

### **3. NOISE**

#### **3.1 EIA Finding**

Construction of the proposed infrastructure works is likely to produce high noise levels exceeding 75 dB(A) Leq(30-min) at the existing NSRs, if unmitigated. The potential impacts can be mitigated through proper implementation of noise control measures, including the use of silenced equipment, suitable siting of equipment, and use of mobile noise barriers. In particular, the use of acoustic enclosures and curved/inverted-L noise barriers (located close to the noise source) are considered feasible and appropriate, especially in front of KL7 and CM4. A full enclosure has been proposed in front of King Lam Estate and Chung Ming Court. It is recommended that the construction of this enclosure should be completed within 6 months after works commencement in order to screen sensitive building facades from construction noise to further reduce noise levels at these receivers. It is anticipated that use of the above measures would reduce the impacts from construction works and resulting noise levels would meet the criteria specified in the Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO). Hence, an EM&A programme as detailed in the following sections is necessary to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action.

#### **3.2 Noise Parameters**

The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (Leq). Leq(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, Leq(5 min) shall be employed for comparison with the NCO criteria.

The road traffic noise during operation of the Project shall be measured in terms of the A-weighted equivalent of  $L_{10}$ (1-hr). During the traffic noise measurement, traffic count shall also be undertaken concurrently.

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 Figure 3-1 for reference.

#### **3.3 Monitoring Equipment**

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.

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

The ET Leader is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise measuring 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.

### 3.4 Monitoring Locations

The noise monitoring locations are proposed on top of the library in Area 24 and the church in Area 37 along Road P1 as shown in Figure 2.2. The status and locations of noise sensitive receivers may change after issuing this manual. If such cases exist, the ET Leader shall propose updated monitoring locations and seek approval from ER & IC(E) and agreement from EPD of the proposal.

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

- (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, performing art centre should be considered as 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.

The monitoring station shall normally be at a point 1m from the exterior of the sensitive receivers 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 on the monitoring position 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.

### 3.5 Baseline Monitoring for Construction Noise

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 for approval before the monitoring starts.

There shall not be any construction activities in the vicinity during the baseline monitoring. 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 to the ER for approval.

### 3.6 Impact Monitoring for Construction Noise

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.

For the measurements (b), (c) and (d) above, one set of measurements shall at least include 3 consecutive Leq(5 min) results.

If a school exists near the construction activity, noise monitoring shall be carried out at the monitoring stations for the schools during the school examination periods. The ET Leader shall liaise with the school's personnel and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract.

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.

### 3.7 Event and Action Plan for Construction Noise

The Action and Limit levels for construction noise are defined in Table 3.1. Should non-compliance of the criteria occur, action in accordance with the Action Plan in Table 3.2, shall be carried out.

**Table 3.1 Action and Limit Levels for Construction Noise**

<b>Time Period</b>	<b>Action</b>	<b>Limit</b>
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 3.2 Event/Action Plan for Construction Noise**

EXCEEDANCE	ACTION			
	ET	IC(E)	ER	Contractor
Action Level	<ol style="list-style-type: none"> <li>1. Undertake measurement to establish validity of complaint</li> <li>2. Identify the source(s) of the complaint</li> <li>3. Inform ER&amp;IC(E) in writing. Discuss remedial actions required with ER&amp;IC(E)</li> <li>4. Increase monitoring frequency to assess efficacy of remedial measures</li> <li>5. If exceedance continues, meet with ER&amp;IC(E) to review implementation of appropriate mitigation measures</li> <li>6. If exceedance stops, cease additional monitoring</li> </ol>	<ol style="list-style-type: none"> <li>1. Review the analysed results submitted by the ET</li> <li>2. Review the proposed remedial measures by the Contractor and advise the ER &amp; ET accordingly</li> <li>3. Supervise the implementation of remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of complaint and notify Contractor if proven</li> <li>2. Check monitoring data trends and Contractor's working methods.</li> <li>3. Remind the Contractor of his contractual obligations and discuss with ET, IC(E) and Contractor on proposed remedial actions</li> <li>4. Assess the efficacy of remedial actions and keep the Contractor informed</li> <li>5. Inform complainant of actions taken</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit proposals for remedial actions to ER within three working days of notification</li> <li>2. Amend proposals if required by the Engineer</li> <li>3. Implement the remedial actions immediately upon instruction</li> <li>4. Liaise with the ER to optimise the effectiveness of the agreed mitigation</li> <li>5. Amend proposal if appropriate</li> </ol>

**Table 3.2 Event/Action Plan for Construction Noise (Cont'd)**

EXCEEDANCE	ACTION			
	ET	IC(E)	ER	Contractor
Limit Level	<ol style="list-style-type: none"> <li>1. Repeat measurement to confirm findings</li> <li>2. Identify the source(s) of impact</li> <li>3. Inform ER&amp;IC(E) and EPD in writing</li> <li>4. Discuss remedial actions required with ER&amp;IC(E)</li> <li>5. Increase monitoring frequency to assess efficacy of remedial measures</li> <li>6. If exceedance continues, meet with ER&amp;IC(E) to identify appropriate mitigation measures</li> <li>7. If exceedance stops, cease additional monitoring</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET</li> <li>2. Review Contractor's remedial actions to assure their effectiveness and advise the ER &amp; ET accordingly</li> <li>3. Supervise the implementation of the remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance and notify Contractor</li> <li>2. Check monitoring data trends and Contractor's working methods</li> <li>3. Discuss with ET, IC(E) and Contractor on proposed remedial actions to be implemented</li> <li>4. Assess the efficacy of remedial actions and keep the Contractor informed</li> <li>5. If exceedance continuous, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is aborted</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance</li> <li>2. Submit proposals for remedial actions to ER within three working days of notification</li> <li>3. Amend proposals if required by the ER</li> <li>4. Implement remedial actions immediately upon instruction</li> <li>5. Liaise with the ER to optimise the effectiveness of the agreed mitigation</li> <li>6. Resubmit proposals if problem still not under control</li> <li>7. Stop the relevant portion of works as determined by the ER until the exceedance is aborted.</li> </ol>

### 3.8 Noise Mitigation Measures

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

- Use of silenced equipment as detailed in Section 7.1.5 of the EIA Report,
- Suitable siting of equipment,
- Use of mobile noise barriers,
- Complete construction of the full enclosure in front of KL7 and CM4 within 6 months after works commencement.

If the above measures are not sufficient to restore the construction noise quality to an acceptable levels upon the advice of ET Leader, the Contractor shall liaise with the ET Leader and IC(E) on some other mitigation measures, propose to ER and IC(E) for approval, and carry out the mitigation measures.

### 3.9 Traffic Noise Monitoring

3.9.1 The Project Proponent shall deposit to the Director, at least 6 months before the operation of the project, a monitoring plan for the purpose of assessing the accuracy of traffic noise predictions by comparing the project noise impact predictions with the actual impacts. The monitoring plan shall contain monitoring locations, monitoring schedules, methodology of noise monitoring including noise measurement procedures, traffic counts and speed checks, and methodology of comparison with the predicted levels. Monitoring shall be conducted in accordance with the deposited monitoring plan unless with prior justification. Monitoring details and results including the comparison between the measured noise levels and the predicted levels shall be recorded in a report to be deposited with the Director within one month of the completion of the monitoring. The report shall be certified by the Project Proponent before deposit with the Director. The above shall be duly incorporated in the EM&A Manual.

3.9.2 Noise monitoring shall be carried out at the following designated locations upon the completion of the Project :

- The 15<sup>th</sup> floor of NSR CM4;
- The 15<sup>th</sup> floor of NSR ON6.

3.9.3 The traffic noise levels should be measured immediately before the opening (baseline measurement) and thereafter at 6 months interval within the first year.

3.9.4 One set of  $L_{10}$  (1-hr) shall be measured during weekdays at the time of peak traffic flow.

3.9.5 During the 30min  $L_{10}$  measurement of traffic noise, traffic count shall be undertaken in order to adjust the measured traffic noise level and compare to the predicted traffic noise level.

3.9.6 The parameters listed below shall be measured for each of the roads.

- Total number of vehicles per hour;
- Percentage of heavy vehicles;
- Average of vehicle speed.