

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

**Road Traffic Noise Impact Assessment
Under the Environmental Impact Assessment Ordinance**

(This guidance note supersedes EIAO Guidance Note No. 12/2010 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 Environmental Impact Assessment (EIA) Process. Each case has to be considered on individual merits. This guidance note may be subject to revision without prior notice. This guideline note serves to provide some good practices on EIA and was developed in consultation with the EIAO Users Liaison Groups and the Advisory Council on the Environment. 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 This guidance note (GN) serves to provide general reference for practitioners to prepare Road Traffic Noise Impact Assessment (RTNIA) for designated projects (DPs) under the Environmental Impact Assessment Ordinance (EIAO).
- 1.2 This GN is advisory in nature and is designed to facilitate practitioners to prepare the RTNIA. It should not be construed in any way as to supersede the relevant requirements in the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The principles set out in the EIAO-TM are to avoid (which should be given the highest priority) and minimize the potential adverse environmental impacts by alternative land use arrangements, alignments, siting and other measures, and should be followed when preparing the RTNIA.

2. Road Project or Road Improvement Work which Requires an Environmental Permit under the EIAO

- 2.1 The following two categories of road projects or road improvement works would require an environmental permit (EP) for construction and/or operation under the EIAO (and hereafter called “road project” in this GN):
- (i) “A carriageway for motor vehicles that is an expressway, trunk road, primary distributor road or district distributor road”, as defined under item A.1, Part I, Schedule 2 to the EIAO; and
 - (ii) A material change to an exempted project would require an EP under section 9(4) of the EIAO. Material change, under Schedule 1 to the EIAO, “means a physical addition or alteration to a designated project which results in an adverse environmental impact as defined in the technical memorandum”. Under section 6.1 of the EIAO-TM, material change shall only refer to significant changes which cause an adverse environmental impact. An environmental impact is considered to

be adverse if any factor listed in Annex 3 of the EIAO-TM applies and the criteria in Annexes 4 to 10 of the EIAO-TM may be violated.

2.2 In general, the following road improvement works would not cause significant change of noise impact on a nearby noise sensitive receiver (NSR) as it would not affect the design capacity of the concerned road section and not significantly reduce the distance between the alignment of the main carriageway and the nearby NSR:

- Minor works authorized under section 4 of the Roads (Works, Use and Compensation) Ordinance (Cap. 370);
- Improvement of road auxiliaries, e.g. parapet wall, road repair and maintenance work;
- Addition of a lay-by, cycle track, noise barrier, noise enclosure;
- Decking over or converting into an underpass; and
- Improvement of a road junction or roundabouts.

2.3 To determine whether the traffic noise impact due to a road improvement project/works would be considered significant as mentioned in paragraph 2.1(ii) above, detailed information with respect to factors such as change of nature of road, change of alignment, change of traffic capacity or traffic composition, etc. would normally be required. The traffic noise impact would be considered significant if the traffic noise level with the road project would be greater than that without the road project at the design year (i.e. worst assessment year within 15 years after commencement of the road project) by 1.0 dB(A) or more.

2.4 In considering whether the road improvement works would require an EP, the project proponent should make reference to the EIAO and the EIAO-TM for detailed consideration. The project proponent is advised to provide the following information for determination of whether such works should be considered causing adverse environmental impact:

- whether there is any change on the nature of road, e.g. changed from a local road to a district distributor road;
- whether there is any alignment (horizontal or vertical) change of the road;
- description on the extent of the road improvement works;
- layout plan showing the road and representative nearby NSRs without modification;
- layout plan showing the road and representative nearby NSRs with modification (with the modified parts shaded);
- the prevailing traffic flow before the modification;
- the predicted maximum traffic flow within 15 years after the completion of modification;
- the predicted maximum traffic flow at that particular year if no modification is carried out; and
- the calculation of the following traffic noise levels at the worst affected NSRs:
 - (i) the prevailing overall noise level before the modification;
 - (ii) the predicted overall noise level for the maximum traffic projection within 15 years after the completion of modification; and
 - (iii) the predicted overall noise level at that particular year if no modification is carried out.

The overall noise level refers to the total noise together with noise from other roads in the vicinity.

3. Approach to RTNIA

- 3.1 Section 4.4.1 of the EIAO-TM stipulates that the requirements set out in the EIA study brief and EIAO-TM shall be complied with.
- 3.2 Whilst the relevant noise standards for road traffic noise and guidelines for RTNIA are stipulated in Annexes 5 and 13 of the EIAO-TM, the EIA study brief spells out the purpose and objectives of the EIA study, and sets out the scope of the environmental issues to be addressed, procedural and reporting requirements to be fulfilled and where appropriate, methodologies or approaches to be followed. The formulation of the EIA study brief is guided by section 3 of the EIAO-TM.

4. Major provisions and paragraphs in EIAO and EIAO-TM

- 4.1 The following are some points to note for general reference only. They should be read in conjunction with the EIAO, EIAO-TM and EIA study brief for the project, if any.

4.2 Assessment Area

- 4.2.1 According to section 3.3 of EIAO-TM, the EIA study brief may stipulate the geographic and temporal boundaries of the assessment. An area within 300 m from the project boundary would usually be specified as the assessment area for RTNIA. This area may be reduced or extended in accordance with the prevailing situation to ensure that the assessment of the road traffic noise impact on NSRs is adequate, and there would not be unacceptable road traffic noise impact on NSRs.

4.3 Identification of Noise Sensitive Receivers

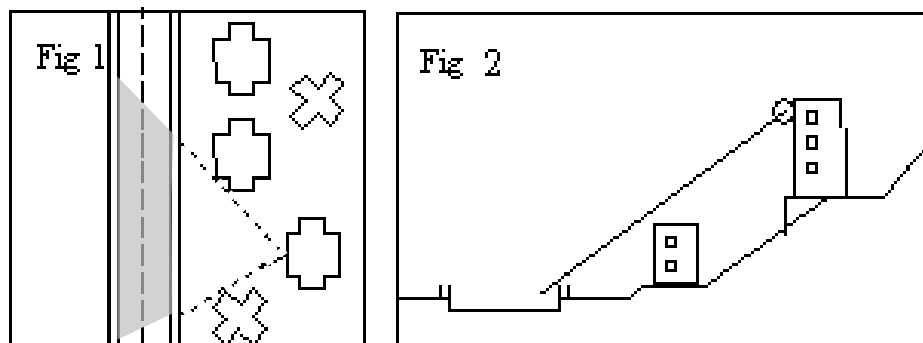
- 4.3.1 NSRs are defined under section 3 of Annex 13 of EIAO-TM and the NSRs should include existing, committed and planned uses at the time of the submission. According to section 3.5 of the EIAO-TM, the assessment shall be based on the best available information at the time of the assessment. Project proponents may need to consult relevant authorities, e.g. Planning Department, regarding the latest land use planning in the vicinity of their proposed project(s).
- 4.3.2 “Planned use”, as defined under Schedule 1 to the EIAO, means the land use proposed in the draft or approved plans prepared under the Town Planning Ordinance (Cap.131) or any other land use plans published by the Government. In this connection, the current Outline Zoning Plan (OZP), Development Permission Area Plans, Outline Development Plan, Layout Plan, any other statutory plans and any approved rezoning requests or section 16 applications for noise sensitive developments shall be referred to in searching for planned NSRs. Usually, zonings designated as “Residential”, “Commercial/Residential”, “Comprehensive Development Area”, “Village Type Development”, “Government, Institution or Community” and “Other Specified Uses (Comprehensive Development and Wetland Enhancement Area)” with allowed noise sensitive uses in the plans would be

considered as NSRs. The practitioner is required to note that there may be noise sensitive development in other types of zoning.

- 4.3.3 Photos of the existing NSRs should be taken and recorded in the RTNIA report for reference.

4.4 Selection of Assessment Points

- 4.4.1 Section 4.1.1 of the EIAO-TM requires a detailed assessment in quantitative terms and in qualitative terms of the likely environmental impacts and environmental benefits of the project. To this end, it is essential to ensure that sufficient assessment points which are able to represent all identified NSRs, and which are vulnerable to the change as stated in section 4.3.1(b)(ii) of the EIAO-TM, are selected. Examples in Figures 1 & 2 show some situations where NSRs behind the front layer of NSRs may not be protected against excessive road traffic noise impact.



Normally, the assessment points should be selected such that there exists at least one assessment point able to represent the noise level at each affected sensitive façade of every identified NSR for mitigated and unmitigated scenarios. For NSRs located close to or identified to be affected by the project but with no representative assessment point, detailed explanation should be provided to justify why they are not being included as assessment points (e.g. single aspect building, etc.).

- 4.4.2 For committed or planned NSRs where no development scheme is available, a practicable assumption for RTNIA should usually be made. Such assumption together with any constraints identified and mitigation measures required on the committed or planned land uses, such as setback of building, building orientation, extended podium, acoustic windows/balconies, etc. should be evaluated and confirmed with relevant parties including the Planning Department and Lands Department as per section 6.2 of Annex 13 of EIAO-TM, or concerned developers, e.g. the Hong Kong Housing Authority or Hong Kong Housing Society.

4.5 Determination of Assessment Year

- 4.5.1 Section 5.1 of Annex 13 of the EIAO-TM states that predictions shall normally be based on the design traffic conditions or the maximum traffic projections within 15 years upon operation of the road works or occupation of the noise sensitive receivers or uses, whichever appropriate. For example, for a Schedule 3 EIA project consisted of planned roads and residential developments, the starting year of the 15 years period should be either the commencement year of the road operation or the latest occupation year of the planned NSRs, whichever is the later. Alternatively, assessment of noise impact may also

be based on the maximum design traffic conditions/carrying capacity (*the design/capacity flow is defined under Transport Planning and Design Manual as the maximum volume of vehicles using the road without the traffic density becoming such as to cause unreasonable delay, hazard or restriction to the drivers freedom to manoeuvre, the design/capacity flow should be consulted or agreed with the relevant authority*) as the worst-case scenario according to section 4.3.1(b)(v) of the EIAO-TM.

- 4.5.2 There may be concerns that a speed lower than the specified speed limit should be adopted for RTNIA, as the specified speed limit may not be reached for the design or maximum traffic flow because of the speed/flow characteristics for the concerned sections of the road project. For such situations, the appropriate speed limit, with the relevant supporting information (*confirmed with the relevant authority*) on speed/flow relationship, should be adopted. In such circumstances, evaluations have to be made to assess whether there would be situations where the maximum road traffic noise impact occurs at a time other than the traffic reaching the maximum flow.

4.6 Validity of Traffic Data

- 4.6.1 According to section 4.4.2(b) of EIAO-TM, one of the factors for determining whether the quality of the EIA report would be adequate is to consider whether the assumptions, information and descriptions in the EIA report are appropriate and factually correct. Hence, it is essential to ensure the traffic data were reasonable and suitable for the purpose of the RTNIA. In this connection, the project proponent or the consultant need to consult and agree with the relevant authority, i.e. the Transport Department, on the adopted traffic data. The project proponent is required to spell out clearly in the EIA report the assumptions made for the traffic modeling in deriving the predicted traffic data. The project proponent could also make reference to the previously approved EIA reports according to section 11 of the EIAO-TM, in particular for relevant traffic data adopted for other planned or committed roads when considering cumulative impact stipulated under section 4.3.1(c)(ii) of the EIAO-TM.

4.7 Consideration of Noise Mitigation Measures

- 4.7.1 Section 4.3.1(d) of the EIAO-TM states that priority should be given to avoidance of impacts before considering measures to reduce or remedy the impacts. In this connection, due regards should be given to explore alternative options such as alternative alignment, alternative siting, alternative land use arrangement or building layout, and other practical options, etc.
- 4.7.2 Section 6.1, Annex 13 of the EIAO-TM states that where the predicted noise impacts exceed the applicable noise criteria, direct mitigation measures, such as treatment of source, application of low noise road surfacing, alternative land use arrangement, setback of buildings and screening by noise tolerant buildings, etc., shall be considered and evaluated in an appropriate manner. It should be noted that the road traffic noise impact can be alleviated or avoided by many approaches and the approach to avoid adverse traffic noise impacts through land use planning should be given priority. Examples of these approaches are:
- road alignment, i.e. providing distance separation between the noise sensitive receiver and the road;
 - traffic composition and volume, i.e. using traffic planning and management to

- control vehicle movements and type of vehicles at different time of the day; and
- line-of-sight, i.e. using noise-tolerant buildings and alternative building orientation to reduce the angle of view of noise sensitive receiver on road traffic and the exposed area of a development.

4.7.3 In evaluating the predicted noise impact, section 4.3.1(c)(ii) of the EIAO-TM requires the evaluation of the projected environmental conditions with the project in place and the sum total of the environmental impacts taking into account all relevant existing, committed and planned projects. According to section 3.5 of the EIAO-TM, the assessment shall be based on the best available information at the time of the assessment. Project proponents shall consult and agree with relevant authorities, e.g. the Planning Department, regarding the latest land use planning in the vicinity of their proposed project(s).

4.7.4 Section 4.3.1(c)(iii) of the EIAO-TM, requires the differentiation of the environmental impact caused by the project from other projects, and to what extent the project aggravates or improves the existing or projected environmental conditions.

4.7.5 According to section 4.4.3(a)(ii) of the EIAO-TM, it is also required to consider the extent to which the project would trigger or contribute to any cumulative environmental impacts when considered in conjunction with the existing or potential impacts from other projects.

4.7.6 Taking into the principles set out above, direct mitigation measures should be considered or proposed on the project road(s) under the subject DP if there would be adverse road traffic noise impact. If the NSRs are also affected by noise from other existing roads, direct mitigation measures are required to reduce the noise from the project road(s) to a level that it:

- (i) is not higher than the standard laid down in Annex 5 of the EIAO-TM; and
- (ii) has no significant contribution to the overall noise compared to other existing roads, if the cumulative noise level, i.e. noise from the project road(s) under the subject DP together with other existing roads, exceeds the standard.

4.7.7 It is considered that there will not be significant contribution to the cumulative road traffic noise impact (i.e. summation of road traffic noise from the project road(s) under consideration and the road traffic noise level due to roads other than the project road(s)) if noise from the project road(s) would not cause the overall road traffic noise level to increase by 1.0 dB(A) or more. Some examples on the situations are as follows:

Example 1: noise level from other existing roads = 75 dB(A)

Measures should be considered to mitigate the noise from the project road(s) to a level of about 68 dB(A) if the NSRs involved are residential premises.

Example 2: noise level from other existing roads = 78 dB(A)

Measures should be considered to mitigate the noise from the project road(s) to meet the planning standard of 70 dB(A) for residential use.

The direct mitigation measures listed under section 6.1 of Annex 13 of the EIAO-TM should be fully explored and evaluated with a view to reducing the traffic noise level at the NSRs concerned to the level meeting the relevant noise standard. Also, the feasibility, practicability, programming and effectiveness of the recommended mitigation measures should be assessed in accordance with section 4.4.2(k) of the EIAO-TM.

- 4.7.8 When considering barrier as noise mitigation measure, reference should be made to the “Guidelines on Design of Noise Barriers” jointly published by the EEPD and the Highways Department. The project proponent should specify the details of the barrier, e.g. form, height and configuration (and colour scheme if possible) in the EIA report.
- 4.7.9 Following the guiding principles set out in the LC Paper (no. CB(1)755/02-03(01)) prepared by ETWB in January 2003, sections of barriers proposed to protect existing NSRs should be differentiated from those for protection of future NSRs as the latter is only required to be constructed before the occupation of the planned NSRs. To facilitate the phased implementation of the barriers under this principle, a barrier inventory showing intended NSRs (i.e. existing NSRs and different planned NSRs) to be protected by different barrier sections (by how many dB(A) reduction) should be provided.
- 4.7.10 Section 4.4.2(f) and (k) of the EIAO-TM, also indicated that the mitigation measures considered should be practicable. In so far as practicability is concerned, consideration should be given to a number of factors including but not limited to engineering constraints, acoustic effectiveness (including noise levels and details with respect to the extent of the mitigation measure concerns and the NSRs intended to be protected), fire safety considerations, sightline and road safety considerations, landscape and visual impact, and public objections, etc.

4.8 Consideration of Indirect Mitigation Measures

- 4.8.1 Section 6.3 of Annex 13 of the EIAO-TM states that upon exhaust of direct mitigation measures, indirect mitigation measures in the form of window insulation and air-conditioning is often the “last resort” in an attempt to ameliorate the residual traffic noise impact.
- 4.8.2 On the eligibility testing criteria for indirect noise mitigation measures, the testing criteria are set out as below:
- (i) the predicted overall noise level from the road project together with other road traffic noise in the vicinity must be above the standard laid down in Annex 5 of the EIAO-TM;
 - (ii) the predicted overall road traffic noise level is at least 1.0 dB(A) more than the prevailing road traffic noise level, i.e. the total road traffic noise level existing before the works to construct the road were commenced; and
 - (iii) the contribution to the increase in the predicted overall road traffic noise level from the road project must be at least 1.0 dB(A).

4.9 Useful Points to Note in Conducting RTNIA

- 4.9.1 For some situations that site measurement is required to obtain the road traffic noise level, the consultant is required to agree the procedures and requirements with the Director of Environmental Protection (Director) prior to the commencement. **Annex I** briefly summarises the procedures and requirement to be met.

Environmental Protection Department

Date of Issue: December 2023

Procedures and Requirement on Measurement of Road Traffic Noise

The following only highlights the essential elements to be noted when measuring noise from an actual flow of traffic flow on a road. It is required to refer to the standard acoustic procedures and requirements.

1. Physical or weather conditions

- Measurements are only to be made when the road surface in the measurement area is dry;
- The average wind speed is not more than 2 m/s in the direction from the road to the assessment point;
- The wind speed at the microphone in any direction should not exceed 10 m/s;
- Wind shield is to be used.

2. Measuring equipment

- The equipment and the calibration device should shall be agreed with the Director;
- Class 1 equipment complying with IEC 61672-1 or 61672-2 or the equivalent is required;
- Immediately prior to and following each session of work the overall sensitivity of the electroacoustical system should be checked using an acoustic calibrator generating a known sound pressure at a known frequency. Measurements may be accepted as valid only if calibration levels agree within 1dB.
- To ensure overall measurement precision, within twelve months immediately prior to the measurement the overall system should have been directly compared with an independent reference system.
- Similarly, the output level of the acoustic calibrator should also have been checked by direct comparison with an independent reference device.

3. Measurement location:

- It is to be close to the road or at the required locations and other traffic (i.e. road traffic noise from road not under concern) or extraneous noise (e.g. construction noise) do not influence the measured noise;
- At 1.2 m above the road surface and no reflecting surfaces (other than the ground) within 15m of the microphone position;
- Unobstructed to the road under concern and should normally be not less than 4m but not more than 15 m from the nearside edge of the carriageway.

4. Measurement period

- The minimum measurement period (T_{\min}) to obtain a valid measurement is as follows:

$$T_{\min} = (4000/q + 120/r) \text{ min, where } q \text{ is traffic flow/hr and } > 100 \text{ veh/hr;}$$

$$\text{and } r \text{ is sampling rate and } > 5 \text{ samples/min}$$

and T_{\min} should not be less than 5 minutes

5. Traffic counts

- The measurements of traffic flow and composition should be concurrent with measurements of the traffic noise;
- The following data should be obtained for each bound of the carriageway;
 - The total no. of vehicles;
 - % of heavy vehicles (e.g. lorry, container truck, public light bus and bus);
 - Average traffic speed for each bound of carriageway (in case of different traffic speed limits for heavy vehicles, the average traffic speed for heavy vehicles should also be included).

6. Measurement report

To ensure the proper record and quality measurement, a report shall at least contain the following information:

- Date and time of the measurement;
- Personnel carrying out the measurement and the equipment used;
- Weather conditions (e.g. wind speed, any fog, rain, etc.);
- Locations of the measurement points;
- Traffic data, i.e. no. of vehicles passing over the measurement period, hourly traffic flow, % of heavy vehicles and average traffic speed, for each bound of each of the carriageway under consideration;
- Result of the measurement, attaching the printout of the noise measurement result from the sound level meters (SLM) with the serial number and model number of the SLM;
- Site survey photos showing the measurement points and surrounding environment;
- Survey maps showing the noise measurement point; and
- Any observation made by the personnel taking the measurement.