

**Environmental Impact Assessment Ordinance, Cap.499
Guidance Note**

**Preparation of Construction Noise Impact Assessment
Under the Environmental Impact Assessment Ordinance**

(This guidance note supersedes EIAO Guidance Note No. 9/2004 with immediate effect)

(Important Note :

The guidance note is intended for general reference only. You are advised to refer to and follow the requirements in the Environmental Impact Assessment Ordinance (Cap 499) and the Technical Memorandum on the Environmental Impact Assessment (EIA) Process. Each case has to be considered on individual merits. This guidance note serves to provide some good practices on EIA and was developed in consultation with the EIA Ordinance Users Liaison Groups and the Advisory Council on the Environment. This guidance note may be subject to revision without prior notice. You are advised to make reference to the guidance note current to the date. Any enquiry on this guidance note should be directed to the EIA Ordinance Register Office of EPD on 27th Floor, Southorn Centre, 130 Hennessy Road, Wan Chai, Hong Kong. (Telephone: 2835-1835, Faxline: 2147-0894), or through the EIA Ordinance web site (www.epd.gov.hk/eia)

1. Purpose

- 1.1 The guidance note (GN) serves to provide some good practices to the practitioners on the preparation of Construction Noise Impact Assessment (CNIA) of designated projects (DPs).
- 1.2 The GN is applicable to all EIA reports where CNIA is required, under the EIA Ordinance, unless otherwise specified in the study brief. It is advisory in nature and is not intended to supersede the relevant Annexes of the TM.
- 1.3 The considerations in identifying adverse environmental impacts, criteria for evaluating construction noise impact for each project, contents of EIA Report, guidelines for CNIA, guidelines for the review of an EIA report, contents of Environmental Monitoring and Audit Programme are respectively detailed in Annexes 3, 5, 11, 13, 20 and 21 of the TM.
- 1.4 The GN should not be considered as a prescriptive set of rules or an exhaustive manual of methods/techniques. It does not obviate the need for the compliance with all the requirements in the relevant Annexes of the TM and the study brief of the project.
- 1.5 The coverage of the GN includes those types of DP that may create construction noise impacts. The level of information required for individual CNIA and hence the application of relevant parts of the GN is dependent on the type of DP and the surrounding situation in which the DP is located.
- 1.6 The GN may be updated and supplemented by other advice from the Environmental Protection Department from time to time to take into account changing circumstances. Revised GN will be promulgated should such a need arise.

2 Construction Noise Criteria

- 2.1 Upon application from the Project Proponent, the Director of Environmental Protection, which is the EIA authority under the EIAO, will issue a Study Brief under the EIA Ordinance for the Project Proponent to conduct an EIA study. For identified construction noise impact, the requirements to conduct an assessment would be included in the Study Brief. An example is attached in Appendix A.
- 2.2 For evaluating and assessing the noise impacts, the criteria and guidelines given in Annexes 5 and 13 of the EIA-TM are to be followed. In brief, the construction noise criteria are Leq (30mins) 75 dB(A) for residential premises and 70 dB(A) for educational institutions [this is reduced to 65 dB(A) during examinations] during daytime. As specified in the EIA-TM, these construction noise criteria shall be met as far as practicable.
- 2.3 This GN is not intended for the assessment of construction noise during restricted hours [1900 to 0700 hours on any day not being a general holiday AND at any time on a general holiday as defined under the Noise Control Ordinance (NCO)], which is controlled under section 6 of the NCO. Only in cases where the project proponent likes to evaluate the feasibility of construction work during restricted hours in the context of programming should CNIA be carried out. Regardless of the results of the CNIA for restricted hours, the Noise Control Authority under the NCO will consider an application based on the prevailing condition/situations of adjoining land uses. The CNIA at EIA stage is meant to demonstrate that practical and feasible approaches can be found.
- 2.4 This GN is not intended for the assessment of structural/ ground borne construction noise, i.e. noise generated by the construction work transmitted primarily through the ground and the structural elements of the building. In case there is likely structural/ ground borne noise affecting Noise Sensitive Receivers (NSRs), the assessment methodology / model for structural/ ground borne noise shall be agreed with the Director prior to obtaining the empirical parameters required in the ground borne noise model or proceed with the assessment.
- 2.5 This GN is not intended for the assessment of construction noise from percussive piling, which is controlled under section 6 of the NCO.

3 **EIA Report**

- 3.1 As mentioned above, a Study Brief would be issued to the Project Proponent for conducting the EIA study. Where a CNIA is required, the likely key requirements could cover the following:
- Determination of assessment area, usually 300m from the project boundary;
 - Identification of noise sensitive receivers;
 - Provision of an emission inventory of the noise source; and
 - Assessment of construction noise.
- 3.2 The assessment area is usually within 300m from the project boundary. However, if warranted, impacts outside 300m should also be considered (e.g. noisy rock breaking site formation activities affecting school).
- 3.3 Regarding identification of NSRs in the construction noise assessment, the approach and

examples of NSRs would be given in the EIA SB and Annex 13 of the EIA-TM respectively. An example of the requirements in identifying NSRs in construction noise assessment is given in Appendix A for reference.

- 3.4 All NSRs, including existing and planned within the Study Area should be identified. Assessment points, representing all identified NSRs, shall be agreed with DEP prior to the quantitative noise assessment. However, it may not be necessary to include planned/committed NSRs, that definitely will not yet be ready for occupation when the concerned construction work is finished.
- 3.5 The key construction noise impact is mainly originated from powered mechanical equipment (PME). For good control of construction noise, project proponent could either enlist the PME employed in the project or apply other method to quantify the noise sources as per EIAO Guidance Note No. 3/2010 “Flexibility and Enforceability of Mitigation Measures proposed in an Environmental Impact Assessment Report”. The emission inventory of the noise source is a list of PME that would be used to perform the various construction activities for the Project. It must be noted that different PME will be used at different stages of the construction work, e.g. site clearance, excavation, earthwork, pavement...etc. Confirmation of the validity of the inventory shall be obtained from the client government work departments or the project proponent’s construction professionals. Where necessary the construction contractor should also be consulted.
- 3.6 The PME list must be realistic, practical and practicable in completing the works within schedule. The list should not be artificially or arbitrarily developed to fit in with the noise criteria without any regard to the practicability. It is therefore important that the necessary amount of PME with compatible output is included in this list. Project proponents should consider the flexibility for construction and could describe different possible scenarios as discussed in the EIAO Guidance Notes No. 3/2010.
- 3.7 The following are some common examples that need to be noted in preparing the inventory list:-
- a hand held pneumatic drill/breaker (or a few of them) could not possibly handle large volume of rock excavation (e.g. site formation in rocky terrain). Large machine such as drilling rigs or excavator mounted breakers are more commonly used;
 - while large diameter bore piling is usually quieter than percussive piling, it may also involve noisy rock breaking activities when encountering rock boulders or rock strata. Chisel or even rock drills may be required;
 - for many construction works, concreting would be required, i.e. concrete lorry mixer, vibratory poker and crane are usually in the PME list;
 - if works sites are isolated and scattered in small clusters, lorry would be required to deliver construction materials;
 - dump truck would be required for disposal of excavated materials offsite, delivery of filling materials or asphalt concrete; &
 - filling materials require compaction. Thus relevant PME such as compactor and roller need to be included.
- 3.8 Paragraphs 5.3 and 5.4 of Annex 13 of the EIAO-TM stipulate the assessment

methodology for construction noise impacts. The assessment shall be based on standard acoustic principles. Reference could be made to the relevant technical memoranda issued under the NCO or international standards, such as British Standard BS5228.

3.9 Tunneling and dredging are normally carried out round the clock in the local construction industry. It is therefore very common that the noise impacts arising from these activities are assessed in the CNIA and the assessment needs to be handled with care.

4 **Mitigation Measures**

4.1 Listed below are some commonly used and quantifiable direct mitigation measures:

- use of quieter PME;
- use of quieter alternative construction method;&
- use of noise barriers/ enclosure.

4.2 It must be noted that reduction of percentage on-time is not a viable mitigation measures for PME. It should never be considered as a direct way to mitigate the construction noise after the assessment found exceedance in the unmitigated construction noise levels. Nonetheless, for some PME which only stay on site for a short period in 30 minutes, for example concrete lorry mixer in case of concreting and dump truck in case of disposal of excavated materials in roadside, a reasonable percentage on-time to reflect the actual situation could be accepted as basic assumption for that kind of PME in the assessment.

4.3 In the EIA SB, there would be a requirement to identify, assess and minimize any side effects and resolve potential constraints arising from the inclusion of any recommended direct mitigation measures. For example, secondary impact such as safety, fire fighting and obstruction in relation to temporary noise barrier should not be ignored

4.4 Quieter PME is referring to those PME, which could deliver the same output but having a sound power level lower than that stipulated in the Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM). The common source of these information are from EPD's Quality Powered Mechanical Equipment System or international standard/ certification, e.g. BS5228-2009, EC directives on outdoors equipment or Germany's Blue Angel Label. However, the consultants should also confirm that the quoted PME could be readily available in the local construction market.

4.5 As stated in 3.4 above project proponent's construction professionals and if necessary the construction contractor should be consulted in the preparation of the PME list. Sometimes, consultants would propose some alternate PME, which are not necessarily viable, to replace those noisier counterparts, for example:-

- lorry to replace dump truck (dump truck has a tilting bin but a lorry does not);
- an air compressor with a lower air flow rate to replace the one with higher flow rate (this could be viable only when the nature and requirement of works do not need higher air flow);
- a breaker with lower sound power level to replace the noisier one [the hand held percussive pneumatic breaker commonly used in the local construction industry is

the one of 37 kg (CNP 026) and pneumatic breaker, hydraulic breaker and electric breaker lighter in weight and quieter may not perform the same duty]; &

- a hand held pneumatic rock drill cannot replace the output of a hydraulic crawler mounted rock drill.

4.6 Use of noise barriers is a possible solution. In general, a 5dB(A) reduction for movable plant, 10 dB(A) for stationary plant and about 15 dB(A) for enclosed ones can be assumed depending on the actual design. The viability of using barriers depends on whether there is sufficient space available. Another concern is safety. A temporary barrier might not be suitable for erecting along a lane closure in highway as the barrier might be knocked down by vehicles. It might also be not possible to enclose large and moving PME, e.g. excavator & dump truck etc. If there is only one nearby NSR the consultant could explore the possibility of locating the barrier nearer to the NSR to optimize the mitigation package.

4.7 It must be noted that reduction of number of PME is not a viable mitigation measures for PME. It should never be considered as a direct way to mitigate the construction noise and there will also be practical problem in the implementation. Nonetheless, some PME for different activities need not be assessed together, as in reality they would never be operated at the same time, e.g. road milling and road paving at the same location. They can be assessed separately by grouping.

4.8 Other mitigation measures, such as good site practice etc. which are not quantifiable should not be taken into account in working out the mitigated noise levels.

4.9 Common mitigation measures for alleviating construction noise impacts have been briefly discussed above. There are some more innovative measures indicated in the following examples which, depending on the individual situation, could also be worth considering:-

- Use of concrete crushers instead of excavator mounted breakers in the demolition of public housing blocks in some HD contracts;
- a cover which completely covers the excavation works, e.g. MTR Lai King Station;
- chemical agent (non-explosive blasting) to replace rock drilling/breaking, e.g. in a North Point residential sites;
- "cut and lift method" for demolishing bridge structures in lieu of traditional "breaking up" method, e.g. a footbridge over Tuen Mun Road near Sham Tseng, where the main span of the footbridge was cut and lifted off in short sections for disposal off-site. This will reduce the duration of on-site works;
- tunnel boring machine to replace "cut and cover" for tunneling, e.g. a section of Kwai Tsing Tunnel in KCR West Rail Phase 1, this will greatly reduce the number of noise sensitive receivers being affected;
- acoustic doors at tunnel portals to prevent noise outbreak, e.g. airport railway tunnel in Tsing Yi;
- stacking of container site offices to act as noise barriers, e.g. sewage treatment works near Laguna City; &
- acoustic enclosure to enclose a vertical shaft for tunneling, e.g. MTR Quarry Bay Relief Works at Tin Hau Temple Road, North Point.

4.10 The above list is not exhaustive and it should be considered on a case-by-case basis.

The consultant should get the construction professionals involved early and encourage the development of innovative mitigation measures. In general, these more innovative mitigation measures should be considered when:

- there are residual impacts after implementation of "common" measures;
- the works site is close to NSRs;
- there are NSRs on all sides of the site; &
- same noisy construction activities would continue at the same location for a long period of time

4.11 According to the EIAO-TM all practicable direct mitigation measures shall be exhausted and the residual impacts are minimised. It is of reference to note that in some cases, such as recent rail projects, because of the close proximity to the NSRs, direct mitigation measures are not practicable in eliminating all construction noise exceedance. The Project Proponents recommended via EIA Reports noise insulation be provided to these NSRs.

5 **Conclusion**

5.1 This document attempts to provide good practices for general reference in preparing construction noise impacts. Though it is expected that the guidelines could be followed for most of the situations, one should always exercise sound professional judgment on the appropriateness and acceptability of the proposals made in the EIA reports.

Environmental Protection Department

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Appendix A

Example Sections extracted from a Study Brief related to construction noise

The following is an example to illustrate the construction noise impact assessment for a site, as this varies from projects to projects, site specific requirements will be tailor made for individual projects.

3.4.2 Noise Impact

3.4.2.1 The noise impact assessment shall include the followings:

(i) **Determination of Assessment Area**

The noise impact assessment shall include all areas within 300m from the project boundary. Subject to the agreement of the Director, the assessment area could be reduced accordingly if the first layer of noise sensitive receivers, closer than 300m from the project boundary, provides acoustic shielding to those receivers located further away.

(ii) **Provision of Background Information**

The Applicant shall provide all background information relevant to the project including relevant previous and current studies. Unless involved in the planning standards, no existing noise levels are required in particular.

(iii) **Identification of Noise Sensitive Receivers**

(a) The Applicant shall refer to Annex 13 of the TM when identifying the noise sensitive receivers (NSRs). The NSRs shall include all existing ones and all planned or committed noise sensitive developments and uses earmarked on the relevant Outline Zoning Plans, Outline Development Plans and Layout Plans.

(b) The Applicant shall select assessment points to represent all identified NSRs for carrying out quantitative noise assessment described below. The assessment points shall be agreed with the Director prior to the quantitative noise assessment. A map showing the location and description including name of building, use, and floors of each and every selected assessment point shall be given.

(iv) **Provision of an Emission Inventory of the Noise Sources**

The Applicant shall provide an inventory of noise sources including construction equipment for construction noise assessment. Confirmation of the validity of the inventory shall be obtained from the relevant government departments/authorities.

(v) **Construction Noise Assessment**

(a) The Applicant shall carry out assessment of noise impact from construction (excluding percussive piling) of the project during day time, i.e. 7 a.m. to 7 p.m., on weekdays other than general holidays in accordance with the

methodology stipulated in paragraphs 5.3. and 5.4 of Annex 13 of the TM. The criteria in Table 1B of Annex 5 of the TM shall be adopted in the assessment.

- (b) To minimize the construction noise impact, alternative construction methods to replace percussive piling shall be proposed as far as practicable.
- (c) If the unmitigated construction noise levels are found to exceed the relevant criteria, the Applicant shall propose practicable direct mitigation measures (including movable barriers, enclosures, quieter alternative methods, re-scheduling and restricting hours of operation of noisy task(s) to minimize the impact. If the mitigated noise levels still exceed the relevant criteria, the duration of the noise exceedance shall be given.
- (d) In case the Applicant would like to evaluate whether construction works in restricted hours as defined under the Noise Control Ordinance (NCO) are feasible or not in the context of programming construction works, reference should be made to the relevant technical memoranda issued under the NCO. Regardless of the results of construction noise impact assessment for restricted hours, the Noise Control Authority will consider a well-justified Construction Noise Permit (CNP) application, once filed, based on the NCO, the relevant technical memoranda issued under the NCO, and the contemporary condition/situations of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. This aspect should be explicitly stated in the noise chapter and the conclusions and recommendations chapter in the EIA report.

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