

## 7A ENVIRONMENTAL MONITORING AND AUDIT

### General

An Environmental Monitoring and Audit (EM&A) programme is required for this project because:

- The project has the potential of causing environmental impacts which are or are likely to be prejudicial to the health or well being of people if the recommended mitigation measures are not properly implemented.
- The EM&A programme will ascertain and verify the assumptions implicit to and accuracy of EIA study predictions.

The following table summarises the criteria for an EM&A programme for this Project.

#### Criteria for an EM&A Programme

Objectives	Possible scenarios for no EM&A programme	Monitoring parameters	Action taken for non-compliance/mitigation measures	Implementation stages			
				Des	C	O	Dec
To protect sensitive receivers from environmental impacts	Likely to be prejudicial to the health or well being of people in the vicinity of the construction site	Construction noise, construction dust (1-hr TSP, 24-hr TSP),	Following Event Action Plans in EM&A Manual		✓		
	Likely to be prejudicial to the health or well being of people within the construction site	landfill gas	Following Event Action Plans in EM&A Manual		✓		
To monitor the effectiveness of mitigation measures	Likely success of the proposed measures, else corrective measures to enhance the protection of the mitigation measures	Traffic noise	Explanation should be given to justify any discrepancies between the predicted traffic noise and the measured noise levels.			✓	

An environmental monitoring and audit (EM&A) programme performs three functions. It ensures that environmental impacts from the construction of the project is kept within acceptable levels; it establishes procedures for checking the application and effectiveness of mitigation measures; and it provides the means by which compliance can be checked, exceedances documented, and corrective action recorded.

In view of the close proximity of the construction works to the identified sensitive receivers, an EM&A programme for dust and noise is considered necessary during the construction period. The monitoring of landfill gas in excavations is also necessary during the construction phase to minimise LFG hazards.

Detailed monitoring schedules and audit requirements should be incorporated into the construction contract for the proposed Project.

In order to verify the effectiveness of noise mitigation measures, operation noise monitoring is recommended. For operation phase LFG monitoring, pre-entry and routine monitoring is also recommended at service ducts/chambers.

The design, implementation and maintenance of landscape mitigation measures should be monitored to ensure that they are fully realised.

### Noise

The construction noise level should be measured in terms of the A-weighted equivalent continuous sound pressure level (Leq). The proposed noise monitoring locations are shown in Figure 3.10.

The operation traffic noise level should be measured at representative NSRs which are in the vicinity of the recommended direct technical remedies. The proposed noise monitoring locations are shown in Figure 3.11.

Section 3.7 provides further details of the monitoring programme.

### Air Quality

1-hour and 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The proposed air quality monitoring locations are shown in Figure 4.13. Section 4.6 provides further details of the monitoring programme.

### Landfill Gas

During the construction phase, monitoring of LFG in terms of methane, carbon dioxide and oxygen at excavations deeper than 300 mm is recommended. For operation phase, monitoring of the same parameters at the service ducts/chambers beneath the underpass should be conducted. Details of the monitoring programme are provided in Section 5.13.

### Landscape

The design, implementation and maintenance of landscape mitigation measures should be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest possible date and without compromise to the intention of the mitigation measures. The recommended landscape monitoring programme includes the following:

- Monitoring of design works against the recommendations of the landscape impact assessments within the EIA. This should be undertaken at the end of master planning, detailed design and tender stages, to ensure that they fulfil the intentions of the mitigation measures. Any subsequent changes to the design, including design changes on site should also be checked.
- Monitoring of the contractor's operations during the construction period.
- Monitoring of the planting works during the 24-month Establishment Period after completion of the construction works.
- Monitoring of the long term management of the planting works in the period up to 10 years after completion of the construction works.

Details of the monitoring programme are provided in the EM&A Manual.

### **Monitoring and Audit Manual**

An Environmental Monitoring and Audit Manual detailing the monitoring schedules and requirements is included in a separate document. This will be the basis for carrying out relevant monitoring and auditing procedures during the construction and operation periods.