

8 ENVIRONMENTAL MONITORING & AUDITING

8.1 Introduction

- 8.1.1 The Environmental Monitoring and Audit (EM&A) Manual has been completed. EM&A is discussed in more general terms in this section. The detailed EM&A requirements are available from this manual. The EM&A process ensures that proactive mitigation measures are adopted to avoid the occurrence of adverse environmental impacts. The EM&A Manual presents in a dedicated document.
- 8.1.2 The EMA and A Manual provides a schedule of operational monitoring requirements, and also defines the baseline requirements. Baseline monitoring prior to commencement of construction is required to enable action levels to be defined.
- 8.1.3 Monitoring can be most concisely defined as the systematic collection of data through a series of repetitive measurements. It involves the measurement of environmental parameters before project initiation to establish a baseline against which impacts can be measured, followed by impact monitoring during project construction and the early period of operation. Environmental audit provides the verification of practice and certification of data and is the process of:
- (i) verifying that all selected levels of the parameters measured by the environmental monitoring programme are within the agreed limits or levels during project construction;
 - (ii) determining and recommending any necessary remedial measures, for which environmental monitoring forms the basis; and
 - (iii) organising and interpreting the environmental monitoring data to establish the record of change associated with a project.
- 8.1.4 Limit Level is a reference value which indicates that deterioration in environmental quality is significant and that urgent corrective action is required.
- 8.1.5 Action Level is a reference value to be used as an early warning of deterioration in environmental quality. Attainment of this Level shall stimulate the increase in frequency of monitoring and the undertaking of investigation of the cause and possibly remedial action if appropriate.
- 8.1.6 The EM&A Programme will consist of a schedule of monitoring and auditing of designated environmental parameters in the locality of North West Kowloon Reclamation, Stonecutters' Island and Tsing Yi in order:
- (i) To provide a baseline database of "ambient", or prevailing background, conditions immediately prior to the commencement of the project. This is normally conducted over a 2-week period prior to commencement of construction.
 - (ii) To monitor and interpret any perturbations of prevailing background conditions with respect to acceptance criteria during construction and initial operation in order to provide an early indication that any of the environmental control measures or construction practices are failing to achieve the required standards.
 - (iii) To provide data to determine the effectiveness of any mitigation or control measures implemented through changes in working practice undertaken if acceptance criteria are exceeded.

- (iv) To provide a database of conditions after construction for the assessment of the extended effects of construction and for the post-project audit.
- (v) To provide an early indication if any of the environmental control measures or environmental design assumptions might fail to achieve their objectives during operation.
- (vi) To assess the compliance with contractual and legislative environmental standards.
- (vii) To assess the validity of the action and limit levels (AL levels) set for the event/action plans.
- (viii) To ensure that only acceptable environmental impacts impinge upon nearby sensitive uses and receivers with the aim of minimising adverse impact upon the surrounding environs.

8.2 Dust

8.2.1 A system of dust monitoring and auditing of the construction of R9 will be established to ensure that construction takes place with a minimum of adverse impact on nearby sensitive receivers and in compliance with the Air Quality Objectives for Hong Kong. Locations for monitoring will be presented in the EM&A Manual.

8.2.2 The objectives of the EM&A of dust monitoring are:

- (i) to determine the essential environmental background and control data;
- (ii) to collect the data necessary to monitor significant impacts;
- (iii) to evaluate the quality and significance of data;
- (iv) to compare the measured effects with the acceptance criteria;
- (v) to identify any measures necessary to mitigate unacceptable effects (event/action plans); and
- (vi) to report the details of the above on a regular basis.

8.2.3 An analysis and summary would be completed for exceedances of AL levels. Reasons for exceedances, a description of actions taken in the event of exceedances and any follow-up procedures related to earlier non-compliance would be included. Event/action plans implemented in the event of non-compliance with AL level would be dictated by recommendations provided by EPD. Baseline is chosen arbitrarily to set an example only.

Table 8.1 : AL Levels for Total Suspended Particulate (TSP)

Parameter	24-hour Average TSP	1-hour Average TSP
Action Level	200	350
Limit Level	260	500c

Note * Hong Kong Air Quality Objectives and Contractual Standard
 + Baseline (92) +30%
 c EPD guideline level

8.3 Noise

- 8.3.1 A system of noise monitoring and auditing of the construction of R9 will need to be established to ensure that construction takes place with a minimum of adverse impact on nearby NSRs and in compliance with the Noise Control Ordinance and its associated Technical Memoranda. Construction Noise Permits will inevitably be required for some works. Locations for monitoring are presented in the EM & A Manual.
- 8.3.2 Noise monitoring will be undertaken before the commencement of the Works to establish background and until the completion of the Works:
- (i) to determine essential background and control data;
 - (ii) to collect sufficient data to ensure that predicted impacts and environmental standards are not exceeded;
 - (iii) to evaluate and report on the noise levels measured and their significance;
 - (iv) to identify any measures necessary to mitigate unacceptable effects;
 - (v) to provide data to determine the effectiveness of any mitigation measures which may be sought through changes in working practice, plant and equipment, location of plant and equipment, acoustic screens and barriers etc.;
 - (vi) to protect the nearby NSRs from unacceptable noise impact.

Table 8.2 : AL Levels for Noise Measured at NSRs during Construction

Period	Weekdays 0700 to 1900 Hours Aeq(30 min)	Evenings 1900 to 2300 Hours Sundays and General Holidays Aeq(5 min)	Night-time 2300 to 0700 Hours Aeq(5 min)
Action Level	when one documented complaint is received		
Limit Level	75+ dB(A)	60/65/70** dB(A)	45/50/50** dB(A)

* reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.

** to be selected based on area sensitivity rating.

- 8.3.3 All data recorded in each period would be presented in both tabular and graphical format for presentation on a regular basis. An analysis and summary would be completed for exceedances of AL levels, reasons for exceedances, a description of actions taken in the event of exceedances and any follow-up procedures related to earlier non-compliance. Event/action plans implemented in the event of non-compliance with AL levels would be dictated by recommendations by EPD.
- 8.3.4 Under the conditions of the EIAO, there is a requirement for operational phase noise monitoring. It is proposed that L_{10} (peak hour) noise levels are monitored at Hong Kong Technical College (Tsing Yi) and Mei Foo Sun Chun following completion of construction but prior to the road opening. During the first year of operation, monitoring should be undertaken at the same locations on two further occasions. Traffic (flows and HGV percentage) counts should be undertaken for Route 9 at the same time. The details of noise monitoring shall be subject to the detailed monitoring plan deposited to the Director of Environmental Protection as per Section 8 of the Environmental Monitoring and Auditing Manual.

8.4 Noise Monitoring in the Operation Phase

8.4.1 2 stations will be established at the following stations to monitor the noise local during the operation phase of Route 9.

- Tsing Yi Technical College
- Mei Foo Sun Chun

8.4.2 The exact location will be determined and agreed 6 months before the road opening. The noise level at these locations will be measured immediately before the opening (baseline measurement) and thereafter at 6 months interval within the first year. Traffic counts will be taken at the same time as the noise level is measured to allow validation against the noise level predicated in the EIA Study.

8.4.3 The details of noise monitoring shall be subject to the detailed monitoring plan deposited to the Director of Environmental Protection as per Section 8 of the Environmental Monitoring and Auditing Manual.

8.5 Construction Waste

8.5.1 During site audits, the Environmental Monitoring Team should review the Contractors waste management procedures, and report whether contract specifications and statutory procedures have been observed.

8.6 Water Quality

8.6.1 A system of surface runoff water quality monitoring and auditing of the construction of R9 will be established as necessary to ensure that the projects take place with a minimum of adverse impact on waters and the associated environs.

8.6.2 Monitoring locations would be based on the site discharge locations.

8.6.3 All data recorded for each period would be presented in tabular format for presentation on a regular basis. An analysis of the data would be provided including a summary of exceedances of statutory levels, reasons of exceedances, a description of actions taken in the event of exceedances and any follow-up procedures related to earlier non-compliance. Event/action plans implemented in the event of non-compliance with statutory levels would be dictated by recommendations provided by EPD.

8.7 Summary

8.7.1 Construction impacts have been assessed in the light of known likely construction activities. Mitigation measures to control impacts have been proposed and this information will be taken forward into an EM&A Manual. A final monitoring plan has been agreed and deposited with the Director.