15. ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

15.1 Introduction

15.1.1 This section further elaborates the requirements of environmental monitoring and audit (EM&A) for the construction and operation phases of the Project, based on the assessment results of the various environmental issues. Details of the EM&A programme are presented in an EM&A Manual, which are released as a separate document. Mitigation measures have been recommended in this Environmental Impact Assessment (EIA) report to prevent potential adverse impacts from the construction of the project.

15.2 Implementation of EIA Findings and Recommendations

15.2.1 Sections 4 to 10 have, where appropriate, identify and recommend the implementation of mitigation measures in order to minimize the potential construction and operation phase impacts of the Project. This findings and recommendations form the primary deliverable from the whole EIA process. Once endorsed by Environmental Protection Department, they will form an agreement as to the measures and standards that are to be achieved. It is therefore essential that mechanisms are put in place to ensure that the mitigation measures prescribed in the Implementation Schedule (Appendix J) are fully and effectively implemented during construction.

15.2.2 The required format for the Implementation Schedule is specified in the EIA Study Brief. The format requires the specification of implementation agent(s), timing, duration and location for each of the recommended mitigation measures.

15.2.3 Apart from the mitigation measures defined in the EIA, there is also scope for other requirements to be included within the finalised Implementation Schedule. Prior to the issue of an Environmental Permit, there is an EIA Determination Period. During this period the EIA Report is reviewed and commented upon by both the public and professional bodies. Where recommendations are made and accepted by either the Advisory Council on the Environment (ACE) or its EIA subcommittee, these measures will be included within the Implementation Schedule, where appropriate.

15.3 Statutory Requirements

15.3.1 As the Project constitutes a Designated Project under the EIAO, an Environmental Permit must be obtained before construction or operation of the proposed drainage tunnel can commence.

15.3.2 Upon approval of the EIA Report, Drainage Services Department (DSD) can apply for an Environmental Permit. If the application is successful, the Environmental Permit will, in most circumstances, have conditions attached to it, which must be complied with. In addition, DSD and its appointed Contractors must also comply with all other controlling environmental legislation and guidelines, which are discussed within the specific technical chapters of this report. Failing to comply with these legislative requirements could lead to prosecution under the various Pollution Control Ordinances.

15.4 Environmental Management Plan

15.4.1 For construction of the Project, it is envisaged that the contractual documentation will require DSD's Contractors to define mechanisms for achieving the environmental requirements. This will most likely be achieved by requiring the Contractor to produce and implement an Environmental Management Plan (EMP).

15.4.2 EMP's are similar in nature to safety or quality plans and provide details of the means by which the Contractor (and all subcontractors working for the Contractor) will implement the recommended mitigation measures and achieve the environmental performance standards defined both in Hong Kong environmental legislation and in the Implementation Schedule. A primary reason for adopting the EMP approach is to make sure that the Contractor is fully aware of his environmental responsibilities and to ensure that his commitment to achieving the specified standards.

15.4.3 The EMP approach is grounded on the principle that the Contractor shall define the means by which the environmental requirements of the EIA process, and the contractual documentation shall be met. In the first instance, each Tenderer shall be required to produce a preliminary EMP for submission as part of the tendering process; the skeletal EMP will demonstrate the determination and commitment of the organisation and indicate how the environmental performance requirements laid out in the available EIA documentation will be met. It is recommended that this aspect be included as a specific criterion in the assessment of tender documents; this will act as a clear indication to all Tenderers of DSD's commitment to the minimisation and management of environmental impacts. Upon contract award, the successful Tenderer shall be required to submit a draft and final version of the EMP for the approval of DSD prior to the commencement of the works.

15.5 EM&A Manual

15.5.1 The EPD requires the submittal for approval of an EM&A Manual prior to the commencement of construction. The EM&A Manual has the same purpose of defining the mechanisms for implementing the EM&A requirements specific to each phase of the work.

15.5.2 The EM&A Manual provides a description of the organisational arrangements and resources required for the EM&A programme based on the conclusions and recommendations of this EIA. The EM&A Manual stipulates details of the construction monitoring required, and actions that shall be taken in the event of exceedances of the environmental criteria. In effect, the EM&A Manual forms a handbook for the on-going environmental management during construction.

15.5.3 In accordance with the Study Brief requirements, reporting of monitoring data on air, noise and water quality shall be made available to the public via internet access in the form of a website in the shortest possible time as soon as the data become available..

15.5.4 The EM&A Manual comprises descriptions of the key elements of the EM&A programme including:

- appropriate background information on the construction of the Project with reference to relevant technical reports;
- organisational arrangements, hierarchy and responsibilities with regard to the management of environmental performance functions during the construction

phase to include the EM&A team, the Contractor's team and the Employer's representatives;

- a broad construction programme indicating those activities for which specific mitigation is required, as recommended in the EIA, and providing a schedule for their timely implementation;

- descriptions of the parameters to be monitored and criteria through which performance will be assessed including: monitoring frequency and methodology, monitoring locations (in the first instance, the location of sensitive receivers as listed in the EIA), monitoring equipment lists, event contingency plans for exceedances of established criteria and schedule of mitigation and best practice methods for minimising adverse environmental impacts;

- procedures for undertaking on-site environmental performance audits as a means of ensuring compliance with environmental criteria; and
- reporting procedures.

15.5.5 The EM&A Manual will be a dynamic document which will undergo a series of revisions to accommodate the progression of the construction programme.

15.6 Objectives of EM&A

15.6.1 The objectives of carrying out EM&A for the Project include:

- to provide baseline information against which any short or long term environmental impacts of the projects 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 to enable an environmental audit to be undertaken at regular intervals.

15.6.2 The following sections summarise the recommended EM&A requirements, further details are provided in the EM&A Manual.

15.7 Water Quality

Construction Phase

15.7.1 During the construction phase, regular site auditing is recommended to ensure the recommended mitigation measures are properly implemented.

15.7.2 Impacts on water quality include generation of turbid runoff, concrete washings, lubricants, chemicals and other contaminants. Impacts can be substantially reduced through the implementation of good site practices and incorporation of suitable drainage systems including sedimentation and infiltration pits and temporary grease

trap as well as silt curtains. Discharge should be handled in accordance with ProPECC PN 1/94 on *Construction Site Drainage*.

15.7.3 It is proposed to carry out a baseline monitoring of water quality (prior to commencement of works) in selected watercourses and monitor the water quality at these same locations during construction, to identify the presence of any impacts on water bodies within the Project Area. A minimal environmental monitoring and audit programme is therefore required to ensure effective mitigation, thus, monitoring locations should be selected to represent the major water bodies within the Project Area.

15.7.4 Before works commence one month of baseline monitoring of marine water should be undertaken at western portal discharge outfall. One month of post-construction marine water quality monitoring is recommended to be carried out on completion of marine works.

15.7.5 Underground water level monitoring should be undertaken at those intake locations near natural streams on monthly basis, they are THR2(P), TP789(P), TP5(P), PFLR1(P), W12(P) and Eastern Portal.

15.7.6 Details of water quality monitoring requirements are presented in the EM&A Manual.

Operation Phase

15.7.7 Underground water level monitoring should be undertaken at those intake locations near natural streams during the first year of the tunnel operation on a monthly basis, they are THR2(P), TP789(P), TP5(P), PFLR1(P), W12(P) and Eastern Portal.

15.7.8 The water quality model predicted that the Project would not have adverse impact on Western Buffer water control zone. No significant water quality impact is expected at marine water sensitive receivers, EM&A for water quality is not considered necessary.

15.8 Noise

15.8.1 Construction noise impacts were expected at NSRs identified in this EIA. Appropriate mitigation measures would be required in order to alleviate the impacts to meet the EIAO-TM criteria. Noise monitoring during construction phase will have to be carried out to ensure that such mitigation measures will be implemented properly.

15.8.2 Noise measurement should be undertaken at all monitoring stations for 30-minute period during the daytime when the noisiest activities are being carried out.

15.8.3 To establish the prevailing background noise level, one Leq (30 minutes) measurement, obtained between 0700 and 1900 hours of a normal weekdays, and three consecutive Leq (5 minutes) measurement, obtained for each monitoring period (between 1900 and 2300 hours; and between 2300 and 0700 hours), are required.

15.8.4 Baseline monitoring to establish the background noise environmental will be required and should be carried out for at least 14 consecutive days prior to the commencement of the project.

15.8.5 Air borne and ground borne noise monitoring during TBM construction phase and associated works should be carried out at selected representative NSRs which are likely to be worst affected by the construction works, have potential cumulative noise impacts

or were predicted to have residual impacts after all the practicable direct technical measures have been exhausted.

15.9 **Ecology**

15.9.1 An assessment for ecological impacts have been conducted (Section 4 and Section 11), no unacceptable impacts on terrestrial and marine ecology arising from the construction and operation of the project would be anticipated. However, amphibian surveys at Eastern Portal, PFLR1(P), W12(P), MB16, E5(B)(P), TP789(P) and P5(P) intake locations should be carried out prior to commencement of construction. Frogs and tadpoles found at these works areas will be collected and translocated to nearby unaffected stream prior to commencement of construction.

15.10 **Fisheries**

15.10.1 An assessment for Fisheries have been conducted (Section 12), no unacceptable impacts arising from the construction and operation of the project would be anticipated. A well-planned program of site practices should be able to maintain the impacts to acceptable level. No monitoring and audit was required.

15.11 **Waste Management**

15.11.1 Waste management will be the contractor's responsibility to ensure that all wastes produced during the construction of the Project are handled, stored and disposed of in accordance with good waste management practices and EPD's regulations and requirements. The mitigation measures recommended should form the basis of the site waste management plan to be developed by the Contractor.

15.11.2 It is recommended that the waste arising generated during the construction activities should be audited periodically 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 include undertaking a first audit near the commencement of the construction works, and then monthly audit thereafter. In addition, the regular site inspection should check the strict implementation of the recommended good site practices and other waste management mitigation measures.

15.12 **Air Quality**

15.12.1 Potential dust impacts would be generated from site clearance, excavation, materials handling and wind erosion. The construction works are controlled under the *Air Pollution Control (Construction Dust) Regulation*. Mitigation measures have been proposed. With the implementation of the proposed dust suppression measures, good site practices and comprehensive dust monitoring and audit, the TSP levels at all ASRs would comply with the dust criteria.

15.12.2 Dust monitoring requirements have been recommended in the EM&A Manual to ensure that the mitigation measures are properly implemented and effective.

15.13 **Cultural Heritage**

15.13.1 As discussed in Section 9, the assessment of potential impact on cultural heritage has concluded that the proposed construction works for the Project will not cause any adverse impact to cultural heritage within the boundary of the works area. The Cultural Heritage Impact Assessment has identified several resources which will require mitigation measures during the construction stage. This will include condition surveys at Haw Par Mansion (including the boundary wall and gate) and on the retaining wall of the Former Explosive Magazine of Victoria Barracks. The surveys must be undertaken and findings submitted prior to the commencement of construction works. The contractor will be responsible for ensuring that a 3-meter buffer zone (clearly demarcated by a temporary DSD standard metal site hoarding) will be maintained between the boundary wall and gate of Haw Par Mansion and the retaining wall at the Former Explosive Magazine and the respective works areas.

15.14 Landscape and Visual Assessment

15.14.1 The propose landscape and visual mitigation measures for the construction and operation phases of the Project are described in Section 10. These measures are design measures to be incorporated in the detail design of both portals and intake structures.

15.15 Hazard to Life

15.15.1 There will be no overnight storage of explosives for this project. Transportation of explosives to site for the construction of adit will be undertaken on a daily basis. The contractor is required to destroy any unused explosives before nightfall. With the implementation of rigorous safety measures for the blasting operation, adverse impact to the nearby sensitive receivers adjacent to the blasting locations will not be expected.