

12 ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

12.1 Introduction

- 12.1.1 This section provides a summary of the requirements of environmental monitoring and audit (EM&A) for the construction and operational phases of the Project and associated works based on the assessment results of the various environmental issues. Details of the EM&A requirements are provided in a stand-alone EM&A Manual.
- 12.1.2 Being an old design, the LRT does not meet the current standards in various aspects including waterproofing, dimensions (e.g. headroom and width), smoke extraction, evacuation, durability, Traffic Control and Surveillance System (TCSS), etc.. Comprehensive rehabilitation of the two existing tunnel tubes is needed to bring LRT up to current standard and extend its serviceable years; thereby enhancing the tunnel environment and road safety level.
- 12.1.3 The purpose of the EM&A programme is to ascertain and verify the assumptions implicit to, and accuracy of, EIA study predictions. The EM&A programme includes the scope of the EM&A requirements for the Project to ensure compliance with the EIA study recommendations and assess the effectiveness of the recommended mitigation measures.

12.2 Air Quality Impact

Construction Phase

- 12.2.1 EM&A for potential dust impact should be conducted during construction phase so as to check compliance with the legislative requirements. Details of the monitoring and audit programme are contained in a stand-alone EM&A Manual.
- 12.2.2 Regular site audits for potential dust impact are recommended to be conducted during the entire construction phase of the Project so as to ensure the implementation of the dust mitigation measures proposed in this EIA Report and the dust suppression measures stipulated in Air Pollution Control (Construction Dust) Regulation, the use of approved or exempted non-road mobile machinery stipulated in Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation, and the use of appropriate fuel stipulated in Air Pollution Control (Fuel Restriction) Regulation.

Operation Phase

- 12.2.3 No adverse impact would be generated during the operation phase of the Project. No EM&A requirement would be required during the operation of the Project.

12.3 Noise Impact

Construction Phase

- 12.3.1 Noise monitoring is recommended as part of the EM&A programme for the construction phase of the Project to check compliance with the daytime construction noise criterion. The implementation of the recommended mitigation measures for daytime construction activities should also be audited as part of the EM&A programme.

Operation Phase

- 12.3.2 Road traffic noise levels should be monitored at representative NSRs, which are in the vicinity of the recommended direct mitigation measures, during the first year after road opening. The purpose of the monitoring is to ascertain that the recommended mitigation measures are effective in reducing the noise levels.

- 12.3.3 The assessment results indicated that fixed noise from ventilation building operation would comply with the EIAO-TM criterion. However, as part of the design process, monitoring of operational noise from the proposed fixed plants at Kowloon side during the testing and commissioning stage would be recommended to verify the compliance of the EIAO-TM criteria. For the proposed tunnel ventilation building at Shatin side, since no NSRs are within the 300m assessment boundary, no EM&A requirement is therefore deemed necessary.

12.4 Water Quality Impact

Construction Phase

- 12.4.1 The potential water quality impact from land-based construction works can be controlled by the recommended mitigation measures. Nonetheless, a water quality monitoring programme is recommended to ensure water quality will comply with the relevant criterion and the recommended mitigation measures are implemented properly. Details of the recommended water quality monitoring requirements are provided in the EM&A Manual for the Project. Regular site inspection and audit will be conducted to ensure that the recommended mitigation measures are properly implemented during the construction stage.

Operation Phase

- 12.4.2 The minor additional surface runoff will be collected and screened by road drainage system before diverting into the storm water drains. No water quality monitoring specific for operation phase of the Project is therefore required.

12.5 Waste Management Implication

Construction Phase

- 12.5.1 During the construction period, it is the Contractor's responsibility to ensure that all the waste produced during the construction of the Project are handled, stored and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines.
- 12.5.2 Waste materials generated during construction activities, such as C&D materials, are recommended to be audited at regular intervals to ensure that proper storage, transportation and disposal practices are implemented. This measure ensures the proper disposal of waste. The Contractor would be responsible for the implementation of any mitigation measures to minimize waste or mitigate problems arisen from waste materials.
- 12.5.3 A Waste Management Plan (WMP), as part of the Environmental Management Plan should be prepared in accordance with ETWB TC(W) No.19/2005 and submitted to the Engineer for approval. The recommended mitigation measures should form the basis of the WMP. The monitoring and auditing requirement stated in ETWB TC(W) No.19/2005 should be followed with regard to the management of C&D materials.

Operation Phase

- 12.5.4 It is expected that limited quantities of waste would be generated from the operation of the Project and adverse environmental impacts would not be anticipated with the implementation of good waste management practices. Waste monitoring and audit programme for the operation phase of the Project is not required.

12.6 Land Contamination

- 12.6.1 Any environmental monitoring in relation to land remediation is not required. However, regular site audit during construction phase is required to ensure the implementation of proposed mitigation measures effectively.

12.7 Ecological Impact (Terrestrial)

- 12.7.1 The implementation of the recommended mitigation measures described in **Section 8.10** should be subjected to monthly site audit throughout the construction phase. The major ecological mitigation measures proposed include avoidance/minimization impacts to recognized sites of conservation importance and natural habitats, protection of flora and fauna species of conservation importance, minimization of glare, air quality, noise, water quality and disturbance impact, minimization of groundwater infiltration and compensatory planting for unavoidable woodland loss. The monitoring requirements are stated in sections below. In case of non-compliance, the Contractor should be informed to strengthen the proposed mitigation measures accordingly. Details of environmental monitoring and audit (EM&A) requirements are discussed in the EM&A Manual.

Monitoring of Mitigation Measures on Protection of Flora Species of Conservation Importance

- 12.7.2 Flora species of conservation importance recorded within the Project footprint (e.g. Incense Tree, Butulang Canthium, Ailanthus, and Rhodoleia) should be protected as far as possible. As a mitigation measure, all the unavoidably affected individuals should be preserved on site, transplanted or compensated to suitable habitat(s) nearby prior to the commencement of works. A detailed vegetation survey should be conducted by a qualified ecologist / botanist with at least 10 years relevant experience to identify and record the affected individuals before the commencement of works. Details of monitoring programme and remedial measures recommended in the Preliminary Plant Preservation and Transplantation Proposal (PPTP) in **Appendix 8.7** should be reviewed and updated by a qualified ecologist / botanist with at least 10 years relevant experience to formulate a Final PPTP. Agreement / approval of the Final PPTP should be obtained from relevant government authorities (e.g. AFCD and EPD) prior to commencement of any construction activities.

Monitoring of Mitigation Measures on Protection of Fauna Species of Conservation Importance

- 12.7.3 Although no direct impact on fauna species of conservation importance is anticipated, pre-construction survey should be conducted by qualified ecologist with at least 10 years relevant experience to identify if any fauna species of conservation importance is presented within and in the surrounding of the Project footprint (e.g. section of S7 near the Shatin portal area). A Pre-construction Fauna Survey Report prepared by a qualified ecologist with at least 10 years relevant experience would be submitted to relevant government authorities (e.g. AFCD and EPD). A Protection and Translocation Proposal (PTP) should be prepared by a qualified ecologist with at least 10 years relevant experience, where appropriate, to present detailed findings of potentially affected fauna within the impacted habitats (e.g. species and number of affected individuals), propose protection and translocation methodology (e.g. protection measure, timing of the translocation, implementation programme) and monitoring and maintenance programme. The PTP should be submitted and approved by relevant government authorities (e.g. AFCD and EPD) prior to commencement of any construction activities.

Monitoring of Compensatory Planting for Unavoidable Woodland Loss

- 12.7.4 To mitigate unavoidable impacts on the woodlands within LRCP, woodland compensatory planting would be provided at the potential woodland compensation area at an agricultural land habitat west to the Sha Tin South Fresh Water Service Reservoir within the assessment area. The Preliminary Woodland Compensation Plan (WCP) in **Appendix 8.10** should be reviewed and updated by a qualified ecologist / arborist with at least 10 years relevant experience to prepare a Final WCP. The Final WCP should include details of monitoring programme such as monitoring frequency and parameters, and maintenance works. A monitoring programme should be conducted by qualified ecologist / arborist with at least 10 years relevant experience to monitor the health condition and survival of the woodland compensatory. Monitoring on the health condition of the planted individuals at woodland compensation area should be conducted during the planting and establishment period which normally takes at least 9 years. Monitoring of the planted individuals should be conducted bi-

weekly in the first three months and monthly in the remaining planting and establishment period. After the planting and establishment period, monitoring of planted individuals should continue, however the frequency would be reduced to once every 3 months during the remainder of construction phase, if applicable. Parameters, such as health condition and survival of the plant, presence of weedy plant, should be monitored. Maintenance works (e.g. watering weeding, control of pests, replacement planting, etc.) should also be conducted as necessary. Agreement / approval of the Final WCP shall be obtained from relevant government authorities (e.g. AFCD and EPD) prior to commencement of any construction activities.

Monitoring on Mitigation Measures on Groundwater Infiltration

12.7.5 As stated in Section 5, it is anticipated that the underground tunnel improvement works would not have adverse groundwater infiltration impacts with proper implementation of groundwater infiltration minimization measures. Nonetheless, as a precautionary measure, surface water level monitoring at natural watercourses within LRCP, Beacon Hill SSSI and in the vicinity of the tunnelling works would be conducted during the construction and operation stages. Details of environmental monitoring and audit (EM&A) requirements are discussed in the EM&A Manual.

12.8 Cultural Heritage

12.8.1 Pre and post condition survey of Ex Kowloon Canton Railway Beacon Hill Tunnel (Government Historic Site) should be conducted by professional qualified building surveyor or engineer before and after the construction works respectively. The survey results shall be submitted to AMO for record.

12.8.2 Monitoring of vibration, settlement and tilting incorporated with a set of Alert, Alarm and Action (AAA) system shall be employed for Ex Beacon Hill Tunnel (Government Historic Site) during the construction phase, measuring inside the tunnel tube at locations closest to the proposed construction works. The AAA limiting criteria are proposed, however, the actual limiting criteria should be further agreed with the AMO. A monitoring proposal, including type and frequency of monitoring, distribution of monitoring points and proposed actions to be taken when reaching respective monitoring limits, should be submitted to AMO for agreement before commencement of construction works. Record of monitoring should be submitted regularly to AMO during the construction phase. AMO should be alerted in case any irregularities are observed.

12.8.3 It is suggested that fonts on both sides of the portals of the two tunnels, namely “Lion Rock Tunnel 獅子山隧道” and “Second Lion Rock Tunnel 第二獅子山隧道”, should be kept or replicated and placed on similar position as the current setting. The colour scheme of associated buildings is suggested to be adopted to the new administrative buildings in order to maintain the original sentiment. Moreover, the two commemorative plaques marking the opening ceremony of the tunnel should be kept at prominent position at the new administrative buildings visible to all guests. Detailed photographic recording on the Lion Rock Tunnel and its associated buildings (both exterior and interior) should be conducted before any works to commence. A copy of the photographic documentation should be provided to AMO for record.

12.8.4 No impact is anticipated to NB10 to NB16 and NB21 identified within the 300m assessment area due to considerable distance from proposed works. Hence, no mitigation measure is required to be carried out on these buildings from the point of view of cultural heritage.

12.8.5 Monitoring of vibration, settlement and tilting incorporated with a set of AAA system shall be employed for NB17 to NB20 in the same fashion as the Ex Beacon Hill Tunnel (Section 9.7.2 above).

12.8.6 As a precautionary measure, AMO should be informed immediately in case of discovery of antiquities or supposed antiquities in the course of works, so that appropriate mitigation measures, if needed, can be timely formulated and implemented in agreement with AMO.

12.9 Landscape and Visual Impact

12.9.1 Site audit on landscape and visual aspects of the Project should be carried out during the construction phase and the 12-month establishment period during operation phase. The establishment and site audit for the off-site compensation woodland should be carried out by the Project Proponent in accordance with the requirements set out in the Final Woodland Compensation Plan.

12.10 Hazard to Life

12.10.1 Good safety practices are recommended to further manage and minimize the potential risks during construction phase of the Project. Regular audit during construction phase is recommended.