2 NOISE

2.1 Noise Parameters

2.1.1 The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq(30\ min)}$ shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, $L_{eq(5\ min)}$ shall be employed for comparison with the NCO criteria.

2.1.2 As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. A sample data record sheet is shown in Appendix B1 for reference.

2.2 Monitoring Equipment

2.2.1 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0dB.

2.2.2 Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding $5ms^{-1}$ or wind with gusts exceeding $10ms^{-1}$. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

2.2.3 The ET Leader is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise monitoring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled.

2.3 Monitoring Locations

2.3.1 Those most affected noise sensitive receivers identified in the EIA report already has considered as the noise monitoring locations in this EM&A Manual. The noise monitoring locations during construction phase are listed in Tables 2.1 and 2.2 and shown Figure 2.1 (three sheets). In addition, noise monitoring shall be carried out for one year following construction. The locations for operational noise monitoring shall be defined during detailed design on the basis of the status of the most up-to-date information on proposed developments surrounding the Highway.

Table 2.1 Representative Monitoring Noise and Air Monitoring Location (Existing Receiver)

Monitoring Location No.	Description	Landuses
E1	Village House in To Yuen Wai	Residential
E2	Village House near Lo Fu Hang	Residential
E3	Lam Tei Gospel School	School
E4	Village House in Tan Kwai Tsuen	Residential
E5	Village House near Great Garden	Residential
E6	Village House in Tai Tao Tsuen	Residential
E7	Village House beside Tong Tai Road	Residential
E8	Village House in Lam Hau Tsuen	Residential
E9	Village House in Sham Chung Tsuen	Residential
E10	Village House beside Tai Kei Leng	Residential

Table 2.2 Representative Monitoring Noise and Air Monitoring Location (Planned Receiver)

Monitoring Location No.	Description	Landuses
P1	Proposed Residential Area at To Yuen Wai	Residential
P2	Proposed Residential Area at Fuk Hang Tsuen	Residential
P3	Proposed Residential Area at Tong Yan San Tsuen (R(B)1)	Residential
P4	Proposed Residential Area at east of Long Tin Road (R(D))	Residential

2.3.2 The status and locations of noise sensitive receivers may change after issuing this manual. In this event, the ET Leader shall propose updated monitoring locations and seek approval from ER/IEC and agreement from EPD of the proposal.

2.3.3 When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria in that they should be:

(a) at locations close to the major site activities which are likely to have noise impacts;
(b) close to the noise sensitive receivers (N.B. For the purposes of this section, any domestic premises, hotel, hostel, temporary housing accommodation, hospital, medical clinic, educational institution, place of public worship, library, court of law or performing arts centre should be considered as a noise sensitive receiver); and
(c) for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

2.3.4 The monitoring station shall normally be at a point 1m from the exterior of the sensitive receiver's building facade and be at a position 1.2m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3dB(A) shall

be made to the free-field measurements. The ET Leader shall agree with the ER/IEC on the monitoring positions and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

2.4 Baseline Monitoring

2.4.1 The ET Leader shall carry out baseline noise monitoring prior to the commencement of the construction works. The baseline monitoring shall be carried out daily for a period of at least two weeks. A schedule on the baseline monitoring shall be submitted to the ER/IEC for approval before the monitoring starts.

2.4.2 There shall not be any construction activities in the vicinity of the stations during the baseline monitoring.

2.4.3 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with EPD to agree on an appropriate set of data to be used as a baseline reference and submit this to the ER/IEC for their approval.

2.5 Impact Monitoring

2.5.1 Noise monitoring shall be carried out at all the designated monitoring station. The monitoring frequency shall depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a per week basis when noise generating activities are underway:

(a) one set of measurements between 0700-1900 hours on normal weekdays;
(b) one set of measurements between 1900-2300 hours;
(c) one set of measurements between 2300-0700 hours of next day; and
(d) one set of measurements between 0700-1900 hours on holidays.

2.5.2 For the measurements (b), (c) and (d) above, one set of measurements shall at least include 3 consecutive $L_{eq(5\ min)}$ results.

2.5.3 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in Section 3.7 shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

2.6 Event and Action Plan for Noise

2.6.1 The Action and Limit levels for construction noise are defined in Table 2.3. Should non-compliance of the criteria occur, action in accordance with the Action Plan in Table 2.4, shall be carried out. Necessary mitigation measures are shown in Section 2.7. Timing and responsibilities for the implementation of mitigation measures are shown in Appendix A.

Table 2.3 Action and Limit Levels for Construction Noise

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented complaint is received	75* dB(A)
0700-2300 hrs on holidays; and 1900-2300 hrs on all other days		60/65/70** dB(A)
2300-0700 hrs of next day		45/50/55** 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.

Table 2.4 Event / Action Plan for Construction Noise

EVENT	ACTION	
	ER/IEC	Contractor
Action Level	1. Notify Contractor 2. Analyse Investigation 3. Require Contractor to propose measures for the identified noise problem 4. Increase monitoring frequency to check mitigation effectiveness	1. Submit noise mitigation proposals to ET Leader / ER 2. Implement noise mitigation proposals
Limit Level	1. Notify Contractor 2. Notify EPD 3. Require Contractor to implement mitigation measures and increase monitoring frequency to check mitigation effectiveness	1. Implement mitigation measures 2. Demonstrate to ET Leader and ER the effectiveness of measures applied

2.7 Noise Mitigation Measures

Construction Phase

2.7.1 The EIA report has recommended construction noise control and mitigation measures. The Contractor shall be responsible for the design and implementation of these measures as listed below:

- Plant and vehicles shall be inspected annually to ensure that they are operating efficiently;
- Plant such as compressor, excavator, tracked crane, vibratory roller and bulldozer etc., operating on intermittent basis should be turned off or throttled down when not in active use;
- Plant such as excavator, that is known to emit noise strongly in one direction should be orientated to face away from the NSRs;
- Silencers, mufflers and enclosures for plant such as dump truck, tracked crane and generator etc., should be used and maintained adequately throughout the works;
- Plants such as generator, standard bored pile oscillatory should be sited away from NSRs as far as practicable;
- 3 m high moveable barriers with skid footing and a small cantilevered upper portion can be located along the work area within about 6 metres from stationary plant and about 5 metres from mobile plant;
- Noisy Deep Bay Link construction activities should be avoided during the examinations periods;
- Contractor should use the particular plant such as excavator, dump truck, vibratory roller, tracked crane, standard bored pile oscillator, vibratory poker, generator, water pump, concrete lorry mixer and air compressor with equipment noise levels quieter than those specified in GW-TM;
- Restrict on the number of plant or group of equipment operating concurrently in areas where is less than 5 metres away to the NSRs; and
- Noise monitoring will be carried out at the most affected NSRs. In general, Leq(5 min) noise levels are required to be measured at these affected NSRs which were listed in the Chapter 2 Table 2.1;
- Path for complaints and handling procedures should be set up and implement.

2.7.2 If the above measures are not sufficient to restore the construction noise quality to acceptable levels, upon the advice of ET Leader, the Contractor shall liaise with the ET Leader on alternative mitigation measures, propose such measures to the ER/IEC for approval, and implement the mitigation measures.

Operational Phase

2.7.3 For the operation of the widened Yuen Long Highway, Highways Department is responsible for the design and construction of these mitigation measures. The proposed mitigation measures are noise barriers and low noise surface material on road surface of the section of Yuen Long Highway. Detail locations of the proposed noise barriers are clearly presented in Figure 2.2 (three sheets).

2.8 Operational Monitoring of Traffic Noise

2.8.1 In order to assess the effectiveness of the proposed barriers, traffic noise monitoring is required. During the monitoring, a set of $L_{10\ (1\text{-}hr)}$ shall be measured during weekdays, at peak traffic flow.

2.8.2 The locations and methodology for operational noise monitoring shall be proposed to the ET/IEC for approval. During the one-hour L_{10} measurement of traffic noise, a traffic count shall be undertaken in order to calibrate the measured traffic noise level and compare this to the predicted traffic noise level. The parameters listed below shall be measured for each of the two bounds.

- total number of vehicles per hour;
- percentage of heavy vehicles; and
- average speed of vehicle.