

2 Guiding Principles of Environmental Monitoring and Audit

2.1 Policy and Project Management Organization & Responsibilities

- 2.1.1 An Environmental Policy Statement issued by the Project's executive management shall be included in a Project's EM&A Manual. The statement shall identify the Project Proponent's intentions and principles in relation to the project's environmental performance, which will provide a framework for action and for the setting of environmental objectives and targets. The Policy Statement shall include, *inter alia*, commitments to comply with the requirements of the EIA/EA study process, all relevant environmental laws and standards, and to endeavour to continually improve environmental performance. Project employees shall be conversant with, understand and accept the policies as they relate to their duties and responsibilities under the Manual. The Project Proponent shall ensure that the policy is relevant to the project's activities and environmental effects, some typical examples are given in Appendix B1.
- 2.1.2 The EM&A Manual shall contain all the arrangements for implementation of the environmental monitoring and audit (EM&A) aspects and requirements of the Project. Project specific objectives for environmental management and improvement shall be outlined in an environmental programme, which details the staff responsibilities and the means by which objectives will be achieved.
- 2.1.3 There shall be sufficient resources (such as, manpower, equipment, instrumentation and environmental protection/mitigation measures) specified in the Manual, and made available by the Project Proponent for the timely and effective implementation of all the project EM&A requirements. The EM&A requirements shall be systematic, documented, periodic and objective and shall evaluate the environmental performance of the project's organisation, and the processes in place.
- 2.1.4 Management structures, procedures and protocols shall be documented in the Manual to identify and allow the means for the necessary and sufficient flow of information on environmental matters arising.
- 2.1.5 Periodic Environmental Monitoring and Audit Reports, as required by the Manual, shall present a full and fair account of a project's environmental performance and progress for public information; to be written in a concise and non-technical form.

2.2 Environmental Management Procedures

- 2.2.1 For the purposes of Environmental Management of the Project, the Manual

shall:

- (a) include the written environmental objectives of the project and its environmental performance targets; and description of the methods to assess the achievement of objectives and targets. The manual shall also include objectives and targets covering energy conservation, waste minimization and reuse, recovery programmes, land management programmes, ecological matters, sustainable development issues, etc. Some examples on environmental objectives are given in the Appendix B1.
- (b) take full account of the recommendations and requirements of the EIA/EA study Final Report, and any deliberations of the ACE; and ensure that the recommended mitigation measures for the potential environmental impacts of the project are accurately translated into effective, quantitative, traceable, measurable and enforceable environmental protection and pollution control, contract specifications within the project brief and designs.
- (c) address, in regard to 2.2.1 (b) above, the environmental needs of the project whilst satisfying the overall requirements of the project. Special attention shall be given to the project's contractual and technical specification for materials, components, construction methods & processes and waste disposal alternatives, taking account of environmental constraints and performance requirements.
- (d) include procedures to ensure all project environmental protection, pollution prevention and control, requirements and safeguards are achievable at all times; including in the event of any unforeseen events, project modifications and the removal, decommissioning and/or demolition of any project facilities (temporary or permanent), at any phase of the project (design, construction, operation, maintenance, decommissioning, etc.). Such procedures should include, as a matter of course, protocols to enable pro-active impact mitigation measures to be formulated and taken, on the basis of, inter alia, review of designs, construction methodologies, complaint records, etc.
- (e) give, in regard to 2.2.1(d) above, special consideration to the integration of EIA/EA study recommendations and requirements, and ACE conditions, with project design requirements. Environmental impact mitigation measures shall be included in relevant project design scoping and approval procedures to ensure their translation into effective environmental protection, pollution prevention and control design decisions/measures.
- (f) compile, in regard to 2.2.1(e) above, a checklist of environmental protection, pollution prevention and control, mitigation measures in the form of *an* Implementation Schedule highlighting:
 - why, where, or under what circumstances the recommended impact mitigation action shall be implemented;

- when and for how long the recommended action shall be taken place;
 - who will be the responsible party for the recommended action; and
 - how the recommended action shall be carried out with details involved in such action.
- (g) include procedures to ensure all works agencies (such as, design engineers, contractors and operators etc.) are fully aware of and comply with the project's environmental performance requirements, and the Contractor's environmental performance (monitoring and audit) requirements and obligations under the contract.
- (h) specify the requirements for the submission of environmental monitoring and audit data, including monitoring and audit records; event action plans implemented and follow-up actions; list all relevant environmental protection and pollution control legislation and the required licenses/permits; communication with regulators vis a vis offences under relevant environmental ordinances, prosecutions, etc.; waste disposal documentation; incident reports and investigations; public complaints and their resolution; work programmes & methods including any variations to EIA/EA predictions; design issues, including any variations to EIA/EA predictions; review of monitoring and audit criteria, etc.
- (i) include written mitigation procedures for any major project activities (including construction, design, operation, maintenance, and decommissioning phases) that have potential for environmental impact.
- (j) specify the duty list of Environmental Team and the Independent Checker (Environment) (or Environmental Auditor).
- (k) Outline the complaint procedures clearly stating the complaint receiving set up, case investigation, implementation of corrective measures, communication with the complainant/public and the requirements of complaint log/record.
- (I) specify the requirements for documentation; both internally, for a concise record of traceable implementation status of committed items; and externally, for the frequency and timing of EM&A report submissions.
- 2.2.2 All environmental information in the Manual is to be presented in a well-structured, organised, readable and accessible format.

2.3 Quality Assurance in Environmental Monitoring & Audit

- 2.3.1 The Manual shall state the requirements of qualified personnel for the routine environmental monitoring of the project activities by specifying education, training, knowledge and experience of the team.

- 2.3.2 The Manual shall identify the need of independent auditing of the environmental performance at all stages of the project implementation. The Independent Checker (Environment) is responsible to check, review, verify and validate all recommended environmental protection and mitigation measures are implemented in accordance with EIA/EA study and process requirements and ACE recommendations.
- 2.3.3 The Manual shall specify the Quality Assurance and Control (QA) requirements necessary to ensure control of; field and laboratory operations, laboratory accommodation, standard operating procedures for environmental tests, equipment calibration requirements records, record keeping and the traceability of documents, and the reporting of results of sample collection and analytical activities.
- 2.3.4 In regard to paragraph 2.3.3 above, the QA / QC requirements shall include the following:
- * adequate qualified personnel, facilities, and equipment to perform the tasks in a "controlled" environment
 - * documentation and reporting to provide the traceability necessary for legally defensible data
 - * staff training and equipment/facility maintenance
- 2.3.5 The qualifications and expertise of personnel required to manage and carry out the environmental monitoring and audit programme and tasks, shall be submitted to the Director of Environmental Protection for his information/consideration (within 30 days after the commencement of work)
- 2.3.6 The sample is the focal point of all environmental monitoring & audit. It is essential that the sample, to the maximum extent possible, statistically represents the environment being assessed. Cause-effect relationships shall be established as far as possible for the validation of impacts.

2.4 Environmental Training and Awareness

- 2.4.1 For the purposes of environmental training and awareness, the Manual shall:
- (a) document an effective procedure to manage the distribution of environmental information to all appropriate levels of the project facility, site and management operations.
 - (b) document an appropriate level of regulatory requirements, to ensure all

staff and employees have a necessary and sufficient level of understanding of the environmental issues that are relevant to their areas of responsibility.

- (c) document proposals for appropriate staff environmental training programmes.

2.4.2 Where necessary the Manual shall include project guidelines detailing particular environmental sensitivities, regulations, etc.

2.5 Complaint and Public Relation Procedures

2.5.1 For the purposes of enhancing external project communication, the Manual shall:

- (a) include an effective and clearly defined procedure(s) for liaison with regulatory bodies, the media, local community and special interest groups and the general public.
- (b) include an effective and clearly defined system to respond to, investigate, record and action complaints. Complainant feedback shall be implicit to the complaint procedure. Targets for the resolution of typical complaints shall be given and made available to the public on request.
- (c) set out a system for alerting the public of imminent environmental hazards.
- (d) set the framework for a project's environmental statements, including:
 - (i) description of project's activities.
 - (ii) assessment of all significant environmental issues.
 - (iii) a summary of data for pollutant emissions and other environmental performance aspects including a description of policy, objectives, etc.

2.5.2 In regard to 2.5.1 above, the Manual shall specify the nature, format and frequency of reports for release to the public, covering the audit of environmental performance of the project.

2.6 Technical Requirements

2.6.1 For the purposes of ensuring the environmental performance of the project's

technical requirements, the Manual shall:

- (a) introduce the design, alignment, plan layout or visual appearance of the project.
- (b) outline the physical scale, scope or extent of the project, including the requirements for any off-site facilities, including works areas, waste disposal sites, off-site ecological compensation and /or restoration measures.
- (c) describe the methods for carrying out the project, and the timing, phasing or order of stages for implementation of the project.
- (d) include copy of the project Implementation Schedule, that identifies and specifies, *inter alia*, the scope, magnitude, location, type, timing and commitment to carry out all mitigation measures for the project; including ecological compensation, restoration, and landscaping measures, and any post-project operational management, monitoring & audit and maintenance requirements.
- (e) specify the project's requirement for all necessary permits, licences, etc. to be up-to-date, and to reflect the project's actual conditions and operations.
- (f) specify the baseline, impact and compliance monitoring and audit requirements, and the adoption of appropriate procedures for media sampling, testing and analysis, calculation and audit, etc.
- (g) specify the appropriate environmental monitoring and audit to be carried out according to EIA/EA study objectives, statutory requirements, etc. Records of all environmental monitoring and audit data are to be made available to and reported to the relevant authorities, as required.
- (h) specify appropriate and effective environmental impact remedial measures/actions to be taken when:
 - (i) monitoring & audit data indicate non-compliance with any of the prescribed environmental performance criteria.
 - (ii) the receiving environment indicates unacceptable environmental deterioration or degradation.

2.6.2 For the purposes of monitoring the environmental impact of the project and the effectiveness of measures to mitigate its environmental impact, the Manual shall include specification of:

- (a) the environmental parameters and/or impact to be monitored, such as, monitoring frequency, methodology, locations, equipment/instrumentation, Action/Limit levels to trigger corrective measures; and
- (b) auditing procedure and the statistical validation of the impacts.

2.6.3 Environmental Impact Event/Action Response Plans

- (a) For the purposes of effective environmental protection and pollution control, the Manual shall:
 - (i) contain Environmental Impact Event/Action Response plans, to ensure appropriate remedial actions are taken by the relevant authorities in the event of deteriorating environmental performance or environmental degradation.
 - (ii) ensure that such Event/Action Response plans clearly define all relevant responsibilities for environmental impact remedial actions; all procedures to be taken by the project's relevant authorities; identify/define any environmental sensitivities that may constrain the implementation of proposed remedial measures; identify linkages to any other external resources, plans, authorities, etc. necessary to enable remedial actions to be effectively implemented; and are regularly updated in response to changing project conditions.
 - (iii) require the documentation and reporting of all cases of Event/Action Response plan implementation to project management and the relevant authorities.
- (b) To ensure the effectiveness of impact mitigation, all implemented Response plans shall be audited and reported to project management and the relevant authorities, as required under the Manual.

2.6.4 Environmental Performance Criteria

- (a) In accordance with the requirements of the Manual:
 - (i) all sources (including potential sources) of environmental pollution arising from the project, or external sources having a bearing on the project's environmental performance shall be identified and quantified in submissions of periodic environmental monitoring and audit reports.

- (ii) the location of any environmentally sensitive areas in the vicinity/environs of the project (including any project related remote and/or isolated facilities (use of environmental sensitivity maps) shall be identified in submissions of periodic environmental monitoring and audit reports.
- (b) In regard to 2.6.4(a) above, sources of pollution and the means for their effective mitigation shall include the following areas:

AIR

- * Emission Inventory - to document all air emission characteristics including process areas, storage areas, stack heights/vent positions, etc.
- * mitigation treatment facilities required to achieve the required standards, regulations, etc.
- * air emission mitigation and treatment facility locations.
- * effective and satisfactory provisions for and operation of the treatment and control of air emissions during maintenance or shutdown of any process plant and equipment.

WATER & LIQUID WASTES

- * all sources of surface, ground and marine water pollution.
- * the provision of drainage plans, stormwater and sewage systems, cooling water systems, any process/spill containment systems (waste storage & bunded areas, process areas, stilling ponds/basins/lagoons, etc.), leakage prevention and detection systems, etc. and their effective operation.
- * effective and satisfactory provisions for and operation of the treatment and control of liquid waste emissions during maintenance or shutdown of any plant and equipment.

SOLID WASTES

- * appropriate, necessary and sufficient data on the environmental performance (hazard, etc.) of materials and wastes stored for use in the project (including the identification, categorisation separation and storage requirements)
- * the provision and operation of appropriate, necessary and sufficient waste collection, storage, treatment, and disposal facilities and methods; to ensure compliance with regulatory requirements, standards, etc.

- * the establishment of appropriate waste tracking systems to identify and ensure satisfactory "cradle to grave" control.

NOISE

- * Noise Emission Inventory - to document all noise emissions including process areas, storage areas, fixed plant & equipment, etc.
- * mitigation and treatment facilities required to achieve the required standards, regulations, etc.
- * noise emission mitigation and treatment facility locations.
- * effective and satisfactory provisions for and operation of the mitigation of noise emissions during maintenance or shutdown of any process, plant or equipment.

LAND MANAGEMENT

- * restoration and rehabilitation of disturbed areas carried out in accordance with an appropriate and approved plan, to the satisfaction of the relevant authorities. Restoration to include, but not limited to, grading, profiling, soil treatment/seeding, soil erosion treatment, compensation planting, etc.
 - * all vegetation restored, rehabilitated and compensated to be maintained for the period of time and to the satisfaction of the relevant authorities.
 - * the visual impact of the restored, rehabilitated and compensated facility to be in accordance with the requirements of the relevant authorities.
- (c) Special consideration shall be given to the principles of waste recovery, recycling and reuse to alleviate problems associated with construction waste storage, collection, treatment and disposal.

2.6.5 Environmental Audit

For the purposes of effective audit of the environmental performance of a project, the Manual shall require the following:

- (a) the analysis and interpretation of all monitoring and any audit data, to assist in the prevention and mitigation of impacts on the environment;

- (b) the examination of all available information related to the investigation of the nature, and causes of actual, potential and cumulative environmental impacts and complaints/queries; and
- (c) proposals for:
 - (i) remedial measures for the resolution of impacts
 - (ii) effective implementation of proposed mitigation measures
 - (iii) documentation and summary of audit findings
 - (iv) liaison and consultation of with the public and concerned groups on the effects of project works on the environment (audit)

2.7 Reporting

The Manual shall require periodic project audit reports (see Appendix B3), covering the following:

- (a) review and evaluation of project impact monitoring procedures, protocols and results, involving the analysis of their scope, validity, effectiveness and compliance with the requirements of the project EM&A Manual and relevant contract environmental protection and prevention specifications
- (b) periodic review of audit criteria to take account of anomalies and to ensure practical and enforceable environmental performance limits can be effectively and consistently applied for the duration of the project
- (c) identification and investigation of cases of environmental performance limit non-compliance/deficiency, including:
 - (i) regular site inspections,
 - (ii) issue of environmental performance limit exceedance notices,
 - (iii) liaison (extensive, regular, formal & informal) with site engineers/staff
 - (iv) *ad-hoc* monitoring, as required.
- (d) prediction (early warning) of adverse project effects/problem areas with potential for non-compliance of performance criteria; on the basis of site

observations, works programme review, etc.

- (e) proposals to aid impact resolution; with special reference to the timely identification of problems and the effective and timely implementation of remedial measures