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# **1 INTRODUCTION**

## **1.1 PURPOSE OF THE MANUAL**

This Environmental Monitoring and Audit (EM&A) Manual has been prepared by ERM as a supplementary document of the *Planning and Engineering Feasibility Study for Sham Tseng Development Environmental Impact Assessment (EIA) - Final Report* (Agreement No. CE 93/97), ERM-Hong Kong, Ltd.

The purpose of the 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 and operational phases of Sham Tseng Development (STD) Project. 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 on 15 April 1998 have been commissioned by the Civil Engineering Office, Civil Engineering Department (CED). The Sham Tseng Development Feasibility Study (STDFS) and the Sham Tseng Further Additional Studies (STFAS) were conducted in 1983 and 1985, respectively. These studies concluded that a reclamation between the former San Miguel Brewery Site and Anglers' Beach could be undertaken. The preferred development option of the STDFS was incorporated in the Tsuen Wan West Outline Development Plan No.D/TWW/2 that was endorsed by the Development Progress Committee in May 1987.

The Territorial Development Strategy Review, which was released for public consultation in July 1996, indicated that the housing supply of currently approved plans and programmes will not be adequate to meet the estimated housing demand after 2000/2001. As a result, a study has been commissioned by CED to investigate and examine the planning and engineering feasibility of enlarging the size of reclamation from the originally proposed 6 ha to 25 ha, increasing the available land area for potential development of housing, G/IC facilities and district open space.

The CED commissioned Scott Wilson, in association with ERM-Hong Kong Ltd, ACLA, Townland Consultants Ltd and MVA Asia Ltd to undertake the EIA for this Study. 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 and operation of STD. In particular, the requirements for ensuring compliance with the mitigation measures specified for noise, dust, water quality, waste management, marine ecology and landscape and visual impacts are defined.

### 1.2.1 *Previous Reports*

Relevant background information on the study may be found from the following sources:

- Environmental Impact Assessment Report of the Planning and Engineering Feasibility Study for Sham Tseng Development (*Scott Wilson(Hong Kong) Ltd*);
- Ting Kau and Sham Tseng Sewerage Scheme, Environmental Impact Assessment Study (Agreement No. CE 35/94); and
- Ting Kau and Sham Tseng Sewerage Scheme, Sewerage Treatment and Disposal Facilities (Agreement No. CE67/94);

### 1.2.2 *Proposed Works*

The proposed Sham Tseng Development “the Project” comprises approximately 15.2 ha of reclamation along the coast between the planned Ting Kau and Sham Tseng Sewage Treatment Works and Tsing Lung Tau.

The reclamation is intended to provide land for a maximum of 4,470 flats for approximately 14,010 residents within the residential development areas, in order to meet the estimated housing demand after 2000/2001. The scope of the project comprises:

- formation of about 15.2 hectares of land using public filling materials and/or sand fill material supplied by the Contractors;
- construction of about 1,100 metres of seawall;
- construction of the Sham Tseng Bypass (about 2,400 metres) including connections to the proposed widening of Castle Peak Road;
- construction of about 875 m long waterfront promenade integrated with and located above the Sham Tseng Bypass;
- construction of a government complex (as compensation for the existing Anglers’ Beach) to accommodate a leisure centre, with swimming pool and other sports facilities, and social welfare facilities (with refuse collection point);
- construction of sewerage treatment facilities with a flow capacity of about 4,600 m<sup>3</sup> per day based on chemical treatment;
- construction of sewage pumping station and sewage pipework;
- construction of about 450 metres of nullah and infrastructure drainage works;
- construction of about 900 metres of access road;
- construction of a footbridge;
- construction of a stub pier to replace an existing ‘katio’ pier;
- diversion of an existing 200 mm diameter submarine water pipeline and extension of a 300 mm diameter water main adjacent to Castle Peak Road;
- construction of a public transportation terminus and public toilet; and
- construction of environmental mitigation measures.

It is estimated that the capacity of the planned TKSTSTW will not be able to handle the additional sewage discharge from the development above the STD. Sewage Treatment Facilities for Sham Tseng Development (STFSTD) is therefore proposed.

It is also estimated that a new sea front salt water pumping station will be installed in the new reclamation area to provide salt water for flushing to the development above the STD and also the existing Sham Tseng and Tsing Lung Tau areas

The Project area and extent of reclamation are shown in *Figure 1.2a*.

### 1.2.3 *Development and Planning*

In April 1998, the Consultants commenced the Stage 1 Study for STD. In August 1998, a Value Management Workshop (VMW) was held to review the findings of Stage 1 Study with the conclusion that the 16.3 ha reclamation layout was the preferred option, based on which planning of STD would proceed. In September 1998, a Working Group session was held among concerned departments to discuss the Bypass issues and agreed that the waterfront alignment was the preferred option pending resolution of the interface with the committed TKSTSTW. In November 1998, CPLD endorsed the proposed 16.3 ha reclamation layout and the provision of a waterfront Bypass subject to resolution of the interface problems with Castle Peak Road Improvement Project (CPRIP), the TKSTSTW and Electricity Sub-station (ESS), etc. In December 1998, a Steering Group Meeting was held to discuss and finalise the Planning - Stage 1 Report, and the finalised Planning - Stage 1 Report was issued in December 1998. It has been agreed in the Value Management Workshop held in August 1999 that the proposed reclamation area excluding the area of the Marine Basin becomes 15.2ha.

In selecting the preferred options of the reclamation area and the Bypass alignment, the following main issues have been considered:

#### *Reclamation*

- marine safety of the Ma Wan Fairway; and
- the extent of environmental impact in terms of water quality, air quality, noise and marine ecology taking account of the size and scale of the reclamation.

#### *Sham Tseng Bypass*

- the engineering feasibility;
- the potential noise and air quality impacts and mitigation measures required for the Bypass;
- the planning constraints associated with the Bypass alignment; and
- the landtake of the reclaimed land that is reserved for TKSTSTW and ESS.

Five reclamation layout options were proposed with the various options providing an area of land varying from 6 ha to 25 ha. These options were evaluated during the First Value Management Workshop in August 1998. The preferred option of the reclamation layout (Option 1) provides an optimum solution to satisfy the essential criteria including community acceptance, marine safety, land production, environmental and traffic impact, infrastructure issues and urban design.

While Routes 1A and 2A are the inland alignment options and Route 4A is the waterfront alignment option, Route 3A is a combined inland and waterfront alignment option. These options were evaluated after the First Value Management Workshop in August 1998. The preferred Sham Tseng Bypass (Route 4A) maximises the development potential of the reclamation site while minimises environmental and marine traffic impacts.

As indicated in the Master Development Plan (MDP), STD will provide land for housing development. The potential environmental impact, including noise from road traffic and kaito pier, odour and industrial emissions from the STW and the Garden Bakery have been considered. The environmental planning guidelines specified in the *Hong Kong Planning Standards and Guidelines* (HKPSG) have been observed in formulating the MDP. More than 50 m buffer distances between the planned Comprehensive Development Area (CDA) at Area 5 and the STFSTD at Area 6 have been reserved to minimise the potential noise and odour impacts. A buffer distance of more than 100 m is also provided between the reprovisioned kaito pier at the Marine Basin and the residential towers at Area 2. In addition, the residential towers at the CDA sites at Areas 4 and 5 and the residential development at Area 2 are protected from adverse road traffic noise impact along the proposed Sham Tseng Bypass by the semi-enclosure formed by the promenade above the Bypass. This promenade will extend from the Open Space at Area 6 to the western end of the reclamation.

The target plot ratio for residential site is 5 in line with those adopted by the CDA site and the building height is restricted to 220 mPD. To address the existing shortfall of G/IC facilities, STD will provide land for the development of schools, water supplies facilities, social welfare facilities, a public transport terminus, etc, together with a 1 ha reserve for expansion sewage treatment facilities. STD will provide a Leisure Centre with swimming pools to compensate the loss of Anglers' Beach. In addition, STD will provide land to meet the shortfall of district open space.

Stage 2 of the Study commenced in April 1999. In October 1999, a Steering Group Meeting was held to discuss and finalize the Planning - Final Report, and the finalized Planning - Final Report was issued in January 2000.

#### 1.2.4 *Development Benefits*

The Project will achieve both economic and social benefits for the local population and the economy of the Hong Kong SAR, in particular the construction industry. These benefits include:

- meeting housing demand of the local area and the SAR;
- provision of 2 primary schools and a secondary school on the reclamation to address the district shortfall;
- provision of a total 1.76 ha of land to meet district open space requirements;
- provision of the proposed Bypass to relieve traffic conditions along Castle Peak Road and Sham Tseng Township;
- provision of 1 ha land for sewage treatment facilities; and
- a public filling site during reclamation to address the shortfall of public filling capacity in the SAR.

#### 1.3 *STUDY AREA*

According to the requirements of the *Brief*, various key environmental issues to be addressed have different definitions of the Study Area. They are:

- *Marine Water Quality Impact*: The Study Area covers the eastern part of Pearl River Estuary, East Lamma Channel, West Lamma Channel, and Tathong Channel;
- *Noise Impact Assessment*: The boundary of the Study Area will be 300 m outside the boundary of the reclamation site (the Site) ;
- *Air Quality Impact Assessment*: The boundary of the Study Area will be 500 m outside the boundary of the Site;
- *Landscape and Visual Impact*: The boundary of the Study Area for Landscape Impact Assessment should include all areas within 500 m outside the boundary of the Site, while the Study Area for the Visual Impact Assessment should be defined by the visual envelope;
- *Marine Ecological Impact and Fisheries Impact*:

## 1.4 PROJECT DESIGN

The revised MDP accommodates the waterfront Bypass alignment and includes a main podium open space in the geographical centre of the STD and a major open space at the western portion of the reclamation.

The revised MDP has the following characteristics:

- three school sites south of the Lido Garden (Area 3);
- a government complex that include a Leisure Centre, social welfare facilities (such as a Hostel for Moderately Mentally Handicapped (HMMH) and a Hostel for Severely Mentally Handicapped (HSMH) and a Day Activity Centre) at the eastern portion of the proposed reclamation and adjacent to the TKSTSTW reclamation (Area 7);
- a STFSTD at Area 6;
- an open space at the western end of the proposed reclamation (Area 1);
- podium open space (Area 4) adjacent to the school sites near the CDA at the former San Miguel Brewery (Area 5);
- a Residential Home Care for the Elderly at Area 5;
- a 30 m wide waterfront promenade above the proposed Bypass;
- decked nullahs;
- a salt water pumping station meeting the prevailing Water Supplies Department (WSD) standard located at the west of the reclamation near the waterfront (Area 1);
- an underground sewage pumping station at Area 4;
- a refuse collection point (RCP) at Area 6;
- two 30 m wide non-building areas, one for the proposed twin 300 mm diameter and another for the existing 200 mm diameter water mains, both of which will provide fresh water to Ma Wan;
- a Public Transport Terminus (PTT) below the podium of the residential development site at Area 4;
- a public toilet (PT) within the PTT at Area 4;
- commercial complex with post office in Area 4;

- a marine basin with Katio Pier (Area 1) at the west of the reclamation more than 100 m away from the nearest housing developments;
- about 4470 flats and 14 010 residents within the housing developments above the STD.

## 1.5 PROJECT CONSTRUCTION

Under the Environmental Impact Assessment Ordinance (EIAO), Environmental Permits (EPs) are issued prior to the construction of a Designated Project (DP). Under the EIAO, a person should not construct or operate a DP listed in the Schedule 2 without an EP for the project unless it is exempt under Section 9(2) of the Ordinance.

The Sham Tseng Development (STD) Project is an engineering feasibility study of an urban development project with a Study Area covering more than 20 ha and is, therefore, considered as a DP under item 1 of Schedule 3 "Major Designated Projects Requiring Environmental Impact Assessment Reports". In total, the Project contains 4 individual elements which have been classified as requiring EPs under the EIAO, to be granted by EPD, before their construction and operation. Table 1.3a provides a summary of the four individual DPs in this Project.

**Table 1.3a** *Schedule 2 Designated Projects involved in the Sham Tseng Development under the EIAO*

Designated Project	EIAO Reference	Remarks
Reclamation works (15.2 ha)	Schedule 2, Part I, C.1	Reclamation more than 5 ha in size including dredging of marine basin, pier structures and berthing facilities
Sham Tseng Bypass	Schedule 2, Part I, A.1	A primary distributor with maximum predicted (2019) traffic flow more than 3000 vehicles per hour
Sewage Pumping Station (with installed capacity more than 4500 m <sup>3</sup> per day)	Schedule 2, Part I, F.3	With an installed capacity of more than 2000 m <sup>3</sup> per day and a boundary less than 150 m from the planned residential area and schools
Underpass below Castle Peak Road (about 370 m long)	Schedule 2, Part I, A.9	It is a road fully enclosed by decking above and by structure on the sides for more than 100 m

It is understood that CED will apply for EPs for the construction of the 15.2 ha reclamation, construction and operation of the Sham Tseng Bypass and the Castle Peak Road Underpass with reference to the assessment undertaken in this EIA Final Report.

Other Project infrastructural works that are not considered as DPs comprise:

- The Sewage Treatment Facilities for Sham Tseng Development is not considered as a DP under Schedule 2, Part I, F.2 as the installed capacity will be about 4600 m3 per day (less than the 5000 m3 per day as specified in the EIAO).
- The construction and operational impacts of the planned sewage outfall, which has been assessed and reported in the *Final Assessment Report, Ting Kau and Sham Tseng Sewerage Scheme, EIA (1995)*, has been registered under the EIAO (EIA-077/BC). The proposed combined sewage outfall, which replaces the planned sewage outfall to handle additional sewage loading from the population above the STD, is not expected to generate further adverse environmental impacts during construction and operation (as outlined in *Annex 11* of the EIA report). Thus, it is not considered as a 'material change' under the EIAO.

## 1.6 OPERATION OF THE PROJECT

Table 1.6a summarises the major activities undertaken above the STD during operation.

**Table 1.6a Major Activities undertaken during the Operation of the STD**

Facilities / Infrastructure	Nature of Activity	Potential Environmental Issue
Three schools	Education	Sewage discharge, refuse generation
Government Complex	Recreation	Sewage discharge
Bypass	Roadwork	Traffic noise and traffic exhaust gas emission
WSD salt water pumping station	Flushing water intake	Noise from pump house
Public transport terminus with public toilet	Public transport	Traffic exhaust gas emission and traffic noise
Marine basin	Katio and ferry services	Ferry noise
Residential development	Housing	Sewage discharge, refuse generation
Sewage treatment facilities for Sham Tseng Development	Sewage treatment	Operational noise, odour and water quality impacts
Sewage pumping station	Sewage diversion	Noise and odour from pump house
Refuse collection point	Refuse collection and waste loading of refuse collection vehicles	Noise, odour, sewage generation
Social Welfare Facilities (including HMMH, HSMH and Day Activity Centre)	Social welfare services	Sewage and waste
Commercial complex with public toilet and post office	Commercial activities	Commercial waste and sewage
Residential Care Home for the Elderly	Social welfare service	Sewage and waste
Open space	Recreation and leisure	-

## 1.7 OBJECTIVES OF THE ENVIRONMENTAL MONITORING AND AUDIT PROGRAMME

The construction and operational impacts resulting from the implementation of the STD are specified in the main content of the EIA - 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 the Implementation Schedule contained in *Annex G*. In order to ensure that these mitigation measures are fully and effectively implemented, the EIA recommends that EM&A should be undertaken for noise, air, water, waste, marine ecology, fisheries 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. As the Sham Tseng Development Project comprises of four Schedule 2 Designated Project's (DP's), this EM&A Manual has been compiled in such a manner so that each of the DP's can be implemented independently of each other. The main sections of this EM&A Manual provides a general account of the monitoring and audit requirements for all of the DP's, while the specific EM&A requirements for each of the DP's are defined in *Annexes A, B C and D*. Dredging of the marine basin, pier and berthing facilities construction are integral part of the Reclamation works DP, as contained in Annex A and Table 13.2a of the Implementation Schedule in Annex G.

For all those Non-Designated Projects (non-DP), the recommended EM&A requirements are summarised in Table 13.1a of the Implementation Schedule in Annex G.

Depending on the construction sequence and contractual arrangements, the EM&A requirements of the non-DPs, such as dredging of the marine basin, pier and berthing facilities construction, nullah dredging and decking and diversion/extension of drains, may be included as part of the Reclamation works DP, as contained in Annex A and *Table 13.2a* of the Implementation Schedule in *Annex G*.

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.

## 1.8 THE 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, and marine 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 Contingency Plans (ECPs), 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.

## 1.9 STRUCTURE OF THE EM&A MANUAL

Following this introductory Section, the remainder of the 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 noise, and lists relevant monitoring equipment, compliance and event contingency plans (ECPs);
- *Section 6* details the requirements for baseline and impact monitoring for air quality, and lists relevant monitoring equipment, compliance and ECPs;
- *Section 7* details the audit procedures with regard to waste management issues;
- *Section 8* details the requirements for baseline and impact monitoring for water quality, and lists relevant monitoring equipment, compliance and ECPs.
- *Section 9* details the requirements for biogas monitoring and lists the relevant monitoring equipment and mitigation measures.
- *Section 10* describes the scope and frequency of site auditing;
- *Section 11* details the EM&A reporting requirements;
- *Annex A* details the specific EM&A requirements for the Schedule 2 Designated Project: Reclamation works;
- *Annex B* details the specific EM&A requirements for the Schedule 2 Designated Project: Sham Tseng Bypass;
- *Annex C* details the specific EM&A requirements for the Schedule 2 Designated Project: Sewage Pumping Station;
- *Annex D* details the specific EM&A requirements for the Schedule 2 Designated Project: Underpass below Castle Peak Road;
- *Annex E* contains the figures identifying the noise, air, water and biogas monitoring locations as described in Annexes A, B, C and D;
- *Annex F* contains the details of the recommended Reporting Documentation; and
- *Annex G* contains the implementation schedule.

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, IC(E) and EPD, and when the proposed work processes and activities have been determined following any supplementary environmental reviews which may be required. The primary 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 and operational phases of each of the DP's.

### 2.2 GENERAL

#### 2.2.1 Sham Tseng Development EIA

The STD EIA report provides an assessment of the predicted scope and extent of likely environmental impacts resulting from the construction and operation of the STD. 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 G. 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 EM&A Manual (this document) is submitted at the time of the EIA and 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 and operation phases, this 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 Manual provides details of the specific monitoring requirements (e.g. noise, air, water, bio-gas etc) for each of the Designated Projects. This EM&A programme also outlines guidelines for site inspections as a means of identifying and resolving problems, and the associated reporting requirements.

This EM&A Manual should be reviewed (as necessary) during the detailed design stage of the project if it is determined, or anticipated, that substantial changes to the extent or scope of the Project may occur which could have an influence on the Project's environmental performance. In this instance, it is customary that a revised assessment and EM&A Manual are produced to maintain the relevance of the EM&A process to the Works. The same process should also be followed on award of the project.

### 2.2.3 *Contractual Documentation*

In order to ensure that Contractor(s) implement the recommended mitigation measures during the Project's design and construction phases, it is recommended that their contractual documentation should include clauses related to compliance with the appropriately recommended mitigation measures / environmental monitoring requirements. In addition, the contractual documentation should define appropriate contractual mechanisms to ensure compliance with these environmental requirements. The range of mechanisms available to the Engineer should reflect the priority that the Client gives to environmental issues, possibly including a provision for suspending works pending the remediation of persistent environmental problems. Similarly, the inclusion of environmental performance milestone payments could be considered by the Client as a means of enhancing the environmental performance and encouraging the design and construction Contractors to meet these contractual obligations.

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 STD 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 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 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, IC(E) 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(s).

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 IC(E).

The contractual requirement for an EMP would generally comprise appropriate extracts from (and references to) the Project EIA 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 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 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**

The use of an electronic communication and data recording system would facilitate the rapid and effective communication of the Contractor's environmental performance, as well as serving as a management tool for the Contractor. The system has the potential to interface with EPD's *Specialised Electronic Environmental Monitoring and Audit (SEEMA)* system and so function as a database for the entry of all recorded monitoring and audit information. In addition, the system could:

- automatically issues Notifications of Exceedances and track their completion;
- action Event Contingency Plans and track their completion;
- store details of complaints;
- store details of licenses/permits and notify of forthcoming expiry dates;
- store construction activity details and other relevant site information and link these to the EM&A Implementation Schedule; and
- allow retrieval of electronic versions of the EM&A Manual and other documents.

## **2.4 OPERATIONAL PHASE**

### **2.4.1 EM&A Manual**

Prior to the commencement of STD operations, it is envisaged that the Civil Engineering Department (CED) shall be responsible for reviewing and updating this EM&A Manual to make it specific to the Project's operational phase.

The operational phase EM&A Manual shall set out the detailed requirements for environmental monitoring and auditing, the organisational arrangements, the mechanisms for ensuring that the recommended mitigation measures are fully and effectively implemented, and the actions to be taken in the event of any exceedances of the event or action limits.

It is recommended that the operational phase EM&A Manual should be regularly reviewed, and if required, updated (at least once a year) to incorporate any amendments to the organisational arrangements or the environmental monitoring and auditing requirements that may result from changes to operations of the Project.

It is envisaged that the operational phase EM&A Manual will, in effect, act as a guide to personnel involved with implementing the environmental monitoring and auditing requirements.

#### **2.4.2 *Environmental Management Plan***

In order to ensure compliance with the environmental requirements recommended in the approved EIA Report for the operational phase, it will be necessary to establish robust and specific environmental management procedures. In order to achieve this, it is recommended that the CED produces an EMP that details the environmental management mechanisms and procedures for that it will implement to effective compliance with the stated mitigation measures and environmental monitoring and auditing requirements. It is envisaged that this operational phase EMP will be similar in format to that recommended under *Section 2.3.2* for the construction phase, and that it will set out an appropriate supervisory framework for monitoring the effectiveness of the proposed procedures. The EMP should complement the operational phase EM&A Manual.

During the development of the EMP, it is recommended that CED draws upon documentation such as ISO 9000/14000.

#### **2.5 *SUMMARY***

The environmental management concepts described above have evolved from previous experiences in implementing large scale EM&As 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(s) for each of the Designated Projects shall appoint an Environmental Team (ET) to conduct the monitoring and auditing works and to provide specialist advice to the Contractor(s) 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 "Environmental Checker" (IC(E)) 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. The organisation and lines of communication with respect to environmental works are shown in *Figure 3.2a*.

For the purpose of this 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

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 IC(E), as required, and undertake any corrective actions instructed by the Engineer;
- provide information/advice to the ET or IC(E) 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*

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 Contingency Plan in the event of any exceedance;
- employ an Independent Environmental Checker (IC(E)) to audit the results of the EM&A works carried out by the ET; and
- 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*

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 IC(E), 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*

An Independent Environmental Checker (IC(E)) 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 reclamation works are assumed to be carried out in four phases, progressing from west (Anglers' Beach) to east (Ting Kau and Sham Tseng Sewage Treatment Works) (see Figure 1.2a). The works are expected to be completed by December 2008.

According to the preliminary construction programme, the proposed Sham Tseng Bypass and the residential development in Area 2 will be completed by 2012, with other residential developments completed around 2013 / 2014.

### 3.3 *OPERATIONAL EM&A REQUIREMENTS*

The management system described above will not be extended to cover the operational phase. However, an appropriate framework for undertaking the operational phase EM&A requirements should be developed and implemented by the CED.

Suitably qualified environmental practitioners shall be employed to undertake any operational environmental monitoring requirements.

## 4 EM&A GENERAL REQUIREMENT

### 4.1 INTRODUCTION

In this Section, the general requirements of the EM&A programme are presented with reference to the relevant EIA findings that have formed the basis of the scope and content of the programme.

### 4.2 SUMMARY OF THE ENVIRONMENTAL IMPACT ASSESSMENT

A summary of the key findings of the EIA that have a bearing on the objectives, scope and content of the EM&A programme are presented below. The recommended mitigation measures and schedule for their Implementation Schedule are detailed in *Annex G*.

#### 4.2.1 Noise

##### *Construction Noise*

Construction noise was highlighted as a concern with unmitigated construction activities associated with the Sham Tseng Reclamation predicted to result in exceedances of the daytime construction noise criteria at most of the nearby noise sensitive receivers (NSRs) during the normal working hours. The most affected areas were predicted to be the residential buildings at the former Union Carbide Tower 2, DD387 Lot 99, the former San Miguel Brewery Site and Goldenville.

In order for the works to meet the required noise criteria, the EIA made recommendations for the implementation of appropriate mitigation measures to minimise the predicted noise impacts. The type of measures predicted as being required included the use of quiet plant, on-site movable noise barriers, limiting the number of plant operating concurrently and restricting the operating PME time usage to 50% and 25% as required. Regular impact monitoring is recommended at NSRs throughout the construction phase in order to verify compliance with the required noise criteria.

##### *Operational Noise*

Noise impacts arising from road traffic on Castle Peak Road and the proposed Sham Tseng Bypass were predicted to be the main sources of noise during the operational phase. Unmitigated traffic noise from the proposed development in the year 2019 was predicted to cause exceedances of the noise criteria contained in the *Hong Kong Planning Standards and Guidelines* (HKPSG). The worst affected areas were predicted to be at the existing NSRs at Sea Crest Villa, Goldenville, Dragon Garden, the planned NSRs at residential development (Area 2), Golden Villa and the educational uses in Area 3. The implementation of a combination of 3.5 m and 6 m high roadside vertical barriers, cantilever noise barriers of 6 m vertical section and 3 m horizontal section, semi-enclosure, extension of the promenade at the western end, special building layout design on Area 2 and re-orientation of the proposed

secondary school layout in Area 3 have been recommended to alleviate the traffic noise impacts.

Residual impacts after mitigation were identified at the planned Area 3 secondary school, with 13 noise sensitive rooms requiring technical remedies in the form of window insulation and air-conditioning. Noise impacts from fixed noise sources were not considered to generate any adverse impacts to the NSRs provided that the sound power levels (SWLs) from the different fixed plant were restricted to below the maximum permissible SWLs defined in the EIA Report.

EM&A for operational noise will be required to ensure that the traffic noise criteria is complied with at the NSRs.

#### 4.2.2 *Air Quality*

##### *Construction Air Quality*

Construction dust was identified as the main air quality issue during the construction phase of STD. Reclamation, wind erosion over surcharge material, vehicle movements on haul roads and infrastructure construction were expected to be the major dust sources. The air quality impact during the construction phase was assessed within the EIA, and dust levels at all ASRs were, with the implementation of appropriate mitigation, predicted to comply with the necessary dust criteria. With the implementation of the dust suppression measures defined in the *Air Pollution Control (Construction Dust) Regulation*, no adverse dust impacts are expected. Dust monitoring should be conducted to ensure the efficacy of the control measures and to ensure that the dust criteria are not exceeded.

##### *Operational Air Quality*

##### Traffic and Industrial Impacts

Vehicle exhaust from existing and future roads and industrial emissions was identified as the main pollutant sources during the operational phase of STD. The EIA Report determined that the ASRs will be affected by road traffic emissions at low level (less than 30 m above ground) and by industrial emissions at high level (greater than 30 m above the ground). However, the predicted results indicate that the AQO criteria will be satisfied at all ASRs at both low and high levels.

##### Ting Kau and Sham Tseng Sewerage Treatment Works

To minimise odour nuisance from the operation of the proposed Ting Kau and Sham Tseng Sewerage Treatment Works at Area 7, odour removal and treatment facilities will be installed and EPD's odour criteria is expected to be complied with.

## Development above the Reclamation

Odour impact from the nullah on the reclamation is not expected as sewerage discharge will be collected by the Sewerage Master Scheme and treated at the sewerage treatment works. Odour nuisance from the proposed Refuse Collection Point in Area 6 could be avoided by proper waste management. Odour levels predicted from the operation of Garden Bakery exceeded the odour criteria at the nearby planned ASRs. However, the prediction is considered conservative, and no health risk or long term impacts are expected; adverse odour impact to the ASR is not anticipated.

Air quality inside the proposed public transport terminus is predicted to satisfy the Public Transport Interchange Air Quality Guidelines. Mechanical ventilation may be required and its design and operation should meet the requirements specified in the ProPECC PN 1/98.

Diluted hydrogen gas emission from the WSD salt water pumping station is not considered as an air quality issue as the hydrogen gas is not toxic in nature and concentrations released will be low (less than 1% in volume of hydrogen gas to cause any suffocation effect. Thus, no adverse air quality impact are expected from the operation of the pumping station.

It has been therefore concluded that operational air quality EM&A is not required.

### 4.2.3 *Water Quality*

#### *Construction Impact*

With the implementation of the mitigation measures, including filling behind the completed seawall and limitation of dredging and filling rates, recommended in the EIA, water quality impact associated with the dredging and filling works should be minimised to local waters adjacent to the construction site. Construction water quality monitoring shall be undertaken to ensure the effectiveness of the proposed mitigation measures.

Water quality impacts associated with the land-based discharges of surface runoff and effluent from various construction sites, and sewage from construction workers should be controlled by implementation of an appropriate draining system, silt and oil interceptors, and chemical toilets. Effluent will only be allowed to be discharged from the sites under the control of the *Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*. No unacceptable residual impacts to local water quality are therefore anticipated.

Routine monitoring of the effluent quality from the planned TKSTSTW and its expansion shall be undertaken to satisfy EPD's license conditions. Monitoring of the quality of sewage effluent from the planned TKSTSTW and the proposed STFSTD will be undertaken under the WPCO.

### *Operational Impact*

The major source of impact during operational phase is likely to be the effluent discharge from the Ting Kau and Sham Tseng Sewage Treatment Works (TKSTSTW) and Sewage Treatment Facilities for Sham Tseng Development (STFSTD). The sewage discharged from the STFSTD should not generate adverse water quality impact upon the water sensitive receivers adjacent to the STD. Substantial water quality impact is predicted if failure of the sewage treatment facilities occur. It is recommended that should a failure occur, the necessary repairs should be expedited in order to limit the period of discharge. Risk of failure should be controlled by regular maintenance of treatment facilities, and provision of backup power supply and standby units of key components of the TKSTSTW and STFSTD.

#### **4.2.4 Waste Management**

The EIA determined that the potential environmental impacts associated with the storage, handling, collection, transport, and disposal of wastes arising from the construction and operation of the STD would meet the criteria specified in the EIAO-TM and as such, no unacceptable environmental impacts were envisaged.

The following quantities of waste are expected to arise during the construction of the STD. Dredged materials (approximately 354 000 m<sup>3</sup> if dredging only limited at seawall and marine basin), excavated materials (22 500m<sup>3</sup> inert material and 2 500m<sup>3</sup> C&D waste); demolition material (55 00m<sup>3</sup> inert material and 500m<sup>3</sup> C&D waste) and construction material (27 100m<sup>3</sup> inert material and 6 800m<sup>3</sup> C&D waste); chemical waste (a few hundred litres per month); and general refuse (240 kg per day). It was recommended that the Contractor should be responsible for implementing the recommended mitigation measures and good site practices in order to ensure that adverse environmental impacts are prevented and that the opportunities for waste minimisation and recycling are maximised.

Based on the land use arrangement of the revised MDP, the future domestic waste generation will be about 16 tonnes per day. No estimation for commercial waste generation can be made as number of employees is not currently available. No adverse environmental impacts associated with the transportation and disposal of domestic waste is anticipated.

#### **4.2.5 Landscape and Visual**

The proposed development will cause a significant change in the existing landscape character of Sham Tseng through redefinition of the coastal edge. It will create a new local landscape of urban character and medium and high-rise residential dwellings on newly reclaimed land (15.2 ha). This will be in-keeping with the existing general character of this area and much of the adjacent coastal areas. Importantly, the development addresses the shortfall of open space in the Sham Tseng area and will provide greater recreation opportunities and public open space for Sham Tseng residents.

The building layout has minimised many of the potential visual impacts by retaining the view corridors, although Lido Garden and San Miguel will both suffer significant impacts due to their proximity to the development and the narrowing of their view corridors. Additionally, the loss of Anglers' Beach (430m in length) is also considered to be a significant impact. However, provisions have been recommended including the provision of pedestrian access to an alternative neighbouring beach, the creation of a waterfront public open space and the development of an Leisure Centre with swimming pool and other sports facilities.

Although several significant impacts have been identified, the recommended mitigation measures aim to reduce the magnitude of these impacts as far as possible.

#### 4.2.6 *Marine Ecology*

Direct impacts during the construction phase will occur through marine habitat loss in the area that is to be dredged or reclaimed. This will affect the soft benthos as well as hard surface assemblages at Sham Tseng. The assemblages lost are of low ecological value and the size of the reclamation is small (approximately 15.2 hectares).

Indirect impacts during the construction phase, such as an increase in suspended sediment concentrations and decrease in dissolved oxygen in the water column, may impact filter feeders living on intertidal and subtidal habitats. However, these indirect impacts are anticipated to be localised and transient. The impacts to the Chinese White Dolphin are predicted to be minimal and transient (dredging will last for approximately 18 weeks during the 50 months of reclamation works) such that they can resume normal activities after the reclamation works. In addition, any constraints on construction operations recommended to reduce impacts to water quality to acceptable levels are expected to also mitigate for effects on marine ecology. Impacts during the operational phase are predicted to be negligible and should not be a cause of concern.

The residual impact occurring as a result of construction and operation of the STD is the loss of the intertidal hard bottom assemblages covering 250 m of natural sandy shore and 250 m of gazetted beach, 900 m of artificial coastline and intertidal soft bottom assemblages covering an area of approximately 15.2 ha at the area of Sham Tseng Development.

The loss of the assemblages within the construction site can be mitigated through the subsequent recolonisation of fauna on the seawalls after construction. The monitoring and audit activities designed to detect and mitigate any unacceptable impacts to water quality will also serve to protect against unacceptable indirect impacts to ecologically valuable marine species and habitats. As no unacceptable impacts to marine ecology are expected to occur, the development and implementation of a monitoring and audit programme specifically designed to assess the effects associated with the STD on marine ecology is not necessary.

#### **4.2.7 Fisheries**

Potential impacts to fisheries resources and operations may arise from disturbances to benthic habitats, changes in water quality and contaminant release. Disturbances to benthic habitats are predicted to be largely confined within the reclamation area and shall be in compliance with the relevant WQOs. Sediment deposition outside of the reclamation area is minimal and not anticipated to impact fisheries resources. As changes in water quality will be minimal and transient, adverse impacts to fisheries resources are not predicted to arise. Assessment of contaminant release has indicated that minimal concentrations will be released and are not predicted to impact fisheries resources.

As impacts arising from the proposed reclamation works are thus predicted to be largely confined to the reclamation area, they are not expected to cause adverse impacts to any fishery grounds including the nearest Fish Culture Zone, Ma Wan, or species of importance to the fishery. While no special mitigation measures are required for fisheries resources, constraints on dredging operations recommended to control impacts to water quality to within acceptable levels are also expected to mitigate impacts to fisheries resources. Cumulative impacts predicted to arise from the proposed reclamation operations in conjunction with concurrent projects are not expected to result in greater adverse impacts to fisheries resources than impacts arising from the concurrent projects independently.

#### **4.2.8 Marine Archaeological Investigation**

The Marine Archaeological Investigation indicates that no archaeological material is likely to be buried within the Study Area. Therefore, no impact to any marine archaeological deposit is expected and neither further archaeological investigation nor any mitigation measures are required.

#### **4.2.9 Landuse Impact**

Within the EIA, the potential land use impact associated with the construction and operational phases of the STD has been considered, with the concerns over increased construction works and the traffic impacts having been addressed. No insurmountable impacts were anticipated after the implementation of the appropriate mitigation measures during the various phases of the Project.

#### **4.2.10 Biogas Assessment**

Given that, at this stage, it is not possible to measure the rates of gas emission from the organic sediment left within the area of the proposed STD, an estimate of the future rate of gas generation has been made from the results of analysis of the sediment for TOC and SOD.

Several assumptions and estimations have to be made when making theoretical predictions about possible future rates of methane generation at the undredged areas. The estimated average rate of methane gas generation is well within the suggested maximum rate of methane emission per unit area of 10 L m<sup>2</sup> per day and the limit of 84.7 L m<sup>2</sup> per day recommended by the London Scientific Services. The former criterion provides a reasonable general guide for determining whether the rates of methane emission pose an unacceptable risk to unrestricted development on a potentially gassing site. The latter criterion represents the absolute “cut-off” level of methane flux which developments should be allowed to build on the potentially gassing site.

Overall, based on the results of the sediment analysis and comparison with published guidance on safe levels of gas emissions, it is considered that the predicted rates of gas generation from the undredged areas will not pose unacceptable risk or constraint to the future developments on top of the reclamation areas.

Given the inherent uncertainties involved in estimating future rates of gas emissions from theoretical calculations of rates of gas generation and given that mitigation measures for avoiding the potential risks may be very expensive, it would be of benefit to undertake monitoring of gas emission rates by qualified specialists following the reclamation of the area of the proposed development to confirm the findings of this assessment.

### **4.3 CONSTRUCTION PHASE EM&A**

#### **4.3.1 General**

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

During the construction phase, noise, dust, water, waste and landscape and visual issues will be subject to EM&A, with environmental monitoring being undertaken for noise, dust, water quality and biogas, as outlined in *Annexes A, B, C, and D*.

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.

#### 4.3.2 *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, together with the assessment of biogas after the completion of the reclamation, as discussed in *Annex A* of this report.

#### 4.3.3 *Action and 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.

#### 4.3.4 *Event Contingency Plans*

The purpose of the Event Contingency Plans (ECPs) 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.

#### 4.3.5 *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 Leader 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 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 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-compliances. Non-compliances, and the corrective actions undertaken, shall also be reported in the monthly EM&A Reports.

*Section 10* of this 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.

#### **4.3.6 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 IC(E), undertake additional monitoring to verify the existence and severity of the alleged complaint;
  - liaise with the IC(E) 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.

#### **4.3.7 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 11*.

#### **4.3.8 Cessation of EM&A**

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

#### **4.4 OPERATIONAL PHASE EM&A**

Environmental monitoring during the operational phase is anticipated for noise impacts, with the need for biogas monitoring to be considered based on monitoring results. The suggested noise monitoring parameters and locations are outlined in *Annexes B, C, and D* of this report.

## 5 NOISE MONITORING

### 5.1 INTRODUCTION

In this section, the general requirements, methodology, equipment, and mitigation measures for the monitoring and audit of noise impacts associated with the construction and operational phases of the Designated Projects are described below. The specific noise EM&A requirements for each of the Designated Projects are defined in *Annexes A, B, C, and D*.

### 5.2 CONSTRUCTION PHASE EM&A

#### 5.2.1 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. A sample data record sheet is shown in *Annex B (Report Sheet 1.1)* for reference.

Whilst the *Noise Control Ordinance (NCO)* does not provide for the statutory control of construction activities occurring on weekdays during normal working hours (that is, Monday to Saturday inclusive 0700-1900), a voluntary daytime limit of  $L_{Aeq(30\text{ minute})}$  75 dB, recommended in the *Practice Note for Professional Persons - Noise from Construction Activities - Non-statutory Controls, EPD, May 1993 (ProPECC PN2/93)* was proposed in the EIA and agreed with EPD as the appropriate criterion for all residential dwellings; while a daytime limit of  $L_{Aeq(30\text{ minute})}$  70 dB was proposed in the EIA as the appropriate criterion for all educational institutions during normal school days and  $L_{Aeq(30\text{ minute})}$  65 dB during examination periods.

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 5.2a*.

**Table 5.2a** *Acceptable Noise Levels (ANLs)*

Time Period	Area Sensitivity Rating		
	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

### 5.2.2 *Monitoring Equipment*

The ET Leader 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  $\text{ms}^{-1}$  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.

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 Leader 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  $5 \text{ ms}^{-1}$  or wind with gusts exceeding  $10 \text{ ms}^{-1}$ . The wind speed shall be checked with the hand-held anemometers. The equipment requirements for each of the Designated Projects is outlined in *Annexe's A, B, C & D of this EM&A Manual*.

### 5.2.3 *Monitoring Locations*

The noise monitoring locations for each of the Designated Projects are outlined in *Annexe's A, B, C & D of this EM&A Manual*, and the figures showing the location of the environmental sensitive receivers are included in *Annex E*.

### 5.2.4 *Baseline Monitoring*

The ET Leader 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 of STD 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, IC(E) and EPD.

### 5.2.5 Impact Monitoring

During normal construction working hours (0700-1900 Monday to Saturday), monitoring of  $L_{Aeq, 30min}$  noise levels (as six consecutive  $L_{Aeq, 5min}$  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  $L_{Aeq, 5min}$  readings shall be used to calculate the  $L_{Aeq, 30min}$  noise level and this shall be compared to the  $L_{Aeq, 30min}$  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  $L_{Aeq, 5min}$  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.

### 5.2.6 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 5.2d.

**Table 5.2d Action and Limit Levels for Construction Noise**

Time Period	Action	Limit
0700-1900 on any day not being a Sunday or public holiday.	When one or more documented complaints are received	75 dB(A) <sup>(1)</sup>
1900-2300 on all days and 0700-2300 on general holidays (including Sundays).	When one or more documented complaints are received	60/65/70 dB(A) <sup>(2)</sup>
2300-0700 on all days	When one or more documented complaints are received	45/50/55 dB(A) <sup>(2)</sup>

1) For educational establishments the limit level shall be 70 dB(A), reduced to 65 dB(A) during examination periods.  
2) Acceptable Noise Levels for Area Sensitivity Rating A/B/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.

### **5.2.7 *Event Contingency Plan***

The principle on which the ECP 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, the Engineer and the Contractor shall strictly observe the relevant actions of the ECP shown in *Table 5.2e*.

**Noise Monitoring Event Contingency Plan**

<b>Event</b>	<b>ET Leader</b>	<b>Contractor</b>	<b>IC(E)</b>	<b>Engineer</b>
<i>Action Level</i>				
Exceedance	<p>Inform the Contractor and identify the potential noise source (s). Repeat noise measurements to confirm findings</p> <p>If repeat measurements confirm exceedance, increase monitoring frequency to daily to assess efficacy of remedial measures and keep the Contractor informed.</p> <p>If exceedance stops, inform Contractor and cease additional noise monitoring.</p>	<p>Confirm receipt of notification of exceedance and notify the Engineer and IC(E) in writing. Liaise with Engineer and IC(E) to develop appropriate remedial measures.</p> <p>Submit proposal within three working days to the Engineer and IC(E) for remedial actions to reduce noise impact.</p> <p>Amend proposal if required by the Engineer or IC(E).</p> <p>Immediately implement the agreed remedial actions.</p> <p>If exceedance continues, discuss further appropriate mitigation measures with the Engineer, IC(E) and if practicable, implement measures as soon as possible.</p>	<p>Confirm receipt of notification of exceedance in writing. Check and confirm proposed remedial actions are appropriate.</p>	<p>Confirm receipt of notification of exceedance in writing. Remind the Contractor of his contractual obligations and review the Contractor’s working methods Discuss remedial actions with the Contractor and IC(E).</p> <p>Inform complainant of actions taken, if necessary.</p>
<i>Limit Level</i>				
Exceedance	Inform the Contractor of exceedance	Confirm receipt of notification of exceedance and immediately inform the Engineer and IC(E) and immediate action to avoid further exceedance(s).	Confirm receipt of notification of exceedance in writing.	Confirm receipt of notification of exceedance in writing.

Event	ET Leader	Contractor	IC(E)	Engineer
Investigate the cause of the exceedance and identify the main source(s) of impact		Liaise with Engineer and IC(E) to develop appropriate remedial measures.	Check and confirm proposed remedial actions are appropriate.	Remind the Contractor of his Contractual obligations and review the Contractors working methods.
Repeat noise measurements to confirm findings.		Submit proposals for remedial actions to Engineer and IC(E) within three working days of notification.		Discuss remedial actions with the Contractor and IC(E).
If repeat measurement confirm exceedance, increase monitoring frequency to daily to assess efficacy of remedial measurements and keep the Contractor informed.		Amend proposals if required by the Engineer or IC(E).		Inform complainant of actions taken, if necessary.
If exceedance stops, inform the Contractor and cease additional monitoring.		Implement immediately the agreed remedial actions.		
		If exceedance continues, discuss further appropriate mitigation measures with the Engineer and IC(E).		

### 5.3 OPERATIONAL NOISE MONITORING

#### 5.3.1 Introduction

Noise monitoring has been recommended to be undertaken during the operational phase of the STD, to verify the traffic noise predictions and the effectiveness of traffic noise mitigation measures are effective and the impact at the NSRs will be within the acceptable noise limits. It is recommended that CED shall be responsible for the operational phase monitoring. A qualified monitoring contractor or laboratory shall be employed to carry out the proposed monitoring.

#### 5.3.2 Methodology and Criteria

The operational noise monitoring shall focus on traffic noise levels and shall be measured twice within the first year of the Sham Tseng Bypass opening. Measurements shall be made in terms of the A-weighted  $L_{10}$  over 3 half hour periods during the peak traffic flows, and within the relevant road traffic noise assessment criteria given in the EIAO-TM.

#### 5.3.3 Monitoring Equipment

The same monitoring equipment shall be used as specified in *Section 5.2.2*, with the sound level meters in compliance with the *International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1)* specifications. Calibration procedures and other measurement conditions are also specified in *Section 5.2.2*.

#### 5.3.4 Monitoring Locations

The operational noise monitoring locations for each of the Designated Projects are outlined in *Annexe's B, C & D of this EM&A Manual*.

#### 5.3.5 Baseline Monitoring

As there is no traffic before the opening of the Sham Tseng Bypass, baseline monitoring prior to the operation of the road is not necessary.

#### 5.3.6 Impact Monitoring

Traffic noise monitoring shall be carried out at the proposed monitoring locations (subject to final approval from EPD) upon completion of the Sham Tseng Bypass. It is recommended that two sets of noise monitoring data shall be obtained during the first year of operation. The following is a guide on the traffic noise monitoring for each station once the Bypass is operational.

- one set of measurements during the morning traffic peak hour on normal weekdays. The exact timing should be confirmed with the Transport Department and agreed with EPD; and
- one set of measurements during the evening traffic peak hour on normal weekdays. The exact timing should be confirmed with the Transport Department and agreed with EPD.

During the traffic noise monitoring a traffic count, average traffic speed and % heavy vehicles should also be conducted in order to ensure that traffic noise of the peak periods is covered for both sides of the roads concerned.

The measured noise levels should be compared with the noise modelling result obtained with the counted traffic data. The discrepancy, if any shall be investigated and reported to EPD.

#### **5.4**    *MITIGATION MEASURES*

The STD EIA has recommended noise control and mitigation measures during the construction and operational phases of the Project. In the event of exceedances or complaints, the Contractor shall be responsible for the design and implementation of these measures which are outlined in Implementation Schedule in *Annex G*.

## 6 AIR QUALITY MONITORING

### 6.1 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 Projects are described below. The specific air quality EM&A requirements for each of the Designated Projects are defined in *Annexes A, B, C, and D*.

### 6.2 CONSTRUCTION MONITORING

#### 6.2.1 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.

#### 6.2.2 Methodology and Criteria

Monitoring and audit of the 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-hour TSP levels of 260 mg m<sup>-3</sup>; and
- The statutory 1-hour TSP limit of 500 mg m<sup>-3</sup>.

These levels are not to be exceeded at Air Sensitive Receivers (ASRs).

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 two 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 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. A sample data sheet is shown in *Annex F (Record Sheet 1.2)*.

### 6.2.3 *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<sup>3</sup> min<sup>-1</sup> (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<sup>2</sup> (63 in<sup>2</sup>);
- 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 Leader shall be responsible for the provision of the monitoring equipment. He 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 as mentioned in a *Annex F (Record Sheet 1.2)*.

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 mg m<sup>-3</sup>, 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. The recommended types and quantities of TSP monitoring equipment required for each designated project are defined in *Annex A, B, C & D of this EM&A Manual*.

#### **6.2.4 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 IC(E). The IC(E) 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.

#### **6.2.5 Monitoring Locations**

The air quality monitoring locations for each of the Designated Projects are outlined in *Annexe's A, B, C & D of this EM&A Manual*, and the figures showing the location of the environmental sensitive receivers are included in *Annex E*.

#### **6.2.6 Baseline Monitoring**

Baseline monitoring shall be carried out 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.

Baseline monitoring shall be carried out for a continuous period of at least two weeks 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, IC(E) and EPD.

### 6.2.7 Impact Monitoring

The monthly schedule of the compliance and impact monitoring programme shall be drawn up by the ET Leader one month prior to the commencement of the scheduled construction period. For regular impact monitoring, a sampling frequency of at least once in every six-days shall be strictly observed at all of the monitoring stations for 24-hour TSP monitoring. In case of complaints, 1-hour TSP monitoring shall be conducted at least three times in every six-days when the highest dust impacts are likely to occur. Before commencing the baseline monitoring, the ET Leader shall inform the IC(E) of the impact monitoring programme such that the IC(E) can conduct an on-site audit to ensure the accuracy of the impact monitoring results.

The specific time to start and stop the 24-hour TSP monitoring shall be clearly defined for each location and shall be strictly followed by the operator.

### 6.2.8 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 *Tables 6.2c* and *6.2d*.

**Table 6.2c** *Derivation of Action and Limit Levels for 24-Hour TSP Monitoring*

Level	Total Suspended Particulates ( $\mu\text{g m}^{-3}$ )
Baseline	Numerical average of physical measurements prior to construction commencement
Action	For baseline $< 108 \text{ mg m}^{-3}$ , average of 130% of baseline and the Limit level For $108 \text{ mg m}^{-3} < \text{baseline} < 154 \text{ mg m}^{-3}$ , $200 \text{ mg m}^{-3}$ For baseline $> 154 \text{ mg m}^{-3}$ , 130% of baseline level
Limit	AQO for 24-hour TSP: $260 \text{ mg m}^{-3}$

**Table 6.2d** *Derivation of Action and Limit Levels for 1-Hour TSP Monitoring*

Level	Total Suspended Particulates ( $\mu\text{g m}^{-3}$ )
Baseline	Numerical average of physical measurements prior to construction commencement
Action	For baseline $< 154 \text{ mg m}^{-3}$ , average of 130% of baseline and the Limit level For $154 \text{ mg m}^{-3} < \text{baseline} < 269 \text{ mg m}^{-3}$ , $350 \text{ mg m}^{-3}$ For baseline $> 269 \text{ mg m}^{-3}$ , 130% of baseline level
Limit	EIAO Statutory Limit: $500 \text{ mg m}^{-3}$

### 6.2.9 *Event Contingency Plan*

The principle upon which the ECP 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 (*Tables 6.2c and 6.2d*) 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 ECP shown in *Table 6.2e* below.

**Table 6.2e Air Quality Monitoring Event Contingency Plan**

<b>Event</b>	<b>ET Leader</b>	<b>Contractor</b>	<b>IC(E)</b>	<b>Engineer</b>
<i>Action Level</i>				
Exceedance	<p>Inform the Contractor and identify the potential source (s) of exceedance.</p> <p>Repeat dust measurements to confirm findings</p> <p>If repeat measurements confirm exceedance, increase monitoring frequency to daily to assess efficacy of remedial measures and keep the Contractor informed.</p> <p>If exceedance stops, inform Contractor and cease additional dust monitoring.</p>	<p>Confirm receipt of notification of exceedance and notify the Engineer and IC(E) in writing.</p> <p>Liaise with Engineer and IC(E) to develop appropriate remedial measures.</p> <p>Submit proposal within three working days to the Engineer and IC(E) for remedial actions to reduce dust impact.</p> <p>Amend proposal if required by the Engineer or IC(E).</p> <p>Immediately implement the agreed remedial actions.</p> <p>If exceedance continues, discuss further appropriate mitigation measures with the Engineer, IC(E) and if practicable, implement measures as soon as possible.</p>	<p>Confirm receipt of notification of exceedance in writing.</p> <p>Check and confirm proposed remedial actions are appropriate.</p>	<p>Confirm receipt of notification of exceedance in writing.</p> <p>Remind the Contractor of his contractual obligations and review the Contractor's working methods</p> <p>Discuss remedial actions with the Contractor and IC(E).</p> <p>Inform complainant of actions taken, if necessary.</p>
<i>Limit Level</i>				
Exceedance	<p>Inform the Contractor of exceedance</p> <p>Investigate the cause of the exceedance and identify the main source(s) of impact</p> <p>Repeat dust measurements to confirm findings.</p>	<p>Confirm receipt of notification of exceedance and immediately inform the Engineer and IC(E) and immediate action to avoid further exceedance(s).</p> <p>Liaise with Engineer and IC(E) to develop appropriate remedial measures.</p> <p>Submit proposals for remedial actions to Engineer and IC(E) within three working days of notification.</p>	<p>Confirm receipt of notification of exceedance in writing.</p> <p>Check and confirm proposed remedial actions are appropriate.</p>	<p>Confirm receipt of notification of exceedance in writing.</p> <p>Remind the Contractor of his Contractual obligations and review the Contractors working methods.</p> <p>Discuss remedial actions with the Contractor and IC(E).</p>

Event	ET Leader	Contractor	IC(E)	Engineer
	<p>If repeat measurement confirm exceedance, increase monitoring frequency to daily to assess efficacy of remedial measurements and keep the Contractor informed.</p> <p>If exceedance stops, inform the Contractor and cease additional monitoring.</p>	<p>Amend proposals if required by the Engineer or IC(E).</p> <p>Implement immediately the agreed for remedial actions.</p> <p>If exceedance continues, discuss further appropriate mitigation measures with the Engineer and IC(E).</p>		<p>Inform complainant of actions taken, if necessary.</p>

### **6.2.10 Mitigation Measures**

The EIA has recommended air quality control and mitigation measures during the construction phases of the Project. These are outlined in the Implementation Schedule detailed in *Annex G*. In the event of exceedances or complaints, the Contractor shall be responsible for reviewing the effectiveness of these measures and for proposing, designing and implementing alternative measures as appropriate.

### **6.3 OPERATIONAL MONITORING**

With the implementation of appropriate mitigation measures and building design, the proposed development above the STD was not predicted to generate any adverse air quality impact upon the receivers. Operational EM&A is therefore not required.

## 7 WASTE MANAGEMENT

### 7.1 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 Projects.

### 7.2 WASTE MANAGEMENT PRACTICES

The Construction Contractor(s) should incorporate these recommendations into a Waste Management Plan 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 in *Annex G* provides details on the appropriate mitigation measures for avoiding and minimising potential adverse impacts associated with waste arising from the construction of the STD and the associated developments. The Waste Management Plan 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 to.

### 7.3 EM&A RECOMMENDATIONS

In order to ensure that the Contractor has implemented the recommendations of the EIA, the IC(E) 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.

### 7.3.1 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 (*Annex G*) 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;
- ensure 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.
- to monitor 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 IC(E) should be responsible for auditing the result of the system; and
- to encourage the reuse and recycling of materials.

### 7.3.2 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 IC(E) 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 contained in *Annex G*.

#### *General Legislation for Waste Management*

- *Waste Disposal Ordinance (Cap 354)*;
- *Waste Disposal (Chemical Waste) (General) Regulation (Cap 354)*;
- *Land (Miscellaneous Provisions) Ordinance (Cap 28)*;
- *Public Health and Municipal Services Ordinance (Cap 132) - Public Cleansing and Prevention of Nuisances Regulation*; and
- *Dumping at Sea Ordinance (1995)*;
- 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 No. 12/2000, Fill Management*; Works Branch, Hong Kong Government;
- *Works Branch Technical Circular 3/2000, Marine Disposal of Dredged Mud*;
- *Works Branch Technical Circular, 32/92, The Use of Tropical Hard Wood on Construction Site*; Works Branch, Hong Kong Government;
- *Technical Circular No 1-1-92 Classification of Dredged Sediments for Marine Disposal*, Environmental Protection Department;
- *Works Branch Technical Circular No. 2/93, 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 No. 4/98, Use of Public Fill in Reclamation and Earth Filling Projects*; Works Bureau, Hong Kong SAR Government;
- *Works Bureau Technical Circular No 5/98, On-site Sorting of Construction Waste on Demolition Site*; Works Bureau, Hong Kong SAR Government;
- *Waste Reduction Framework Plan, 1998 to 2007*, Planning, Environment and Lands Bureau, Government Secretariat, 5 November 1998;
- *Works Bureau Technical Circular No 5/99, Trip-ticket System for Disposal of Construction and Demolition Material*; Works Bureau, Hong Kong SAR Government; and
- *Work Bureau Technical Circular No. 25/99, Incorporation of Information on Construction and Demolition Material Management in Public Works Subcommittee Papers*; Works Bureau, Hong Kong SAR Government.

#### **7.4 MITIGATION MEASURES**

Details of the recommended mitigation measures are included within the Implementation Schedule (*Annex G*).

## 8 WATER QUALITY MONITORING

### 8.1 INTRODUCTION

The EM&A requirements for water quality monitoring apply only to one Designated Project-the Reclamation. Since its is more desirable to group all the EM&A requirements of the Reclamation into Annex A, the detailed description of the methodology, criteria, monitoring location, monitoring requirements, baseline monitoring, impact monitoring, compliance assessment and event contingency plan for water quality has been considered in Annex A of this Report.

### 8.2 THE PROPOSED SEWERAGE TREATMENT FACILITIES FOR SHAM TSENG DEVELOPMENT - OPERATIONAL PHASE

The treated sewage from the proposed sewage treatment facilities for Sham Tseng Development (STFSTD) will be subject to a comprehensive performance verification programme, funded by the project vote for the STFSTD and implemented through engagement of consultant<sup>(1)</sup>. The scope of which is subject to the EPD's approval.

The Environmental Permit Holder, shall be responsible for undertaking routine water quality monitoring of the effluent from the proposed sewerage treatment facilities, to ensure that it satisfies EPD's license conditions. The following parameters shall be monitored: suspended solids, E. coli, total residue chlorine, oil and grease and BOD.

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(1) Under the existing arrangement, such consultancy service will be procured by EPD and managed by the designed team under the Water Policy Group of EPD which consists of staff seconded to EPD from DSD. Similar arrangement will be effected for this project with the assumption that the current practice persists.

## **9**     ***BIOGAS MONITORING***

### **9.1**    ***INTRODUCTION***

The EM&A requirements for biogas monitoring applies only to one Designated Project-the Reclamation. Since its is more desirable to group all the EM&A requirements of the Reclamation into Annex A, the detailed description of the monitoring methodology, precautions during construction and mitigation measures has been considered in Annex A of this Report.

## 10 ENVIRONMENTAL AUDITING

### 10.1 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 Leader 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 IC(E) when conducting his Environmental Performance Reviews.

Site inspections shall be carried out at least once per week. 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 Leader 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 programme;
- works progress and programme;
- 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 IC(E).

The ET Leader's inspection results and their associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the IC(E) 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 Leader 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.

## 10.2 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 Programme, 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 Leader during his 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.

## 10.3 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 IC(E), 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 cooperate 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 *Figure 10.3a*, with a suggested format for a complaint proforma shown in *Annex F (Record Sheet 1.4)*.

## **11 REPORTING**

### **11.1 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 IC(E), and EPD, be provided using an electronic medium, such as the EPD's *Specialised Electronic Environmental Monitoring and Audit* (SEEMA) software (or a similar alternative). All the monitoring data (baseline and impact) shall also be submitted on diskettes in an agreed format.

### **11.2 BASELINE MONITORING REPORT**

The ET Leader 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, IC(E), 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 programme 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 (and depth);
  - monitoring date, time, frequency and duration;
  - 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.

### **11.3 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 Leader. The reports shall be submitted to the IC(E) to be endorsed and copied to the EPD within ten 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, IC(E) and Engineer for information. The ET Leader 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:

#### **11.3.1 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 telephone numbers;
- Construction Programme 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 study final 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 programme 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.

### 11.3.2 *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 Programme 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 study 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 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.

(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 programme 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:
  - i) major activities being carried out on site during the period;
  - ii) weather conditions during the period; and
  - iii) any other factors which might affect the monitoring results;
- Monitoring schedule for the present and next reporting period;
- Cumulative statistics on complaints, notifications of summons and successful prosecutions;
- Outstanding issues and deficiencies

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

- (h) a summary of 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 (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and
- (o) proponents' contacts and any hotline telephone number for the public to make enquiries.

### **11.5 FINAL EM&A SUMMARY REPORT**

The EM&A programme 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 alia, the following:

- (a) an executive summary;
- (b) basic project information including a synopsis of the project organisation, programme, 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 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; 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 programme (e.g. effectiveness and efficiency of the mitigation measures) recommend any improvement in the EM&A programme; and
- (q) a conclusion to state the return of ambient and/or the predicted scenario as per EIA findings.

#### **11.6 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 Leader 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. The water quality data software format shall be agreed with EPD. All the documents and data shall be kept for at least one year after completion of the construction contract.

#### **11.7 INTERIM NOTIFICATION OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCES**

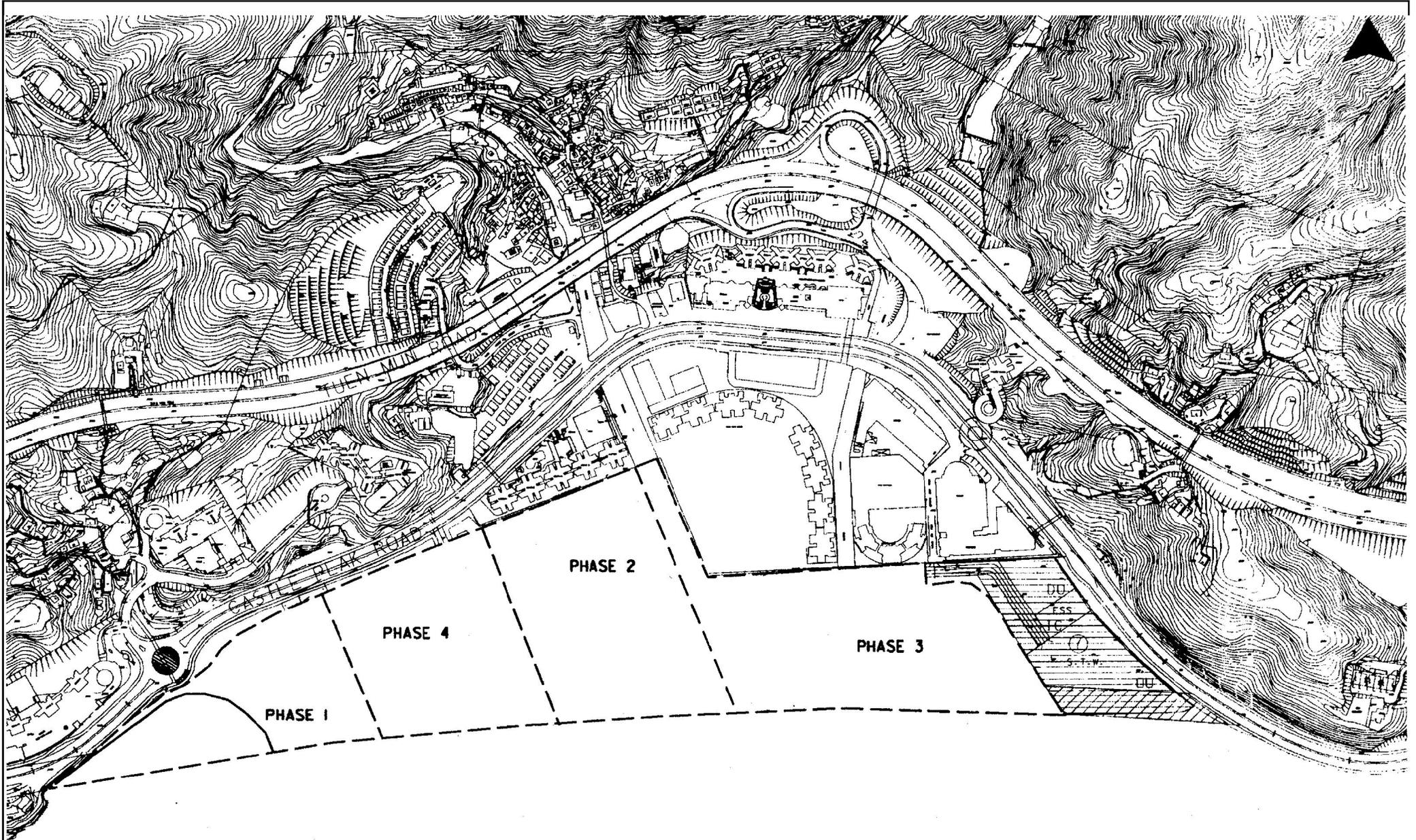
Interim notifications of exceedances of Limit levels will be issued to the EPD within 24 hours of the identification of an exceedance. The Monthly Reports will contain all available details concerning measures exceedances and complaints, their causes and those steps taken to control impacts and prevent their recurrence. A suggested format for a complaints proforma is in *Annex F (Record Sheet 1.4)*.

# Figures

1.2a

3.2a

8.3a



Scott Wilson (Hong Kong) Ltd  
 偉信顧問(香港)有限公司



**Proposed Reclamation Phasing**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
 SHAM TSENG DEVELOPMENT

Drawing No.  
 圖則編號

**1.2a**

Designed  
 設計

Drawn  
 繪圖

Checked  
 校核

Scale  
 比例

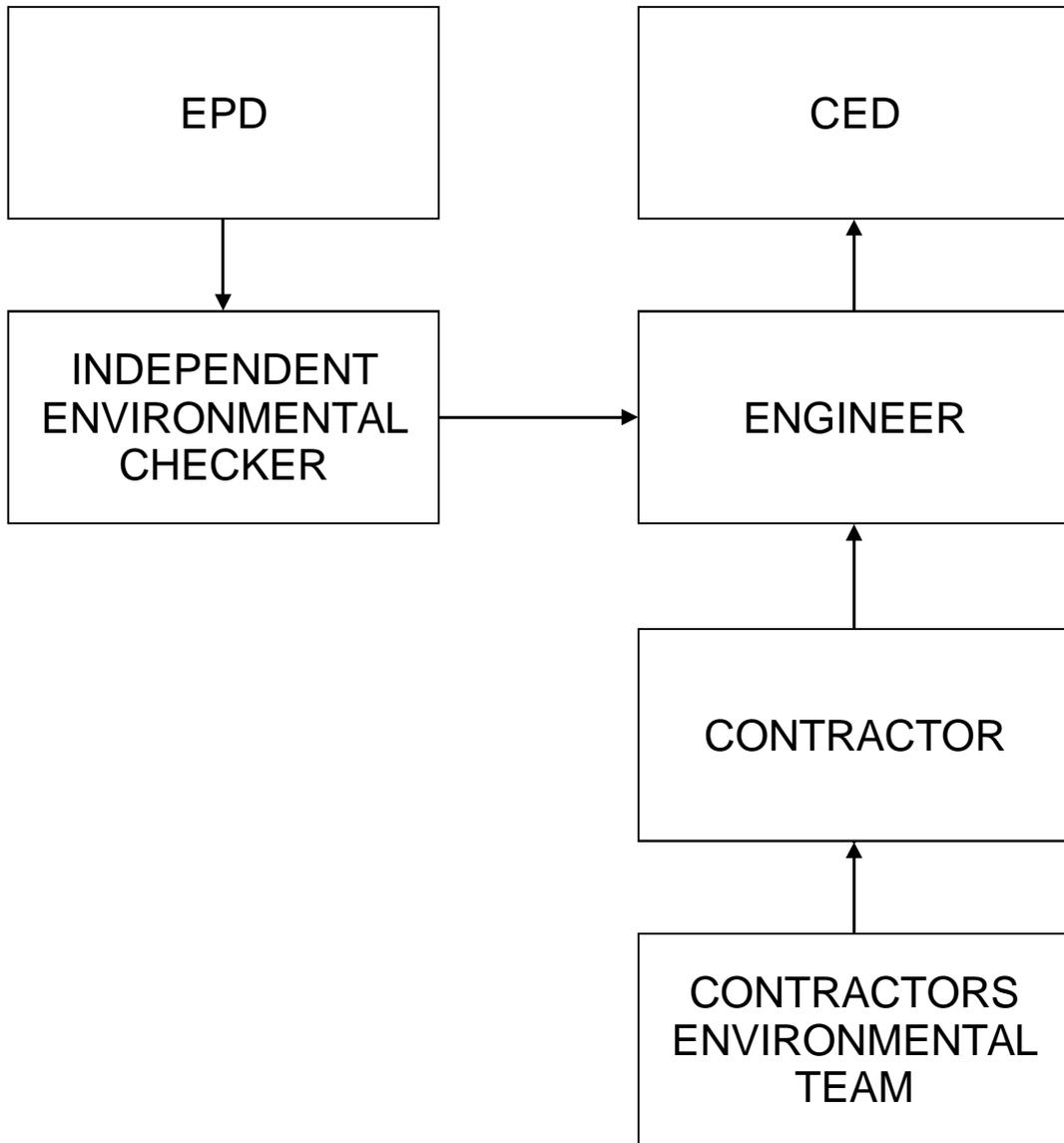
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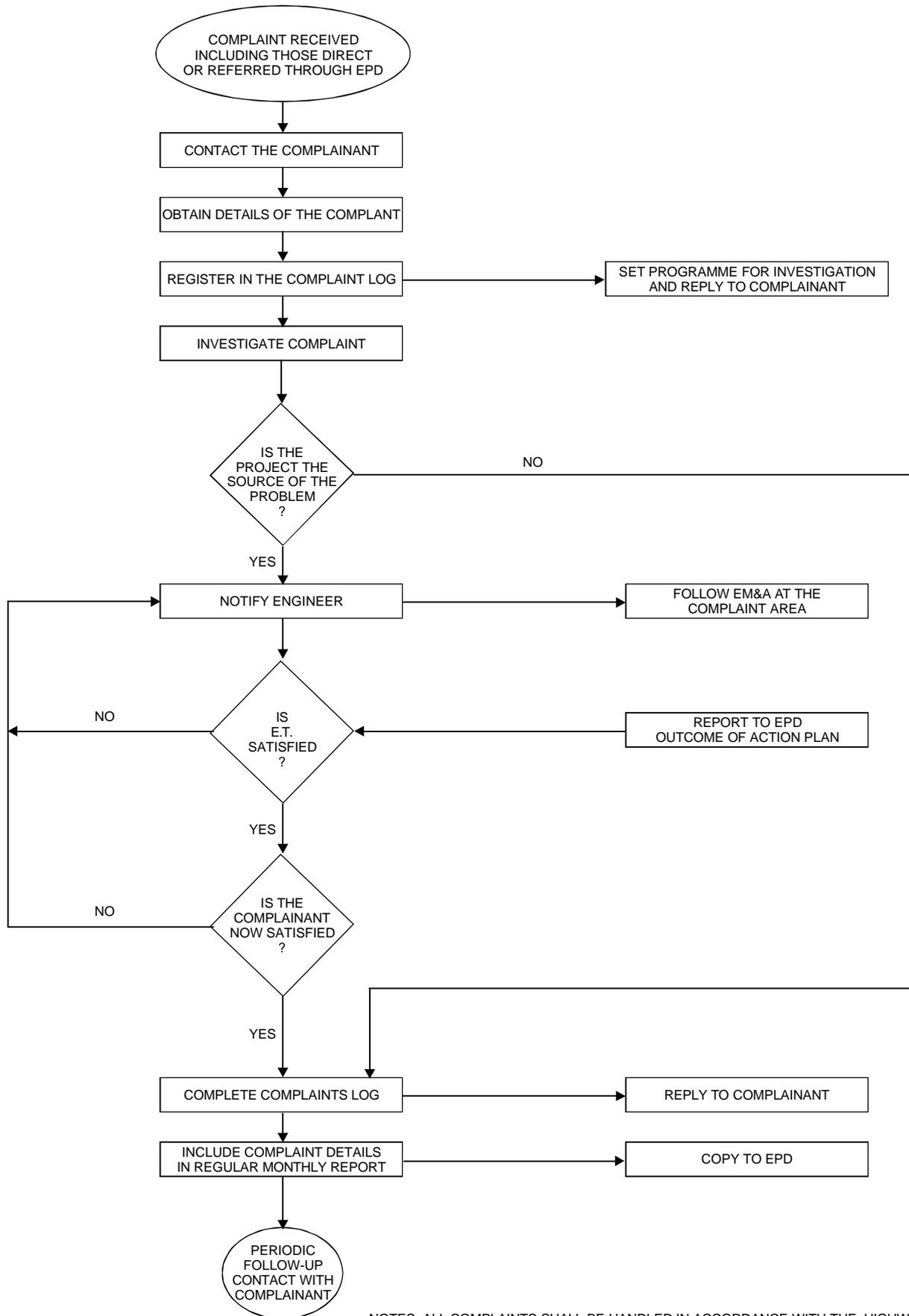
Date  
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**土木工程署**  
**Civil Engineering**  
**Department**





NOTES: ALL COMPLAINTS SHALL BE HANDLED IN ACCORDANCE WITH THE HIGHWAYS DEPARTMENT GENERAL CIRCULAR NO.1/98 "DEPARTMENTAL COMPLAINTS PROCEDURE"

Annex A

Specific EM&A  
Requirements for Schedule  
2 Designated Project :  
Reclamation Works

## A1 EM&A REQUIREMENTS

### A1.1 INTRODUCTION

This Annex provides a summary of the specific EM&A requirements for the Schedule 2 Designated Project, involving the formation of approximately 15.2 hectares of land by reclamation. Depending on the construction sequence and contractual arrangements, the EM&A requirements of the non-DPs, such as dredging of the marine basin, pier and berthing facilities construction, nullah dredging and decking and diversion/extension of drains, may be included as part of the Reclamation works DP, as contained in *Table 13.2a* of the Implementation Schedule (in *Annex G*).

The same methodology and equipment will be employed for the noise, air and water quality monitoring as outlined in *Sections 5 to 7 of this EM&A Manual*. This Annex outlines those EM&A requirements which are specific to the reclamation works.

### A1.2 NOISE MONITORING

As outlined in *Section 5 of the EIA Report*, the appointed Contractor for the reclamation works is responsible for conducting noise monitoring at the following representative monitoring stations, as defined in *Table A1.2b* and shown in *Figures E1.2a and E1.2b*.

*Table A1.2a* lists the suggested quantities of noise monitoring equipment required for the Project, although the exact requirements will be dependent upon the manpower employed by the Contractor to perform the monitoring.

**Table A1.2a** Noise Monitoring Equipment

Description	Quantity
Noise meter	1 unit
Calibrator	1 unit
Hand-held anemometer	1 unit

**Table AA1.2b** EM&A Representative Monitoring Locations

NSR No	Identity/Description
CM1	Golden Villa
CM2	Union Carbide Tower 2
CM3	Lido Garden Tower 3
CM4	DD 387 Lot 99 (Residential building)
CM5	Goldenville

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.

### **A1.3 AIR QUALITY MONITORING**

As outlined in *Section 6 of the EIA Report*, the appointed Contractor for the reclamation works is responsible for conducting air quality monitoring at the following representative monitoring stations, as defined in *Table A1.3b* and shown in *Figures E1.3a and E1.3b*.

*Table A1.3a* presents the recommended types and quantities of TSP monitoring equipment required, although the exact requirements will depend on the manpower employed by the contractor.

**Table A1.3a TSP Recommended Monitoring Equipment**

<b>Description</b>	<b>Quantity</b>
High Volume sampler	2 units
Hand-held direct reading dust meter	1 units

**Table A1.3b** *EM&A Representative Monitoring Locations*

<b>ASR No.</b>	<b>Identity/Description</b>
AM 1	Proposed Residential Development at former San Miguel Brewery
AM 2	Residential Development at Union Carbide

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.

#### **A1.4** *WATER QUALITY MONITORING*

##### **A1.4.1** *Introduction*

In this section, the requirements, methodology, equipment, monitoring locations and mitigation measures for the monitoring and audit of marine water quality impacts from the reclamation works.

##### **A1.4.2** *Methodology and Criteria*

Water quality monitoring shall be carried out by the Environmental Team to ensure that any deteriorating water quality is readily detected and that timely action is taken to rectify the situation. The appropriate water quality mitigation measures are outlined in the Implementation Schedule (*Annex G*).

## *Water Quality Monitoring*

The objectives of the water quality monitoring programme are as follows:

- to determine the effectiveness of the operational controls and mitigation measures employed, and the need for supplementary mitigation measures; and
- to check compliance with relevant Water Quality Objectives (WQO).

Parameters to be measured *in situ* are:

- Dissolved oxygen (DO) (% saturation);
- Temperature (°C);
- Turbidity (NTU);
- Salinity (mg L<sup>-1</sup>);
- pH; and
- Water depth (m).

Parameters to be measured in the laboratory are:

- Dissolved oxygen (DO) (mg L<sup>-1</sup>);
- suspended solids (mg L<sup>-1</sup>);
- total inorganic nitrogen (mg L<sup>-1</sup>); and
- unionised ammonia (mg L<sup>-1</sup>).

In addition to the water quality parameters, other relevant data shall also be measured and recorded, including monitoring location / position, time, weather conditions, sea conditions (where appropriate), tidal stage (where appropriate), special phenomena and work activities at the construction site.

A full listing of the water quality monitoring parameters to be monitored at each location is given in *Table A1.4d*, and a sample monitoring record sheet shown in *Annex F(Record Sheet 1.3)*.

### **A1.4.3**      *Monitoring Equipment*

For water quality monitoring, the following equipment shall be supplied by the ET and submitted for approval to the Engineer and the EPD prior to undertaking the baseline and impact monitoring.

### *Dissolved Oxygen and Temperature Measuring Equipment*

The instrument shall be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and shall be operable from a DC power source. It shall be capable of measuring:

- dissolved oxygen levels in the range of 0 - 20 mg L<sup>-1</sup> and 0 - 200% saturation; and
- a temperature of 0 - 45 degrees Celsius.

It shall have a membrane electrode with automatic temperature compensation complete with a cable of not less than 25 m in length. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary. (For example, YSI model 59 metre, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

### *Turbidity Measurement Equipment*

Turbidity within the water shall be measured in-situ by the nephelometric method. The instrument shall be a portable, weatherproof turbidity-measuring unit complete with cable, sensor and comprehensive operation manuals. The equipment shall be operated from a DC power source, it shall have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU and shall be complete with a cable with at least 25 m in length (Hach 2100P or an approved similar instrument).

The turbidity meter shall be calibrated to establish the relationship between turbidity readings (in NTU) and levels of suspended solids (in mg L<sup>-1</sup>). After calibration, turbidity measurements shall be taken as a true representation of levels of suspended solids only before laboratory test results for suspended solids are known.

### *Suspended Solids*

A water sample shall be taken at the same time as the turbidity results are obtained using a Niskin Water Sampler (or a similar approved instrument) of at least 2.5 litre capacity with messenger and a 10 m line. Gravimetric suspended solid concentrations in each sample shall be determined in the laboratory according to Method No. 2540 D in APHA *Standard Methods for the Examination of Water and Wastewater*, 19th edition.

### *Water Depth Gauge*

A portable, battery-operated echo sounder (Seafarer 700 or a similar approved instrument) shall be used for the determination of water depth at each designated monitoring station. This unit shall either be hand-held or affixed to the bottom of the work boat if the same vessel is to be used throughout the monitoring programme.

### *Salinity Measurement Instrument*

A portable salinometer capable of measuring salinity in the range of 0 - 40 mg L<sup>-1</sup> shall be provided for measuring salinity of the water at each monitoring location.

### *pH Measuring Instrument*

A portable pH meter shall be provided for measuring pH of the water at each monitoring location, which is approved by the EPD.

### *Water Sampling Equipment*

A water sampler, consisting of a transparent PVC or glass cylinder of not less than two litres which can be effectively sealed with cups at both ends, shall be used (Kahlsico Water Sampler 13SWB203 or an approved similar instrument). The water sampler shall have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth.

Water samples for SS measurements shall be collected in high density polythene bottles, packed in ice (cooled to 4 °C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.

### *Positioning Device*

A boat-fixed type digital Differential Global Positioning System (DGPS) shall be used during monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

### *Testing Protocols*

All *in situ* monitoring instruments shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location. The turbidity meter shall be calibrated to establish the relationship between turbidity readings (in NTU) and levels of suspended solids (in mg l<sup>-1</sup>) where possible.

For the on-site calibration of field equipment, the *BS 1427 : 1993, Guide to Field and On-Site Test Methods for the Analysis of Waters* shall be observed. Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when equipment is under maintenance, calibration etc.

#### *Laboratory Analysis*

All laboratory work shall be carried out in a HOKLAS accredited laboratory. Water samples of about 1,000 ml shall be collected at the monitoring stations for carrying out the laboratory determinations. The determination work shall start within 24 hours after collection of the water samples. The analyses shall follow the standard methods according to *Table A1.4a* and as described in *APHA Standard Methods for the Examination of Water and Wastewater*, 19th edition, unless otherwise specified.

**Table A1.4a** *Analytical Methods to be Applied to Marine Water Quality Samples*

<b>Determinant</b>	<b>Standard Method</b>
Suspended solids	APHA 2540D
Total inorganic nitrogen	APHA 4500-N <sub>org</sub> /NO <sub>3</sub> ; or equivalent methods subject to approval of DEP.
Ammonia	APHA 4500-NO <sub>3</sub> G;

For each of the testing methods details shall be submitted to the EPD for approval prior to the commencement of the monitoring programme. The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of replicate samples per-batch etc), detection limits and accuracy. The QA/QC details shall be in accordance with requirements of HOKLAS or another internationally accredited scheme. The QA/QC results shall be reported. EPD may request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. Additional duplicate samples may be required by EPD for inter-laboratory calibration. Remaining samples after analysis shall be kept by the laboratory for 3 months in case repeat analysis is required. If *in-house* or non-standard methods are proposed, details of the method verification should, if required, be submitted to the EPD. In any circumstances, the sample testing shall have comprehensive quality assurance and quality control programmes. The laboratory shall be prepared to demonstrate the quality control programmes to the EPD or their representative if and when required.

#### *Monitoring Locations*

Nine monitoring stations and three control stations shall be established. Their locations are detailed in *Tables A1.4b & A1.4c* and depicted in *Figure E1.4a*.

Table A1.4d provides a summary of the marine water quality monitoring requirements.

Annex E contains the figures showing the location of the environmental sensitive receivers as identified in the EIA Report.

**Table A1.4b** *Locations of Marine Water Quality Monitoring Stations*

Station	Easting	Northing
W1	822817	824652
W2	823 309	824 700
W3	825 147	824 852
W4	825 402	825 040
W5	825 945	825 332
W6	826 256	825 462
W7	829240	825 367
W8	823 908	823 680
W9	824 437	823 447

**Table A1.4c** *Locations of Marine Water Quality Control Stations*

Station	Easting	Northing
C1	820 957	823 373
C2	825 953	822 045
C3	828 182	825 199

**Table A1.4d** *Summary of Marine Water Quality Monitoring*

Category	Station Number	Parameters to be Monitored
Beaches and water contact sports	W1, W2, W3, W4, W5, W6, W9	Suspended solids, turbidity, temperature, and dissolved oxygen (mg L-1 and % saturation), pH and salinity. total inorganic nitrogen, and unionised ammonia.
WSD salt water intake at Tsuen Wan	W7	Suspended solids, turbidity, temperature, dissolved oxygen (mg L-1 and % saturation), ammonia, pH and salinity.ia.
Mariculture area at Ma Wan	W8	Suspended solids, turbidity, temperature, dissolved oxygen (mg L-1 and % saturation), total inorganic nitrogen and ammonical nitrogen pH and salinity..
Control Station	C1, C2, C3	Suspended solids, turbidity, temperature, dissolved oxygen (mg L-1 and % saturation), total inorganic nitrogen, ammonia, pH and salinity.

Prior to the commencement of the EM&A programme, the ET Leader shall seek approval of the proposed water quality monitoring stations from the Engineer and EPD.

When alternative monitoring locations are proposed, they should be chosen taking regard on the following criteria:

- at locations close to and preferably at the boundary of the mixing zone of the major site activities as indicated in the EIA , which are likely to have water quality impacts;
- close to sensitive receptors which are directly or likely to be affected;
- for monitoring locations located in the vicinity of the sensitive receptors, care should be taken to cause minimal disturbance during monitoring;
- at two or more control stations which shall be at locations representative of the project site in its undisturbed condition. Control stations should be outside the area of influence of the works and, as far as practicable, not affected by any other works.

#### **A1.4.4 Baseline Monitoring**

The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed impact and control monitoring stations. The measurements shall be taken at all designated impact and control stations, 3-days per week, at mid-flood and mid-ebb tides, for 1 month prior to the commencement of the reclamation works.

Table A1.4e summarises the baseline monitoring programme for each water quality parameter.

**Table A1.4e Summary of Baseline Monitoring Programme for Water Quality**

<b>Parameter</b>	<b>Monitoring Stations</b>	<b>Frequency</b>	<b>Total Number of Sampling Days</b>
Dissolved Oxygen	All	Three days per week at each monitoring station	12
Temperature	All	Three days per week at each monitoring station	12
Turbidity	All	Three days per week at each monitoring station	12
pH	All	Three days per week at each monitoring station	12
Suspended Solids	All	Three days per week at each monitoring station	12
Salinity	All	Three days per week at each monitoring station	12
Ammoniacal Nitrogen	W7, W8, C1,C2,C3	Three days per week at each monitoring station	12
Total inorganic nitrogen	W7, W8, C1,C2,C3	Three days per week at each monitoring station	12

All measurements shall be carried out at three water depths, namely, 1 m below water surface, mid-water depth, and 1 m above sea bed as appropriate to the derivation of Action and Limit levels. If the water depth is less than 6 m, the mid-depth measurement may be omitted subject to the approval of the Engineer. If the depth is less than 3 m, only the mid-depth measurement needs to be taken subject to the approval of the Engineer. There shall not be any marine construction activities in the vicinity of the stations during the baseline monitoring. All parameters should be measured at the control stations on each monitoring day.

The ET Leader shall seek approval for the Baseline conditions for water quality from the Engineer and the EPD prior to the commencement of Works.

#### **A1.4.5**      ***Impact Monitoring***

During the course of the marine works, impact monitoring shall be undertaken on three working days per week. Monitoring at each station shall be undertaken at both mid-ebb and mid-flood tides (i.e. consolidated as a single set of monitoring data) on the same day. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of the Action and/or Limit levels, in which case the monitoring frequency will be increased. Two consecutive measurements of DO concentration ( $\text{mg L}^{-1}$ ), DO saturation (%) and turbidity (NTU) will be taken *in situ* at 1 metre below the surface, mid-depth and 1 metre above the seabed at each location. If the water depth is less than 6 m, the mid-depth measurement may be omitted subject to the approval of the Engineer. If the depth is less than 3 m, only the mid-depth measurement need be taken subject to the approval of the Engineer. The monitoring probes shall be retrieved out of water after the first measurement and then redeployed for the second measurement. Where the difference in value between the first and second readings of DO or turbidity parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings shall be taken. Water samples for SS ( $\text{mg L}^{-1}$ ),  $\text{NH}_3\text{-N}$  ( $\text{mg L}^{-1}$ ), and TIN ( $\text{mg L}^{-1}$ ) measurements shall be collected at the same three depths for the entire duration of the construction works. As for the *in situ* measurements, replicate samples shall be taken at both Control and Impact monitoring stations.

*Table A1.4f* summarises the impact monitoring programme for each water quality parameter.

**Table A1.4f Summary of Impact Monitoring Programme for Water Quality**

Parameter	Monitoring Stations	Frequency	Total Number of Sampling Days
Dissolved Oxygen (DO concentration and saturation)	All	Three days per week at each monitoring station	Entire duration of construction works
Temperature	All	Three days per week at each monitoring station	Entire duration of construction works
pH	All	Three days per week at each monitoring station	Entire duration of construction works
Turbidity	All	Three days per week at each monitoring station	Entire duration of construction works
Suspended Solids	All	Three days per week at each monitoring station	Entire duration of construction works
Salinity	All	Three days per week at each monitoring station	Entire duration of construction works
Ammoniacal Nitrogen	W7, W8, C1,C2,C3	Three days per week at each monitoring station	Entire duration of construction works
Total inorganic nitrogen	W7, W8, C1,C2,C3	Three days per week at each monitoring station	Entire duration of construction works

In addition to the above in-situ measurements temperature, salinity and pH will be determined at all Control and Impact stations at the same three depths, as specified above. Impact monitoring of salinity and pH shall be carried out for the first 3 months, if no changes are found monitoring can be stopped.

For the purpose of evaluating water quality, the values obtained from individual water depths (i.e. surface, middle, bottom) will be assessed individually against the statutory standards of the *Water Pollution Control Ordinance (WPCO)*. Should the action / limit levels or WPCO be exceeded at any time, the Engineer may direct that monitoring be undertaken daily at each of the designated monitoring stations until the recorded depth-averaged values of the described parameters, meet with the satisfaction of the Engineer and result in an acceptable level of water quality.

Upon completion of all marine activities, a post project monitoring exercise water quality shall be carried out for four weeks, in the same manner as the impact monitoring during construction phase. This shall include the monitoring of DO concentration ( $\text{mg L}^{-1}$ ), DO saturation (%), turbidity (NTU), pH, SS ( $\text{mg L}^{-1}$ ),  $\text{NH}_3\text{-N}$  ( $\text{mg L}^{-1}$ ), and TIN ( $\text{mg L}^{-1}$ ) and salinity.

Water quality monitoring results will be evaluated against Action and Limit levels as shown in *Table A1.4g* for all monitoring stations. For all other parameters, Action and Limit Levels shall be proposed by the ET Leader for agreement with the EPD following the completion of the baseline monitoring.

Exceedances of the Action and Limit level may, as necessary, result in changes to the monitoring and dredging operations, potentially involving increased monitoring and implementation of appropriate mitigation measures.

**Table A1.4g**      *Action and Limit for Marine Water Quality*

Parameters	Action	Limit
DO in mg L <sup>-1</sup> (Surface, Middle and Bottom)	Surface and Middle 5 percentile of baseline data for surface and middle layer	Surface and Middle 4 mg L <sup>-1</sup> (5 mg L <sup>-1</sup> for Fish Culture Zone (FCZ) or 1 percentile of baseline data for surface and middle layer whichever is lower)
	Bottom 5 percentile of baseline data for bottom layer	Bottom 2 mg L <sup>-1</sup> or 1 percentile of baseline data for bottom layer whichever is lower.
SS in mg L <sup>-1</sup> ( <i>depth-averaged</i> )	95 percentile of baseline data and 120% of upstream control station's SS/Tby at the same tide of the same day whichever is higher.	95 percentile of baseline or 130% of upstream control station's SS/Tby at the same tide of the same day whichever is higher.
Turbidity ( <i>Tby</i> ) in NTU ( <i>depth-averaged</i> )	95 percentile of baseline data and 120% of upstream control station's SS/Tby at the same tide on the same day whichever is higher.	95 percentile of baseline data and 130% of upstream control station's SS/Tby at the same tide on the same day whichever is higher.
NH <sub>3</sub> -N in mg L <sup>-1</sup> ( <i>depth-averaged</i> )	95 percentile of baseline data.	95 percentile of baseline data or 0.021 mg/L for unionised ammoniacal nitrogen, whichever is higher.
TIN in mg L <sup>-1</sup> ( <i>depth-averaged</i> )	95 percentile of baseline data	95 percentile of baseline data or 0.5 mg/L for the North Western WCZ and 0.4 for the Western Buffer WCZ, whichever is higher.

Notes:

- "depth-averaged" is calculated by taking the arithmetic means of reading of all three depths;
- For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- For SS, Tby, NH<sub>3</sub>-N and TIN, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered necessary.
- Whichever of the two criteria is greater shall be used as the Action and Limit levels, subject to approval from EPD.
- Unionised ammoniacal nitrogen shall be calculated from the monitored ammoniacal nitrogen based on temperature, pH and salinity which are routinely monitored.

### A1.4.7 *Event Contingency Plan*

Should the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality criteria have been exceeded, the actions in accordance with the Event Contingency Plan in *Table A1.4h* and / or *Table A1.4i* shall be carried out.

**Table A1.4h** *Event Contingency Plan for Water Quality (except at FCZ)*

<b>Exceedance</b>	<b>ET Leader &amp; ET</b>	<b>Contractor</b>	<b>Engineer</b>
Action level exceeded on one sampling day	Repeat in-situ measurement to confirm findings;	Inform the Engineer, WSD(if necessary) and EPD immediately and confirm notification of the non-compliance in writing;	Discuss with ET and Contractor on the proposed mitigation measures;
	Identify source(s) of impact;	Rectify unacceptable practice;	Make agreement on the mitigation measures to be implemented;
	Inform Contractor immediately;	Check all plant and equipment;	Assess the effectiveness of the implemented mitigation measures
	Check monitoring data, all plant, equipment and Contractor's working methods;	Consider changes of working methods;	
	Discuss mitigation measures with Engineer and Contractor;	Propose and discuss mitigation measures with Engineer;	
Repeat measurement on next day of exceedance.		Implement the agreed mitigation measures.	
Action level exceeded on more than two consecutive sampling days	Repeat in-situ measurements to confirm findings;	Inform the Engineer, WSD (if necessary) and EPD immediately and confirm notification of the non-compliance in writing;	Discuss with ET and Contractor on the proposed mitigation measures;
	Identify source(s) of impact;	Rectify unacceptable practice;	Make agreement on the mitigation measures to be implemented;
	Inform Contractor immediately;	Check all plant and equipment; Consider changes of working methods;	Assess the effectiveness of the implemented mitigation measures.
	Check monitoring data, all plant, equipment and Contractor's working methods;	Propose mitigation measures to Engineer within 3 working days and discuss with ET and Engineer;	
	Discuss mitigation measure with Engineer and Contractor;	Implement the agreed mitigation measures.	
Ensure mitigation measures are implemented;			

<b>Exceedance</b>	<b>ET Leader &amp; ET</b>	<b>Contractor</b>	<b>Engineer</b>
	Prepare to increase the monitoring frequency to daily; Repeat measurement on next day of exceedance.		
Limit level exceeded on one sampling day	Repeat in-situ measurement to confirm findings;  Identify source(s) of impact;  Inform Contractor immediately;  Check monitoring data, all plant, equipment and Contractor's working methods;  Discuss mitigation measure with Engineer and Contractor;  Ensure mitigation measures are implemented;  Increase the monitoring frequency to daily until no exceedance of Limit level .	Immediately inform the Engineer, WSD (if necessary) and EPD and confirm notification of the non-compliance in writing;  Rectify unacceptable practice;  Check all plant and equipment; Consider changes of working methods;  Propose mitigation measures to Engineer within 3 working days and discuss with Engineer;  Implement the agreed mitigation measures.	Discuss with ET and Contractor on the proposed mitigation measures;  Request Contractor to critically review the working methods;  Make agreement on the mitigation measures to be implemented;  Assess the effectiveness of the implemented mitigation measures.

**Table A1.4i** *Event Contingency Plan (near FCZ)*

<b>Exceedance</b>	<b>ET Leader &amp; ET</b>	<b>Contractor</b>	<b>Engineer</b>
Action	Increase SS monitoring to at least six times per day until compliance achieved;  Identify source(s) of impact;  Inform Contractor, EPD and AFCD within 48 hours if exceedance confirmed from SS determination.  Check monitoring data, all plant, equipment and Contractor's working methods;  Discuss mitigation measures with Engineer and Contractor;  Ensure mitigation measures are implemented.	Inform the Engineer and confirm notification of the non-compliance in writing;  Rectify unacceptable practice;  Check all plant and equipment; consider changes of working methods;  Propose mitigation measures to Engineer within 2 working days and discuss with Engineer;  Implement the agreed mitigation measures.	Discuss with ET and Contractor on the proposed mitigation measures;  Request Contractor to critically review the working methods;  Make agreement on the mitigation measures to be implemented;  Assess the effectiveness of the implemented mitigation measures.

<b>Exceedance</b>	<b>ET Leader &amp; ET</b>	<b>Contractor</b>	<b>Engineer</b>
Limit	Increase SS monitoring to at least six times per day until compliance achieved	Inform the Engineer and confirm notification of the non-compliance in writing;	Discuss with ET and Contractor on the proposed mitigation measures;
	Identify source(s) of impact;	Rectify unacceptable practice;	Request Contractor to critically review the working methods;
	Inform Contractor, EPD and AFCD within 48 hours if exceedance confirmed by SS results;	Check all plant and equipment; consider changes of working methods;	Make agreement on the mitigation measures to be implemented;
	Check monitoring data, all plant, equipment and Contractor's working methods;	Propose mitigation measures to Engineer within 2 working days and discuss with Engineer;	Assess the effectiveness of the implemented mitigation measures.
	Discuss mitigation measure with Engineer and Contractor;	Implement the agreed mitigation measures.	
	Ensure mitigation measures are implemented.		

## **A1.5** *MARINE ECOLOGY AND FISHERIES*

### **A1.5.1** *The EM&A Recommendations*

The impacts of the reclamation activities on marine ecological resources will be monitored indirectly through impacts to water quality. The requirements for the monitoring and auditing of marine ecological resources are identified in the Implementation Schedule (*Annex G*).

## **A1.6** *BIOGAS MONITORING*

### **A1.6.1** *Introduction*

The Reclamation Contractor should be responsible for biogas monitoring within the reclamation site. The results will be used to determine the potential risks due to biogas emission and the need for protective measures against methane gas ingress into future developments.

### **A1.6.2** *EM&A Recommendations*

In order to determine more accurately the risk related to biogas emissions from the organic sediment at the STD, it is recommended that monitoring of the reclaimed land should be undertaken following completion of the reclamation works. This will enable actual rates of gas emission to be determined and will ensure that account is taken of the effect of changing atmospheric pressure on the behaviour of the gas reservoir which may accumulate within the reclamation fill above the gas producing organic sediments.

## Monitoring

It may take some time for fully anaerobic conditions to be established within the organic sediment and for a reservoir of gas to accumulate within the reclamation fill. Thus, monitoring should be undertaken for as long as possible prior to the commencement of construction of the new developments on the reclaimed land. Ideally, monitoring should be undertaken for one full year, which will measure potential seasonal variations of gas migration. Monitoring should commence immediately upon completion of the reclamation so that any trends may be observed and results extrapolated to the period of construction and occupation of the developments.

A qualified biogas specialist shall be employed by the Contractor, who will be responsible for providing technical advice on the monitoring system (including borehole locations and measuring methods), interpretation of the monitoring results and propose mitigation measures, if needed, in subsequent stages of the project.

Monitoring should be undertaken via purpose built monitoring wells installed within boreholes drilled into the fill material. The boreholes should be drilled down to the level of the groundwater (mean sea water level) and standard landfill gas-type monitoring wells should be installed. These should be fitted with a removable cap and gas monitoring valve so that gas concentrations may be measured as well as flow rates from the open well.

It is recommended that two monitoring wells should be installed across the area. These should be located such as to give an approximately even distribution across the whole area. If they are located within areas designated for open space, it may be possible to retain them for future long-term monitoring. *Figure E1.6a* shows the proposed locations of the monitoring wells. The wells should be monitored as follows:

- concentrations of the following gases should be measured using portable monitoring equipment (such as, GA94 manufactured by Geotechnical Instrument Ltd). It is proposed that for a regular impact monitoring, a sampling frequency of at least once in every two weeks shall be observed at all the monitoring wells during the first six months of the monitoring. The sampling frequency could be reduced to monthly interval for the next six months, if the monitoring for the first six months shows no or low level (less than 1% (v/v)) methane. One gas sample should be collected for gas chromatographic (GC) analysis on monthly basis to confirm the field monitoring results:
  - methane
  - carbon dioxide
  - oxygen

- gas flow rates from the open wells - very sensitive techniques (such as micro-anemometer) will need to be used to measure the anticipated very low flow rates.

In addition, it will be important that the gas flows are monitored from each of the wells under different meteorological conditions and to include some occasions when atmospheric pressure is falling quite quickly (for example, immediately preceding a typhoon).

### **A1.6.3**      *Precautions During Construction*

On the basis of the results of the biogas assessment, there is a possibility that methane may be generated from the sediment which left in place at the STD area. Given the relatively low rates of gas generation which have been predicted, any gas emitted from the surface of the reclaimed land will be rapidly dispersed in the atmosphere. It is therefore considered that there should be no risk to people working on the reclaimed land in the open air and that most construction activities will be able to proceed in safety without special precautions.

However, it is considered that, depending on the results from the gas monitoring, certain precautions may be required for any work which involves excavation into the fill material or below ground working. These precautions would include monitoring of the excavation / below ground void for concentrations of methane, carbon dioxide and oxygen before and during access by any personnel and the presence of someone at the surface at all times that any below ground work is being undertaken to monitor the work and ensure the safety of the people involved.

Similarly, precautions may be required to ensure that there is no risk due to the accumulation of gas within any temporary structures, such as site offices, during any construction works on the reclamation area. It may be necessary, for example, to raise such structures slightly off the ground so that any gas emitted from the ground beneath the structure may disperse to atmosphere rather than entering the structure.

The exact requirements for precautionary measures during the construction phase would need to be specified following assessment of the results obtained from the gas monitoring and the details would depend on the depth of excavation or nature of the voids / structures involved.

Further information and advice, including the precautions required for the drilling of the monitoring boreholes, may be found in the Hong Kong Government's advisory document *Landfill Gas Hazard Assessment Guidance Note* prepared by the Environmental Protection Department.

Any chamber, manhole or culvert which is large enough to permit access to personnel should be subject to entry safety procedures. Such work in confined spaces is controlled by the Factories and Industrial Undertakings

(Confined Spaces) Regulations of the Factories and Industrial Undertakings Ordinance.

#### **A1.6.4**      *Mitigation measures*

Depending on the results of the gas monitoring, it may be necessary to incorporate a number of general protection measures into the design of the future developments on top of the reclamation (in particular at the area of the sediment pocket) and to include specific measures in the design of individual buildings. Specific details cannot be provided until the results of this monitoring and exact details of individual building designs are available. A combination of different measures may be used for protecting the development against possible risks due to biogas and discussions would need to be held with the developers and architects to determine which are the most appropriate.

Typical, generic, protection measures which may be employed (depending on the results of the monitoring and exact building designs) are detailed in the Implementation Schedule (*Annex G*).

### **A1.7**      *LANDSCAPE AND VISUAL*

#### **A1.7.1**      *Introduction*

This section identifies a range of measures to mitigate against landscape and visual impacts associated with the construction phase of the Project. The main recommended mitigation measures are as follows.

#### **A1.7.2**      *General*

In general, the EM&A requirements concerning the landscape works of the EIA will relate to contractual matters during implementation, particularly regarding items such as the erection of hoarding to screen low-level views adjacent to pedestrian areas, the hydroseeding of the reclaimed areas and the early implementation where possible of landscape works to act as a visual screen. The mitigation measures for the reclaimed area should also include the re-provision of Angler's Beach and the protection of the coastal area immediately west of the reclamation.

All landscape works shall be designed and implemented to the satisfaction of Civil Engineering Department, Highways Department / Landscape Unit, Agriculture, Fisheries and Conservation Department and Leisure and Cultural Services Department for soft landscape areas, and Highways Department/ Maintenance Division for hard landscape in accordance with WBTC No. 18/94.

#### **A1.7.3**      *Mitigation Measures*

Details of all the recommended mitigation measures are included within the Implementation Schedule (*Annex G*)

#### **A1.7.4**      *Auditing Requirements*

In order to ensure that landscape and visual resources are adequately protected it will be necessary to undertake audits to ensure the effective implementation of the recommended mitigation measures. *Section 11* of this EM&A Manual sets out the requirements of the auditing programme.

Annex B

Specific EM&A  
Requirement for Schedule 2  
Designated Project :  
Sham Tseng Bypass

## **B1**            **EM&A REQUIREMENTS**

### **B1.1**            **INTRODUCTION**

This Annex provides a summary of the specific EM&A requirements for the Schedule 2 Designated Project, involving the construction of Sham Tseng Bypass (about 2400 m) including connections to the proposed widening of Castle Peak Road.

The same methodology and equipment will be employed for the noise and air quality monitoring as outlined in *Sections 5 and 6 of this EM&A Manual*. This Annex outlines those EM&A requirements which are specific to the construction works.

### **B1.2**            **NOISE MONITORING**

As outlined in *Section 5 of the EIA Report*, the appointed Contractor for the reclamation works is responsible for conducting noise monitoring at the following representative monitoring stations, as defined in *Table B1.2b* and shown in *Figures E1.2a and E1.2b*.

*Table B1.2a* lists the suggested quantities of noise monitoring equipment required for the Project, although the exact requirements will be dependent upon the manpower employed by the Contractor to perform the monitoring.

**Table B1.2a**        **Noise Monitoring Equipment**

<b>Description</b>	<b>Quantity</b>
Noise meter	1 unit
Calibrator	1 unit
Hand-held anemometer	1 unit

**Table B1.2b**        **EM&A Representative Monitoring Locations**

<b>NSR No</b>	<b>Identity/Description</b>
CM1	Golden Villa
CM2	Union Carbide Tower 2
CM3	Lido Garden Tower 3
CM4	DD 387 Lot 99 (Residential building)
CM5	Goldenville

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.

### **B1.2.1** *Operational Phase Noise Monitoring*

Noise monitoring has been recommended to be undertaken during the operational phase of the STD. It is recommended that CED shall be responsible for the operational phase monitoring, although, a qualified monitoring contractor or laboratory shall be employed to carry out the proposed monitoring.

The noise monitoring locations are shown in *Figure E1.2c* and summarised in *Table B1.2c*. Should the monitoring locations be relocated, prior approval should be obtained from EPD.

**Table B1.2c** *EM&A Operational Noise Monitoring Stations*

<b>NSR No.</b>	<b>Identity/Description</b>	<b>Proposed Monitoring Elevation</b>
OM1	Golden Villa	Low Level
OM2	DD 387 Lot 99 (Residential Building)	Low Level
OM3	Sea Crest Vila Block 10	Mid and Top Level
OM4	Planned Residential Development in Site 2	Low and Mid Level

Details of all the recommended mitigation measures are shown in Figure B1 to B2 and they are included within the Implementation Schedule (Annex G).

### **B1.3** *AIR QUALITY MONITORING*

As outlined in *Section 6 of the EIA Report*, the appointed Contractor for the reclamation works is responsible for conducting air quality monitoring at the following representative monitoring stations, as defined in *Table B1.3b* and shown in *Figures E1.3a and E1.3b*.

Table B1.3a presents the recommended types and quantities of TSP monitoring equipment required, although the exact requirements will depend on the manpower employed by the contractor.

**Table B1.3a TSP Recommended Monitoring Equipment**

Description	Quantity
High Volume sampler	2 units
Hand-held direct reading dust meter	1 units

**Table B1.3b EM&A Representative Monitoring Locations**

ASR No.	Identity/Description
AM 1	Proposed Residential Development at former San Miguel Brewery
AM 2	Residential Development at Union Carbide

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.

## **B1.4** WATER QUALITY MONITORING

### **B1.4.1** Auditing Requirements

In order to ensure that water quality resources are adequately protected during the Construction Phase, it will be necessary for the Contractor to undertake audits to ensure the effective implementation of the recommended mitigation measures as outlined in EIA and Implementation Schedule (*Annex G*). *Section 11* of this EM&A Manual sets out the requirements of the auditing programme.

## **B1.5** LANDSCAPE AND VISUAL

### **B1.5.1** Introduction

This section identifies a range of measures to mitigate against landscape and visual impacts associated with the construction phase of the Project. The main recommended mitigation measures are as follows.

### **B1.5.2** General

In general, the EM&A requirements concerning the landscape works of the EIA will relate to contractual matters during implementation, particularly regarding items such as topsoils and tree preservation.

All landscape works shall be designed and implemented to the satisfaction of Civil Engineering Department, Highways Department / Landscape Unit, Agriculture, Fisheries and Conservation Department and Leisure and Cultural Services Department for soft landscape areas, and Highways Department/ Maintenance Division for hard landscape in accordance with WBTC No. 18/94.

### **B1.5.3** Mitigation Measures

Details of all the recommended mitigation measures are included within the Implementation Schedule (*Annex G*).

### **B1.5.4** Auditing Requirements

In order to ensure that landscape and visual resources are adequately protected it will be necessary to undertake audits to ensure the effective implementation of the recommended mitigation measures. *Section 11* of this EM&A Manual sets out the requirements of the auditing programme.

Annex C

Specific EM&A  
Requirements for Schedule  
2 Designated Project:  
Sewage Pumping Station

## C1 EM&A REQUIREMENTS

### C1.1 INTRODUCTION

This Annex provides a summary of the specific EM&A requirements for the Schedule 2 Designated Project, involving the construction of sewage pumping station at Sham Tseng.

The same methodology and equipment will be employed for the noise and air quality monitoring as outlined in *Sections 5 and 6 of this EM&A Manual*. This Annex outlines those EM&A requirements which are specific to the construction works.

### C1.2 NOISE MONITORING

As outlined in *Section 5 of the EIA Report*, the appointed Contractor for the reclamation works is responsible for conducting noise monitoring at the following representative monitoring stations, as defined in *Table C1.2b* and shown in *Figures E1.2a and E1.2b*.

*Table C1.2a* lists the suggested quantities of noise monitoring equipment required for the Project, although the exact requirements will be dependent upon the manpower employed by the Contractor to perform the monitoring.

*Table C1.2a Noise Monitoring Equipment*

Description	Quantity
Noise meter	1 unit
Calibrator	1 unit
Hand-held anemometer	1 unit

*Table CC1.2b EM&A Representative Monitoring Locations*

NSR No	Identity/Description
CM3	Lido Garden Tower 3

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 station(s) are chosen, the baseline monitoring and impact monitoring shall be carried out at the same positions.

### C1.3 AIR QUALITY MONITORING

As outlined in *Section 6 of the EIA Report*, the appointed Contractor for the reclamation works is responsible for conducting air quality monitoring at the following representative monitoring stations, as defined in *Table C1.3b* and shown in *Figure E1.3a and E1.3b*.

*Table C1.3a* presents the recommended types and quantities of TSP monitoring equipment required, although the exact requirements will depend on the manpower employed by the contractor.

**Table C1.3a TSP Recommended Monitoring Equipment**

Description	Quantity
High Volume sampler	2 units
Hand-held direct reading dust meter	1 units

**Table C1.3b EM&A Representative Monitoring Locations**

ASR No.	Identity/Description
AM 1	Proposed Residential Development at former San Miguel Brewery
AM 2	Residential Development at Union Carbide

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.

## **C1.4**      *WATER QUALITY MONITORING*

### **C1.4.1**    *Auditing Requirements during the Construction Phase*

In order to ensure that water quality resources are adequately protected during the Construction Phase, it will be necessary for the Contractor to undertake audits to ensure the effective implementation of the recommended mitigation measures as outlined in EIA and Implementation Schedule in *Annex G. Section 11* of this EM&A Manual sets out the requirements of the auditing programme.

## **C1.5**      *LANDSCAPE AND VISUAL*

### **C1.5.1**    *Introduction*

This section identifies a range of measures to mitigate against landscape and visual impacts associated with the construction phase of the Project. The main recommended mitigation measures are as follows.

### **C1.5.2**    *General*

In general, the EM&A requirements concerning the landscape works of the EIA will relate to contractual matters during implementation, particularly regarding items such as topsoils and tree preservation.

All landscape works shall be designed and implemented to the satisfaction of Civil Engineering Department, Highways Department / Landscape Unit, Drainage Service Department and Leisure and Cultural Services Department for soft landscape areas, and Highways Department/ Maintenance Division for hard landscape in accordance with WBTC No. 18/94.

### **C1.5.3**    *Mitigation Measures*

Details of all the recommended mitigation measures are included within the Implementation Schedule (*Annex G*).

#### **C1.5.4**      *Auditing Requirements*

In order to ensure that landscape and visual resources are adequately protected it will be necessary to undertake audits to ensure the effective implementation of the recommended mitigation measures. *Section 11* of this EM&A Manual sets out the requirements of the auditing programme.

Annex D

Specific EM&A  
Requirement for Schedule 2  
Designated Project : Castle  
Peak Road Underpass

## D1 EM&A REQUIREMENTS

### D1.1 INTRODUCTION

This Annex provides a summary of the specific EM&A requirements for the Schedule 2 Designated Project, involving the construction of a 370 m long underpass below Castle Peak Road.

The same methodology and equipment will be employed for the noise and air quality monitoring as outlined in *Sections 5 and 6 of this EM&A Manual*. This Annex outlines those EM&A requirements which are specific to the construction works.

### D1.2 NOISE MONITORING

As outlined in *Section 5 of the EIA Report*, the appointed Contractor for the reclamation works is responsible for conducting noise monitoring at the following representative monitoring stations, as defined in *Table D1.2b* and shown in *Figures E1.2a and E1.2b*.

*Table D1.2a* lists the suggested quantities of noise monitoring equipment required for the Project, although the exact requirements will be dependent upon the manpower employed by the Contractor to perform the monitoring.

*Table D1.2a Noise Monitoring Equipment*

Description	Quantity
Noise meter	1 unit
Calibrator	1 unit
Hand-held anemometer	1 unit

*Table D1.2b EM&A Representative Monitoring Locations*

NSR No	Identity/Description
CM4	DD 387 Lot 99 (Residential building)
CM5	Goldenville
CM6	Sea Crest Villa Block 7

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.

#### **D1.2.1 Operational Phase Noise Monitoring**

Noise monitoring has been recommended to be undertaken during the operational phase of the STD. It is recommended that CED shall be responsible for the operational phase monitoring, although, a qualified monitoring contractor of laboratory shall be employed to carry out the proposed monitoring

The operational noise monitoring locations are shown in *Figure E1.2c* and summarised in *Table D1.2c*. Should the monitoring locations be relocated, prior approval should be obtained from EPD.

**Table D1.2c EM&A Operational Noise Monitoring Locations**

<b>NSR No</b>	<b>Identity/Description</b>
OM5	Sea Crest Villa Tower 7

#### **D1.3 AIR QUALITY MONITORING**

As outlined in *Section 6 of the EIA Report*, the appointed Contractor for the reclamation works is responsible for conducting air quality monitoring at the following representative monitoring stations, as defined in *Table D1.3b* and shown in *Figures E1.3a and E1.3b*.

*Table D1.3a* presents the recommended types and quantities of TSP monitoring equipment required, although the exact requirements will depend on the manpower employed by the contractor.

**Table D1.3a TSP Recommended Monitoring Equipment**

Description	Quantity
High Volume sampler	2 units
Hand-held direct reading dust meter	1 units

**Table D1.3b EM&A Representative Monitoring Locations**

ASR No.	Identity/Description
AM 1	Proposed Residential Development at former San Miguel Brewery
AM 2	Residential Development at Union Carbide

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.

## **D1.4 WATER QUALITY MONITORING**

### **D1.4.1 Auditing Requirements**

In order to ensure that water quality resources are adequately protected during the Construction Phase, it will be necessary for the Contractor to undertake audits to ensure the effective implementation of the recommended mitigation measures as outlined in EIA and Implementation Schedule (*Section 13* of the EIA). *Section 11* of this EM&A Manual sets out the requirements of the auditing programme.

## **D1.5**            **LANDSCAPE AND VISUAL**

### **D1.5.1**        ***Introduction***

This section identifies a range of measures to mitigate against landscape and visual impacts associated with the construction phase of the Project. The main recommended mitigation measures are as follows.

### **D1.5.2**        ***General***

In general, the EM&A requirements concerning the landscape works of the EIA will relate to contractual matters during implementation, particularly regarding items such as topsoils and tree preservation.

All landscape works shall be designed and implemented to the satisfaction of Civil Engineering Department, Highways Department / Landscape Unit, Agriculture, Fisheries and Conservation Department and Leisure and Cultural Services Department for soft landscape areas, and Highways Department/ Maintenance Division for hard landscape in accordance with WBTC No. 18/94.

### **D1.5.3**        ***Mitigation Measures***

Details of all the recommended mitigation measures are included within the Implementation Schedule *in Annex G of this EM&A Manual*.

### **D1.5.4**        ***Auditing Requirements***

In order to ensure that landscape and visual resources are adequately protected it will be necessary to undertake audits to ensure the effective implementation of the recommended mitigation measures. *Section 11* of this EM&A Manual sets out the requirements of the auditing programme.

Annex E

# Monitoring Locations and Environmentally Sensitive Receivers

Figures

E1.2a  
E1.2b  
E1.2c  
E1.3a  
E1.4a  
E1.6a  
E1  
E2  
E3  
E4  
E5  
E6  
E7  
E8  
E9



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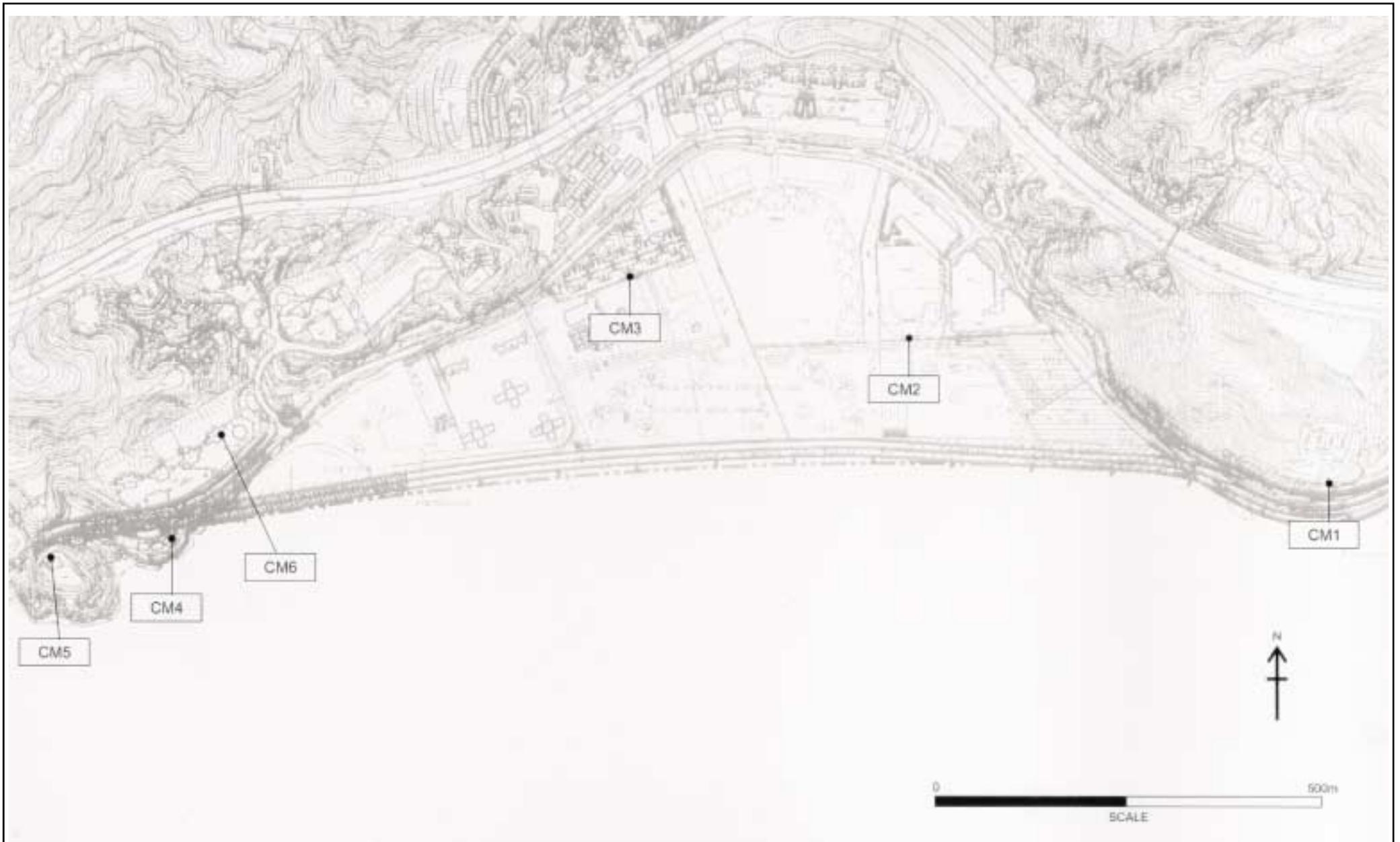
PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
 SHAM TSENG DEVELOPMENT

**Construction Phase Noise  
 Monitoring Locations**

Drawing No. 圖則編號	E1.2a		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況



土木工程署  
 Civil Engineering  
 Department



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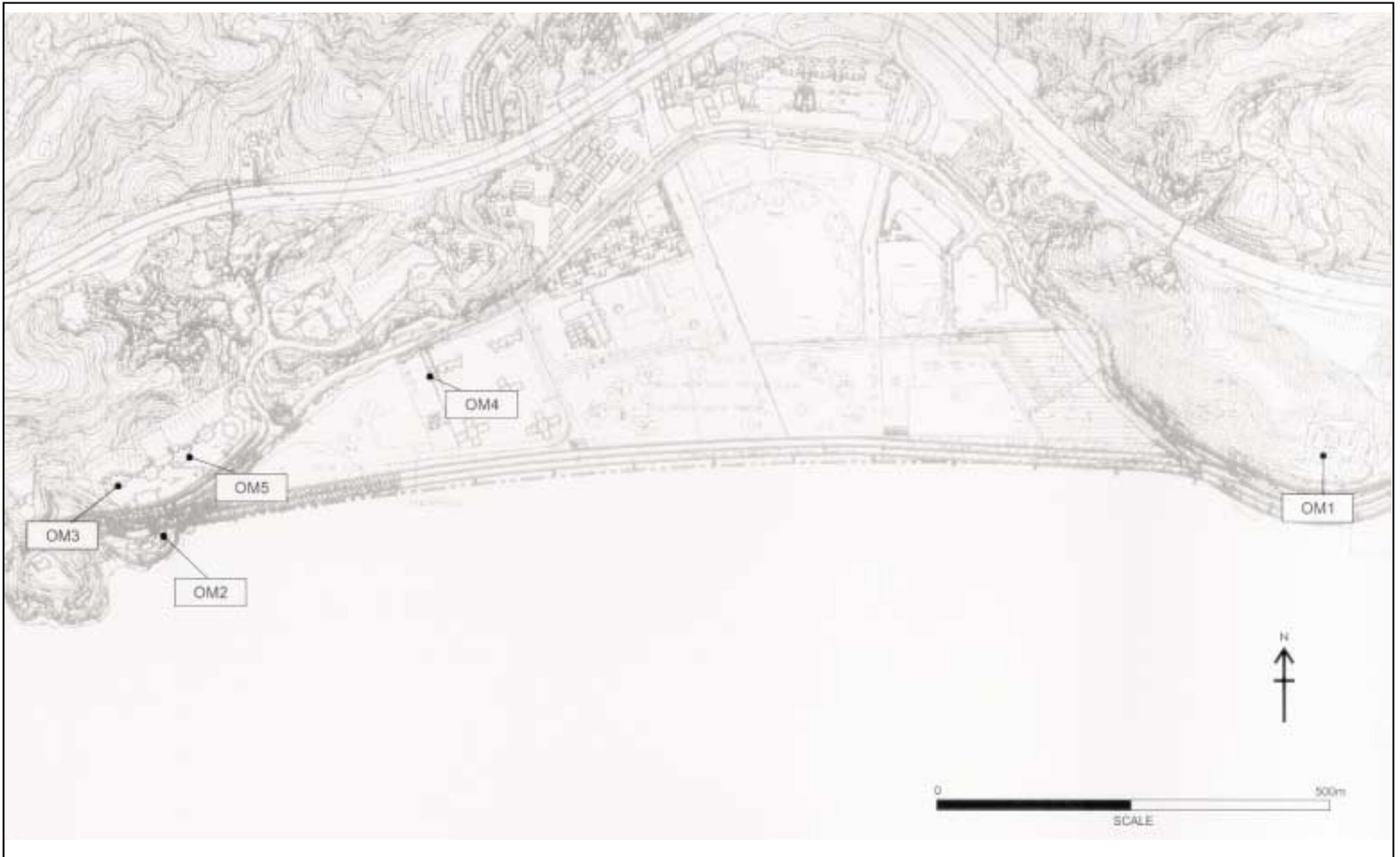


**Construction Phase Noise  
Monitoring Locations**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	E1.2b		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況





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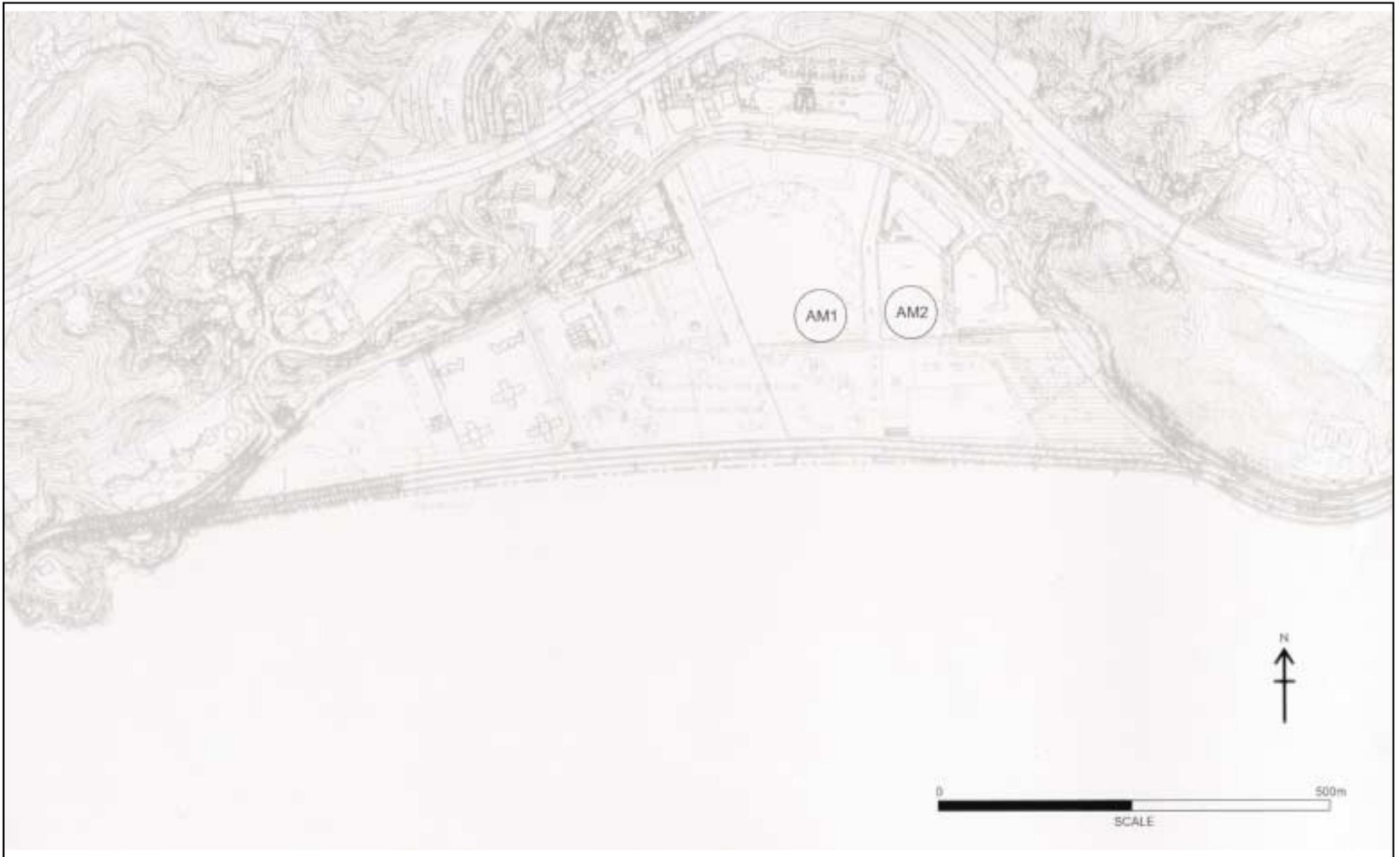


**Construction Phase Noise  
 Monitoring Locations**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
 SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	<b>E1.2c</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況





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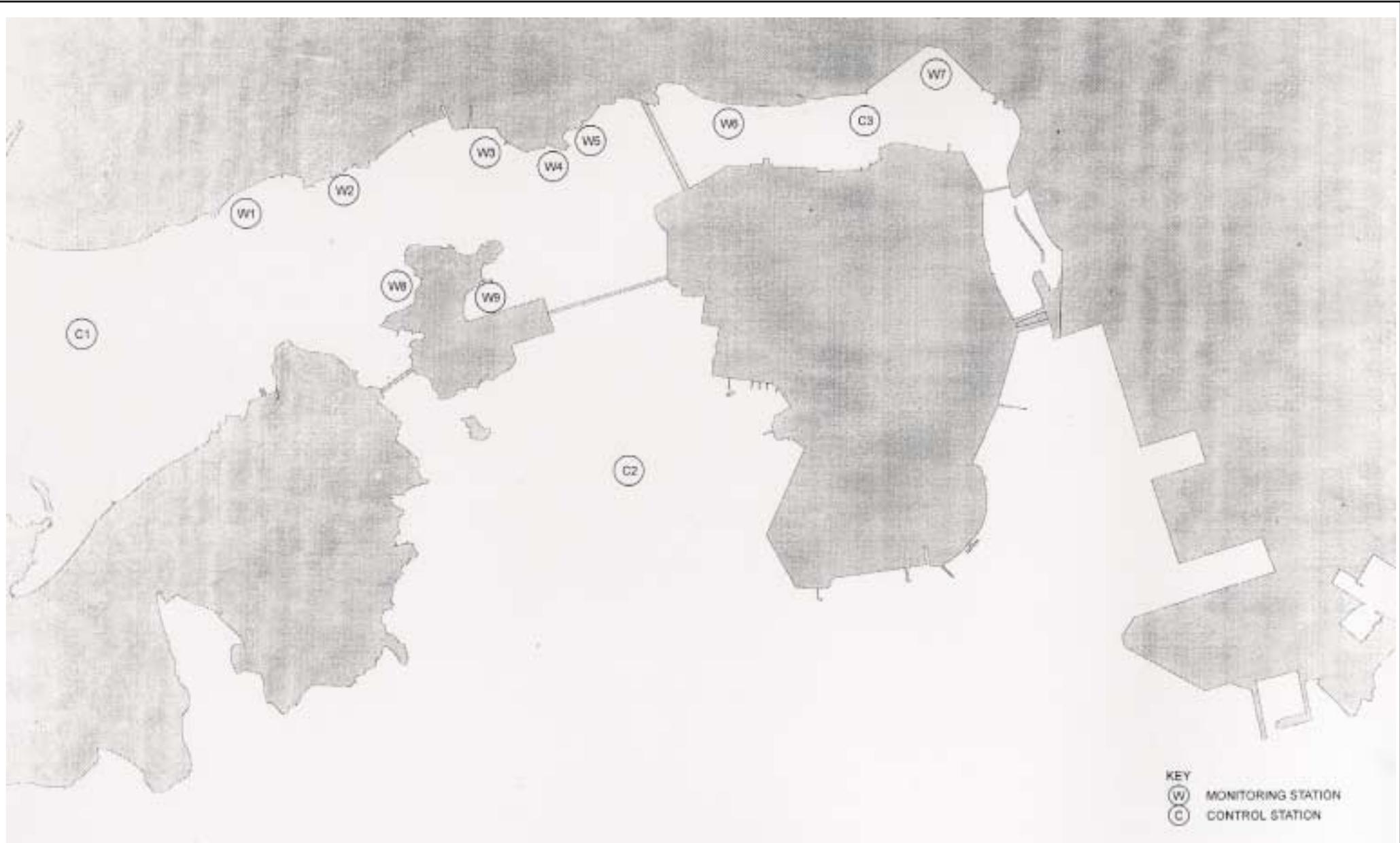


PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
 SHAM TSENG DEVELOPMENT

**Construction Phase Air Quality  
 Monitoring Location**

Drawing No. 圖則編號	<b>E1.3a</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況





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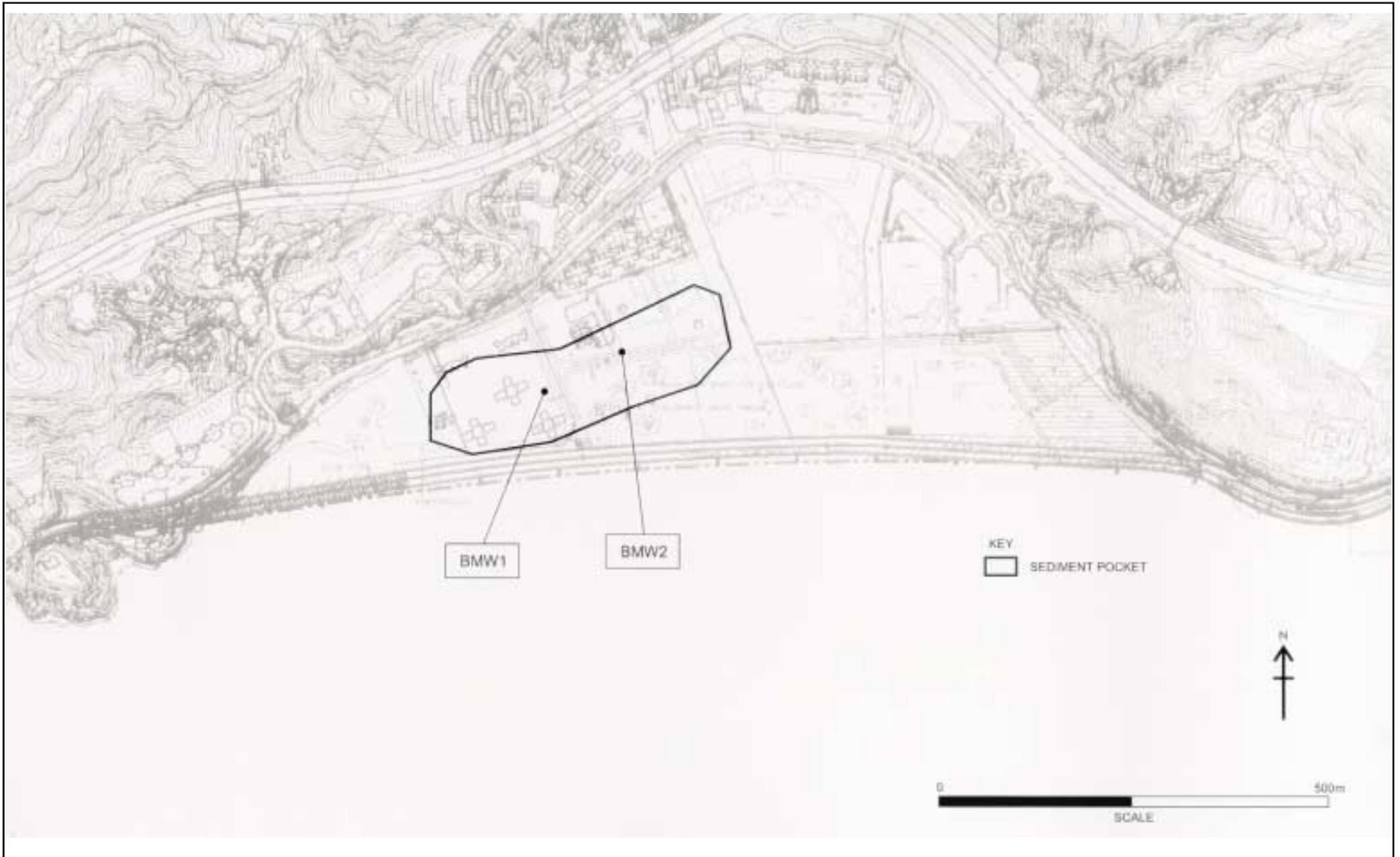


**Locations of Water Quality  
 Monitoring and Control Stations**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
 SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	E1.4a		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准	Date 日期		Status 現況





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**Locations of Biogas Monitoring Wells**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	<b>E1.6a</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況





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**Locations of Noise Sensitive Receivers  
during Construction Phase**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	<b>E1</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況



**土木工程署  
Civil Engineering  
Department**



SCALE 1:3000

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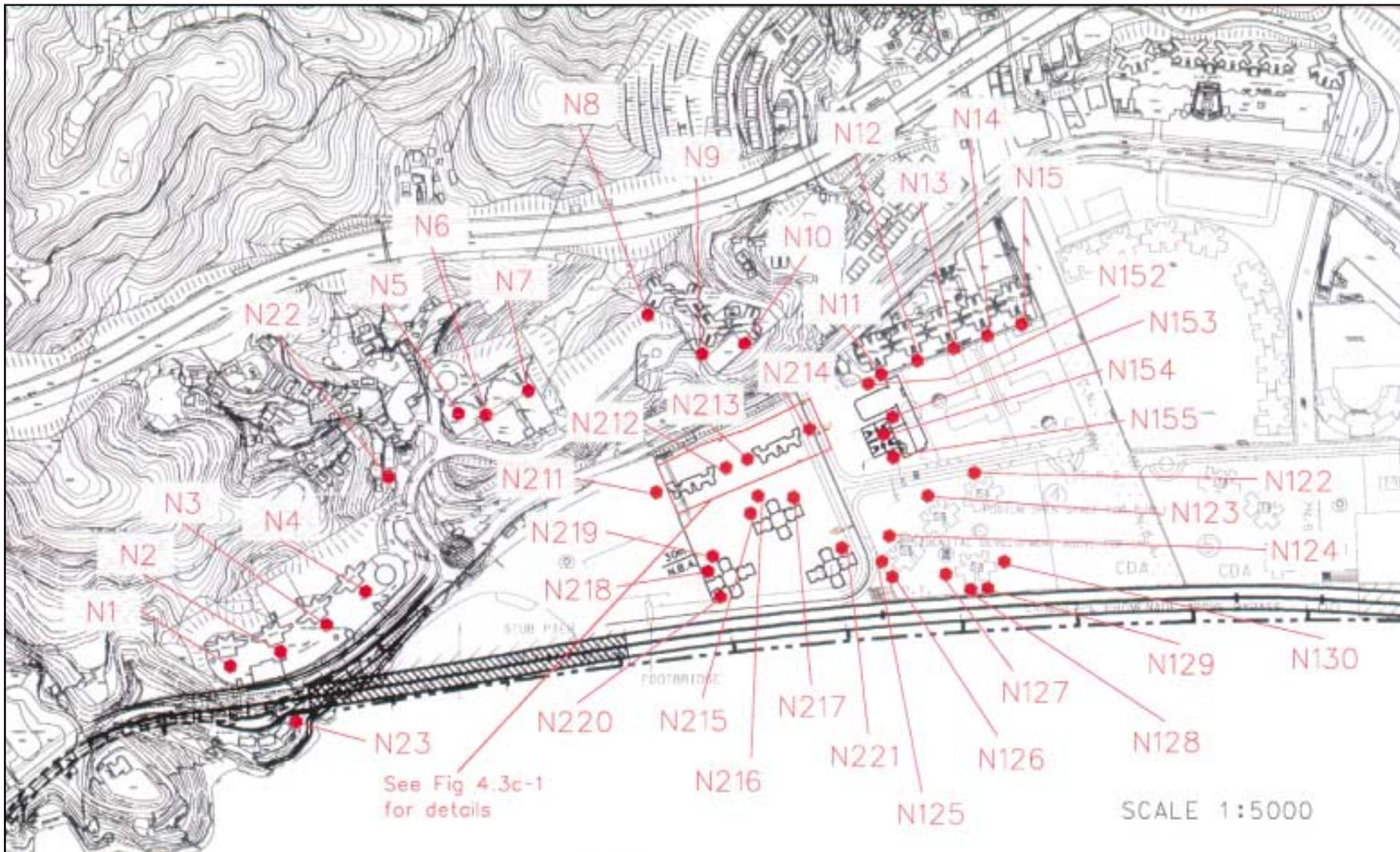


**Locations of Noise Sensitive Receivers  
 during Construction Phase**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
 SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	<b>E2</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況





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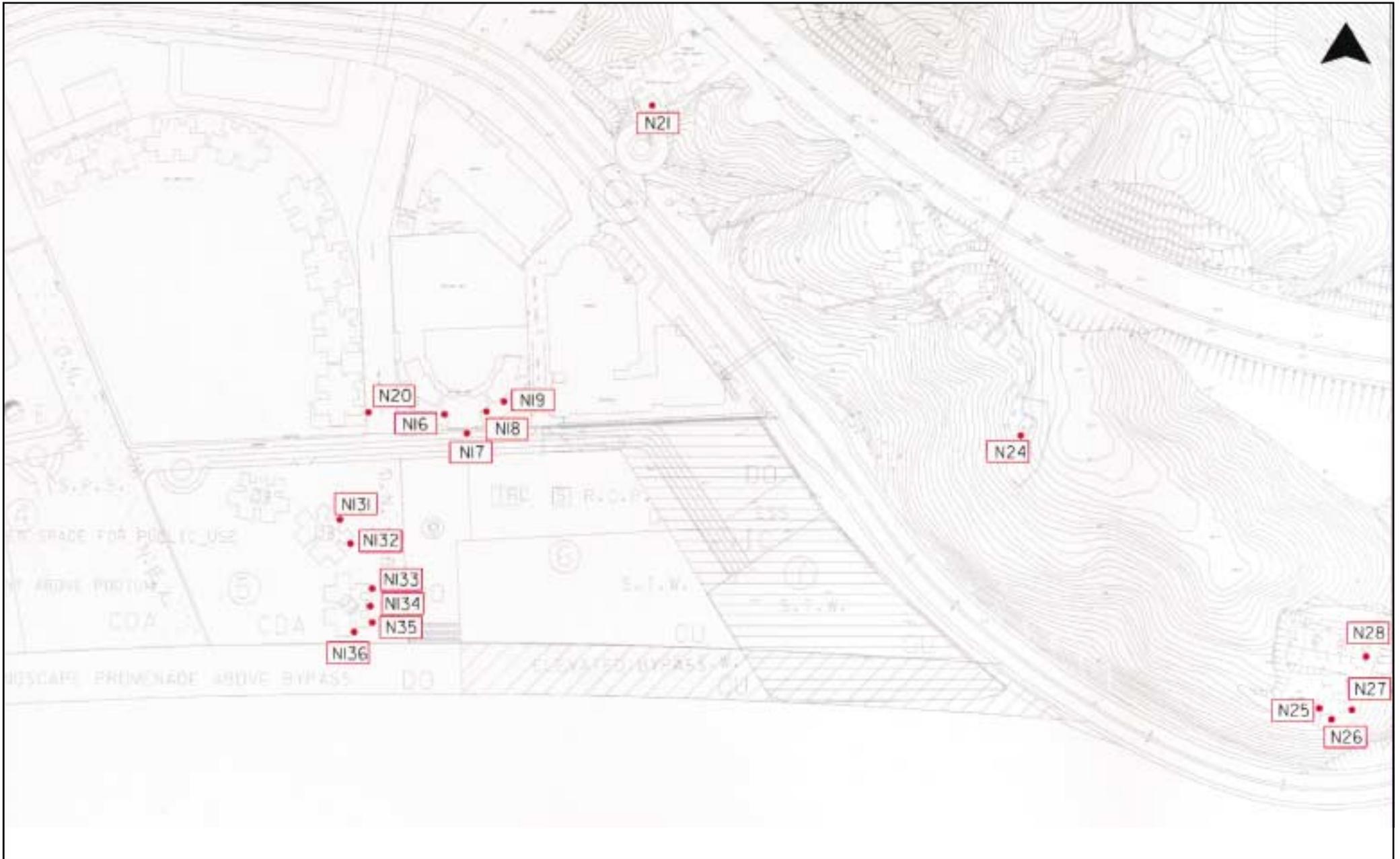


**Locations of Noise Sensitive Receivers  
 during Operation Phase**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
 SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	E3		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況





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 偉信顧問(香港)有限公司  


**PLANNING AND ENGINEERING FEASIBILITY STUDY FOR SHAM TSENG DEVELOPMENT**

**Location of Noise Sensitive Receivers during Operational Phase**

Drawing No. 圖則編號	<b>E4</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況


**土木工程署**  
**Civil Engineering Department**



Scott Wilson (Hong Kong) Ltd  
 偉信顧問(香港)有限公司



**Location of Noise Sensitive Receivers  
 during Operational Phase**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
 SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	<b>E5</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況

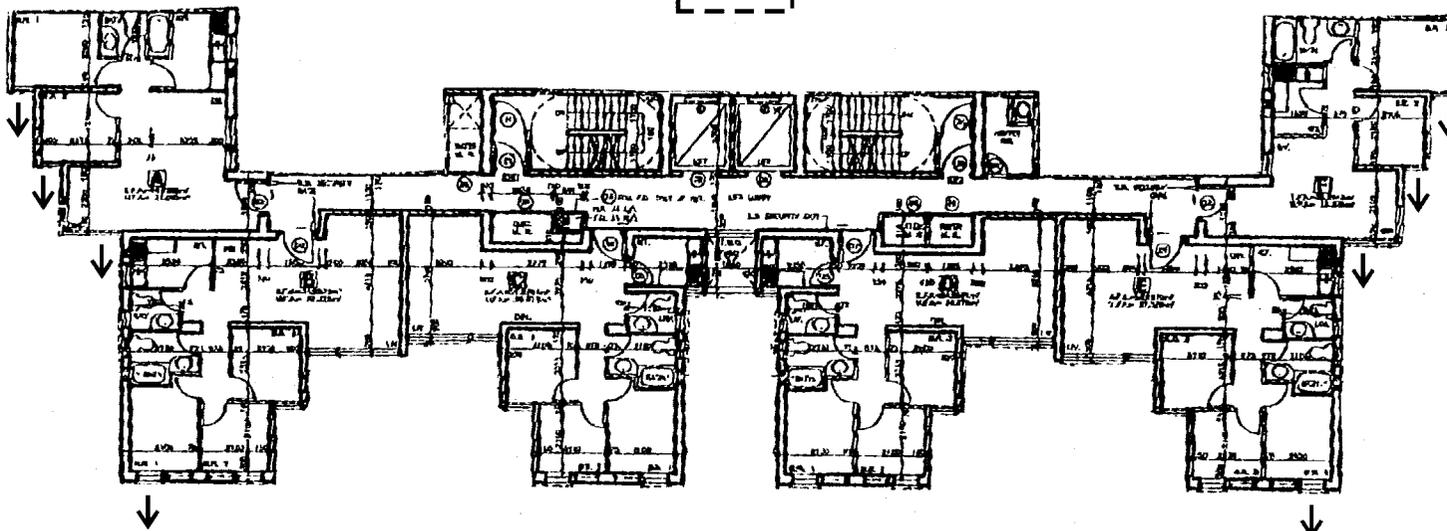


FACADE FACING CASTLE PEAK ROAD



OPENABLE  
WINDOWS

N211 / N213



OPENABLE  
WINDOWS

N212 / N214

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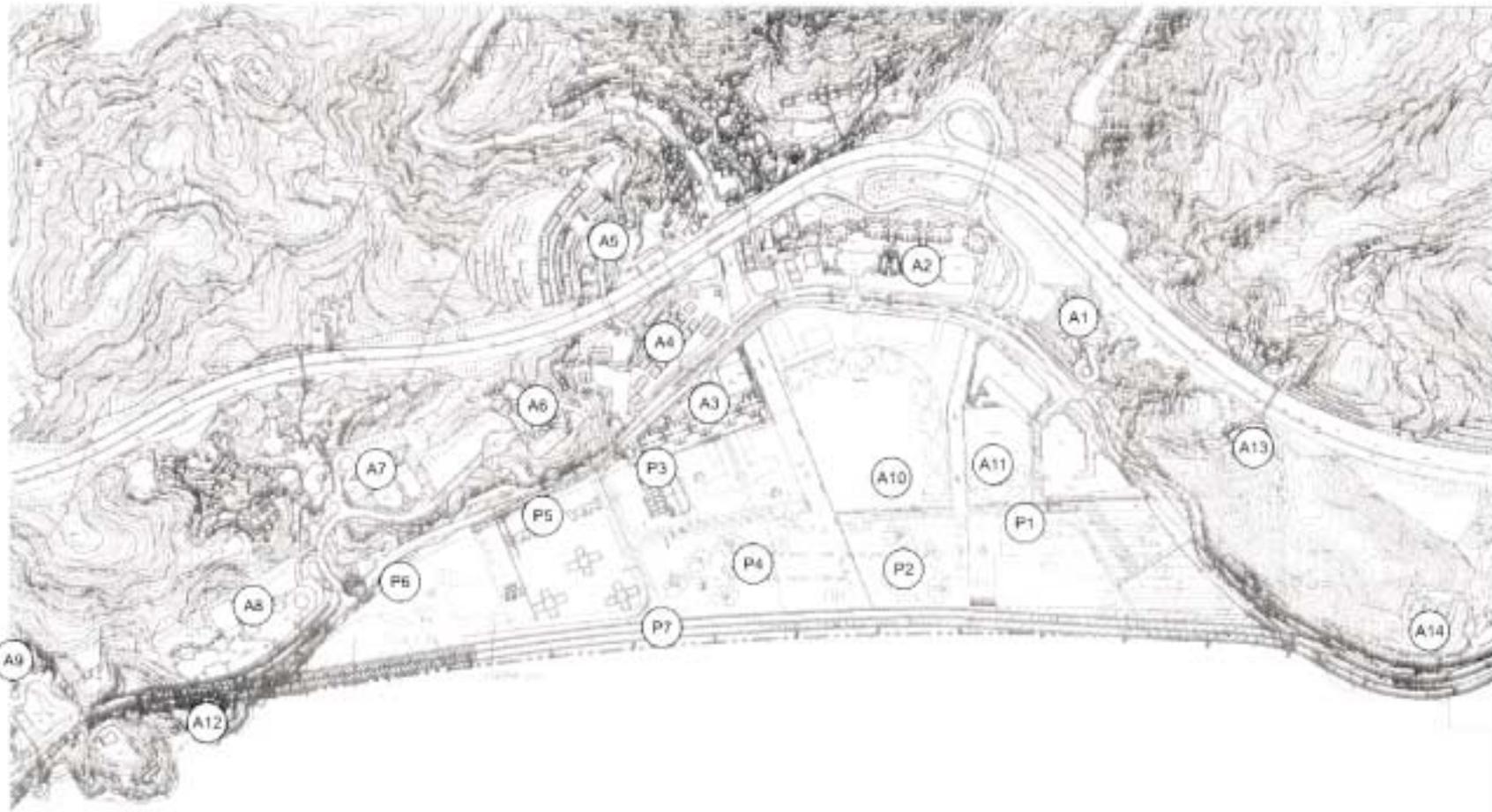
PLANNING AND ENGINEERING FEASIBILITY STUDY FOR  
SHAM TSENG DEVELOPMENT

A Special Design on  
Building Layout in Area 2 -  
NSR Location

Drawing No. 圖則編號	E6		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准	Date 日期		Status 現況



土木工程署  
Civil Engineering  
Department



- KEY**
- A1 RHINE TERRACE
  - A2 RHINE GARDEN
  - A3 LIDO GARDEN
  - A4 SHAM TSENG VILLAGE
  - A5 SHAM TSENG KAU TSUEN
  - A6 SEA CREST VILLA (PHASE I)
  - A7 SEA CREST VILLA (PHASE II)
  - A8 SEA CREST VILLA (PHASE III)
  - A9 SEA CREST VILLA (PHASE IV)
  - A10 PROPOSED RESIDENTIAL DEVELOPMENT AT SAN MIGUEL BREWERY
  - A11 PROPOSED RESIDENTIAL DEVELOPMENT AT UNION CARBIDE
  - A12 DO 367 LOT 89
  - A13 SHAM TSENG TUNG TSUEN
  - A14 GOLDEN VILLA
  - P1 PROPOSED RC/SWQ BUILDING ON THE RECLAMATION
  - P2 PROPOSED CDA SITE AT AREA 5 ON THE RECLAMATION
  - P3 PROPOSED SCHOOL ON THE RECLAMATION
  - P4 PROPOSED RESIDENTIAL DEVELOPMENT AT AREA 4 ON THE RECLAMATION
  - P5 PROPOSED HQS/SPS DEVELOPMENT ON THE RECLAMATION
  - P6 PROPOSED WESTERN COASTAL PARK ON THE RECLAMATION
  - P7 PROMENADE ABOVE THE THE PROPOSED SHAM TSENG BYPASS

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**Locations of ASRs for Sham Tseng Development**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	<b>E7</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況





**KEY**  
 A15 = DRAGONVILLE  
 A16 = EASTERN WINTER SWIMMING ASSOCIATION  
 A17 = DRAGON GARDEN  
 A18 = VICTORIA VARIE'S COURT  
 A19 = VILLA ALFAVISTA

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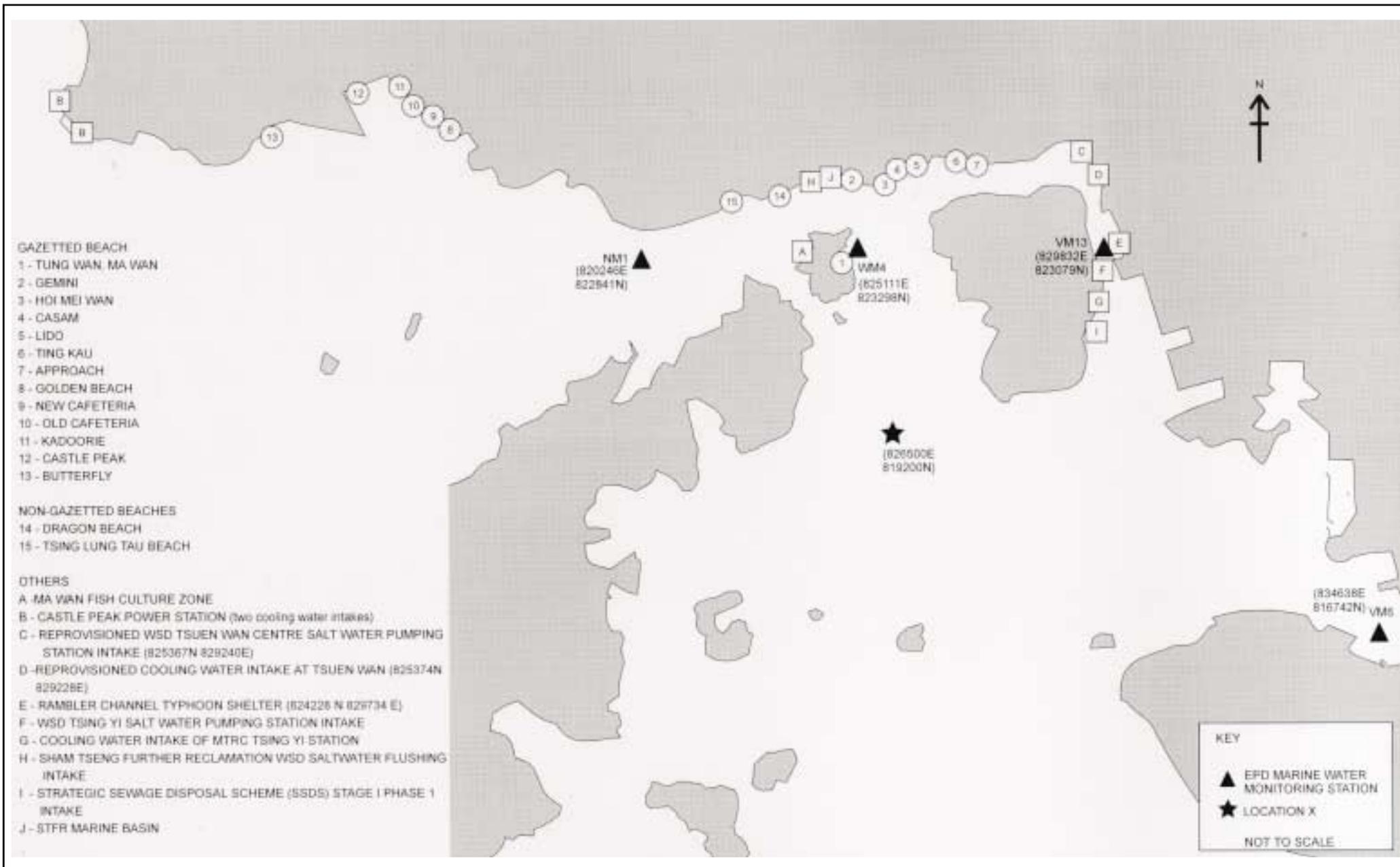


**Locations of ASRs**

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	<b>E8</b>		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況





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PLANNING AND ENGINEERING FEASIBILITY STUDY FOR SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號		<b>E9</b>	
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況

**Water Sensitive Receivers and Additional Locations for Water Quality Modelling (▲ and ★)**

 **土木工程署  
Civil Engineering  
Department**

Annex F

## Proforma for Construction Phase EM&A Programme

- 1.1 Construction Phase Noise Monitoring Field Record Sheet
- 1.2 Construction Phase TSP Monitoring Field Record Sheet
- 1.3 Construction Phase Water Quality Monitoring Field Record Sheet
- 1.4 Complaints Proforma

Monitoring Location		
Details of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length (min.)		
Noise Meter Model/Identification		
Calibrator Model/Identification		
Measurement Results	L <sub>90</sub> (dB(A))	
	L <sub>10</sub> (dB(A))	
	L <sub>eq</sub> (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

Name & DesignationSignatureDate

Recorded By : \_\_\_\_\_

Checked by : \_\_\_\_\_

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Q <sub>si</sub>	P <sub>i</sub> (mmHg)	
	T <sub>i</sub> (°C)	
	H <sub>i</sub> (in.)	
	Q <sub>si</sub> (Std.m <sup>3</sup> )	
Final Flow Rate, Q <sub>sf</sub>	P <sub>f</sub> (mmHg)	
	T <sub>f</sub> (°C)	
	H <sub>f</sub> (in.)	
	Q <sub>sf</sub> (Std.m <sup>3</sup> )	
Average Flow Rate	(Std.m <sup>3</sup> )	
Total Volume	(Std.m <sup>3</sup> )	
Filter Identification No.		
Initial Wt.. of Filter	(g)	
Final Wt.. of Filter	(g)	
Measured TSP Level	(g/ m <sup>3</sup> )	

	<u>Name &amp; Designation</u>	<u>Signature</u>	<u>Date</u>
Field Operator	:	_____	_____
Laboratory Technician	:	_____	_____
Checked by	:	_____	_____

Monitoring Location				
Date of Monitoring				
Start Time (hh.mm)				
Weather				
Sea Conditions				
Tidal Mode				
Monitoring Depth		Surface	Middle	Bottom
Salinity				
Temperature (°C)				
DO Saturation (%)				
DO (mg/l)				
Turbidity (NTU)				
SS Sample Identification				
SS (mg/l)				
Observed Construction Activities	<100m from location			
	>100m from location			
Other Observations				

Name & DesignationSignatureDate

Recorded By : \_\_\_\_\_

Laboratory Technician : \_\_\_\_\_

Checked by : \_\_\_\_\_

Note: The SS results are to be completed once they are available from the laboratory

Sham Tseng Development		Sheet _____ of _____ Unit Reference _____	
<b><u>RECIPIENT</u></b>			
Name:		Location:	Tel:
<b><u>COMPLAINANT</u></b>			
Name:		Tel:	
Address:		Fax:	
<b><u>COMPLAINT</u></b>			
Type: Noise/Dust/Other			
Date:		Time:	Location:
Description:			
Copy fax to: _____		Original to: _____	
Date: _____		Date: _____	
<b><u>REVIEW RESULTS</u></b>			
Signed:		Date:	
<b><u>RECOMMENDATIONS</u></b>			
Signed:		Date:	
<b><u>ATTACHMENTS</u></b>			
Copy to:		Date/Time:	
PR Manager:		Date:	Time:
Engineer		Date:	Time:
Independent Environmental Checker		Date:	Time:

Annex G

# Implementation Programme

Annex G Table 1 Implementation Schedule (Non-Designated Projects)

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Air Quality</b>								
<i>Construction Phase</i>								
Within all construction sites	5.7.1	-	<p>The Air Pollution (Construction Dust) Regulation, for example:</p> <ul style="list-style-type: none"> <li>excavated dusty material should be covered by impervious sheeting and sprayed with water to keep the entire surface wet;</li> <li>the haul roads should be located away from sensitive receivers and sprayed with water to keep the entire road surface wet;</li> <li>every vehicle should be washed to remove dusty materials from its body and wheels before leaving a construction site;</li> <li>the load carried by vehicle should be covered by impervious sheeting to ensure no leakage of dusty materials from the vehicle; and</li> <li>the heights from which fill materials are dropped should be controlled to a practical level to minimise the fugitive dust arising from unloading.</li> </ul>	Contractor	Construction Stage	CED	Contractor	Air Pollution Control (Construction Dust) Regulation
<i>Construction Air Quality Monitoring</i>								
Monitoring Locations	13.4.1	6.2.5	Baseline monitoring should be carried out at all of the designated monitoring location(s) prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. One-hour sampling shall also be done at least 3 times per day while the highest dust impact is expected.	Environmental Team of the Contractor	At least 14 consecutive days prior to the commissioning of the construction works	CED	-	-
Monitoring Locations	13.4.1	6.2.5	<p>Sampling for regular impact monitoring, shall be carried out at least once in every six-days at all the monitoring stations for 24-hour TSP monitoring.</p> <p>For 1-hour TSP impact monitoring, sampling frequency of at least 3 times in every 6-days shall be undertaken when the highest dust impact occurs.</p>	Environmental Team of the Contractor	Construction Phase	CED	-	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Monitoring Locations	-	6.2.5	In case of non-compliance of the air quality criteria occurs, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until exceedance stops.	Environmental Team of the Contractor	Specified times	CED	-	-
Operational Phase								
Sewage Treatment Facilities for STD	5.6.2 & 5.7.2	-	Installation of odour removal and treatment facilities	DSD	Prior to operation of the treatment facilities	CED	DSD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Government Complex in Area 6	5.6.2 & 5.7.2	-	Installation of deodorisation facilities at the fresh air intake	ArchSD	Detail design stage	CED	-	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Public Transport Terminus (PTT)	5.7.2	-	The design and operation of the PTT should meet the requirements specified in the ProPECC PN 1/98	LandsD / CED	Prior to the operation of the PTT	CED	TD / HyD / EMSD	ProPECC PN 1/98 and Public Transport Interchange Air Quality Guidelines.

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Noise</b>								
Construction Phase								
Within all construction sites	4.7.1	-	<p><i>Good Site Practice</i></p> <ul style="list-style-type: none"> <li>only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction works;</li> <li>machines and plant that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from nearby NSRs;</li> <li>silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction works;</li> <li>mobile plant should be sited as far away from NSRs as possible; and</li> <li>material stockpiles and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul>	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO
Within all construction sites	4.7.1	-	Use of quiet PME, movable noise barriers, limit the number of plant operating concurrently and restricting the operating PME time usage to 50% and 25%	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Salt Water Pumping Station, Area 1	4.6.3	-	<p>Maximum permissible sound power level is 95 dB(A) during the day time and 80 dB(A) during the night time.</p> <p>As a good planning and design practice, it is recommended that there should be no opening of the salt water pumping station structure in Area 1 facing the residential site in Area 2. If necessary, other widely accepted good design practices such as adopting silencers for ventilating fans, acoustic doors, acoustic louvres and absorptive wall lining should be adopted. Moreover, vent ducts rather than plain openings could also be used to facilitate ventilation and this could be further considered during the detailed design stage.</p>	CED	During the operation of the salt water pumping station	CED	WSD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Public Transport Terminus, Area 4	4.6.3	-	Maximum permissible sound power level is 91 dB(A) during the day time and 76 dB(A) during the night time. Reverberation noise not exceeding 2 second at 500 Hz.	Contractor	During the operation of the public transport terminus	CED	Private Developer	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Refuse Collection Point, Area 6	4.6.3	-	Maximum permissible sound power level is 89 dB(A) during the day time and 74 dB(A) during the night time	CED	During the operation of the refuse collection point	CED	FEHD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Sewage Treatment Facilities for STD, Area 6	4.6.3	-	Maximum permissible sound power level is 95 dB(A) during the day time and 85 dB(A) during the night time	CED	During the operation of the Proposed Sewage Treatment Facilities for STD	CED	DSD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Electricity sub-station Area 7	4.6.3	-	Maximum permissible sound power level is 111 dB(A) during the day time and 96 dB(A) during the night time	CLP	During the operation of the electricity sub-station	CLP	CLP	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
<i>Construction Noise Monitoring</i>								
Monitoring Locations	-	5.2.3 & 5.2.4	The baseline noise monitoring shall be carried out at the noise monitoring locations for a period of one week at a minimum logging interval of 15 minutes prior to the commencement of the construction	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Monitoring Locations	-	5.2.5	During normal construction working hours (0700 - 1900 Monday to Saturday), construction noise monitoring of $L_{Aeq, 30 \text{ minutes}}$ shall be carried out once every six days.  If restricted hours works are undertaken, monitoring of $L_{Aeq, 15 \text{ minutes}}$ noise levels shall be carried out at the same frequency as specified for normal working hours.	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Monitoring Locations	-	5.2.7	In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
<i>Operational Noise Monitoring</i>								
Monitoring Locations	-	5.2.3	Two sets of traffic noise monitoring data shall be obtained during the first year of the operation of the Bypass:  <ul style="list-style-type: none"> <li>· one set of measurements at the morning traffic peak hour on normal weekdays;</li> <li>· one set of measurements at the evening traffic peak hour on normal weekdays</li> </ul> Exact timing for monitoring has to be confirmed with the Transport Department and agreed with EPD. During the traffic noise monitoring, traffic count, average speed and percentage of heavy vehicles shall also be conducted so as to ensure the traffic noise of the peak periods are covered.	Environmental Team of Contractor	Operational Phase (after completion of the Sham Tseng Bypass)	CED	-	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Water Quality</b>								
Construction Phase								
Within construction sites (Con't)	3.7.1	-	<p><i>Construction Runoff and Drainage</i></p> <ul style="list-style-type: none"> <li>• use of sediment traps, wheel washing facilities for vehicles leaving the site, and adequate maintenance of drainage systems to prevent flooding and overflow;</li> <li>• Permanent drainage channels should incorporate sediment basins or traps and baffles to enhance depositions rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94;</li> <li>• a sediment tank constructed from pre-formed individual cells of approximately 6 - 8 m<sup>3</sup> capacity can be used for settling ground water prior to disposal.</li> <li>• oil interceptors should be provided in the drainage system and regularly cleaned to prevent the release of oils and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain; and</li> <li>• precautions and actions to be taken when a rainstorm is imminent or forecast, and during or after rainstorms. Particular attention should be paid to the control of any silty surface runoff during storms events.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Professional Persons on Construction Site Drainage, Professional Persons Environmental Consultative Committee, 1994 (ProPECC PN 1/94), Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991  Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	3.7.1	-	<p><i>General Construction Activities</i></p> <ul style="list-style-type: none"> <li>debris and rubbish on site should be collected, handled and disposed of properly to avoid entering the water column to cause water quality impacts;</li> <li>all fuel tanks and storage areas should be provided with locks and be located on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank, to prevent spilled fuel oil from reaching coastal waters of Ma Wan Channel.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
Within construction sites	3.7.1	-	<p><i>Sewage from Construction Work Force</i></p> <ul style="list-style-type: none"> <li>Construction work force sewage discharges on site are expected to be connected to the existing trunk sewer or sewage treatment facilities. The construction sewage may need to be handled by portable chemical toilets prior to the commission of the on-site sewer system. Appropriate numbers of portable toilets shall be provided by a licensed contractor to serve the large number of construction workers over the construction site. The Contractor shall also be responsible for waste disposal and maintenance practices.</li> </ul>	Contractor	Construction Phase	CED	Contractor	-
Within construction sites	3.7.1	-	Site audit to ensure all mitigation measures are in place and being properly maintained.	Contractor	Construction phase	CED	Contractor	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Operational Phase								
Within the Proposed Sewage Treatment Facilities for STD and its Expansion	3.7.2	-	<p>Should a failure of the sewage treatment facilities occur the necessary repairs should be expedited in order to limit the period of emergency discharge.</p> <p>To minimise the risk of failure of the Sewage Treatment Facilities for STD, standby equipment and treatment units plus dual power supply should be provided.</p> <p>A contingency plan should be prepared by the operator and to be agreed by the project proponent prior to project commencement.</p>	DSD	Operational Phase (during emergency discharge condition)	DSD	DSD	-
	3.9.2	8.2	The treated effluent from the Sewage Treatment Facilities for STD will be subject to a comprehensive performance verification programme.	DSD/EPD	Operational Phase	EPD	DSD	

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within the STD	3.7.2	-	<p>The following measures are applicable to reduce stormwater run-off pollution within the STD:</p> <ul style="list-style-type: none"> <li>• provision of silt traps to reduce the concentration of silt/sediments in stormwater run-off. These silt traps should be cleaned and maintained regularly to ensure that they function properly;</li> <li>• compliance of the WPCO for Western Buffer through the issuance of relevant discharge licence for the proposed development within the STD;</li> <li>• the stringent control on the discharge of sewage into Western Buffer with all expedient connection eliminated and untreated effluent conveyed to the Sewage Treatment Facilities for STD for treatment and disposal.</li> </ul> <p>To facilitate EPD's enforcement works of identifying expedient connections and eliminating dry weather flows in stormdrains, inspection manholes should be provided at the connection point of side branches into the decked nullah.</p>	CED	Prior to the construction of the residential development	CED	DSD	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
<b>Waste Management</b>								
Construction Phase								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	6.7.2	-	<p><i>Dredged Material</i></p> <ul style="list-style-type: none"> <li>The volume of material dredged should be minimised as far as practicable;</li> <li>minimising exposure to any contaminated material by the wearing of protective gear such as gloves, providing adequate hygiene and washing facilities, and preventing eating during dredging;</li> <li>any contaminated sediment dredged should not be allowed to stockpile on the site and should be immediately removed from site once dredged;</li> <li>all vessels for marine transportation of dredged sediment should be fitted with tight fitting seals to their bottom openings to prevent leakage of materials; and</li> <li>loading of barges and hoppers should be controlled to prevent splashing of dredged material to the surrounding water, and barges or hoppers should under no circumstances to be filled to a level which will cause other overflowing of materials or polluted water during loading or transportation.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Works Branch Technical Circular (WBTC) No. 3/2000, Management of Dredged/Excavated Sediment
Within construction sites	6.7.4	-	<p><i>Excavated Materials</i></p> <ul style="list-style-type: none"> <li>If any surplus uncontaminated inert materials do arise then they may be delivered to public filling areas or other reclamation sites.</li> <li>Excavated materials should be segregated from other wastes to avoid possible contamination, thereby allowing disposal at public filling areas.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Waste Disposal Ordinance (Cap 354)
Within construction sites	6.7.5	-	<p><i>C&amp;D Waste</i></p> <ul style="list-style-type: none"> <li>Careful design, planning and good site management can minimise over ordering and generation and waste materials such as concrete, mortars and cement grouts.</li> <li>the Contractor shall recycle C&amp;DM on-site;</li> <li>the handling and disposal of bentonite slurries should be undertaken in accordance with <i>ProPECC PN 1/94</i> on construction site drainage;</li> </ul>	Contractor	Construction Phase	CED	Contractor	Works Branch Technical Circular (WBTC) No. 5/98, On-site Sorting of Construction Waste on Demolition Sites

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>C&amp;DM should be segregated on site into different waste and material types. Where site conditions allowed, different types of wastes should be segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. An on-site temporary storage area should also be provided.</li> </ul>					
Within construction sites	6.7.6	-	<p><i>Chemical Waste</i></p> <p>Containers used for the storage of chemical wastes shall:</p> <ul style="list-style-type: none"> <li>be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;</li> <li>have a capacity of less than 450 litres unless the specifications have been approved by the EPD; and</li> <li>display a label in English and Chinese in accordance with instructions prescribed in <i>Schedule 2</i> of the <i>Regulations</i>.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
			<p>The storage area for chemical wastes shall:</p> <ul style="list-style-type: none"> <li>be clearly labelled and used solely for the storage of chemical waste;</li> <li>be enclosed on at least 3 sides;</li> <li>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;</li> <li>have adequate ventilation;</li> <li>be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and</li> <li>be arranged so that incompatible materials are adequately separated.</li> </ul>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<p>Disposal of chemical waste shall:</p> <ul style="list-style-type: none"> <li>• be via a licensed waste collector; and</li> <li>• be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers; or</li> <li>• be to a reuser of the waste, under approval from the EPD.</li> </ul> <p>The Centre for Environmental Technology operates a Waste Exchange Scheme which can assist in finding receivers or buyers.</p>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
Within construction sites	6.7.7	-	<p><i>General Refuse</i></p> <ul style="list-style-type: none"> <li>• general refuse shall be stored in enclosed bins or compaction units separate from C&amp;D and chemical wastes. Waste collector shall be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimise odour, pest and litter impacts;</li> <li>• General refuse is generated largely by food service activities on site, so reusable rather than disposable dishware should be used if feasible.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Authorized Person and Registered Structural Engineers, Building Department and Public Health and Municipal Services Ordinance
<i>Waste Auditing</i>								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within Construction sites	6.9	-	It is recommended that audit of each waste stream should be carried out on regular basis (e.g. monthly) by an Independent Environmental Checker to determine if wastes are being managed in accordance with approved procedures and the site waste management plan. The audits should look at all aspects of waste management including waste generation, storage, recycling, transport and disposal. An appropriate audit programme would be to undertake a first audit at the commencement of the construction works and then to audit monthly thereafter.	Contractor	Construction Phase	CED	Contractor	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
Within Construction sites	6.9	7.2 & 7.3	In order to monitor 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. An Independent Checker (Environment) should be responsible for auditing the result of the system.	Contractor	Construction Phase	CED	Contractor	WBTC No. 25/99, Incorporation of Information on Construction and Demolition Material Management in Public Works Subcommittee Papers
At Public Filling Area	6.7.3	7.2 & 7.3	The Contractor should enforce strict application of the dumping license conditions and monitor the material placed in the reclamation and barges to control disposal of unauthorised material. The Contractor shall also provide floating booms and collect any floating materials on a daily basis at the public filling area.	Contractor	Construction Phase	CED	Contractor	-
<b>Operational Phase</b>								
Within the Sewage Treatment Facilities for STD	6.7.8	-	<p><i>Sewage Sludge</i></p> <ul style="list-style-type: none"> <li>Use of fully enclosed container for transportation of sludge.</li> <li>The period for storage on-site should be as low as practicable</li> </ul>	DSD	Operational Phase	DSD	DSD	-
<b>Visual and Landscape</b>								
Construction Phase								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within all construction sites	7.16	-	Consideration of design of all engineering structures in accordance with EIA recommendations	Design consultant	Detail Design	CED	N/A	-
Within all construction sites	7.16	-	Consideration of design of all slopes to minimise extent of cutting and design in accordance with EIA recommendations	Design consultant	Detail Design	CED	N/A	WBTC 25/93 Control of Visual Impact of Slopes
Within all construction sites	7.16	-	Minimisation of all slope cutting where possible	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.16	-	Felling of trees in accordance with WBTC 24/94 Tree Preservation · Felling and transplanting of trees affected in accordance with Tree Felling Application and with-contract documents	Contractor	Construction	CED	Contractor	WBTC 24/94 Tree Preservation
Within all construction sites	7.16	-	Erection of hoarding or advance planting as visual screen to works	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.16	-	Topsoils to be tested for quality and if valuable to be stockpiled no greater than 2 m high for later use	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.16	-	Design of landscape works in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	Contractor	-
Within construction sites	7.16	-	<i>Reprovisioning of Anglers' Beach</i> • The coastal area to the immediate west of the reclamation will be left intact, with landscaping works to enhance the natural waterfront environment for the area.	Private Developer / LCSD	Detail Design	CED	LCSD / ArchSD	-
<b>Operation Phase</b>								
Area 1 DO	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	LCSD / ArchSD	Detail Design	CED	LCSD / ArchSD	HKPSG
Area 2 LO	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	HD/ Private Developer	Detail Design	HD	Developer	HKPSG
Area 3 Schools	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	ED	Detail Design	ED	ED	HKPSG
Area 4 Private Development LO on CDA	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	Private Developer	Detail Design	Private Developer	Private Developer	HKPSG

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Area 4 Podium open space for public use	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	Private Developer	Detail Design	Private Developer	Private Developer	HKPSG
Area 5 Private Development LO on CDA	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	Private Developer	Detail Design	Private Developer	Private Developer	HKPSG
Area 6 DO	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	LCSD / ArchSD	Detail Design	CED	LCSD / ArchSD	HKPSG
Promenade above bypass DO (not structure)	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	LCSD / ArchSD	Detail Design	CED	LCSD / ArchSD	HKPSG
Roadside hardworks	7.16	-	Design of landscape works in accordance with EIA recommendations and HyD standards	CED / LCSD	Detail Design	CED	HyD	HyD Standards
Roadside planting	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	CED / LCSD	Detail Design	CED	LCSD	HKPSG
Amenity Areas	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	CED / LCSD	Detail Design	CED	LCSD / ArchSD	HKPSG
Within construction sites	7.16	-	<i>Reprovisioning of Anglers' Beach</i> <ul style="list-style-type: none"> <li>Footpaths will be designed to provide easy access from the residential developments to this coastal area.</li> <li>The provision of an indoor public swimming pool within the government complex / leisure centre at Area 6.</li> </ul>	Private Developer / LCSD	Detail Design	CED	LCSD / ArchSD	-
<b>Land Use Impacts</b>								
Construction								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	11.6	-	<p><i>Reprovisioning of Anglers' Beach</i></p> <ul style="list-style-type: none"> <li>The coastal area to the immediate west of the reclamation will be left intact, with landscaping works to enhance the natural waterfront environment for the area.</li> <li>Footpaths will be designed to provide easy access from the residential developments to this coastal area.</li> <li>The provision of an indoor public swimming pool within the government complex / leisure centre at Area 6.</li> </ul>	Private Developer / LCSD	Detail Design	CED	LCSD / ArchSD	-
Within / construction sites	11.6.2	-	<p><i>Reprovisioning of Kaito Pier</i></p> <ul style="list-style-type: none"> <li>A marine basin with two berthing spaces and sufficient headroom under the western portion of the Bypass will accommodate the reprovisioned kaito pier</li> </ul>	Contractor	Construction	CED	CED (Portworks)	-
Within construction sites	11.6.3	-	<p><i>Careful Urban Design</i></p> <ul style="list-style-type: none"> <li>A well-connected pedestrian network, e.g. elevators, escalators, stairs, ramps, footpaths and footbridges, should be considered to avoid a vertical segregation of the open spaces and to provide better linkage among activities nodes.</li> </ul>	Contractor / Private Developer	Detail Design	CED / Private Developer	ArchSD / Private Developer	-
Within construction sites	11.6.5	-	<p><i>Well Co-ordinated Construction Programme</i></p> <ul style="list-style-type: none"> <li>construction programme of the STD and other projects (including Castle Peak Road widening) should be well co-ordinated to avoid insurmountable problems or conflicts.</li> </ul>	Contractor / CED / HyD	Detail Design / Construction	-	-	-

**Biogas** (no biogas monitoring is required)

**Annex G Table 2 Implementation Schedule for Reclamation Works**

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Air Quality</b>								
Construction Phase								
Within all construction sites	5.7.1	-	<p>The Air Pollution (Construction Dust) Regulation, for example:</p> <ul style="list-style-type: none"> <li>excavated dusty material should be covered by impervious sheeting and sprayed with water to keep the entire surface wet;</li> <li>the haul roads should be located away from sensitive receivers and sprayed with water to keep the entire road surface wet;</li> <li>every vehicle should be washed to remove dusty materials from its body and wheels before leaving a construction site;</li> <li>the load carried by vehicle should be covered by impervious sheeting to ensure no leakage of dusty materials from the vehicle; and</li> <li>the heights from which fill materials are dropped should be controlled to a practical level to minimise the fugitive dust arising from unloading.</li> </ul>	Contractor	Construction Stage	CED	Contractor	Air Pollution Control (Construction Dust) Regulation
<i>Construction Air Quality Monitoring</i>								
Monitoring Locations	13.4.1	6.2.6 Annex A	Baseline monitoring should be carried out at all of the designated monitoring location(s) prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. One-hour sampling shall also be done at least 3 times per day while the highest dust impact is expected.	Environmental Team of the Contractor	At least 14 consecutive days prior to the commissioning of the construction works	CED	-	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Monitoring Locations	13.4.1	6.2.7 Annex A	Sampling for regular impact monitoring, shall be carried out at least once in every six-days at all the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP impact monitoring, sampling frequency of at least 3 times in every 6-days shall be undertaken when the highest dust impact occurs.	Environmental Team of the Contractor	Construction Phase	CED	-	-
Monitoring Locations	-	6.2.9 Annex A	In case of non-compliance of the air quality criteria occurs, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until exceedance stops.	Environmental Team of the Contractor	Specified times	CED	-	-
<b>Noise</b>								
Construction Phase								
Within all construction sites	4.7.1	-	<i>Good Site Practice</i> <ul style="list-style-type: none"> <li>only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction works;</li> <li>machines and plant that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from nearby NSRs;</li> <li>silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction works;</li> <li>mobile plant should be sited as far away from NSRs as possible; and</li> <li>material stockpiles and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul>	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO
Within all construction sites	4.7.1	-	Use of quiet PME, movable noise barriers, limit the number of plant operating concurrently and restricting the operating PME time usage to 50% and 25%	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<i>Construction Noise Monitoring</i>								
Monitoring Locations	-	5.2.4 Annex A	The baseline noise monitoring shall be carried out at the noise monitoring locations for a period of one week at a minimum logging interval of 15 minutes prior to the commencement of the construction	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Monitoring Locations	-	5.2.5 Annex A	During normal construction working hours (0700 - 1900 Monday to Saturday), construction noise monitoring of $L_{Aeq, 30 \text{ minutes}}$ shall be carried out once every six days. If restricted hours works are undertaken, monitoring of $L_{Aeq, 15 \text{ minutes}}$ noise levels shall be carried out at the same frequency as specified for normal working hours.	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Monitoring Locations	-	5.2.7 Annex A	In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
<b>Water Quality</b>								
<i>Construction Phase</i>								
Within construction sites	3.7.1	-	<p><i>Sandfilling and Public Filling</i></p> <ul style="list-style-type: none"> <li>For Phase 1 reclamation, sandfilling and public filling together should be limited to a total rate of not more than 5,000 cu per day. Sandfilling and public filling should only be undertaken with the release point of filling at least 200 m behind the leading edge of the seawall constructed above the sea level. If exceedance of WQOs at WSRs are observed during the construction, silt curtains should be deployed at the reclamation area to further contain sediment plume dispersion.</li> <li>For Phases 2, 3 and 4 reclamation, sandfilling and public filling should be undertaken within the waterbody formed by the permanently constructed seawall and the temporary seawall structures that is erected above the sea level, perpendicular to the permanent seawall, and connected to the existing coastline.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Water Quality Objectives under the Water Pollution Control Ordinance

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>• For Phase 3 reclamation, diversion of Sham Tseng West Nullah to the final shoreline should take place prior to the placement of the seawall blocks for Phase 3 reclamation.</li> <li>• Refuse boom and refuse collection services should be provided to contain and collect floating refuse during public filling.</li> <li>• The construction sequences for various phases of reclamation should follow Figure 3.7a to 3.7c of the EIA Report</li> <li>• A silt curtain could be deployed along the reclamation area to minimize potential SS impact in the vicinity</li> </ul>					

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites (Con't)	3.7.1	-	<p><i>Dredging</i></p> <ul style="list-style-type: none"> <li>The total rate of dredging should not exceed 4000 m<sup>3</sup> per day.</li> </ul> <p>The requirements of the construction sequence can be referred to in Figure 3.7a to 3.7c of the EIA Report.</p> <p>Other mitigation measures include:</p> <ul style="list-style-type: none"> <li>No more than one grab dredger should be used for the dredging works;</li> <li>mechanical grabs, if used, should be designed and maintained to avoid spillage and sealed tightly while being lifted. For dredging of contaminated mud, closed watertight grabs must be used;</li> <li>all vessels should be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash;</li> </ul>	Contractor	Construction Phase	CED	Contractor	Water Quality Objectives under the Water Pollution Control Ordinance

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>all hopper barges and dredgers should be fitted with tight fitting seals to their bottom openings to prevent leakage of material;</li> <li>construction activities should not cause foam, oil, grease, scum, litter or other objectionable matter to be present on the water within the site or dumping grounds;</li> <li>loading of barges and hoppers should be controlled to prevent splashing of dredged material into the surrounding water. Barges or hoppers should not be filled to a level which will cause the overflow of materials or polluted water during loading or transportation.</li> </ul>					
Within construction sites (Con't)	3.7.1	-	<p><i>Construction Runoff and Drainage</i></p> <ul style="list-style-type: none"> <li>use of sediment traps, wheel washing facilities for vehicles leaving the site, and adequate maintenance of drainage systems to prevent flooding and overflow;</li> <li>Permanent drainage channels should incorporate sediment basins or traps and baffles to enhance depositions rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94;</li> <li>a sediment tank constructed from pre-formed individual cells of approximately 6 - 8 m<sup>3</sup> capacity can be used for settling ground water prior to disposal.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Professional Persons on Construction Site Drainage, Professional Persons Environmental Consultative Committee, 1994 (ProPECC PN 1/94), Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>oil interceptors should be provided in the drainage system and regularly cleaned to prevent the release of oils and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain; and</li> </ul>					Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>precautions and actions to be taken when a rainstorm is imminent or forecast, and during or after rainstorms. Particular attention should be paid to the control of any silty surface runoff during storms events.</li> </ul>					Guideline in Appendix A2 of ProPECC PN 1/94

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	3.7.1	-	<p><i>General Construction Activities</i></p> <ul style="list-style-type: none"> <li>debris and rubbish on site should be collected, handled and disposed of properly to avoid entering the water column to cause water quality impacts;</li> <li>all fuel tanks and storage areas should be provided with locks and be located on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank, to prevent spilled fuel oil from reaching coastal waters of Ma Wan Channel.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
Within construction sites	3.7.1	-	<p><i>Sewage from Construction Work Force</i></p> <ul style="list-style-type: none"> <li>Construction work force sewage discharges on site are expected to be connected to the existing trunk sewer or sewage treatment facilities. The construction sewage may need to be handled by portable chemical toilets prior to the commission of the on-site sewer system. Appropriate numbers of portable toilets shall be provided by a licensed contractor to serve the large number of construction workers over the construction site. The Contractor shall also be responsible for waste disposal and maintenance practices.</li> </ul>	Contractor	Construction Phase	CED	Contractor	-
<i>Water Quality Monitoring</i>								
Monitoring Locations	13.2.1	6.2.5, 6.2.6 Annex A	<p>Baseline monitoring should be taken in 3 days per week at mid-flood and mid-ebb tides prior to the commencement of marine works.</p> <p>There shall not be any marine construction activities in the vicinity if the stations during the baseline monitoring</p>	Environmental Team of the Contractor	4 weeks prior to the commencement of marine works	CED	-	-
Monitoring Locations	13.2.1	6.2.7 Annex A	<p>Impact monitoring: 3 days per week, at mid-flood and mid-ebb tides.</p> <p>The interval between two sets of monitoring shall not be less than 36 hours.</p>	Environmental Team of the Contractor	Construction Phase	CED	-	-
Monitoring Locations	-	6.2.8, 6.2.9 Annex A	<p>In case there are exceedances of Action and /or Limit levels, monitoring frequency will be increased.</p>	Environmental Team of the Contractor	Construction Phase	CED	-	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Operational Phase								
Within the STD	3.7.2	-	<p>The following measures are applicable to reduce stormwater run-off pollution within the STD:</p> <ul style="list-style-type: none"> <li>• provision of silt traps to reduce the concentration of silt/sediments in stormwater run-off. These silt traps should be cleaned and maintained regularly to ensure that they function properly;</li> <li>• compliance of the WPCO for Western Buffer through the issuance of relevant discharge licence for the proposed development within the STD;</li> <li>• the stringent control on the discharge of sewage into Western Buffer with all expedient connection eliminated and untreated effluent conveyed to the Sewage Treatment Facilities for STD for treatment and disposal.</li> </ul> <p>To facilitate EPD's enforcement works of identifying expedient connections and eliminating dry weather flows in stormdrains, inspection manholes should be provided at the connection point of side branches into the decked nullah.</p>	CED	Prior to the construction of the residential development	CED	DSD	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Waste Management</b>								
Construction Phase								
Within construction sites	6.7.2	-	<p><i>Dredged Material</i></p> <ul style="list-style-type: none"> <li>The volume of material dredged should be minimised as far as practicable;</li> <li>minimising exposure to any contaminated material by the wearing of protective gear such as gloves, providing adequate hygiene and washing facilities, and preventing eating during dredging;</li> <li>any contaminated sediment dredged should not be allowed to stockpile on the site and should be immediately removed from site once dredged;</li> <li>all vessels for marine transportation of dredged sediment should be fitted with tight fitting seals to their bottom openings to prevent leakage of materials; and</li> <li>loading of barges and hoppers should be controlled to prevent splashing of dredged material to the surrounding water, and barges or hoppers should under no circumstances to be filled to a level which will cause other overflowing of materials or polluted water during loading or transportation.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Works Bureau Technical Circular (WBTC) No. 3/2000, Management of Dredged/Excavated Sediment
Within construction sites	6.7.4	-	<p><i>Excavated Materials</i></p> <ul style="list-style-type: none"> <li>If any surplus uncontaminated inert materials do arise then they may be delivered to public filling areas or other reclamation sites.</li> <li>Excavated materials should be segregated from other wastes to avoid possible contamination, thereby allowing disposal at public filling areas.</li> </ul>	Contractor	Construction Phase	CED	Contractor	

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	6.7.5	-	<p><i>C&amp;D Waste</i></p> <ul style="list-style-type: none"> <li>Careful design, planning and good site management can minimise over ordering and generation and waste materials such as concrete, mortars and cement grouts.</li> <li>the handling and disposal of bentonite slurries should be undertaken in accordance with <i>ProPECC PN 1/94</i> on construction site drainage;</li> <li>C&amp;DM should be segregated on site into different waste and material types. Where site conditions allowed, different types of wastes should be segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. An on-site temporary storage area should also be provided.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Works Bureau Technical Circular (WBTC) No. 5/98, On-site Sorting of Construction Waste on Demolition Sites
Within construction sites	6.7.6	-	<p><i>Chemical Waste</i></p> <p>Containers used for the storage of chemical wastes shall:</p> <ul style="list-style-type: none"> <li>be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;</li> <li>have a capacity of less than 450 litres unless the specifications have been approved by the EPD; and</li> <li>display a label in English and Chinese in accordance with instructions prescribed in <i>Schedule 2</i> of the <i>Regulations</i>.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<p>The storage area for chemical wastes shall:</p> <ul style="list-style-type: none"> <li>• be clearly labelled and used solely for the storage of chemical waste;</li> <li>• be enclosed on at least 3 sides;</li> <li>• 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;</li> <li>• have adequate ventilation;</li> <li>• be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and</li> <li>• be arranged so that incompatible materials are adequately separated.</li> </ul>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
			<p>Disposal of chemical waste shall:</p> <ul style="list-style-type: none"> <li>• be via a licensed waste collector; and</li> <li>• be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers; or</li> <li>• be to a reuser of the waste, under approval from the EPD.</li> </ul> <p>The Centre for Environmental Technology operates a Waste Exchange Scheme which can assist in finding receivers or buyers.</p>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
Within construction sites	6.7.7	-	<p><i>General Refuse</i></p> <ul style="list-style-type: none"> <li>• general refuse shall be stored in enclosed bins or compaction units separate from C&amp;D and chemical wastes. Waste collector shall be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimise odour, pest and litter impacts;</li> <li>• General refuse is generated largely by food service activities on site, so reusable rather than disposable dishware should be used if feasible.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Authorised Person and Registered Structural Engineers, Building Department and Public Health and Municipal Services Ordinance

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<i>Waste Auditing</i>								
Within Construction sites	6.9	-	It is recommended that audit of each waste stream should be carried out on regular basis (e.g. monthly) by an Independent Environmental Checker to determine if wastes are being managed in accordance with approved procedures and the site waste management plan. The audits should look at all aspects of waste management including waste generation, storage, recycling, transport and disposal. An appropriate audit programme would be to undertake a first audit at the commencement of the construction works and then to audit monthly thereafter.	Contractor	Construction Phase	CED	CED	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
Within Construction sites	6.9	7.2 & 7.3	In order to monitor the disposal of public fill and C&D waste at public filling facilities and landfills, respectively 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. An Independent Checker (Environment) should be responsible for auditing the result of the system.	Contractor	Construction Phase	CED	CED	WBTC No. 5/99, Trip-ticket System for Disposal of Construction and Demolition Material.
<b>Visual and Landscape</b>								
Construction Phase								
Within all construction sites	7.16	-	Consideration of design of all engineering structures in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	N/A	-
Within all construction sites	7.16	-	Hydoseeding of all reclaimed areas where there is no immediate after use for reclaimed area.	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.16	-	Erection of hoarding or advance planting as visual screen to works	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.16	-	Design of landscape works in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	N/A	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	7.16	-	<i>Reprovisioning of Anglers' Beach</i> <ul style="list-style-type: none"> <li>The coastal area to the immediate west of the reclamation will be left intact, with landscaping works to enhance the natural waterfront environment for the area.</li> </ul>	Contractor	Construction	CED	Contractor	-
Operation Phase								
Within reclamation area	7.16	-	<i>Reprovisioning of Anglers' Beach</i> <ul style="list-style-type: none"> <li>Footpaths will be designed to provide easy access from the residential developments to this coastal area.</li> <li>The provision of an indoor public swimming pool within the government complex / leisure centre at Area 6.</li> </ul>	Private Developer / LCSD	Detail Design	CED	LCSD / ArchSD	-
Within reclamation area	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	LCSD / ArchSD	Detail Design	CED	LCSD / ArchSD	HKPSG
<b>Land Use Impacts</b>								
Construction								
Within construction sites	11.6	-	<i>Reprovisioning of Anglers' Beach</i> <ul style="list-style-type: none"> <li>The coastal area to the immediate west of the reclamation will be left intact, with landscaping works to enhance the natural waterfront environment for the area.</li> <li>Footpaths will be designed to provide easy access from the residential developments to this coastal area.</li> <li>The provision of an indoor public swimming pool within the government complex / leisure centre at Area 6.</li> </ul>	Private Developer / LCSD	Detail Design	CED	LCSD / ArchSD	-
Within construction sites	11.6.2	-	<i>Reprovisioning of Kaito Pier</i> <ul style="list-style-type: none"> <li>A marine basin with two berthing spaces and sufficient headroom under the western portion of the Bypass will accommodate the reprovisioned kaito pier</li> </ul>	Contractor	Construction	CED	CED (Portworks)	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	11.6.3	-	<p><i>Careful Urban Design</i></p> <ul style="list-style-type: none"> <li>A well-connected pedestrian network, e.g. elevators, escalators, stairs, ramps, footpaths and footbridges, should be considered to avoid a vertical segregation of the open spaces and to provide better linkage among activities nodes.</li> </ul>	Contractor / Private Developer	Detail Design	CED / Private Developer	CED / ArchSD / Private Developer	-
Within construction sites	11.6.5	-	<p><i>Well Co-ordinated Construction Programme</i></p> <ul style="list-style-type: none"> <li>construction programme of the STD and other projects (including Castle Peak Road widening) should be well co-ordinated to avoid insurmountable problems or conflicts.</li> </ul>	Contractor / CED / HyD	Detail Design / Construction	N/A	N/A	-
<b>Biogas</b>								
Construction Phase								
<i>Gas Monitoring</i>								
At two monitoring wells	12.9.1	Annex A	<ul style="list-style-type: none"> <li>Monitoring of methane, carbon dioxide, oxygen and gas flow should be undertaken by qualified specialists at two monitoring wells installed across the undredged area for a period of at least one year prior to the construction of the development at the reclamation.</li> <li>The following criteria provide general guidelines to determine the need for protective measures:</li> </ul> <p><i>Scenario 1</i></p> <p>If rates of methane emission are consistently much less than the trigger value (10 L m<sup>-2</sup> day<sup>-1</sup>), including monitoring occasions when atmospheric pressure is falling quite quickly, and they do not show any rising trend over time, then the buildings will not require gas protection measures. That is if (gas flow rate in terms of L day<sup>-1</sup>) × (concentration of methane in gas (in % gas)) &lt; 200 L day<sup>-1</sup></p>	Contractor	Detail Design / Construction	CED	CED	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
At two monitoring wells (Con't)	12.9.1	Annex A	<p><i>Scenario 2</i></p> <p>If the rates of methane emission from any borehole frequently exceed the trigger value or show a rising trend such that future emission rates are likely to exceed the trigger value, then any buildings to be constructed on that part of the site will require some form of gas protection measures. That is when (gas flow rate in terms of L day<sup>-1</sup>) x (concentration of methane in gas (in % gas)) &gt; 200 L day<sup>-1</sup>.</p> <p>The exact details of the gas protection measures would need to be designed to take into account the design and use of the particular buildings involved but would, most probably, include the installation of a low gas permeability membrane in the floor slab of the building. The exact area of the reclamation over which buildings would need to have gas protection measures would depend on the pattern of the results from the different monitoring boreholes and further investigation may be required to determine the area of land which is affected by gas emissions. The analysis and assessment of the results and design of any gas protection measures, should be undertaken by suitably qualified and experienced professionals who are familiar with the properties of biogas and the way in which buildings may be protected against the impacts of gases derived from the ground.</p>	Contractor	Detail Design / Construction	CED	CED	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
At two monitoring wells (Con't)	12.9.1	Annex A	<p><i>Scenario 3</i></p> <p>If there are occasional exceedances of the methane emission rate trigger value or if there is significant fluctuation of the results obtained with some readings coming close to the trigger value, then the exact pattern and any trends in the results will need to be assessed to determine their significance and whether any building protection measures are required. It might be necessary to undertake additional monitoring by extending the monitoring period, for example, if an apparently spurious high reading is noted towards the end of the monitoring period or if it seems likely that future rates of emission may exceed the trigger value.</p> <p>Whatever the results obtained from the proposed monitoring of gas emission rates, the analysis and assessment of the results and design of any gas protection measures, should be undertaken by suitably qualified and experienced professionals who are familiar with the properties of biogas and the way in which buildings may be protected against the impacts of gases derived from the ground.</p> <p><i>Scenario 4</i></p> <p>If the rates of methane emission from any borehole frequently exceed the Limit value (84.7 L m<sup>-2</sup> day<sup>-1</sup>), or show a rising trend such that future emission rates are likely to exceed the limit value, then no buildings should be constructed on that part of the site. That is when the (gas flow rate in terms of L day<sup>-1</sup>) × (concentration of methane in gas (in % gas)) &gt; 1694 L day<sup>-1</sup>.</p>	Contractor	Detail Design / Construction	CED	CED	-

**Annex G Table 3 Implementation Schedule for Sham Tseng Bypass**

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Air Quality</b>								
<i>Construction Phase</i>								
Within all construction sites	5.7.1	-	<p>The Air Pollution (Construction Dust) Regulation, for example:</p> <ul style="list-style-type: none"> <li>excavated dusty material should be covered by impervious sheeting and sprayed with water to keep the entire surface wet;</li> <li>the haul roads should be located away from sensitive receivers and sprayed with water to keep the entire road surface wet;</li> <li>every vehicle should be washed to remove dusty materials from its body and wheels before leaving a construction site;</li> <li>the load carried by vehicle should be covered by impervious sheeting to ensure no leakage of dusty materials from the vehicle; and</li> <li>the heights from which fill materials are dropped should be controlled to a practical level to minimise the fugitive dust arising from unloading.</li> </ul>	Contractor	Construction Stage	CED	Contractor	Air Pollution Control (Construction Dust) Regulation
<i>Construction Air Quality Monitoring</i>								
Monitoring Locations	13.4.1	6.2.6 Annex B	Baseline monitoring should be carried out at all of the designated monitoring location(s) prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. One-hour sampling shall also be done at least 3 times per day while the highest dust impact is expected.	Environmental Team of the Contractor	At least 14 consecutive days prior to the commissioning of the construction works	CED	-	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Monitoring Locations	13.4.1	6.2.7 Annex B	Sampling for regular impact monitoring, shall be carried out at least once in every six-days at all the monitoring stations for 24-hour TSP monitoring.  For 1-hour TSP impact monitoring, sampling frequency of at least 3 times in every 6-days shall be undertaken when the highest dust impact occurs.	Environmental Team of the Contractor	Construction Phase	CED	-	-
Monitoring Locations	-	6.2.9 Annex B	In case of non-compliance of the air quality criteria occurs, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until exceedance stops.	Environmental Team of the Contractor	Specified times	CED	-	-
<b>Noise</b>								
Construction Phase								
Within all construction sites	4.7.1	-	<p><i>Good Site Practice</i></p> <ul style="list-style-type: none"> <li>only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction works;</li> <li>machines and plant that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from nearby NSRs;</li> <li>silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction works;</li> </ul>	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>mobile plant should be sited as far away from NSRs as possible; and</li> <li>material stockpiles and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul>					
Within all construction sites	4.7.1	-	Use of quiet PME, movable noise barriers, limit the number of plant operating concurrently and restricting the operating PME time usage to 50% and 25%	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO
<i>Construction Noise Monitoring</i>								
Monitoring Locations	-	5.2.3 & 5.2.4 Annex B	The baseline noise monitoring shall be carried out at the noise monitoring locations for a period of one week at a minimum logging interval of 15 minutes prior to the commencement of the construction	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Monitoring Locations	-	5.2.5 Annex B	<p>During normal construction working hours (0700 - 1900 Monday to Saturday), construction noise monitoring of <math>L_{Aeq, 30 \text{ minutes}}</math> shall be carried out once every six days.</p> <p>If restricted hours works are undertaken, monitoring of <math>L_{Aeq, 15 \text{ minutes}}</math> noise levels shall be carried out at the same frequency as specified for normal working hours.</p>	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Monitoring Locations	-	5.2.7 Annex B	In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Operational Phase								
Promenade Extension	4.7.2 Fig.4.7a	-	Promenade extension along the western end (380m long CH: 725 to CH: 1100)	CED	Before operation of the Sham Tseng Bypass	CED	HyD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Along the central reserve of Sham Tseng Bypass (approximately 30 m long starting from CH: 570 to CH:600)	4.7.2 Fig.4.7a	-	5 m vertical barrier in absorptive material	CED	Before operation of the Sham Tseng Bypass	CED	HyD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Along the southern side of eastbound Sham Tseng Bypass (approximately 50 m long starting from CH:600 to CH:650)	4.7.2 Fig.4.7a	-	5 m vertical barrier in absorptive material	CED	Before operation of the Sham Tseng Bypass	CED	HyD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Along the northern side of eastbound Sham Tseng Bypass (approximately 130 m long from CH: 600 to CH:725)	4.7.2 Fig.4.7a	-	Semi-enclosure with cantilever 3 m from central reserve	CED	Before operation of the Sham Tseng Bypass	CED	HyD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Along the western end of Sham Tseng Bypass (approximately 380 m long starting from CH: 725 to CH:1100)	4.7.2 Fig.4.7a	-	Promenade extension	CED	Before operation of the Sham Tseng Bypass	CED	HyD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Along the southern side of the westbound Sham Tseng Bypass (approximately 100 m long starting from CH:700 to CH:800)	4.7.2 Fig.4.7a	-	3.5 m vertical barrier in reflective material	CED	Before operation of the Sham Tseng Bypass	CED	HyD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Along the northern side of Castle Peak Road Eastbound (approximately 170 m starting from CH:2150 to CH:2325)	4.7.2 Fig.4.7b	-	6 m vertical barrier in reflective material	CED	Before operation of the Sham Tseng Bypass	CED	HyD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
Along the central reserve of Castle Peak Road (approximately 100 m long starting from CH:2150 to CH:2255)	4.7.2 Fig.4.7b	-	5 m vertical barrier in reflective material	CED	Before operation of the Sham Tseng Bypass	CED	HyD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
<i>Operational Noise Monitoring</i>								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Monitoring Locations	-	5.3.6 Annex B	<p>Two sets of traffic noise monitoring data shall be obtained during the first year of the operation of the Bypass:</p> <ul style="list-style-type: none"> <li>• one set of measurements at the morning traffic peak hour on normal weekdays;</li> <li>• one set of measurements at the evening traffic peak hour on normal weekdays</li> </ul> <p>Exact timing for monitoring has to be confirmed with the Transport Department and agreed with EPD. During the traffic noise monitoring, traffic count, average traffic speed and percentage of heavy vehicles shall also be conducted so as to ensure the traffic noise of the peak periods are covered.</p>	Environmental Team of Contractor	Operational Phase (after completion of the Sham Tseng Bypass)	CED	-	-
<b>Water Quality</b>								
Construction Phase								
Within construction sites	3.7.1	-	<p><i>Construction Runoff and Drainage</i></p> <ul style="list-style-type: none"> <li>• use of sediment traps, wheel washing facilities for vehicles leaving the site, and adequate maintenance of drainage systems to prevent flooding and overflow;</li> <li>• Permanent drainage channels should incorporate sediment basins or traps and baffles to enhance depositions rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94;</li> <li>• a sediment tank constructed from pre-formed individual cells of approximately 6 - 8 m<sup>3</sup> capacity can be used for settling ground water prior to disposal.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Professional Persons on Construction Site Drainage, Professional Persons Environmental Consultative Committee, 1994 (ProPECC PN 1/94), Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>oil interceptors should be provided in the drainage system and regularly cleaned to prevent the release of oils and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain; and</li> </ul>					Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991
			<ul style="list-style-type: none"> <li>precautions and actions to be taken when a rainstorm is imminent or forecast, and during or after rainstorms. Particular attention should be paid to the control of any silty surface runoff during storms events.</li> </ul>					Guideline in Appendix A2 of ProPECC PN 1/94
Within construction sites	3.7.1	-	<p><i>General Construction Activities</i></p> <ul style="list-style-type: none"> <li>debris and rubbish on site should be collected, handled and disposed of properly to avoid entering the water column to cause water quality impacts;</li> <li>all fuel tanks and storage areas should be provided with locks and be located on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank, to prevent spilled fuel oil from reaching coastal waters of Ma Wan Channel.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	3.7.1	-	<p><i>Sewage from Construction Work Force</i></p> <ul style="list-style-type: none"> <li>Construction work force sewage discharges on site are expected to be connected to the existing trunk sewer or sewage treatment facilities. The construction sewage may need to be handled by portable chemical toilets prior to the commission of the on-site sewer system. Appropriate numbers of portable toilets shall be provided by a licensed contractor to serve the large number of construction workers over the construction site. The Contractor shall also be responsible for waste disposal and maintenance practices.</li> </ul>	Contractor	Construction Phase	CED	Contractor	-
<i>Water Quality Monitoring (not required)</i>								
Operational Phase								
Within the bypass boundary	3.7.2	-	<p>The following measures are applicable to reduce stormwater run-off pollution within the boundary of the bypass:</p> <ul style="list-style-type: none"> <li>provision of silt traps to reduce the concentration of silt/sediments in stormwater run-off. These silt traps should be cleaned and maintained regularly to ensure that they function properly;</li> <li>compliance of the WPCO for Western Buffer through the issuance of relevant discharge licence for the proposed storm drains associated with the bypass;</li> </ul>	CED	During construction of the bypass	CED	DSD	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
<b>Waste Management</b>								
Construction Phase								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	6.7.4	-	<p><i>Excavated Materials</i></p> <ul style="list-style-type: none"> <li>• If any surplus uncontaminated inert materials do arise then they may be delivered to public filling areas or other reclamation sites.</li> <li>• Excavated materials should be segregated from other wastes to avoid possible contamination, thereby allowing disposal at public filling areas.</li> </ul>	Contractor	Construction Phase	CED	Contractor	
Within construction sites	6.7.5	-	<p><i>C&amp;D Waste</i></p> <ul style="list-style-type: none"> <li>• Careful design, planning and good site management can minimise over ordering and generation and waste materials such as concrete, mortars and cement grouts.</li> <li>• the handling and disposal of bentonite slurries should be undertaken in accordance with <i>ProPECC PN 1/94</i> on construction site drainage;</li> <li>• C&amp;DM should be segregated on site into different waste and material types. Where site conditions allowed, different types of wastes should be segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. An on-site temporary storage area should also be provided.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Works Bureau Technical Circular (WBTC) No. 5/98, On-site Sorting of Construction Waste on Demolition Sites

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	6.7.6	-	<p><i>Chemical Waste</i></p> <p>Containers used for the storage of chemical wastes shall:</p> <ul style="list-style-type: none"> <li>• be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;</li> <li>• have a capacity of less than 450 litres unless the specifications have been approved by the EPD; and</li> <li>• display a label in English and Chinese in accordance with instructions prescribed in <i>Schedule 2 of the Regulations</i>.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
			<p>The storage area for chemical wastes shall:</p> <ul style="list-style-type: none"> <li>• be clearly labelled and used solely for the storage of chemical waste;</li> <li>• be enclosed on at least 3 sides;</li> <li>• 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;</li> <li>• have adequate ventilation;</li> <li>• be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and</li> <li>• be arranged so that incompatible materials are adequately separated.</li> </ul>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<p>Disposal of chemical waste shall:</p> <ul style="list-style-type: none"> <li>• be via a licensed waste collector; and</li> <li>• be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers; or</li> <li>• be to a reuser of the waste, under approval from the EPD.</li> </ul> <p>The Centre for Environmental Technology operates a Waste Exchange Scheme which can assist in finding receivers or buyers.</p>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
Within construction sites	6.7.7	-	<p><i>General Refuse</i></p> <ul style="list-style-type: none"> <li>• general refuse shall be stored in enclosed bins or compaction units separate from C&amp;D and chemical wastes. Waste collector shall be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimise odour, pest and litter impacts.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Authorised Person and Registered Structural Engineers, Building Department and Public Health and Municipal Services Ordinance
<i>Waste Auditing</i>								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within Construction sites	6.9	-	It is recommended that audit of each waste stream should be carried out on regular basis (e.g. monthly) by an Independent Environmental Checker to determine if wastes are being managed in accordance with approved procedures and the site waste management plan. The audits should look at all aspects of waste management including waste generation, storage, recycling, transport and disposal. An appropriate audit programme would be to undertake a first audit at the commencement of the construction works and then to audit monthly thereafter.	Contractor	Construction Phase	CED	CED	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
Within Construction sites	6.9	7.2 & 7.3	In order to monitor 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. An Independent Checker (Environment) should be responsible for auditing the result of the system.	Contractor	Construction Phase	CED	CED	WBTC No. 5/99, Trip-ticket System for Disposal of Construction and Demolition Material.
<b>Visual and Landscape</b>								
Construction Phase								
Within all construction sites	7.16	-	Consideration of design of all engineering structures in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	N/A	-
Within all construction sites	7.16	-	Consideration of design of all slopes to minimise extent of cutting and design in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	N/A	WBTC 25/93 Control of Visual Impact of Slopes
Within all construction sites	7.16	-	Minimisation of all slope cutting where possible	Contractor	Construction	CED	Contractor	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within all construction sites	7.16	-	Felling of trees in accordance with WBTC 24/94 Tree Preservation <ul style="list-style-type: none"> <li>Felling and transplanting of trees affected in accordance with Tree Felling Application and with-contract documents</li> </ul>	Contractor	Construction	CED	Contractor	WBTC 24/94 Tree Preservation
Within all construction sites	7.16	-	Erection of hoarding or advance planting as visual screen to works	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.16	-	Topsoils to be tested for quality and if valuable to be stockpiled no greater than 2 m high for later use	Contractor	Construction	CED	Contractor	-
Within construction sites	7.16	-	<i>Reprovisioning of Anglers' Beach</i> <ul style="list-style-type: none"> <li>The coastal area to the immediate west of the reclamation will be left intact, with landscaping works to enhance the natural waterfront environment for the area.</li> </ul>	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.16	-	Design of landscape works in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	Contractor	-
<b>Operation Phase</b>								
Promenade above bypass DO (not structure)	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	LCSD / ArchSD	Detail Design	CED	LCSD / ArchSD	HKPSG
Within Development Site and Area 6.	7.16	-	<i>Reprovisioning of Anglers' Beach</i> <ul style="list-style-type: none"> <li>Footpaths will be designed to provide easy access from the residential developments to this coastal area.</li> <li>The provision of an indoor public swimming pool within the government complex / Leisure Centre at Area 6.</li> </ul>	Private Developer / LCSD	Detail Design	CED	LCSD / ArchSD	-
Roadside hardworks	7.16	-	Design of landscape works in accordance with EIA recommendations and HyD standards	CED / LCSD	Detail Design	CED	HyD	HyD Standards
Roadside planting	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	CED / LCSD	Detail Design	CED	LCSD	HKPSG
Amenity Areas	7.16	-	Design of landscape works in accordance with EIA recommendations and HKPSG	CED / LCSD	Detail Design	CED	LCSD / ArchSD	HKPSG
<b>Land Use Impacts</b>								
Construction								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	11.6	-	<p><i>Reprovisioning of Anglers' Beach</i></p> <ul style="list-style-type: none"> <li>The coastal area to the immediate west of the reclamation will be left intact, with landscaping works to enhance the natural waterfront environment for the area.</li> <li>Footpaths will be designed to provide easy access from the residential developments to this coastal area.</li> <li>The provision of an indoor public swimming pool within the government complex / leisure centre at Area 6.</li> </ul>	Private Developer / LCSD	Detail Design	CED	LCSD / ArchSD	-
Within construction sites	11.6.2	-	<p><i>Reprovisioning of Kaito Pier</i></p> <ul style="list-style-type: none"> <li>A marine basin with two berthing spaces and sufficient headroom under the western portion of the Bypass will accommodate the reprovisioned kaito pier</li> </ul>	Contractor	Construction	CED	CED (Portworks)	-
Within construction sites	11.6.3	-	<p><i>Careful Urban Design</i></p> <ul style="list-style-type: none"> <li>A well-connected pedestrian network, e.g. elevators, escalators, stairs, ramps, footpaths and footbridges, should be considered to avoid a vertical segregation of the open spaces and to provide better linkage among activities nodes.</li> </ul>	Contractor / Private Developer	Detail Design	CED / Private Developer	CED / ArchSD / Private Developer	-
Within construction sites	11.6.5	-	<p><i>Well Co-ordinated Construction Programme</i></p> <ul style="list-style-type: none"> <li>construction programme of the STD and other projects (including Castle Peak Road widening) should be well co-ordinated to avoid insurmountable problems or conflicts.</li> </ul>	Contractor / CED / HyD	Detail Design / Construction	N/A	N/A	-
<b>Biogas</b>								
(No biogas monitoring required)								

**Annex G Table 4 Implementation Schedule for Sewage Pumping Station**

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Air Quality</b>								
<i>Construction Phase</i>								
Within all construction sites	5.7.1	-	<p>The Air Pollution (Construction Dust) Regulation, for example:</p> <ul style="list-style-type: none"> <li>excavated dusty material should be covered by impervious sheeting and sprayed with water to keep the entire surface wet;</li> <li>the haul roads should be located away from sensitive receivers and sprayed with water to keep the entire road surface wet;</li> <li>every vehicle should be washed to remove dusty materials from its body and wheels before leaving a construction site;</li> <li>the load carried by vehicle should be covered by impervious sheeting to ensure no leakage of dusty materials from the vehicle; and</li> <li>the heights from which fill materials are dropped should be controlled to a practical level to minimise the fugitive dust arising from unloading.</li> </ul>	Contractor	Construction Stage	CED	Contractor	Air Pollution Control (Construction Dust) Regulation
<i>Construction Air Quality Monitoring</i>								
Monitoring Locations	13.4.1	6.2.6 Annex C	Baseline monitoring should be carried out at all of the designated monitoring location(s) prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. One-hour sampling shall also be done at least 3 times per day while the highest dust impact is expected.	Environmental Team of the Contractor	At least 14 consecutive days prior to the commissioning of the construction works	CED	-	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Monitoring Locations	13.4.1	6.2.7 Annex C	Sampling for regular impact monitoring, shall be carried out at least once in every six-days at all the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP impact monitoring, sampling frequency of at least 3 times in every 6-days shall be undertaken when the highest dust impact occurs.	Environmental Team of the Contractor	Construction Phase	CED	-	-
Monitoring Locations	-	6.2.9 Annex C	In case of non-compliance of the air quality criteria occurs, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until exceedance stops.	Environmental Team of the Contractor	Specified times	CED	-	-
<b>Operational Phase</b>								
Sewage pumping station at Area 4	5.5.2 & 5.7.2	-	<ul style="list-style-type: none"> <li>Installation of odour removal facilities at the air vent of the sewage pumping station;</li> <li>Wet Well of the sewage pumping station to be installed underground and enclosed by air-tight cover;</li> <li>Reinforced concrete superstructure to enclose the underground substructures including the wet well, inlet chamber, screening chamber, etc.</li> </ul>	CED	Prior to the operation of the sewage pumping station	CED	DSD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
<b>Noise</b>								
<b>Construction Phase</b>								
Within all construction sites	4.7.1	-	<p><i>Good Site Practice</i></p> <ul style="list-style-type: none"> <li>only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction works;</li> <li>machines and plant that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from nearby NSRs;</li> <li>silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction works;</li> <li>mobile plant should be sited as far away from NSRs as possible; and</li> </ul>	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>material stockpiles and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul> <p>Use of quiet PME, movable noise barriers, limit the number of plant operating concurrently and restricting the operating PME time usage to 50% and 25%</p>					
<i>Construction Noise Monitoring</i>								
Monitoring Locations	-	5.2.3 & 5.2.4 Annex C	The baseline noise monitoring shall be carried out at the noise monitoring locations for a period of one week at a minimum logging interval of 15 minutes prior to the commencement of the construction	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Monitoring Locations	-	5.2.5 Annex C	<p>During normal construction working hours (0700 - 1900 Monday to Saturday), construction noise monitoring of <math>L_{Aeq, 30 \text{ minutes}}</math> shall be carried out once every six days.</p> <p>If restricted hours works are undertaken, monitoring of <math>L_{Aeq, 15 \text{ minutes}}</math> noise levels shall be carried out at the same frequency as specified for normal working hours.</p>	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Monitoring Locations	-	5.2.7 Annex C	In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Operational Phase								
Sewage Pumping Station, Area 4	4.6.3	-	<p>Maximum permissible sound power level is 85 dB(A) during the day time and 75 dB(A) during the night time</p> <p>To minimize potential noise impact, the sewage pumping station is to be located underground.</p> <p>Silencer for the extraction fans of the de-odourizers, acoustic doors, acoustic louvers and obsurptive wall lining should be adopted.</p> <p>Extraction fans of the de-odourizers are to be located away from the sensitive receivers.</p>	CED	During the construction of the sewage pumping station	CED	DSD	Technical Memorandum of Environmental Impact Assessment (EIAO-TM)
<i>Operational Noise Monitoring (Not required since operational noise would be controlled under S13 of NCO)</i>								
<b>Water Quality</b>								
Construction Phase								
Within construction sites	3.7.1	-	<p><i>Construction Runoff and Drainage</i></p> <ul style="list-style-type: none"> <li>• use of sediment traps, wheel washing facilities for vehicles leaving the site, and adequate maintenance of drainage systems to prevent flooding and overflow;</li> <li>• Permanent drainage channels should incorporate sediment basins or traps and baffles to enhance depositions rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94;</li> <li>• a sediment tank constructed from pre-formed individual cells of approximately 6 - 8 m<sup>3</sup> capacity can be used for settling ground water prior to disposal.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Professional Persons on Construction Site Drainage, Professional Persons Environmental Consultative Committee, 1994 (ProPECC PN 1/94), Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<ul style="list-style-type: none"> <li>oil interceptors should be provided in the drainage system and regularly cleaned to prevent the release of oils and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain; and</li> </ul>					Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991
			<ul style="list-style-type: none"> <li>precautions and actions to be taken when a rainstorm is imminent or forecast, and during or after rainstorms. Particular attention should be paid to the control of any silty surface runoff during storms events.</li> </ul>					Guideline in Appendix A2 of ProPECC PN 1/94
Within construction sites	3.7.1	-	<p><i>General Construction Activities</i></p> <ul style="list-style-type: none"> <li>debris and rubbish on site should be collected, handled and disposed of properly to avoid entering the water column to cause water quality impacts;</li> <li>all fuel tanks and storage areas should be provided with locks and be located on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank, to prevent spilled fuel oil from reaching coastal waters of Ma Wan Channel.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
Within construction sites	3.7.1	-	<p><i>Sewage from Construction Work Force</i></p> <ul style="list-style-type: none"> <li>Construction work force sewage discharges on site are expected to be connected to the existing trunk sewer or sewage treatment facilities. The construction sewage may need to be handled by portable chemical toilets prior to the commission of the on-site sewer system. Appropriate numbers of portable toilets shall be provided by a licensed contractor to serve the large number of construction workers over the construction site. The Contractor shall also be responsible for waste disposal and maintenance practices.</li> </ul>	Contractor	Construction Phase	CED	Contractor	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<i>Water Quality Monitoring (not required)</i>								
Operational Phase								
Within the Sewage Pumping Station	3.7.2	-	<p>Should a failure of the pumping station occur the necessary repairs should be expedited in order to limit the period of emergency discharge. The following measures shall be considered as part of the contingency plan:</p> <ul style="list-style-type: none"> <li>• Standby pump should be provided to facilitate maintenance and repairing of equipment;</li> <li>• Dual (back-up) power supply should be provided. Dual power supply could be in form of ring main or an automatic-operated emergency generator with sufficient capacity to cope with the demand loading of the essential plant equipment;</li> <li>• If the pumping station is unmanned, a telemetry system should be provided to the nearest manned station/plant so that swift actions could be taken in case of malfunction of the unmanned facilities;</li> <li>• Hand-cleaned screens should be provided at the overflow bypass to prevent the discharge of floating solids into receiving water bodies. The clear spacing of the bar screen should normally be about 25mm; and</li> <li>• The discharge point of the overflow bypass should be below the low water.</li> </ul> <p>To minimise the risk of failure of the pumping station, standby equipment plus dual power supply should be provided.</p> <p>Twin rising mains will be provided to allow one main closed for maintenance</p>	CED	Operational Phase (during emergency discharge condition)	CED	DSD	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within the STD	3.7.2	-	<p>The following measures are applicable to reduce stormwater run-off pollution within the boundaries of the sewage pumping station site:</p> <ul style="list-style-type: none"> <li>• provision of silt traps to reduce the concentration of silt/sediments in stormwater run-off. These silt traps should be cleaned and maintained regularly to ensure that they function properly;</li> <li>• compliance of the WPCO for Western Buffer through the issuance of relevant discharge licence;</li> </ul>	CED	Prior to the construction of the residential development	CED	DSD	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
<b>Waste Management</b>								
Construction Phase								
Within construction sites	6.7.4	-	<p><i>Excavated Materials</i></p> <ul style="list-style-type: none"> <li>• If any surplus uncontaminated inert materials do arise then they may be delivered to public filling areas or other reclamation sites.</li> <li>• Excavated materials should be segregated from other wastes to avoid possible contamination, thereby allowing disposal at public filling areas.</li> </ul>	Contractor	Construction Phase	CED	Contractor	

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	6.7.5	-	<p><i>C&amp;D Waste</i></p> <ul style="list-style-type: none"> <li>Careful design, planning and good site management can minimise over ordering and generation and waste materials such as concrete, mortars and cement grouts.</li> <li>the handling and disposal of bentonite slurries should be undertaken in accordance with <i>ProPECC PN 1/94</i> on construction site drainage;</li> <li>C&amp;DM should be segregated on site into different waste and material types. Where site conditions allowed, different types of wastes should be segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. An on-site temporary storage area should also be provided.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Works Branch Technical Circular (WBTC) No. 5/98, On-site Sorting of Construction Waste on Demolition Sites
Within construction sites	6.7.6	-	<p><i>Chemical Waste</i></p> <p>Containers used for the storage of chemical wastes shall:</p> <ul style="list-style-type: none"> <li>be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;</li> <li>have a capacity of less than 450 litres unless the specifications have been approved by the EPD; and</li> <li>display a label in English and Chinese in accordance with instructions prescribed in <i>Schedule 2 of the Regulations</i>.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<p>The storage area for chemical wastes shall:</p> <ul style="list-style-type: none"> <li>• be clearly labelled and used solely for the storage of chemical waste;</li> <li>• be enclosed on at least 3 sides;</li> <li>• 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;</li> <li>• have adequate ventilation;</li> <li>• be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and</li> <li>• be arranged so that incompatible materials are adequately separated.</li> </ul>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
			<p>Disposal of chemical waste shall:</p> <ul style="list-style-type: none"> <li>• be via a licensed waste collector; and</li> <li>• be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers; or</li> <li>• be to a reuser of the waste, under approval from the EPD.</li> </ul> <p>The Centre for Environmental Technology operates a Waste Exchange Scheme which can assist in finding receivers or buyers.</p>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	6.7.7	-	General refuse shall be stored in enclosed bins or compaction units separate from C&D and chemical wastes. Waste collector shall be employed by the Contractor to remove general refuse from the site, separately from public fill and chemical waste, on a daily basis to minimise odour, pest and litter impacts.	Contractor	Construction Phase	CED	Contractor	Practice Note for Authorised Person and Registered Structural Engineers, Building Department and Public Health and Municipal Services Ordinance
<i>Waste Auditing</i>								
Within Construction sites	6.9	7.3	A trip-ticket system should be established and used to monitored the disposal of public fill and C&D waste at public filling facilities and landfills, respectively to control fly tipping.	Contractor	Construction Phase	CED	CED	WBTC No. 5/99, Trip-ticket System for Disposal of Construction and Demolition Material.
<i>Operational Phase</i>								
Within the Pumping Station	6.7.8 & 6.7.9	-	Chemical waste generated during the operation phase should be stored, handled and collected of in accordance with the <i>Code of Practice on the Packaging, labelling and storage of Chemical Waste</i> published by the EPD.  Chemical waste should be disposed of at licensed chemical waste treatment facilities approved by the EPD.  Collection of solid waste in enclosed environment. Use of fully enclosed container for transportation of waste. The frequency of collection of waste should be twice a week.	DSD	Operational Phase	DSD	DSD	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Visual and Landscape</b>								
Construction Phase								
Within all construction sites	7.9	-	Consideration of design of all engineering structures in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	-	
Within all construction sites	7.9	-	Erection of hoarding or advance planting as visual screen to works	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.9	-	Design of landscape works in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	Contractor	-
Operation Phase items								
Within reclamation area	7.9	-	Design of landscape works in accordance with EIA recommendations and HKPSG	DSD	Detail Design	CED	DSD	
<b>Land Use Impacts</b>								
Construction								
Within construction sites	11.6.5	-	<i>Well Co-ordinated Construction Programme</i> <ul style="list-style-type: none"> <li>construction programme of the STD and other projects (including Castle Peak Road widening) should be well co-ordinated to avoid insurmountable problems or conflicts.</li> </ul>	Contractor / CED / HyD	Detail Design / Construction	N/A	N/A	-
<b>Biogas</b>								
(No biogas monitoring required)								

**Annex G Table 5 Implementation Schedule for Castle Peak Road Underpass**

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Air Quality</b>								
<i>Construction Phase</i>								
Within all construction sites	5.7.1	-	<p>The Air Pollution (Construction Dust) Regulation, for example:</p> <ul style="list-style-type: none"> <li>excavated dusty material should be covered by impervious sheeting and sprayed with water to keep the entire surface wet;</li> <li>the haul roads should be located away from sensitive receivers and sprayed with water to keep the entire road surface wet;</li> <li>every vehicle should be washed to remove dusty materials from its body and wheels before leaving a construction site;</li> <li>the load carried by vehicle should be covered by impervious sheeting to ensure no leakage of dusty materials from the vehicle; and</li> <li>the heights from which fill materials are dropped should be controlled to a practical level to minimise the fugitive dust arising from unloading.</li> </ul>	Contractor	Construction Stage	CED	Contractor	Air Pollution Control (Construction Dust) Regulation
<i>Construction Air Quality Monitoring</i>								
Monitoring Locations	13.4.1	6.2.6 Annex D	Baseline monitoring should be carried out at all of the designated monitoring location(s) prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. One-hour sampling shall also be done at least 3 times per day while the highest dust impact is expected.	Environmental Team of the Contractor	At least 14 consecutive days prior to the commissioning of the construction works	CED	-	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Monitoring Locations	13.4.1	6.2.7 Annex D	Sampling for regular impact monitoring, shall be carried out at least once in every six-days at all the monitoring stations for 24-hour TSP monitoring.  For 1-hour TSP impact monitoring, sampling frequency of at least 3 times in every 6-days shall be undertaken when the highest dust impact occurs.	Environmental Team of the Contractor	Construction Phase	CED	-	-
Monitoring Locations	-	6.2.9 Annex D	In case of non-compliance of the air quality criteria occurs, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until exceedance stops.	Environmental Team of the Contractor	Specified times	CED	-	-
Operational Phase								
Inside Underpass	5.5.2	-	Ventilation System to be provided in order to meet Tunnel Air Quality guideline	CED	Prior to operation of the underpass	CED	HyD/EMSD	Tunnel Air Quality Guideline
<b>Noise</b>								
Construction Phase								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within all construction sites	4.7.1	-	<p><i>Good Site Practice</i></p> <ul style="list-style-type: none"> <li>only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction works;</li> <li>machines and plant that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from nearby NSRs;</li> <li>silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction works;</li> <li>mobile plant should be sited as far away from NSRs as possible; and</li> <li>material stockpiles and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul>	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO
Within all construction sites	4.7.1	-	Use of quiet PME, movable noise barriers, limit the number of plant operating concurrently and restricting the operating PME time usage to 50% and 25%	Contractor	Construction	CED	Contractor	PN 2/93 & EIAO
<i>Construction Noise Monitoring</i>								
Monitoring Locations	-	5.2.3 & 5.2.4 Annex D	The baseline noise monitoring shall be carried out at the noise monitoring locations for a period of one week at a minimum logging interval of 15 minutes prior to the commencement of the construction	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Monitoring Locations	-	5.2.5 Annex D	During normal construction working hours (0700 - 1900 Monday to Saturday), construction noise monitoring of $L_{Aeq, 30 \text{ minutes}}$ shall be carried out once every six days.  If restricted hours works are undertaken, monitoring of $L_{Aeq, 15 \text{ minutes}}$ noise levels shall be carried out at the same frequency as specified for normal working hours.	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Monitoring Locations	-	5.2.7 Annex D	In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan shall be carried out. The additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.	Environmental Team of the Contractor	Specified times	CED	-	PN 2/93 & EIAO
Operational Phase								
Monitoring Locations	-	5.3.6 Annex D	Two sets of traffic noise monitoring data shall be obtained during the first year of the operation of the Bypass: <ul style="list-style-type: none"> <li>one set of measurements at the morning traffic peak hour on normal weekdays;</li> <li>one set of measurements at the evening traffic peak hour on normal weekdays</li> </ul> Exact timing for monitoring has to be confirmed with the Transport Department and agreed with EPD. During the traffic noise monitoring, traffic count, average traffic speed and percentage of heavy vehicles shall also be conducted so as to ensure the traffic noise of the peak periods are covered.	Environmental Team of Contractor	Operational Phase (after completion of the Castle Peak Road Underpass)	CED	-	-

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Water Quality</b>								
Construction Phase								
Within construction sites	3.7.1	-	<p><i>Construction Runoff and Drainage</i></p> <ul style="list-style-type: none"> <li>• use of sediment traps, wheel washing facilities for vehicles leaving the site, and adequate maintenance of drainage systems to prevent flooding and overflow;</li> <li>• Permanent drainage channels should incorporate sediment basins or traps and baffles to enhance depositions rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94;</li> <li>• a sediment tank constructed from pre-formed individual cells of approximately 6 - 8 m<sup>3</sup> capacity can be used for settling ground water prior to disposal.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Professional Persons on Construction Site Drainage, Professional Persons Environmental Consultative Committee, 1994 (ProPECC PN 1/94), Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991
			<ul style="list-style-type: none"> <li>• oil interceptors should be provided in the drainage system and regularly cleaned to prevent the release of oils and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain; and</li> </ul>					Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters, EPD, 1991
			<ul style="list-style-type: none"> <li>• precautions and actions to be taken when a rainstorm is imminent or forecast, and during or after rainstorms. Particular attention should be paid to the control of any silty surface runoff during storms events.</li> </ul>					Guideline in Appendix A2 of ProPECC PN 1/94

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	3.7.1	-	<p><i>General Construction Activities</i></p> <ul style="list-style-type: none"> <li>debris and rubbish on site should be collected, handled and disposed of properly to avoid entering the water column to cause water quality impacts;</li> <li>all fuel tanks and storage areas should be provided with locks and be located on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank, to prevent spilled fuel oil from reaching coastal waters of Ma Wan Channel.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
Within construction sites	3.7.1	-	<p><i>Sewage from Construction Work Force</i></p> <ul style="list-style-type: none"> <li>Construction work force sewage discharges on site are expected to be connected to the existing trunk sewer or sewage treatment facilities. The construction sewage may need to be handled by portable chemical toilets prior to the commission of the on-site sewer system. Appropriate numbers of portable toilets shall be provided by a licensed contractor to serve the large number of construction workers over the construction site. The Contractor shall also be responsible for waste disposal and maintenance practices.</li> </ul>	Contractor	Construction Phase	CED	Contractor	-
<i>Water Quality Monitoring (not required)</i>								
Operational Phase								

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within the boundary of the road	3.7.2	-	<p>The following measures are applicable to reduce stormwater run-off pollution from the road:</p> <ul style="list-style-type: none"> <li>• provision of silt traps to reduce the concentration of silt/sediments in stormwater run-off. These silt traps should be cleaned and maintained regularly to ensure that they function properly;</li> <li>• compliance of the WPCO for Western Buffer through the issuance of relevant discharge licence for the discharges from the storm water system;</li> </ul>	CED	Prior to the construction of the road	CED	DSD	Technical Memorandum, Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
<b>Waste Management</b>								
Construction Phase								
Within construction sites	6.7.4	-	<p><i>Excavated Materials</i></p> <ul style="list-style-type: none"> <li>• If any surplus uncontaminated inert materials do arise then they may be delivered to public filling areas or other reclamation sites.</li> <li>• Excavated materials should be segregated from other wastes to avoid possible contamination, thereby allowing disposal at public filling areas.</li> </ul>	Contractor	Construction Phase	CED	Contractor	

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	6.7.5	-	<p><i>C&amp;D Waste</i></p> <ul style="list-style-type: none"> <li>Careful design, planning and good site management can minimise over ordering and generation and waste materials such as concrete, mortars and cement grouts.</li> <li>the handling and disposal of bentonite slurries should be undertaken in accordance with <i>ProPECC PN 1/94</i> on construction site drainage;</li> <li>C&amp;DM should be segregated on site into different waste and material types. Where site conditions allowed, different types of wastes should be segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. An on-site temporary storage area should also be provided.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Works Bureau Technical Circular (WBTC) No. 5/98, On-site Sorting of Construction Waste on Demolition Sites
Within construction sites	6.7.6	-	<p><i>Chemical Waste</i></p> <p>Containers used for the storage of chemical wastes shall:</p> <ul style="list-style-type: none"> <li>be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;</li> <li>have a capacity of less than 450 litres unless the specifications have been approved by the EPD; and</li> <li>display a label in English and Chinese in accordance with instructions prescribed in <i>Schedule 2 of the Regulations</i>.</li> </ul>	Contractor	Construction Phase	CED	Contractor	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
			<p>The storage area for chemical wastes shall:</p> <ul style="list-style-type: none"> <li>• be clearly labelled and used solely for the storage of chemical waste;</li> <li>• be enclosed on at least 3 sides;</li> <li>• 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;</li> <li>• have adequate ventilation;</li> <li>• be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and</li> <li>• be arranged so that incompatible materials are adequately separated.</li> </ul>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
			<p>Disposal of chemical waste shall:</p> <ul style="list-style-type: none"> <li>• be via a licensed waste collector; and</li> <li>• be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers; or</li> <li>• be to a reuser of the waste, under approval from the EPD.</li> </ul> <p>The Centre for Environmental Technology operates a Waste Exchange Scheme which can assist in finding receivers or buyers.</p>					Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
Within construction sites	6.7.7	-	<p><i>General Refuse</i></p> <ul style="list-style-type: none"> <li>general refuse shall be stored in enclosed bins or compaction units separate from C&amp;D and chemical wastes. Waste collector shall be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimise odour, pest and litter impacts;</li> </ul>	Contractor	Construction Phase	CED	Contractor	Practice Note for Authorised Person and Registered Structural Engineers, Building Department and Public Health and Municipal Services Ordinance
<i>Waste Auditing</i>								
Within Construction sites	6.9	-	It is recommended that audit of each waste stream should be carried out on regular basis (e.g. monthly) by an Independent Environmental Checker to determine if wastes are being managed in accordance with approved procedures and the site waste management plan. The audits should look at all aspects of waste management including waste generation, storage, recycling, transport and disposal. An appropriate audit programme would be to undertake a first audit at the commencement of the construction works and then to audit monthly thereafter.	Contractor	Construction Phase	CED	CED	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); the Crown Land Ordinance (Cap 28); Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, EPD
Within Construction sites	6.9	7.2 & 7.3	In order to monitor the disposal of public fill and C&D waste at public filling facilities and landfills, respectively 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. An Independent Checker (Environment) should be responsible for auditing the result of the system.	Contractor	Construction Phase	CED	CED	WBTC No. 5/99, Trip-ticket System for Disposal of Construction and Demolition Material.

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Visual and Landscape</b>								
Construction Phase								
Within all construction sites	7.9	-	Consideration of design of all engineering structures in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	-	
Within all construction sites	7.9	-	Consideration of design of all slopes to minimise extent of cutting and design in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	-	WBTC 25/93 Control of Visual Impact of Slopes
Within all construction sites	7.9	-	Minimisation of all slope cutting where possible	Contractor	Construction	CED	Contractor	
Within all construction sites	7.9	-	Felling of trees in accordance with WBTC 24/94 Tree Preservation <ul style="list-style-type: none"> <li>Felling and transplanting of trees affected in accordance with Tree Felling Application and with-contract documents</li> </ul>	Contractor	Construction	CED	-	WBTC 24/94 Tree Preservation
Within all construction sites	7.9	-	Erection of hoarding or advance planting as visual screen to works	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.9	-	Topsoils to be tested for quality and if valuable to be stockpiled no greater than 2 m high for later use	Contractor	Construction	CED	Contractor	-
Within all construction sites	7.9	-	Design of landscape works in accordance with EIA recommendations	CED / Design consultant	Detail Design	CED	-	-
Operation Phase								
Roadside planting	7.9	-	Design of landscape works in accordance with EIA recommendations and HKPSG	CED / LCSD	Detail Design	CED	LCSD	HKPSG

Location	EIA Ref	EM&A Log Ref	Environmental Protection Measures	Implementation Agent	Implementation Stage	Funding Agent	Maintenance Agent	Relevant Legislation and Guidelines
<b>Land Use Impacts</b>								
Construction								
Within construction sites	11.6	-	<i>Reprovisioning of Anglers' Beach</i> <ul style="list-style-type: none"> <li>The coastal area to the immediate west of the reclamation will be left intact, with landscaping works to enhance the natural waterfront environment for the area.</li> <li>Footpaths will be designed to provide easy access from the residential developments to this coastal area.</li> <li>The provision of an indoor public swimming pool within the government complex / leisure centre at Area 6.</li> </ul>	Private Developer / LCSD	Detail Design	CED	LCSD / ArchSD	-
Within construction sites	11.6.5	-	<i>Well Co-ordinated Construction Programme</i> <ul style="list-style-type: none"> <li>construction programme of the STD and other projects (including Castle Peak Road widening) should be well co-ordinated to avoid insurmountable problems or conflicts.</li> </ul>	Contractor / CED / HyD	Detail Design / Construction	N/A	N/A	-
<b>Biogas</b>								
(No biogas monitoring required)								