A Reports and be prepared by the ET. The reports shall be submitted to the IEC to be endorsed and copied to the EPD within 10 working days of the end of each calendar month, with the first report due in the month after construction works commence. Copies shall also be submitted to the Contractor, IEC and Engineer for information. The ET shall liaise with the relevant parties to confirm the exact number and format of monthly reports in both hard copy and electronic format.

The report shall include, but not be limited to, the following elements:

15.3.1 First Monthly EM&A Report

The first monthly EM&A report shall include at least but not be limited to the following:

a.) Executive Summary (1-2 pages)
- Breaches of AL levels;
- Complaint Log;
- Notifications of any summons and successful prosecutions;
- Reporting Changes;
- Future key issues.

b.) Basic Project Information
- Project organisation including key personnel contact names and phone numbers;
- Construction Program with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
- Management structure; and
- Works undertaken during the month.

c.) Environmental Status
- Works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage fines in the fill material used); and
- Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

d.) 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 report;
- Environmental requirements in contract documents;

e.) Implementation Status
Advice on the implementation status of environmental protection and pollution control/mitigation measures including measures for ecological and visual impacts, as recommended in the project EIA study report, summarised in the updated implementation schedule.

f.) Monitoring Results
To provide monitoring results (in both hard and diskette copies) together with the following information:
- Monitoring methodology;
- Name of laboratory and types of equipment used and calibration details;
- Parameters monitored;
- Monitoring locations (and depth);
- Monitoring date, time, frequency, and duration;
- Weather conditions during the period;
- Graphical plots of trends of monitored parameters in the month annotated against;
- The major activities being carried out on site during the period;
- Weather conditions that may affect the results; and
- Any other factors which might affect the monitoring results;
- QA/QC results and detection limits.

g.) Report on Non-compliance, Complaints, Notifications of Summons and Successful

Prosecutions

- Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation's, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

h.) Others

- An account of the future key issues as reviewed from the works program and work method statements;
- Advice on the solid and liquid waste management status; and
- Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarising the EM&A of the period.

15.3.2 Subsequent Monthly EM&A Reports

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

a.) Executive Summary (1-2 pages)

- Breaches of AL levels;
- Complaint Log;
- Notifications of any summons and successful prosecutions;
- Reporting Changes;
- Future key issues.

b.) Environmental Status

- Construction Program with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
- Works undertaken during the month with illustrations including key personnel contact names and telephone numbers; and
- Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations

c.) Implementation Status

Advice on the implementation status of environmental protection and pollution control/mitigation measures including measures for ecological and visual impacts, as recommended in the project EIA report, summarised in the updated implementation schedule.

d.) Monitoring Results

To provide monitoring results (in both hard and diskette copies) together with the following information:

- Monitoring methodology;
- Name of laboratory and types of equipment used and calibration details;
- Parameters monitored;
- Monitoring location;
- Monitoring date, time, frequency, and duration;
- Weather conditions during the period;
- Graphical plots of trends of monitored parameters in the month annotated against;
- The major activities being carried out on site during the period;
- Weather conditions that may affect the results;
- Any other factors which might affect the monitoring results; and
- QA/QC results and detection limits.

e.) Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
- Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation's, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

f.) Others
- An account of the future key issues as reviewed from the works program and work method statements; and
- Advice on the solid and liquid waste management status.

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:
  - 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 statistics on complaints, notifications of summons and successful prosecutions;
- Outstanding issues and deficiencies

15.4 Annual and Bi-annual Reports

In addition to the Monthly Reports, Annual and Bi-annual Reports will be issued which will provide a general summary of the progress of the Project EM&A to date. The reports shall be produced by the ET Leader and 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, program, 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 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.) for project where measurement of suspended solids is required, an quarterly assessment of construction impacts on suspended solids at the project site, including, but not limited to, a comparison of the difference between the quarterly mean and 1.3 times of the ambient mean, which is defined as 30% increase of the baseline data or EPD data, of the related parameters by using appropriate statistical procedures. Suggestion of appropriate mitigation measures if the quarterly assessment analytical results demonstrate that the quarterly mean is significantly higher than the 1.3 on water quality times of the ambient mean ($p<0.05$).
k.) a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
l.) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
m.) a summary record of notification of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation's, locations and nature of the breaches, investigation, follow-up actions taken and results;
n.) comments (eg. effectiveness and efficiency of the mitigation measures), recommendations (eg. any improvement in the EM&A program) and conclusions for the reporting period; and
o.) proponents' contacts and any hotline telephone number for the public to make enquiries.

15.5 Final EM&A Summary Report

The EM&A program shall be terminated upon completion of those construction activities that have the potential to result in a significant environmental impact

Prior to the proposed termination, it may be advisable to consult relevant local communities (such as village representatives/committees and/or District Boards). The proposed termination should only be implemented after the proposal has been endorsed by the Contractor, the Engineer and the project proponent, and following final approval from the Director of Environmental Protection.

The final EM&A summary report shall include, inter alias, the following:

a.) an executive summary;
b.) basic project information including a synopsis of the project organisation, program, contracts of key management, and a synopsis of work undertaken during the entire construction period;
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;
- any other factors which might affect the monitoring results; and
- the return of ambient environmental conditions in comparison with baseline data.

g.) compare and contrast the EM&A data with the EIA predictions and annotate with

explanation for any discrepancies;

h.) provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;

i.) advice on the solid and liquid waste management status;

j.) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

k.) a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;

l.) a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;

m.) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

n.) review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);

o.) a summary record of notification of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation's, locations and nature of the breaches, investigation, follow-up actions taken and results;

p.) review the practicality and effectiveness of the EIA process and EM&A program (e.g. effectiveness and efficiency of the mitigation measures) recommend any improvement in the EM&A program; and

q.) a conclusion to state the return of ambient and/or the predicted scenario as per EIA findings.

15.6 DATA KEEPING

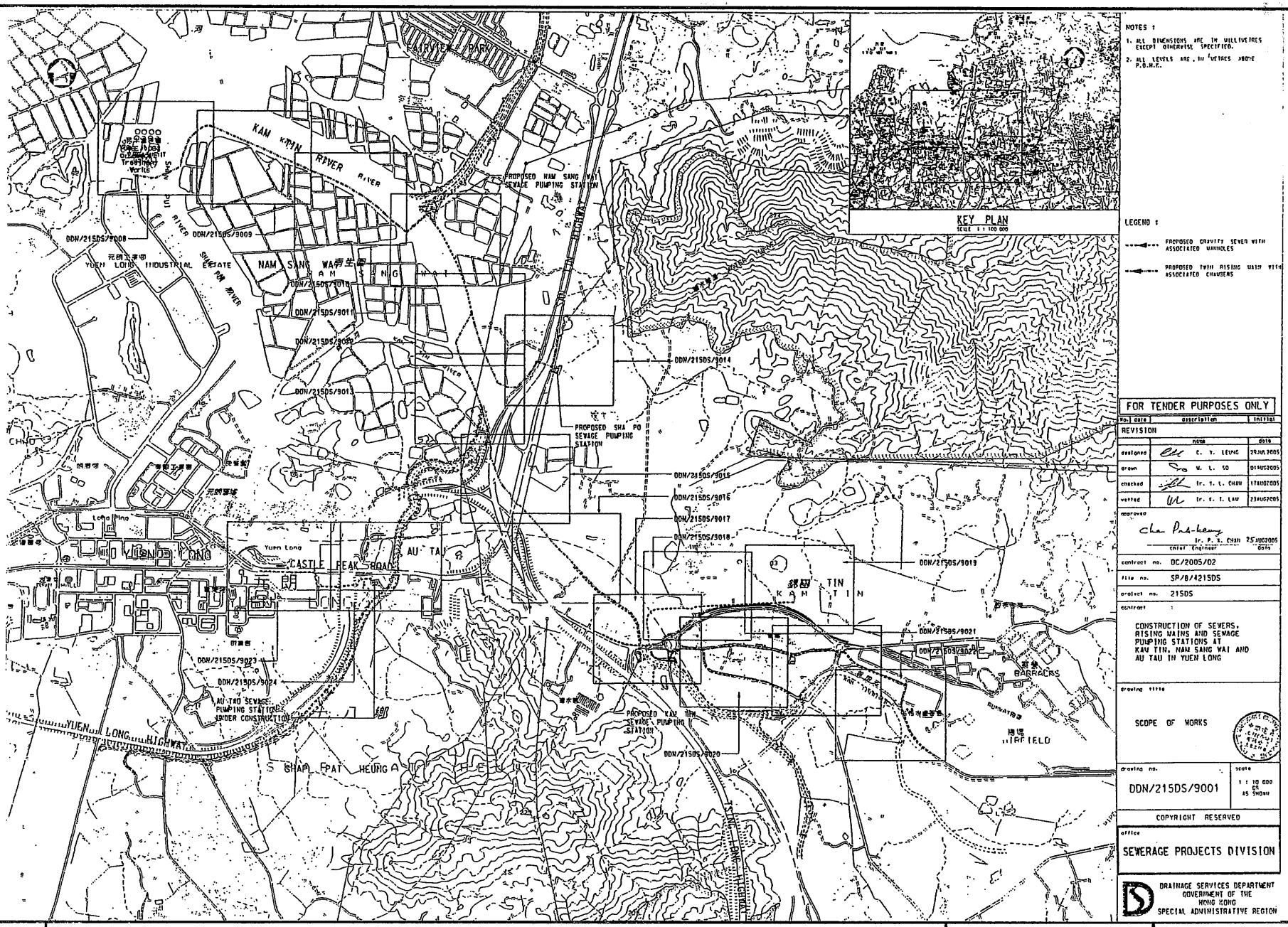
Documentation such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A reports for submission. However, such documents shall be well kept by the ET and Contractor, as appropriate, and shall be available for inspection upon request. All relevant information shall be clearly and systematically recorded in the documents. The monitoring data shall also be recorded in magnetic media form, and the software copy can be available upon request.

15.7 INTERIM NOTIFICATION OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCE

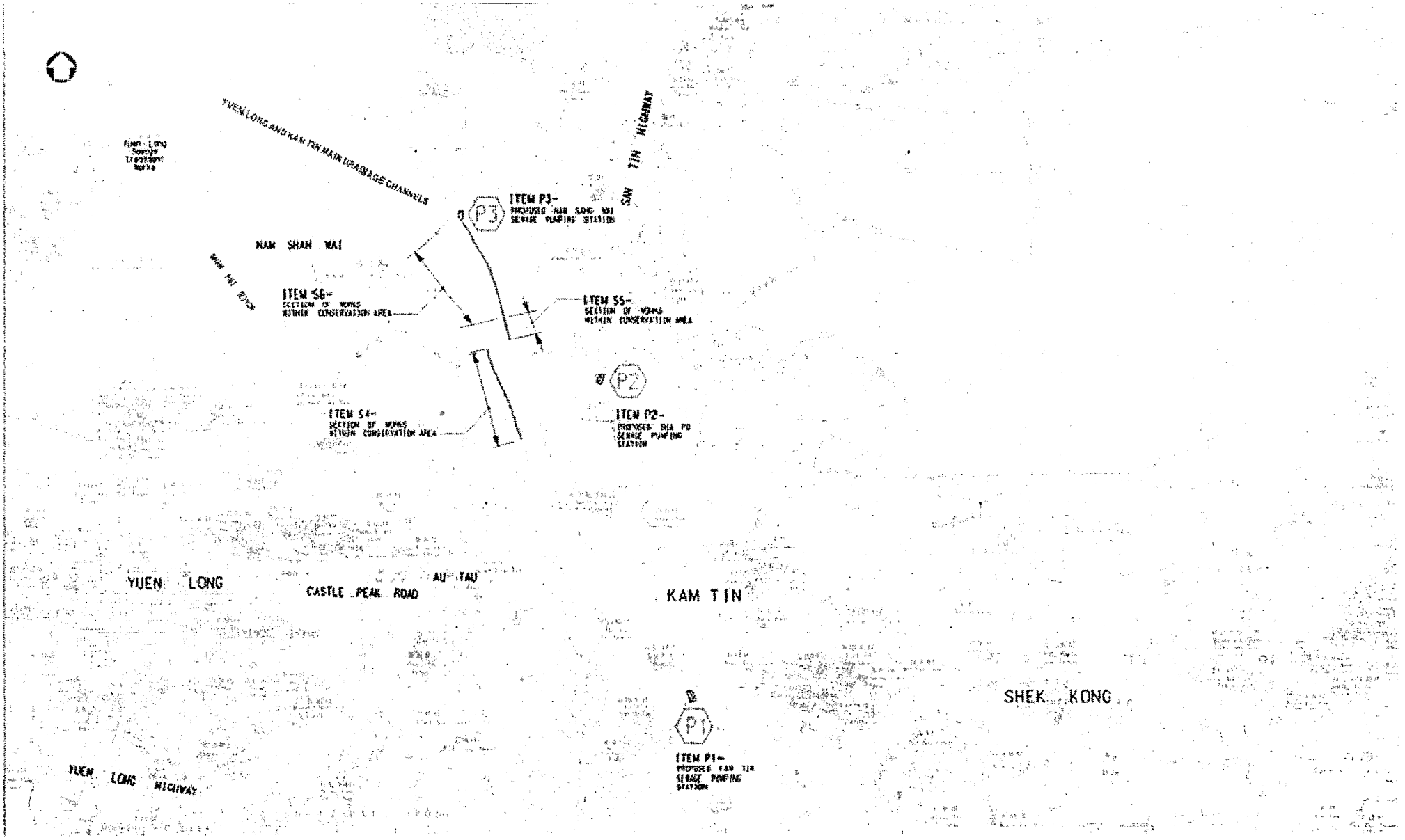
Interim notifications of project-related exceedances of Limit levels will be issued to the EPD within 24 hours of the identification of an exceedance. The Monthly Reports will contain all available details concerning the exceedances and the complaints, their causes and those steps taken to control impacts and prevent their recurrence.

Annex A

Site Layout Plan



AUES	Project Area under the Approved Environmental Impact Assessment (EIA) Report	Figure No.	Scale
		1.2a	NTS



AUES	Designated Project Area under the Updated EM&A Manual and the Environmental Permit (EP-220/2005)	Figure No.	Scale
		1.2b	NTS

Annex B

Mitigation Implementation Schedule

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
		CONSTRUCTION PHASE								
		AIR QUALITY - *Construction Phase*								
		The following measures are enforceable under the *Air Pollution Control (Construction Dust) Regulations*								
		Site boundary and entrance								
3.5	A1	• where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of not less than 2.4 m high from ground level should be provided along the boundaries of the seven pumping stations sites and the works area where the Engineer's site office and the Contractor's site office erected;	To prevent access to the site and control potential dust impacts from construction works.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Part III, Clause 13 (c), Air Pollution Control (Construction Dust) Regulations*
		Access Road								
3.5	A2	• the portion of any road leading only to a construction site that is within 30 m of a discernible or designated vehicle entrance or exit should be kept clear of dusty materials;	To control potential dust impacts from vehicle movements.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Part III, Clause 14, (b), Air Pollution Control (Construction Dust) Regulations*
		Stockpiling of Dusty Materials								
3.5	A3	• any stockpile of dusty materials should be either covered entirely by impervious sheeting and placed in an area sheltered on the top and the 3 sides or sprayed with water so as to maintain the entire surface wet;	To control potential dust impacts during excavation and stockpiling activities.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Part IV, Clause 18, (a, b & c), Air Pollution Control (Construction Dust) Regulations*
		Loading, unloading or transfer of dusty materials								
3.5	A4	• all dusty materials should be sprayed with water or a dust suppression chemical immediately prior to any loading and unloading so as to maintain the dusty materials wet;	To control potential dust impacts during material handling and truck movements.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Part IV, Clause 19, Air Pollution Control (Construction Dust) Regulations*
		Use of vehicles								
3.5	A5	• every vehicle should be washed to remove any dusty materials from its body and wheels immediately before leaving a construction site;	To control potential dust impacts from vehicle movements.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Part IV, Clause 21, (1), Air Pollution Control (Construction*

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
										Dust) Regulations
3.5	A6	• where a vehicle leaving a construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle;	To control potential dust impacts during material transportation.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Part IV, Clause 21, (2), Air Pollution Control (Construction Dust) Regulations*
		Power-driven drilling, and cutting								
3.5	A7	• water should be continuously sprayed on the surface where any mechanical breaking operation that causes dust emission is carried out, unless the process is accompanied by the operation of an effective dusty extraction and filtering device;	To control potential dust impacts during mechanical breaking.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Part IV, Clause 22, Air Pollution Control (Construction Dust) Regulations*
		Excavation and earth moving								
3.5	A8	• the working area of excavation should be sprayed with water immediately before, during and immediately after the operation so as to maintain the entire surface wet;	To control potential dust impacts arising from excavation works.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Part IV, Clause 24, Air Pollution Control (Construction Dust) Regulations*
		Construction of the superstructure of a building								
3.5	A9	• where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the round floor level of the SPS, or if a canopy is provided a the first floor level, from the first floor level, up to the highest level of the scaffolding; and	To control potential dust impacts from SPS building construction works.	Full duration of SPS construction contract.	The Contractor		✓			*Part I, Clause 6, (a), Air Pollution Control (Construction Dust) Regulations*
3.5	A10	• any skip hoist for material transport should be totally enclosed by the impervious sheeting.	To control potential dust impacts during material transportation.	Full duration of SPS construction contract.	The Contractor		✓			*Part I, Clause 6, (b), Air Pollution Control (Construction Dust) Regulations*

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
		NOISE - *Construction Phase*								
		General Site Clearance – Demolition Works								
4.7.1	B1	• Use of quiet PME which meet the SWLs taken from British Standard, *Noise and Vibration Control on Construction Open Sites, BS 5228: Part 1: 1997 (Examples of these PME are shown in Table F2)*,	To control potential noise impacts during site clearance and demolition works	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Annex 5 of EIAO-TM*
		Construction of Sewage Pumping Stations P1, P2 & P3								
4.7.1	B2	• Use of quiet PME which meet the SWLs taken from British Standard, *Noise and Vibration Control on Construction Open Sites, BS 5228: Part 1: 1997*,	To minimise potential noise impacts arising during the construction of *P1, P2 & P3*	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Annex 5 of EIAO-TM*
		• Adoption of temporary noise barrier, in the form of a site hoarding (with a superficial density of at least 20kg/m2, with no substantial gaps), along the site boundary of the pumping station sites.	To minimise potential noise impacts arising during the construction of *P1, P2 & P3*	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Annex 5 of EIAO-TM*
		Sewers and Rising Mains using Open Trench Method								
4.7.1	B3	• Use of quiet PME which meet the SWLs taken from British Standard, *Noise and Vibration Control on Construction Open Sites, BS 5228: Part 1: 1997*,	To control potential noise impacts during excavation works.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Annex 5 of EIAO-TM*
4.7.1	B4	• Use of handheld breakers for all initial road opening activities, when breaking tarmac/concrete road surface to a depth of 300mm or when granular material is reached.	To control potential noise impacts during road opening activities.	Where there are NSRs located within 50m of the line of sight. Throughout the full duration of the road opening activities.	The Contractor		✓			
4.7.1	B5	• Use of movable noise barriers or 3 sided enclosures for all initial road opening activities	To control potential noise impacts during road opening	Where there are NSRs located within 50m of the	The Contractor		✓			

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
		enclosures for all initial road opening activities (breaking tarmac/concrete road surface to a depth of 300mm or when granular material is reached), where there are NSRs located within 50m of the line of sight from the works area.	activities.	line of sight. Throughout the full duration of the road opening activities.						
		Sewers and Rising Mains using Pipe Jacking Method								
4.7.1	B6	• Use of quiet PME which meet the SWLs taken from British Standard, *Noise and Vibration Control on Construction Open Sites, BS 5228: Part 1: 1997*,	To control potential noise impacts from PME during construction works	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Annex 5 of EIAO-TM*
		Road Pavement and Finishes								
4.7.1	B7	• Use of quiet PME which meet the SWLs taken from British Standard, *Noise and Vibration Control on Construction Open Sites, BS 5228: Part 1: 1997*,	To control potential noise impacts from PME during pavement and finish works	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Annex 5 of EIAO-TM*
		WATER QUALITY - *Construction Phase*								
		No water quality monitoring is required under this study.								
		WASTE - *Construction Phase*								
6.6.2	D1	The Contractor shall obtain the necessary waste disposal permits from the appropriate authorities for the disposal of chemical and C&D waste, • Chemical Waste Producer and Chemical Waste Disposal Licence *(Waste Disposal (Chemical Waste) (General) Regulations); and* • Dumping Licence (*Land (Miscellaneous Provisions) Ordinance (Cap 28))*	To monitor the collection, handling and disposal of chemical waste and C&D waste, and in compliance with relevant Hong Kong Standards and Regulations.	Site wide and throughout the full duration of the construction contract.	The Contractor	✓	✓			*Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste)(General) Regulation (Cap 354), the Land (Miscellaneous Provisions) Ordinance (Cap 28))*

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
6.6.2	D2	***Chemical Waste*** Chemical waste that is produced, as defined by Schedule 1 of the *Waste Disposal (Chemical Waste) (General) Regulation,* should be handled in accordance with the regulations and Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as follows. All chemical waste producers should be registered with the EPD.	To control the handling, storage and disposal of chemical waste, in order to minimise potential spillages/leakages and human health and environmental impacts.	To be implemented at all worksites throughout the full duration of the construction phase.	The Contractor		✓			*Part II, (6) Waste Disposal (Chemical Waste) (General) Regulation*
6.6.2	D3	**Storage, Packaging and Labelling of Chemical Waste** Containers used for storage of chemical wastes should: • be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; • have a capacity of less than 450 L unless the specifications have been approved by the EPD; and • display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations.	To ensure the proper storage, packaging and labelling of chemical waste in accordance with the Regulations.	To be implemented at all worksites throughout the full duration of the construction phase.	The Contractor		✓			*Part IV, (9, 10, 11 & 12) Waste Disposal (Chemical Waste) (General) Regulation*
6.6.2	D4	**Storage of chemical waste** The storage area for chemical wastes should: • be clearly labelled and used solely for the storage of chemical waste; • be enclosed on at least 3 sides; • have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest; • have adequate ventilation; • be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste, if necessary); and • be arranged so that incompatible materials are	To ensure the proper storage of chemical waste in accordance with the Regulations.	To be implemented at all worksites throughout the full duration of the construction phase.	The Contractor		✓			*Part IV, (13,14, 15, 16, 17, & 18) Waste Disposal (Chemical Waste) (General) Regulation*

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
		adequately separate								
		Disposal of chemical waste • The Contractor should ensure that the disposal of chemical waste is via a licensed Waste Collector and in accordance with the *Waste Disposal (Chemical Waste) (General) Regulations.*	To control the disposal of chemical waste in accordance with the Regulations.	To be implemented at all worksites throughout the full duration of the construction phase.	The Contractor		✓			*Part IV, (20 -25) Waste Disposal (Chemical Waste) (General) Regulation*
6.6.2	D5	*Management of Waste Disposal* A trip-ticket system should be established which monitors the disposal of C&DM and solid wastes at public filling facilities and landfills and to control fly-tipping, in accordance with *Land (Miscellaneous Provisions) Ordinance (Cap28)* and the *Works Bureau Technical Circular No. 5/99.*	To monitor the disposal of C&DM and solid wastes at public filling facilities and landfills and to control fly-tipping.	To be implemented at all worksites throughout the full duration of the construction phase.	The Engineer/ Contractor		✓			*Land (Miscellaneous Provisions) Ordinance (Cap 295) and Works Bureau Technical Circular No. 5/99.*
7.5.6	E1	**LAND CONTAMINATION- *Construction Phase*** A revised CAP should be submitted to the EPD for approval before the commencement of the construction works. Following receipt of the EPD's approval, the CAP shall be implemented and the findings of the investigations will be reported in the Contaminated Assessment Report (CAR), before ground disturbance is allowed at the concerned sites. If land contamination is confirmed, a Remediation Action Plan (RAP) shall be prepared, and both the CAR and the RAP shall be submitted as a combined report to the EPD for approval before disturbing the ground of the concerned sites. If applicable and required in consultation with the	To determine the presence of soil and groundwater contamination and remedy any potential concerns to acceptable levels.	To be implemented before the commencement of the construction works.	To be Implemented by DSD or their sub-consultants at the Detailed Design Stage, depending upon when site access can be gained.	✓				*EIAO TM Annex 19/3.1.1 & 3.1.2*

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
		EPD, the contaminated site(s) shall be remediated in accordance with the approved CAR/RAP.								
		ECOLOGY - *Construction Phase*								
		Mitigation Measures Adopted - Avoidance								
8.7.1	F1	Construction activities shall be prohibited during the winter season (November to March) along the section of the proposed sewerage alignment, which fall within the Deep Bay Wetland Conservation Area and the Deep Bay Wetland Buffer Area (WCA and WBA) and close to the locations of ecologically sensitive species (including Intermediate Egret, Black-faced Spoonbill, Buzzard, Imperial Eagle and Avocet). (See Figure 8.7a attached). Regular site inspections (at least twice a month) should be conducted by the Environmental Team during the winter season (November to March) to ensure proper implementation of this restriction	To schedule construction works in order to minimise potential impacts to winter visiting birds. To be confirmed by regular site inspections.	At identified location (*Figure 8.7a*) for the full duration of the construction contract.	The Contractor		✓			
		Mitigation Measures Adopted - Minimisation								
8.7.2	F2	Pipe jacking method should be used instead of dredging where sewers and rising mains cross over existing MDC within the WCA and WBA.	To minimise potential construction noise impacts to ecological sensitive receivers within the WCA/WBA.	For the full duration of the construction contract.	The Contractor		✓			
8.7.2	F4	Regular inspections (at least twice a month) should be conducted by the ET during the winter season (November to March) for the remaining sections of the proposed sewerage alignment (including parts of S4, S5 and S6) within the WCA and WBA, where construction activities cannot be rescheduled. The site inspections shall check and report the number of workfronts and implementation of	To schedule noisy construction activities to minimise potential impacts to winter visiting birds.	Work fronts other than identified sections within WBA & WCA (see *Figure 8.7a* attached) throughout the full duration of the construction contract.	The Contractor		✓			

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
		mitigation measures (i.e. erection of movable noise barriers with a suitable footing along the sites) in the monthly EM&A reports.								
		Mitigation Measures Adopted								
8.7.3	F5	Quietened construction plant and equipment (as shown in *Table F2*) should be used for the construction of pumping stations (P3 and P2) and sewerage alignment (S4, S5 and S6) located within the WCA and WBA.	Quiet construction plant shall minimise potential noise impacts to the wildlife, particularly rare birds including Black-faced Spoonbill, Buzzard, Hobby, Imperial Eagle, Intermediate Egret, Avocet and Black-eared Kite	At described locations and throughout the full duration of the construction contract.	The Contractor		✓			
8.7.4	F6	Erection of fences along the boundary of pumping station construction sites (P1 to P3) before the commencement of construction works to prevent tipping, vehicle movements, and encroachment of personnel into adjacent areas, and P2 to avoid disturbance to the remaining pond areas (0.7 ha);	To erect fences to prevent encroachment of construction activities onto adjacent areas.	At P1 to P3 for full duration of the construction contract.	The Contractor		✓			
8.7.4	F7	No filling and dumping to the remaining abandoned fishpond at P2.	To avoid disturbance to abandoned fishponds from construction activities and illegal dumping.	At P2 for full duration of the construction contract	The Contractor		✓			
8.7.4	F8	Installation and operation of silt removal facilities at construction sites of P1 to P3. The silt removal facilities should be designed in accordance with Appendix A1 of ProPECC Note PN1/94 Construction Site Drainage. The minimal total combined volume of the silt removal facilities at Nam Sang Wai SPS (P3) should be 15m^3.	To install silt removal facilities in potentially impact streams and ponds to prevent sedimentation.	At P1 to P3 for full duration of the construction contract.	The Contractor		✓			
8.7.4	F9	No open fires within the site boundary during	To prohibit open fires, thereby	Site wide and throughout	The Contractor		✓			*Air Pollution Control*

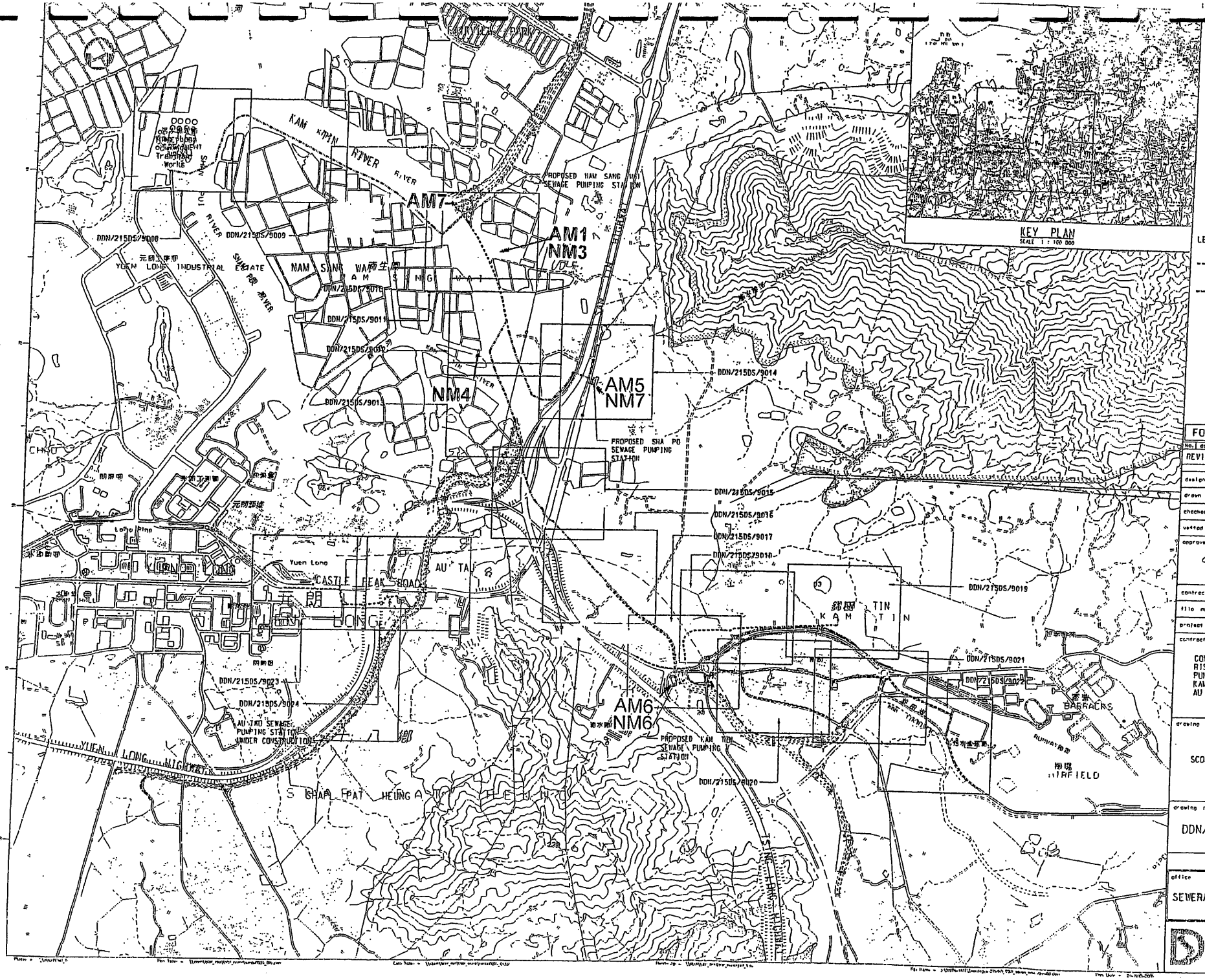
EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
8.7.4	F7	construction and provide temporary fire fighting equipment in the work areas. No filling and dumping to the remaining abandoned fishpond at P2.	minimising potential damage to trees and shrubs. To avoid disturbance to abandoned fishponds from construction activities and illegal dumping.	the full duration of the construction contract. At P2 for full duration of the construction contract	The Contractor		✓			*(Open Burning) Regulation*
8.7.4	F8	Installation and operation of silt removal facilities at construction sites of P1 to P3. The silt removal facilities should be designed in accordance with Appendix A1 of ProPECC Note PN1/94 Construction Site Drainage.	To install silt removal facilities in potentially impact streams and ponds to prevent sedimentation.	At P1 to P3 for full duration of the construction contract.	The Contractor		✓			
8.7.4	F9	No open fires within the site boundary during construction and provide temporary fire fighting equipment in the work areas.	To prohibit open fires, thereby minimising potential damage to trees and shrubs.	Site wide and throughout the full duration of the construction contract.	The Contractor		✓			*Air Pollution Control (Open Burning) Regulation*
		FISHERIES - *Construction Phase* No specific mitigation measures are required for inclusion in the EP.								
		CULTURAL HERITAGE – Not Applicable for Package 1A-1T (DC/2005/02)								
		LANDSCAPE AND VISUAL - *Construction Phase*								
	H1	The site inspections shall check and report the implementation of mitigation measures (i.e. top-soil are reused and new compensatory planting works are carried out immediately after the construction of the civil structure) in the monthly EM&A reports. The first monthly EM&A Report should also report the appearance of the temporary hoarding barriers.	To minimise potential landscape and visual impacts.	To be implemented during the construction phases of the project.	The Contractor		✓			
	H2	Prior to application for an Environmental Permit, a set of landscape plans and building elevations of the proposed pumping stations should be	To minimise potential landscape and visual impacts.	To be implemented during the design and construction phases of the	DSD and The Contractor	✓	✓			

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
		submitted for approval by the EPD. The landscape plans and pumping station elevations should demonstrate that the following elements are considered: • existing landscape elements (such as mature trees), transplantation of valuable trees, new compensatory planting		project.						
		• incorporate information on materials, details and textures so as to be as visually recessive as possible and in a style that fits with the surrounding village buildings. • colour should be of low chromatic intensity to reduce the potential contrast between the structures and their background. The external finishing of the Pumping Stations shall be designed in conjunction with the landscape scheme. • a minimum screen planting of 3m width and use of trees with a dense canopy of up to 5 m in height subject to constraints such as engineering and land availability. • felling of mature trees are kept to a minimum.								
3.7	I1	**EM&A REQUIEMENTS - *Construction Phase*** *Air Quality* Subject to the Environmental Protection Departments (EPDs) agreement, construction phase dust monitoring shall be undertaken at the following locations in accordance with the recommendations of the EIA. • Worksite boundary facing Scattered house in Nam Sang Wai (AM1); • Worksite boundary facing Fung Kat Heung (AM5); • Worksite boundary facing Scattered House near Route 3 (AM6);	Installations of the dust monitoring stations to ensure the action and limit levels are not exceeded.	At specified dust monitoring locations for the duration of the construction works.	To be undertaken by the Environmental Team (ET) and reviewed and audited by the Engineer /DSD		✓			*Air Pollution Control (Construction Dust) Regulations*

EIA* Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures & Main Concerns	Location of the measure	Implementation Agent	Implementation Stage**				Relevant Legislation & Guidelines
						Des	C	O	Dec	
		• at any additional locations, where considered necessary, in agreement with EPD.								
4.9.1	I2	*Construction Noise* Subject to the Environmental Protection Departments (EPDs) agreement, construction phase noise monitoring shall be undertaken at the following locations in accordance with the recommendations of the EIA. • (NM3) Scattered House in Nam San Wai (D12); • (NM4) Scattered House in Nam San Wai (D11); • (NM6) Scattered House near Route 3 (D17); • (NM7) Fung Kat Heung (D19); • and at any additional locations, where considered necessary, in agreement with EPD	Installations of the noise monitoring stations to ensure the action and limit levels are not exceeded.	At specified noise monitoring locations throughout the duration of the construction works.	To be undertaken by the Environmental Team (ET) and reviewed and audited by the Engineer		✓			*Noise Control Ordinance*
Des = Design, C = Construction, O = Operation, Dec = Decommissioning										

Annex C

Locations of Monitoring Stations



NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRES EXCEPT OTHERWISE SPECIFIED.
2. ALL LEVELS ARE IN METRES ABOVE P.D.H.K.

LEGEND :

PROPOSED GRAVITY SEWER WITH ASSOCIATED MANHOLES

PROPOSED TWIN RISING MAIN WITH ASSOCIATED CHAMBERS

FOR TENDER PURPOSES ONLY

No.	date	description	initial
REVISION			

	name	date
designed	E. Y. LEUNG	29JUL2005
drawn	H. L. SO	01AUG2005
checked	Ir. Y. L. CHAN	17AUG2005
vetted	Ir. D. Y. LAM	23AUG2005

approved

Ir. P. K. CHAN
Chief Engineer

25AUG2005
Date

contract no. DC/2005/02

file no. SP/8/4215DS

project no. 215DS

contract :

CONSTRUCTION OF SEWERS, RISING MAINS AND SEWAGE PUMPING STATIONS AT KAM TIN, NAM SANG WAI AND AU TAU IN YUEN LONG

drawing title

SCOPE OF WORKS

drawing no. DDN/215DS/9001

scale 1 : 10 000 OR AS SHOWN

office

SEWERAGE PROJECTS DIVISION

DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

A1 841x594

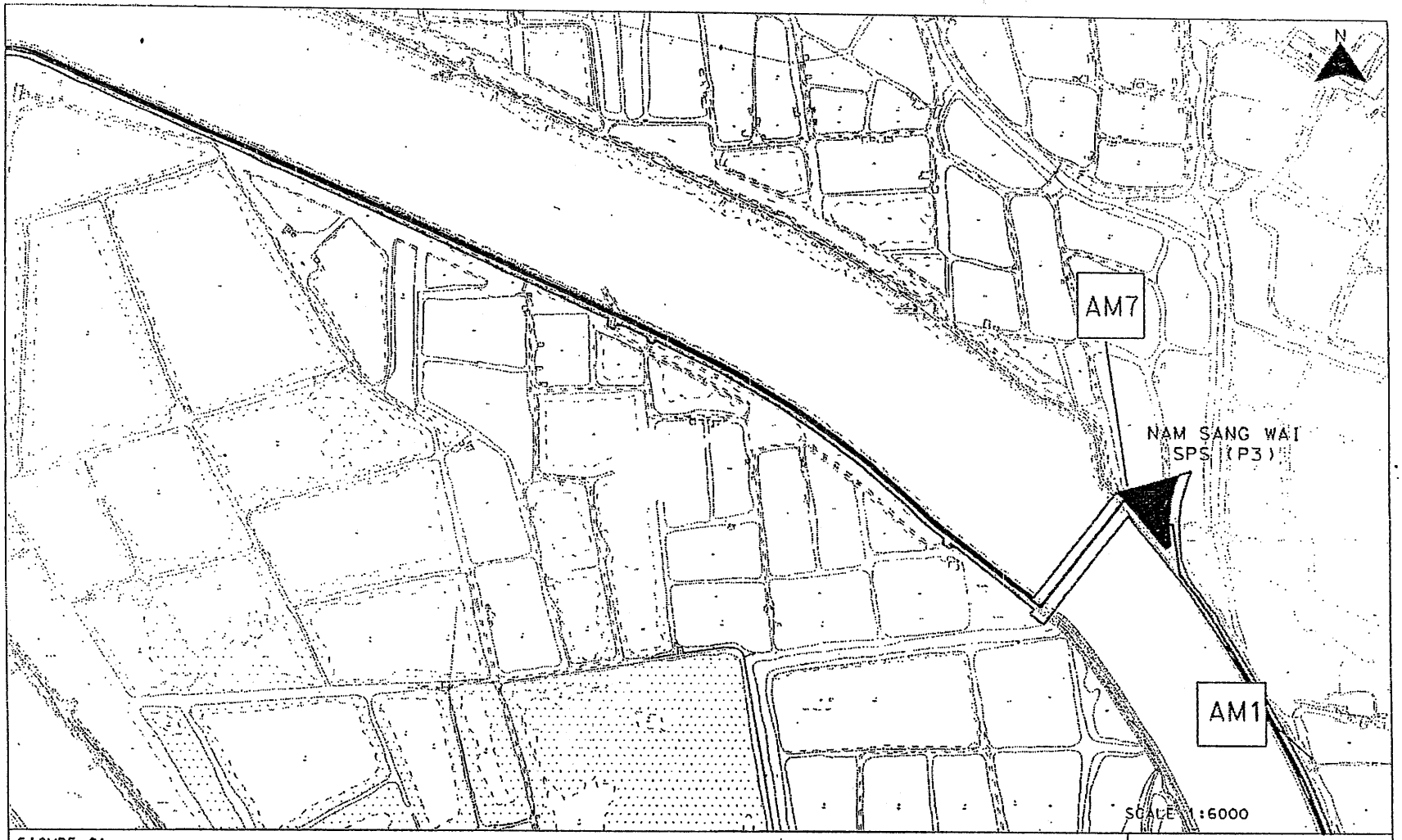


FIGURE C1

LOCATION OF DUST MONITORING STATIONS (AM1, AM2 & AM7)

USIN FILE: C2008/EMAA/EM8A-01

DATE: 23/08/01

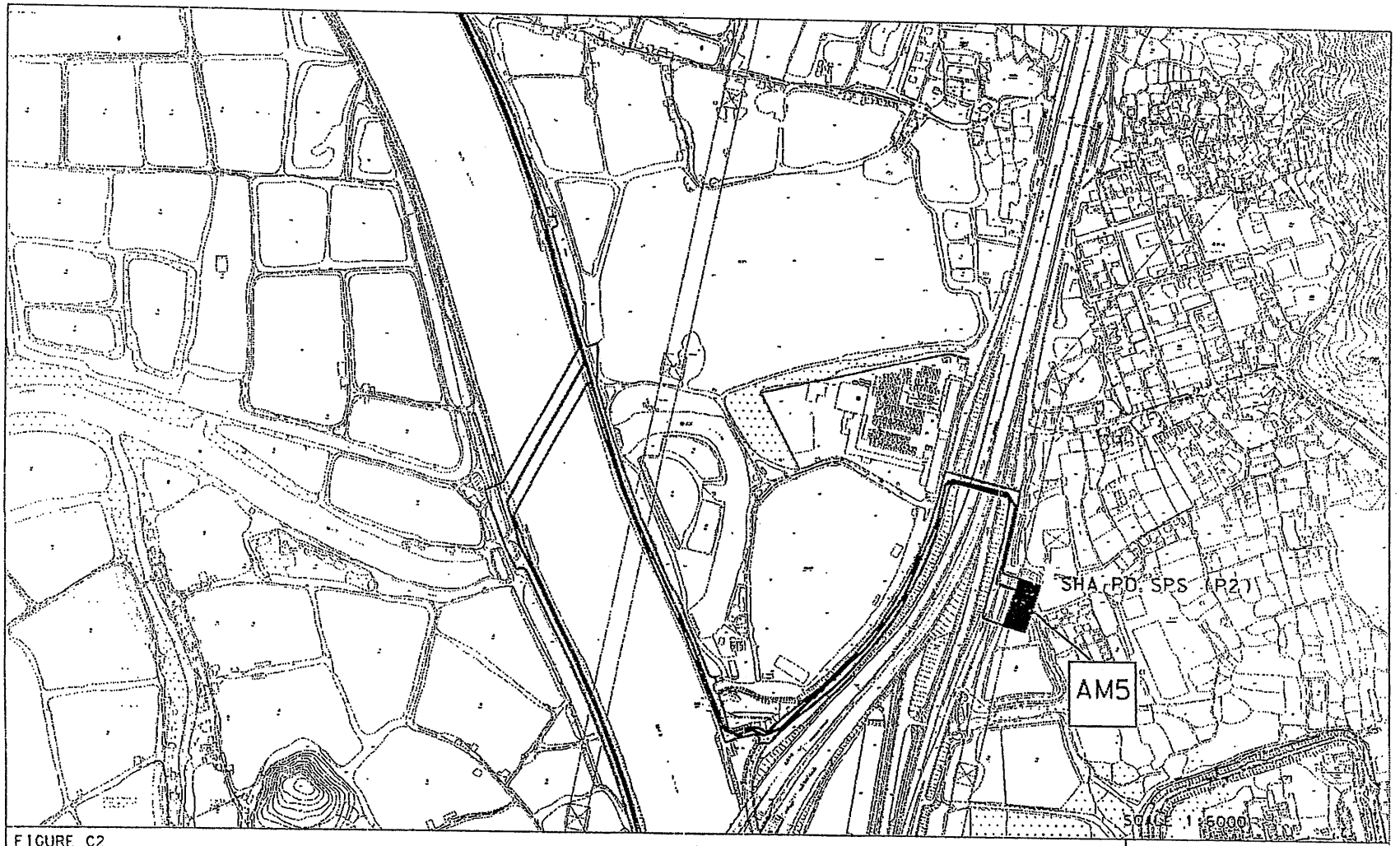


FIGURE C2

LOCATION OF DUST MONITORING STATION (AM5)

USTN FILE: C2006/EMAA/EMAA-c2
DATE: 23/03/01

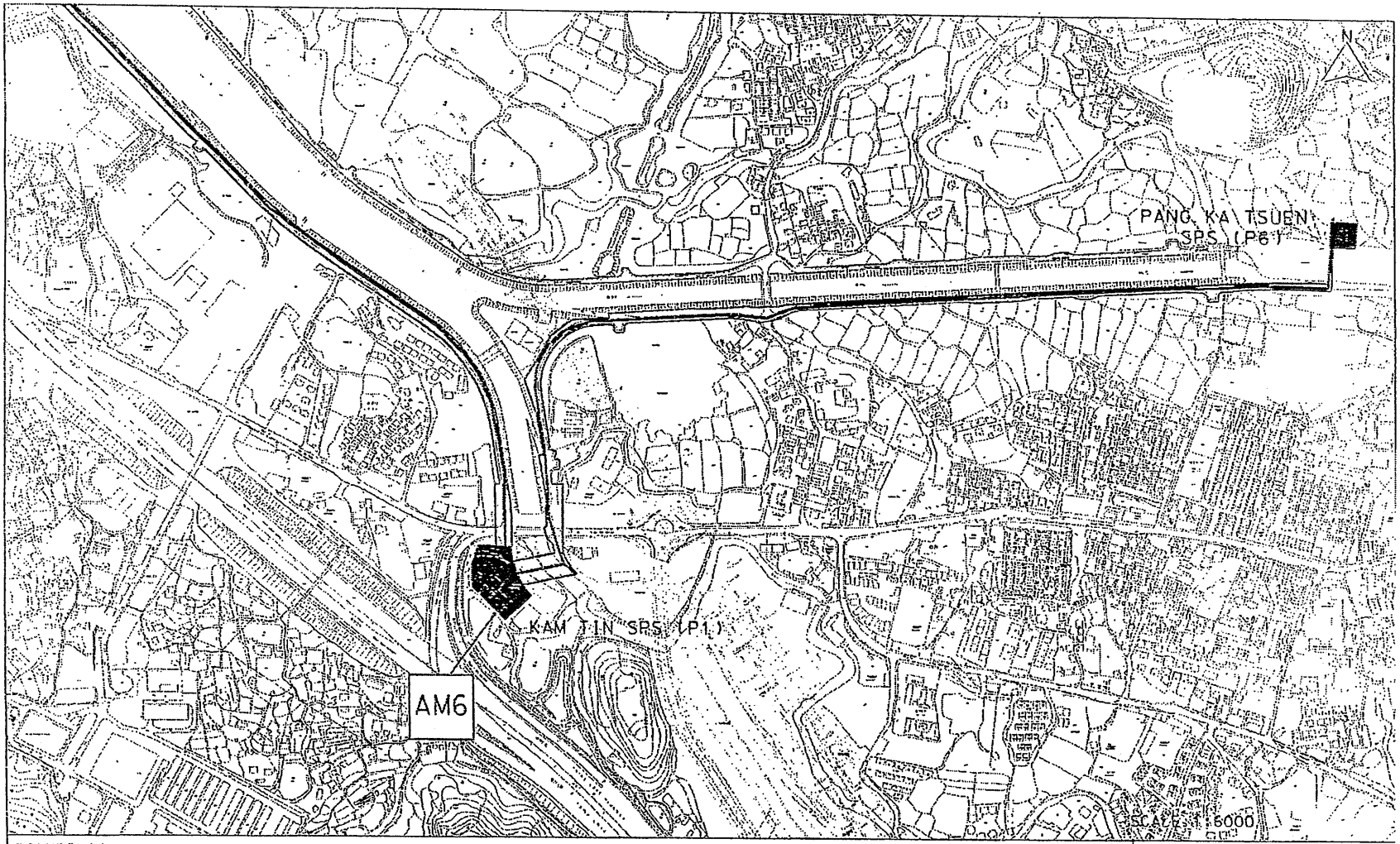


FIGURE C4

LOCATION OF DUST MONITORING STATIONS (AM4, AM6 & AM10)

USTN FILE: C2009/EMSA/EMSA-C4
DATE: 24/09/01

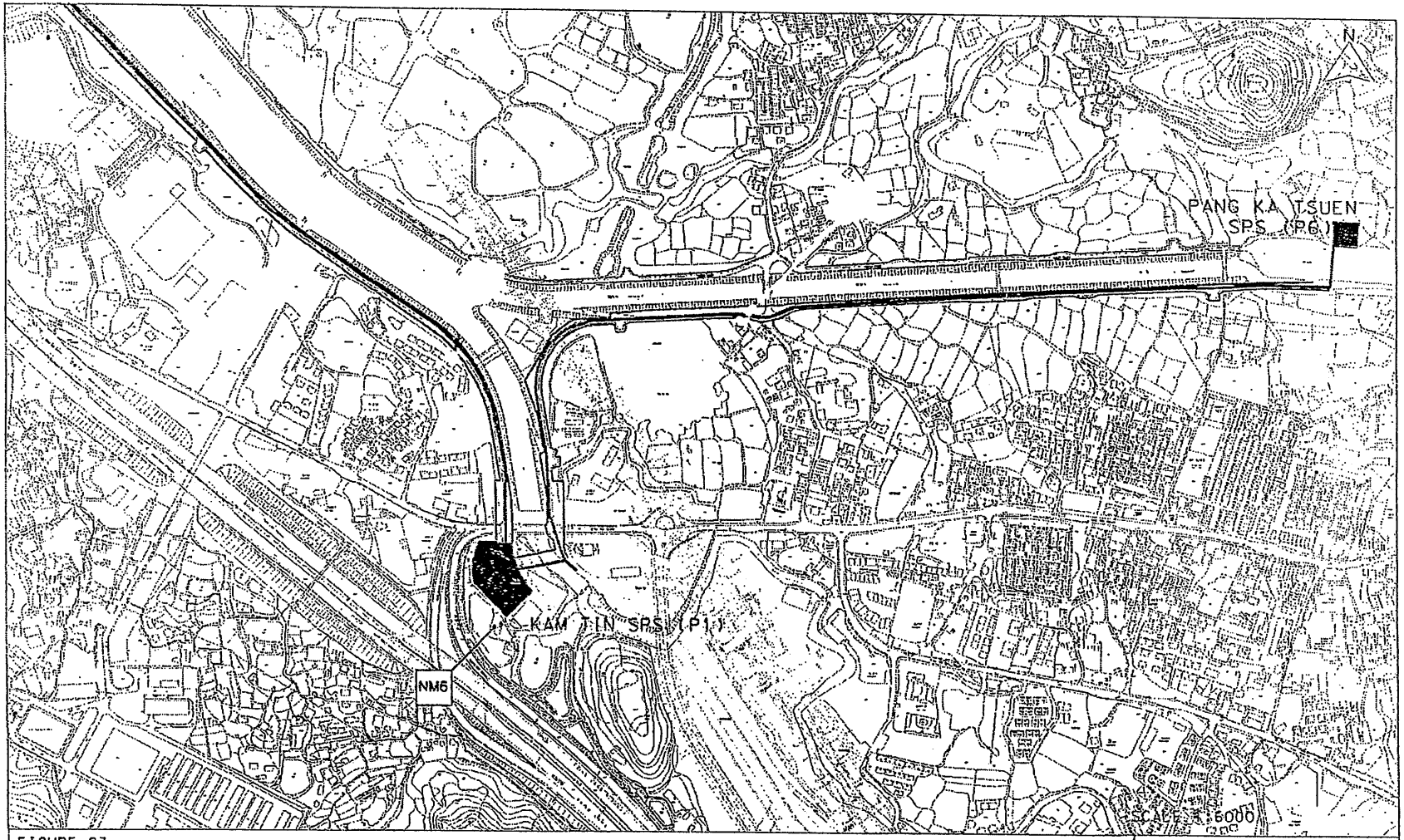


FIGURE C7

LOCATION OF NOISE MONITORING STATIONS (NM1, NM6, NM8, NM9)

USER FILE: C2008/EMSA/EMSA-C7
DATE: 23/08/01

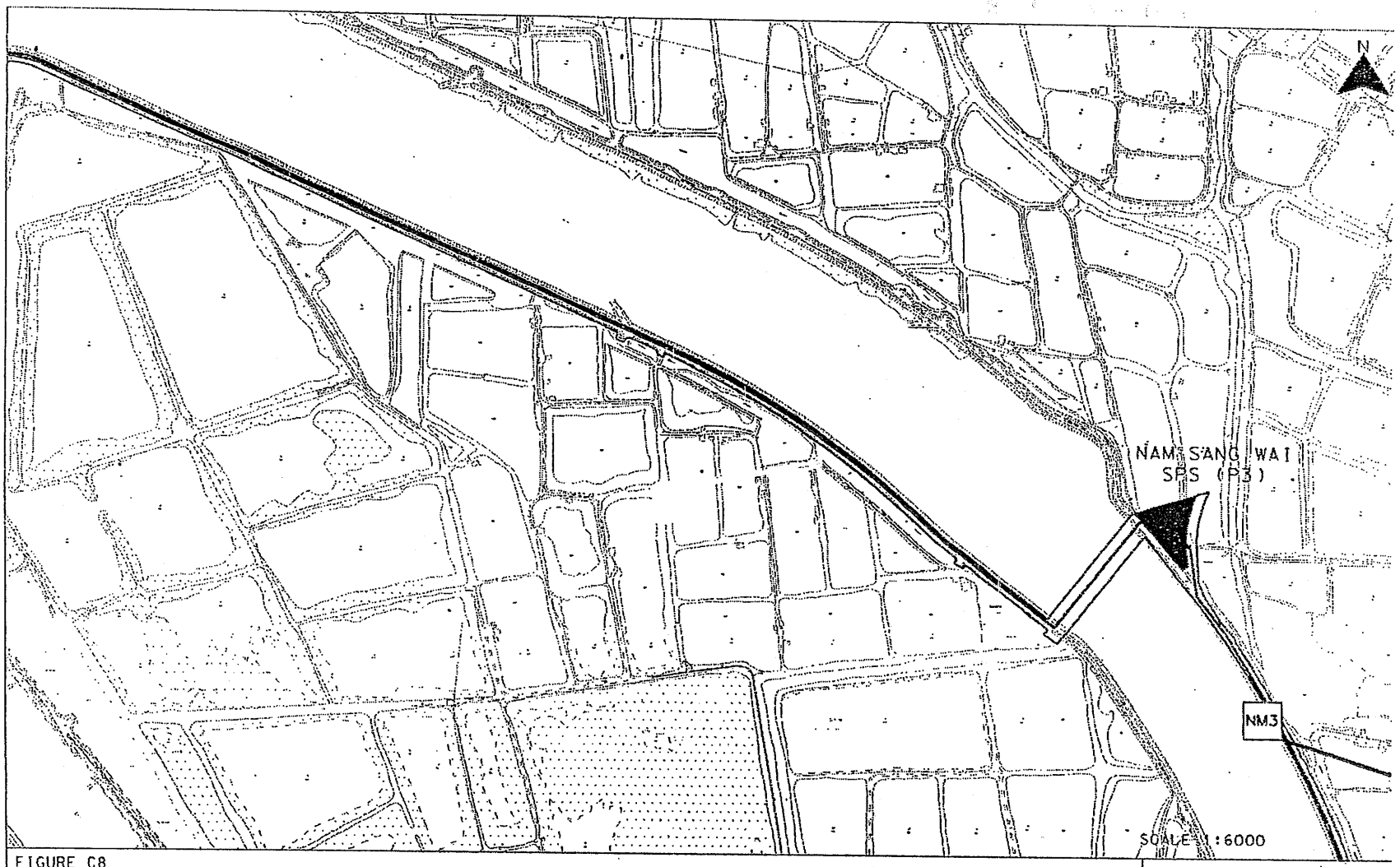


FIGURE C8

LOCATION OF NOISE MONITORING STATIONS (NM3, NM5)

USTN FILE: C2008/EM&A/EM3A-C8

DATE: 23/08/2001

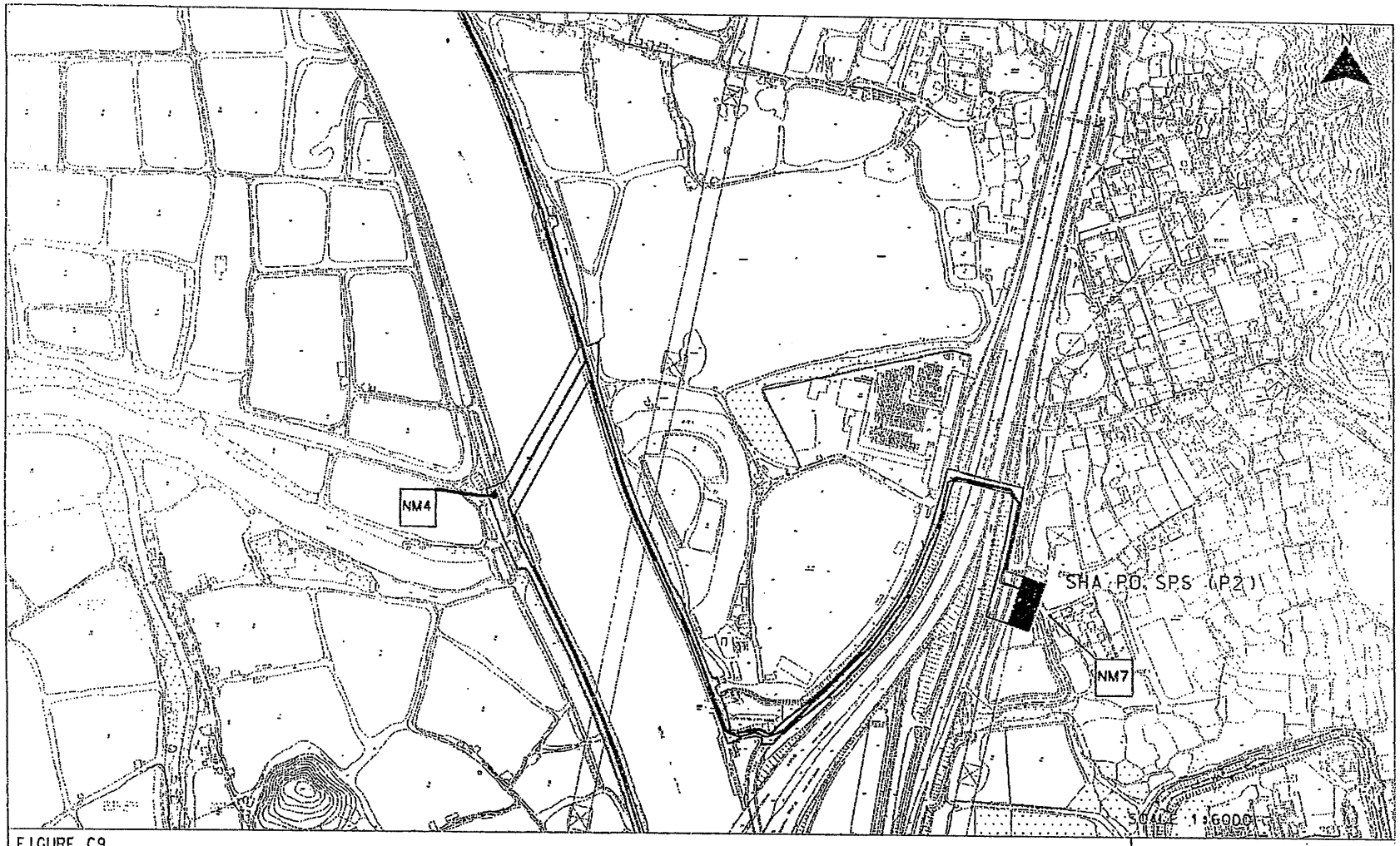


FIGURE C9

LOCATION OF NOISE MONITORING STATIONS (NM4, NM7)

USTN FILE: C2000/EHAA/EHAA-C9
DATE: 23/08/2001

Annex D

Event and Action Plan

Event and Action Plan for Construction Phase Air Quality

EVENT	ACTION			
	ET Leader	IEC	Engineer	Contractor
Action Level				
Exceedance for one sample	1. Identify source (s) of exceedance and inform IEC, Contractor and Engineer 2. Repeat dust measurements to confirm findings 3. Increase monitoring frequency to daily 4. Assess efficacy of remedial measures and keep the Contractor, IEC, and Engineer informed	1. Check monitoring data submitted by ET 2. Check monitoring data trends and Contractors working methods 3. Check and confirm Contractors proposed remedial actions and working methods are appropriate	1. Confirm receipt of notification of exceedance in writing 2. Remind the Contractor of his contractual obligations and review the Contractor's working methods 3. Discuss remedial actions with the Contractor and IEC 4. Inform complainant of actions taken, if necessary	1. Rectify any unacceptable practice 2. Liaise with Engineer and IEC to develop appropriate remedial measures to reduce dust impact 3. Amend working methods and remedial proposals if required by the Engineer or IEC 4. Implement the agreed remedial actions upon instruction from the Engineer and IEC
Exceedance for two or more consecutive samples	1. Identify source (s) of exceedance and inform IEC, Contractor and Engineer 2. Repeat measurements to confirm findings 3. Increase the monitoring frequency to daily to assess the efficacy of remedial measures and keep the Contractor informed 4. Discuss remedial actions with IEC and Contractor 5. If exceedance continues, arrange meeting with Engineer, IEC and Contractor to review working practices and identify further remedial actions 6. If exceedance stops, inform the Contractor and cease additional monitoring	1. Check monitoring data submitted by ET 2. Check monitoring data trends and Contractors working methods 3. Discuss with Contractor and Engineer on possible remedial measures 4. Check and confirm Contractors proposed remedial measures are appropriate 5. Determine the efficacy of remedial actions and keep the Engineer informed	1. Confirm receipt of notification of exceedance in writing 2. Remind the Contractor of his contractual obligations and review the Contractor's working methods 3. Discuss remedial actions with the Contractor and IEC 4. Ensure remedial measures are properly implemented 5. Inform complainant of actions taken, if necessary.	1. Rectify any unacceptable practice, if possible 2. Submit proposals for remedial actions to Engineer and IEC within three working days of notification 3. Discuss and amend remedial actions, if required, by the Engineer and IEC 4. Implement the remedial action (s) immediately upon instruction from the Engineer Discuss with Engineer and IEC, to optimise the effectiveness of the agreed remedial actions
Limit Level				

Event and Action Plan for Construction Phase Air Quality

EVENT	ACTION			
	ET Leader	IEC	Engineer	Contractor
Exceedance for one sample	1. Identify source (s) of exceedance and inform IEC, Contractor and Engineer 2. Repeat dust measurements to confirm findings 3. Increase monitoring frequency to daily 4. Assess efficacy of remedial measures and keep the Contractor, IEC, Engineer and EPD informed	1. Check monitoring data submitted by ET 2. Check monitoring data trends and Contractors working methods 3. Check and confirm Contractors proposed remedial actions and working methods are appropriate 4. Check and confirm Contractors proposed remedial measures are appropriate 5. Determine the efficacy of remedial actions and keep the Engineer informed	1. Confirm receipt of notification of exceedance in writing 2. Remind the Contractor of his contractual obligations and review the Contractor's working methods 3. Discuss remedial actions with the Contractor and IEC, 4. Ensure remedial measures are properly implemented 5. Inform complainant of actions taken, if necessary.	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to Engineer and IEC within three working days of notification 3. Discuss and amend remedial actions, if required, by the Engineer and IEC 4. Implement the remedial action (s) immediately upon instruction from the Engineer 5. Discuss with Engineer and IEC, to optimise the effectiveness of the agreed remedial actions
Exceedance for two or more consecutive samples	1. Identify source (s) of exceedance and inform IEC, Contractor and Engineer 2. Repeat measurements to confirm findings 3. Increase the monitoring frequency to daily to assess the efficacy of remedial measures and keep the Contractor informed 4. Discuss remedial actions with IEC and Contractor 5. If exceedance continues, arrange meeting with Engineer, IEC and Contractor to review working practices and identify further remedial actions 6. If exceedance stops, inform the Contractor and cease additional monitoring.	1. Discuss with Contractor and Engineer on possible remedial measures 2. Check and confirm Contractors proposed remedial measures are appropriate 3. Determine the efficacy of remedial actions and keep the Engineer informed	1. Confirm receipt of notification of exceedance in writing 2. Remind the Contractor of his contractual obligations and review the Contractor's working methods 3. Discuss remedial actions with the Contractor and IEC 4. Ensure remedial measures are properly implemented 5. If exceedance continues, instruct the Contractor to stop the relevant portion of work until the exceedance is abated 6. Inform complainant of actions taken, if necessary.	1. Rectify any unacceptable practice, if possible 2. Submit proposals for remedial actions to Engineer and IEC within three working days of notification 3. Discuss and amend remedial actions, if required, by the Engineer and IEC 4. Implement the remedial action (s) immediately upon instruction from the Engineer 5. Discuss with Engineer and IEC, to optimise the effectiveness of the agreed remedial actions

Event and Action Plan for Construction Noise				
EVENT	**ACTION**			
	ET Leader	**IEC**	**Engineer**	**Contractor**
Limit Level				
Exceedance for one sample	1. Identify source (s) of exceedance and inform IEC, Contractor and Engineer 2. Repeat dust measurements to confirm findings 3. If repeat measurements confirm exceedance ,increase monitoring frequency to daily 4. Assess efficacy of remedial measures and keep the Contractor, IEC, and Engineer informed 5. If exceedance stops, inform Contractor and cease additional noise monitoring	1. Check monitoring data submitted by ET 2. Check monitoring data trends and Contractors working methods 3. Check and confirm Contractors proposed remedial actions and working methods are appropriate	1. Confirm receipt of notification of exceedance in writing 2. Remind the Contractor of his contractual obligations and review the Contractor's working methods 3. Discuss remedial actions with the Contractor and IEC 4. Inform complainant of actions taken, if necessary	1. Rectify any unacceptable practice 2. Liaise with Engineer and IEC to develop appropriate remedial measures to reduce noise impact 3. Amend working methods and remedial proposals if required by the Engineer or IEC 4. Implement the agreed remedial actions upon instruction from the Engineer and IEC
Exceedance for two or more consecutive samples	1. Identify source (s) of exceedance and inform IEC, Contractor and Engineer 2. Repeat measurements to confirm findings 3. Increase the monitoring frequency to daily 4. Discuss remedial actions with IEC, Engineer and the EPD 5. Assess the efficacy of remedial measures and keep the Contractor informed 6. If exceedance continues, arrange meeting with Engineer, IEC and Contractor to review working practices and identify further remedial actions 7. If exceedance stops, inform the Contractor and cease additional monitoring.	1. Check monitoring data submitted by ET 2. Check monitoring data trends and Contractors working methods 3. Discuss with Contractor and Engineer on possible remedial measures 4. Check and confirm Contractors proposed remedial measures are appropriate 5. Determine the efficacy of remedial actions and keep the Engineer informed	1. Confirm receipt of notification of exceedance in writing 2. Remind the Contractor of his contractual obligations and review the Contractor's working methods 3. Discuss remedial actions with the Contractor and IEC 4. Ensure remedial measures are properly implemented 5. If exceedance continues, instruct the Contractor to stop the relevant portion of work until the exceedance is abated 6. Inform complainant of actions taken, if necessary.	1. Rectify any unacceptable practice, if possible 2. Submit proposals for remedial actions to Engineer and IEC within three working days of notification 3. Discuss and amend remedial actions, if required, by the Engineer and IEC 4. Implement the remedial action (s) immediately upon instruction from the Engineer 5. Discuss with Engineer and IEC, to optimise the effectiveness of the agreed remedial actions 6. Stop the relevant portion of work as determined by the Engineer until the exceedance is abated

Annex E

Complaint Handling Flowchart

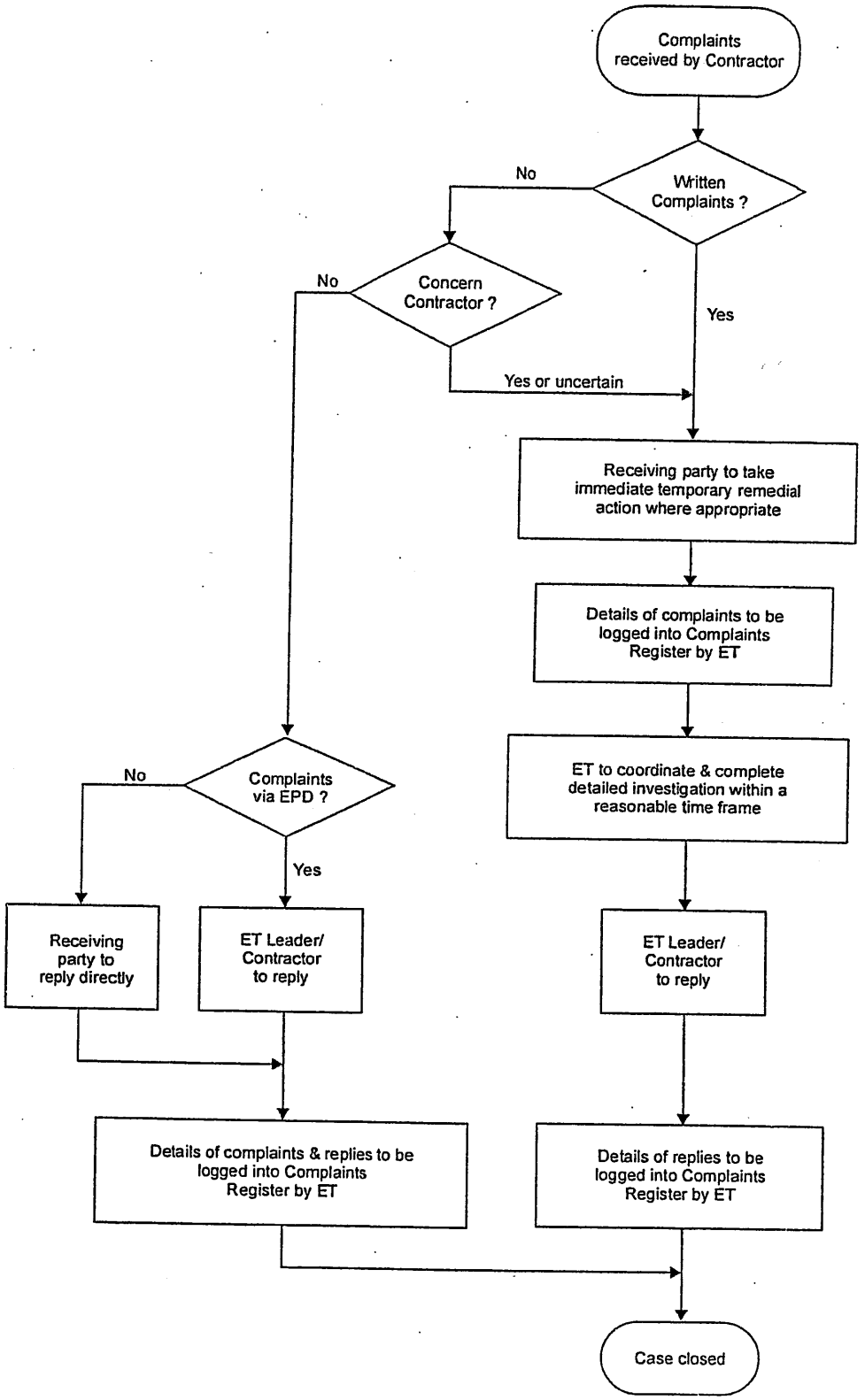


FIGURE 14.3a

COMPLAINTS HANDLING PROCEDURE

FILE: C2008L27
DATE:04/03/02



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