

11. ENVIRONMENTAL MONITORING AND AUDIT

11.1 Introduction

This EIA study has focused on the assessment and mitigation of the potential impacts associated with the construction and operation activities of the Project. One of the key outputs has been the identification of mitigation measures to be undertaken so that residual impacts comply with regulatory requirements including the *EIAO-TM*. To confirm effective and timely implementation of the mitigation measures, it is necessary to develop EM&A procedures and mechanisms by which the Implementation Schedule (**Annex 11A**) may be tracked and its effectiveness assessed.

11.2 Objectives of EM&A

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

- Providing baseline information against which any short or long term environmental impacts of the projects can be determined;
- Providing an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- Monitoring the performance of the Project and the effectiveness of mitigation measures;
- Verifying the environmental impacts identified in the EIA;
- Determining Project compliance with regulatory requirements, standards and government policies;
- Taking remedial action if unexpected results or unacceptable impacts arise; and
- Providing data to enable an environmental audit to be undertaken at regular intervals.

The following sections summarise the recommended EM&A requirements for the Project. Further details are provided in the **EM&A Manual**.

11.3 Water Quality

A number of mitigation measures and standard measures and good site practices for the marine works have been recommended to reduce potential impacts to water sensitive receivers. These measures are summarised in the Implementation Schedule provided in **Annex 11A**.

Marine water quality monitoring at selected WSRs is recommended for marine dredging, backfilling and capping of the Project. Sediment quality monitoring is also recommended for backfilling of the CMPs. Regular site audit will also be conducted throughout the Project. The full details of the EM&A programme for water quality are presented in the **EM&A Manual** for this Project.

11.4 Marine Ecology

This EIA recommends that mitigation and precautionary measures are implemented during the construction and operation activities of the Project. In addition, water quality impacts will be monitored and checked through the implementation of a water and sediment quality EM&A programme. The monitoring and control of water quality impacts during the construction and operation activities of the Project will also serve to avoid unacceptable impacts to marine ecological resources. Details of the methods for the water and sediment monitoring works are elaborated in the **EM&A Manual**. The recommended mitigation and precautionary measures are summarised in the Implementation Schedule provided in **Annex 11A**.

The EIA has indicated that benthic fauna are expected to recolonise the CMPs following capping with uncontaminated mud. It is expected that recolonisation of the natural benthic assemblage will occur and eventually the benthic assemblage will resemble that of the surrounding areas. Recolonisation

may be achieved by larval recruitment, influx of juveniles or adults carried in water currents, or through the active swimming or crawling of individuals. However, other natural (e.g. storm events, hypoxia, salinity fluctuations) or anthropogenic (e.g. pollution, fisheries operations) activities may hinder recolonisation of capped pits. As a result, the factors contributing to the composition of the benthic assemblage may be difficult to determine. It is also important for any recolonisation studies to be aware of any cap maintenance (or "topping up") activities which may also impact the resident benthic assemblages. In order to verify the recolonisation of benthic assemblage on the capped CMPs, a benthic recolonisation monitoring programme is recommended and presented in the **EM&A Manual**.

11.5 Fisheries

This EIA Study concludes that no unacceptable impacts are anticipated to occur during the construction and operation activities of this Project. Monitoring of fisheries resources and biomonitoring programme are recommended to address stakeholders' concerns on the level of fisheries resources and contamination of seafood in the vicinity of the Project. The fisheries resources monitoring and biomonitoring programme are presented in the **EM&A Manual**. In addition, monitoring activities designed to detect and mitigate impacts to water quality during construction and operation activities of the Project are also expected to serve to protect against impacts to fisheries. The details of the water quality monitoring programme are presented in the **EM&A Manual**. The recommended mitigation measures for the construction and operation activities are summarised in the Implementation Schedule provided in **Annex 11A**.

11.6 Waste

It is recommended that site audits will be undertaken by the Project Proponent and the Contractor on a monthly basis during dredging works of the Project to determine if wastes are being managed in accordance with the recommended good site practices in this EIA Report. The audits will investigate all aspects of waste management, including waste generation, storage, handling, recycling, transportation and disposal, to prevent any dumping of waste into the sea or malpractice of waste disposal. The recommended waste management measures are summarised in the Implementation Schedule provided in **Annex 11A**.

No waste monitoring and audit programme for the operation activities (i.e. disposal of contaminated sediments and capping by uncontaminated sediments) of the Project is considered necessary.

11.7 Cultural Heritage

This EIA Study concluded no impacts to archaeological resources are expected, therefore no mitigation measure and environmental monitoring is required.

11.8 Hazard to Health

This EIA Study concluded that no unacceptable risks to human health are foreseen as a result of the proposed Project, therefore no mitigation measure is required. A biomonitoring programme is recommended and presented in the **EM&A Manual**.

11.9 Air Quality

No adverse air quality or odour impact is expected during construction and operation activities of the Project and thus air quality monitoring is not required. Regular site audits are recommended to ensure proper implementation of the recommended air quality and odour mitigation measures throughout the construction and operation activities. The recommended mitigation measures for the construction and operation activities are summarised in the Implementation Schedule provided in **Annex 11A**.

11.10 Noise

The EIA study of the Project concluded that no adverse impacts will be associated with the construction and operation activities of the Project. Based on this, no noise monitoring is considered necessary.