

12 ENVIRONMENTAL MONITORING AND AUDIT

12.1 Introduction

12.1.1 This section provides descriptions of the environmental and operation variables and parameters to be monitored, and the purpose for which should be monitored, e.g. as an indication of general background conditions or as an indicator of unacceptable environmental impact.

12.1.2 In accordance with the requirements as stipulated in Annex 21 of the TM-EIAO, it is considered necessary to conduct the Environmental Monitoring and Audit (EM&A) programme during the construction, operation, restoration and aftercare phases of the Project and to define the relevant scope of EM&A requirements, including:

- (1) Provision of a database against which to determine any short- or long-term environmental impacts of the Project;
- (2) Provision of an early indication that any of the environmental control measures or other operation practices are failing to achieve the required standards;
- (3) Provision of data to determine the effectiveness of any mitigation or control measures implemented through amendments in procedures during the life of Project;
- (4) Provision of data to enable an environmental audit of the construction, operation, restoration and aftercare works to be undertaken; and
- (5) Assessment of compliance with the environmental and pollution control and operation requirements.

12.2 Project Organisation

12.2.1 A project organisation consisting of the Engineer's Representative (ER), Independent Environmental Checker (IEC), Environmental Team (ET), Project Proponent and Contractors should be established to take on the responsibilities for environmental protection for the Project. The IEC will be appointed by the Project Proponent to conduct independent auditing on the overall EM&A programme including environmental and operation monitoring, implementation of mitigation measures, EM&A submissions, and any other submission required under the Environmental Permit (EP). The organisation, responsibilities of respective parties and lines of communication with respect to environmental protection works are given in the EM&A Manual.

12.3 EM&A Manual

12.3.1 EM&A is an important aspect in the EIA process which specifies the timeframe and responsibilities for the implementation of environmental mitigation measures. The requirements on environmental monitoring (including baseline and impact monitoring) are given in the EM&A Manual.

12.3.2 A EM&A Manual specific to the Project will be prepared based on individual contractual requirements and latest design information by the ET. The project specific EM&A Manual will highlight the following issues:

- (1) Organisation, hierarchy and responsibilities of the Contractor, Project Proponent, ET and IEC with respect to the EM&A requirements during construction and operational phases of the Project;
- (2) Information on project organisation and programming of construction activities;
- (3) Requirements with respect to the construction schedule and necessary EM&A programme to track the varying environmental impacts;
- (4) Details of methodologies to be adopted, including all field, laboratory and analytical procedures, and details on quality assurance;
- (5) Procedure for undertaking on-site environmental audits;
- (6) Definition of Action and Limit Levels;
- (7) Establishment of Event and Action Plans;
- (8) Requirements of reviewing pollution sources and working procedures required in the event of non-compliance of environmental criteria and complaints;
- (9) Requirements for reviewing the implementation of mitigation measures, and effectiveness of environmental protection and pollution control measures adopted; and
- (10) Presentation of requirements for EM&A data and appropriate reporting procedures.

12.4 Project Implementation Schedule

12.4.1 A Project Implementation Schedule (PIS) has been prepared and included in **Appendix 12.1** and the EM&A Manual to summarise all the required mitigation measures need to be implemented during the construction and operational phases of the Project. The implementation responsibilities are also identified in the PIS. The EM&A Manual will also present the requirements for environmental monitoring and auditing (e.g. monitoring and audit frequency), throughout the entire construction phase.

12.4.2 The Contractor should review the mitigation measures and PIS with respect to the design developments and construction methodology. In case the Contractor needs to update the mitigation measures and PIS, the EM&A Manual should be updated accordingly.

12.5 EM&A Programme

12.5.1 Detailed requirements of the EM&A programme are described in the EM&A Manual. Measurements and activities are summarised as follows:

- (1) Baseline monitoring (construction dust, airborne noise, water, ecology etc.);
- (2) Impact monitoring (construction dust, airborne noise, water, ecology etc);
- (3) Monitoring of successfulness of ecological mitigation measures;
- (4) Remedial actions in accordance with the Event and Action Plan within the timeframe in case the specified criteria in the EM&A Manual being exceeded;
- (5) Logging and keeping records of monitoring results;
- (6) Real-time reporting of construction monitoring data, wherever practicable, for the Project through a dedicated internet website; and

(7) Preparation and submission of Monthly, Quarterly and Final EM&A Reports.