

Annex to Publication LU-131 Noise Assessment Criteria in Land Use Planning

October 1997

A.1. BACKGROUND

A.1.1 GENERAL

The goal of the Ontario Ministry of the Environment is to provide for the protection, conservation and wise management of the environment in Ontario and this goal is best accomplished by appropriate planning practices. The major objective of the planning process is to minimize the potential for conflict between proposed land uses and sources of pollution.

There are a number of alternatives available to ensure acceptable sound levels in communities; these range from legislation to specific methods describing how to measure, analyse and predict sound levels. Publication LU-131, Noise Assessment Criteria in Land Use Planning, contains the principles and criteria that have been established to implement the stated goal from the perspective of environmental noise. Compliance with the principles and criteria of Publication LU-131 does not provide an exemption from other relevant policies, criteria or guidelines for incompatible land uses. Publication LU-131 is supplementary to relevant policies and guidelines given in References [13], [14] and [15].

A.1.2 PLANNING PROCESS

In the context of land use planning, the mandate of the Ministry of the Environment is derived from two legislative acts, namely the Planning Act, Reference [5] and the Environmental Protection Act, Reference [6]. The Ministry's mandate covers sound, vibration, air quality, water quality and quantity, and servicing, including water, sewage, and waste management. The Ministry of the Environment is involved in the process of planning new sources of sound, such as industrial installations, as well as in the process of planning new noise sensitive land uses, such as residential subdivisions. For new sources of sound or for changes to existing sources of sound, the Ministry issues a Certificate of Approval providing the source is in compliance with the Ministry's guidelines. For noise sensitive land uses, the Ministry makes comments and recommendations on land use planning matters related to its mandate.

The Ministry of the Environment's involvement in land use planning is part of the Ministry's preventative approach to protecting the environment. By ensuring that environmental conflicts are identified and minimized at the earliest possible stage in a development proposal, the need for subsequent abatement controls is avoided. This early planning strategy facilitates cost effectiveness and maximizes the number of available planning or design options.

A.1.3 LEGISLATION

A.1.3.1 Planning Act

The Ontario Planning Act establishes the rules for land use planning in Ontario. The Act provides the basis for consideration of provincial interests related to municipal land use planning. It sets out the process for local planning administration, the preparation of municipal official plans to guide future development, the regulation of land use through zoning by-laws, the division of land into lots for sale by plan of subdivision, and the role of Ontario citizens and land owners in land use planning.

Section 3 of the Planning Act requires that, in exercising any authority that affects planning matters, planning authorities "shall have regard to" policy statements issued under the Act. The Policy Statement, Reference [13], issued under the authority of Section 3 of the Planning Act, provides direction on matters of provincial interest related to land use planning and development. Policy 1.1.3 g) of Reference [13] deals with the issues of land use compatibility and the effects of noise, and specifically states that:

Long term economic prosperity will be supported by planning so that major facilities (such as airports, transportation corridors, sewage treatment facilities, waste management systems, industries and aggregate activities) and sensitive land uses are appropriately designed, buffered and/or separated from each other to prevent adverse effects from odour, noise and other contaminants.

Section A.3.2.1 deals with the aircraft noise provision of policy 1.1.3 g) of Reference [13].

A.1.3.2 Environmental Protection Act

The Ontario Environmental Protection Act provides for the protection and conservation of the natural environment, which includes air, land and water. Under the legislation, no person shall, except under and in accordance with a valid Certificate of Approval, construct, alter, extend or replace any plant, structure, equipment, mechanism or thing that may discharge or from which may be discharged a contaminant into any part of the natural environment. In addition, no person shall discharge a contaminant or cause or permit the discharge of a contaminant into the natural environment that causes or is likely to cause an adverse effect. A contaminant for the purpose of the legislation means any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of these resulting from the human activities that may cause an adverse effect.

An adverse effect means:

- (a) impairment of the quality of the natural environment for any use that can be made of it,
- (b) injury or damage to property or to plant or animal life,
- (c) harm or material discomfort to any person,
- (d) an adverse effect on the health of any person,
- (e) impairment of the safety of any person,
- (f) rendering any property or plant or animal life unfit for use by man,
- (g) loss of enjoyment of normal use of property, and
- (h) interference with the normal conduct of business.

A.2. IMPACT ASSESSMENT AND MITIGATION

A.2.1 STATIONARY NOISE SOURCES

In view of the varied topographical and acoustical circumstances, the noise impact assessment of stationary sources of sound is unique, complex, and requires specialized technical calculation and/or measurement.

A.2.1.1 Interpretation

A stationary noise source is a source of sound which does not normally move from place to place. These types of sources are normally industrial or commercial establishments and ancillary transportation facilities. The specific noise producing equipment within these facilities include fans, blowers, generators, turbines, presses, forges, on-site trucks, bulldozers, loaders, or any combination of these or similar sources. Although some of these facilities may come under the federal jurisdiction, they have been grouped with the other stationary sources to provide consistency in the planning process.

In order to further clarify the scope of a stationary source of sound, the following list includes examples of installations, equipment, activities or facilities that are included and those that are excluded as stationary sources.

(a) Included Sources

Individual stationary sources such as:

- Heating, ventilating and air conditioning (HVAC) equipment;
- Rotating machinery;
- Impacting mechanical sources;
- Generators;
- Burners;
- Grain dryers.

Facilities, usually comprising many sources of sound. The stationary source is understood to encompass all the activities within the property boundary of the facility. The following are examples of such facilities:

- Industrial facilities;
- Commercial facilities;
- Ancillary transportation facilities;
- Aggregate extraction facilities;
- Warehousing facilities;
- Maintenance and repair facilities;
- Snow disposal sites;
- Routine loading and unloading facilities (supermarkets, assembly plants, etc.).

Other sources such as:

- Car washes;
- Race tracks;
- Firearm Ranges.

(b) Excluded Sources

Specific sources or facilities:

- Construction activities;
- Transportation corridors, i.e. roadways and railways;
- Residential air conditioning devices including air conditioners and heat pumps;
- Gas stations;
- Auditory warning devices required or authorized by law or in accordance with good safety practices;
- Occasional movement of vehicles on the property such as infrequent delivery of goods to convenience stores, fast food restaurants, etc.

Other noise sources, normally addressed in a qualitative manner in municipal noise by-laws:

- The operation of auditory signalling devices, including but not limited to the ringing of bells or gongs and the blowing of horns or sirens or whistles, or the production, reproduction or amplification of any similar sounds by electronic means;
- Noise produced by animals kept as domestic pets such as dogs barking;
- Tools and devices used by occupants for domestic purposes such as domestic power tools, radios and televisions, etc., or activities associated with domestic situations such as domestic quarrels, noisy parties, etc;
- Noise resulting from gathering of people at facilities such as restaurants and parks.

Activities related to essential service and maintenance of public facilities such as but not limited to roadways, parks and sewers, including snow removal, road cleaning, road repair and maintenance, lawn mowing and maintenance, sewage removal, garbage collection, etc.

A.2.1.2 Assessment

The impact assessment of noise produced by stationary sources is performed either by prediction or measurement. The noise impact assessment descriptor is the one hour equivalent sound level (L_{eq}), and the noise impact is evaluated at a point of reception. The measured or predicted sound levels have to be adjusted for special sound characteristics such as tonality, impulsiveness and cyclic variation in order to reflect the increased annoyance to such sounds.

It should be noted that in addition to the criteria contained in Publication LU-131, the feasibility of the development is also subject to the requirements of Reference [14] that deals with separation distances between sensitive land uses such as residential developments and Class I (light), Class II (medium) and Class III (heavy) industrial facilities.

A.2.1.3 Mitigation and Design Options

Where the noise impact exceeds the applicable criteria, mitigation is necessary. The mitigation measures may be implemented on the site of the noise sensitive land use or at the source. For stationary sources, contrary to the practice for transportation sources, the preferred and normally the most economical option is to implement noise control measures at the source, and thus reduce the noise emission. Nevertheless, an investigation should be undertaken to determine whether the measures are to be implemented at the source, receiver or both locations.

The general design principles that would allow for the juxtaposition of sensitive land uses and stationary sources can be described as follows:

- The building(s) closest to the stationary source to provide shielding for the remainder of the development;
- The building(s) closest to the stationary source to "face away" from the stationary source;
- The "exposed" side of the building(s) not to contain sensitive indoor spaces such as bedrooms and living rooms, only to include insensitive spaces such as corridors, washrooms, etc;
- No outdoor areas amenable for use on the "exposed" side of the building(s).

In the case of residential developments, single-loaded multi-unit residential buildings where the units are located on the side of the building facing away from the stationary source may present a solution.

Although it is the developer's responsibility to ensure that the applicable sound level criteria are met, a cooperative effort on the part of the developer and the stationary source owner is desirable for both parties. For the developer, cooperation will result in more economical control. For the owner of the source, there is a risk in refusing cooperation: Say the owner of the source chooses not to cooperate but the land is developed regardless and without the appropriate controls. This situation may result in complaints by the occupants of the new land use and possible action by the authorities against the owner of the source.

A.2.1.4 Stationary Sources and Air Conditioning

Fundamentally, the use of air conditioning is an inferior and generally inappropriate means of noise mitigation. The following provides an explanation of this position:

- Air conditioning in itself is not a noise control measure. The use of air conditioning allows windows and doors to remain closed, and it is the closed windows and doors that provide the means for reducing the sound levels. Consequently, the requirement for air conditioning is in fact a requirement for closed

windows. When the windows remain closed, the indoor sound levels are acceptable but the occupants must keep the windows closed to maintain an acceptable acoustic environment.

- The use of air conditioning provides no protection for the outdoor areas and its operation often significantly increases the outdoor sound levels. In addition, this device consumes energy throughout its utilization.
- If air conditioning were to be used as a noise control measure, sensitive land uses could be placed immediately adjacent to industrial facilities (providing they are designed with protected indoor spaces). Such planning is contrary to the stated land use compatibility policies of this Ministry, which regard the juxtaposition of sensitive land uses and industrial facilities as inappropriate, Reference [14].

As a result of the above description, this Ministry does not generally accept the use of air conditioning in the context of controlling the noise from stationary sources. The exceptions to the above position, when air conditioning may be acceptable, are described below:

- Central air conditioning could be an acceptable means of mitigation in facilities such as hospitals or similar institutional uses, which are designed with air conditioning as the primary means of ventilation;
- Central air conditioning in conjunction with sealed (inoperable) windows may, in some cases, be also considered as a possible mitigation option for high-rise multiple-unit residential uses, particularly if these uses were deemed to be temporary residential uses. The appropriateness of air conditioning and sealed windows as mitigation measures in such uses would need to be assessed on an individual basis.

The use of central air conditioning as a noise mitigation measure in the above cases may or may not be acceptable. The following presents some of the factors based on which the acceptability of central air conditioning should be judged:

- sound level in the plane of a window; the higher the sound level excess above the plane of a window criteria, Sections 4.5 and 4.7, the less appropriate is the use of central air conditioning as a means of mitigation;
- potential effect on the operation of the stationary source (industry) such as possible interference with the industry's ability to obtain Certificates of Approval (Air) under Section 9 of the Environmental Protection Act; the higher the probability of affecting the operation of the stationary source (industry), the less appropriate is the use of central air conditioning as a means of mitigation;
- the type of area; a high rise development in an area which is undergoing a transition from industrial to residential is more compatible with the use of central air conditioning.

The plane of a window criteria of Sections 4.5 and 4.7 do not apply if the air conditioning is found acceptable.

When dealing with developments adjacent to transportation corridors, roads and railways, and airports, this Ministry accepts closed windows, along with a requirement for central air conditioning, as a means of mitigation. The acceptance of central air conditioning in these situations is a compromise solution, recognizing that other mitigation measures are unavailable. Also, from the land use compatibility perspective, sensitive land uses and transportation corridors are generally more compatible than sensitive land uses adjacent to industries.

A.2.1.5 Stationary Sources and Sealed Windows

This Ministry does not generally accept the use of sealed (inoperable) windows as a noise mitigation measure. Where sealed windows are used as a result of other requirements, the Ministry shall assume that for the purpose of noise impact assessment, these windows are in fact openable (operable); exceptions to this position are described in Section A.2.1.4. The following provides a justification of this position:

- A mitigation measure must be a long term, preferably permanent, solution to the noise impact problem. As inoperable windows can be easily replaced by operable windows for a relatively low cost, this measure can only be considered as temporary.
- The land use compatibility reasoning that describes the Ministry's position with respect to the use of air conditioning is also applicable to the case of sealed windows. The use of sealed windows would

encourage development of sensitive land uses adjacent to industrial facilities and such planning is contrary to this Ministry's land use compatibility policies.

A.2.1.6 Predictable Worst Case Impact

The assessment of noise impact requires the determination of the "predictable worst case" impact. The "predictable worst case" impact assessment should establish the largest noise excess produced by the source over the applicable limit. The assessment should reflect a planned and predictable mode of operation based on routine activities that occur within the scope of the stationary source.

It is important to emphasize that the "predictable worst case" impact does not necessarily mean that the sound level of the source is highest; it means that the excess over the limit is largest. For example, the excess over the applicable limit at night may be larger even if the day-time sound level produced by the source is higher.

A.2.2 ROAD TRAFFIC NOISE

The assessment of road traffic noise impact is evaluated by prediction using statistically averaged road traffic information, the higher of the AADT (Annual Average Daily Traffic) or SADT (Summer Average Daily Traffic). The prediction method for road traffic noise, recommended by this Ministry, is a method entitled ORNAMENT, Ontario Road Noise Analysis Method for Environment and Transportation, published in 1989, Reference [3], and the descriptors are the 24-hour equivalent sound level, L_{eq} (24) for freeways, and the 16-hour day-time and the 8-hour night-time equivalent sound levels, L_{eq} (16) and L_{eq} (8), for other roads.

In order to comply with the Ministry's guidelines, the predicted noise level is to be assessed in an Outdoor Living Area, such as a rear yard or a patio, and in Indoor Living Areas, such as bedrooms and living rooms. Where the noise impact exceeds the applicable criteria, warning clauses and mitigation measures such as site planning, architectural design, noise barriers, special building components and/or central air conditioning may be necessary. No noise control measures are required if the sound level estimated in the Outdoor Living Area is 55 dBA or less during the day-time and 50 dBA or less in the plane of bedroom windows during the night-time.

A.2.3 RAIL TRAFFIC NOISE

The assessment of rail traffic noise impact is performed using a prediction method entitled STEAM, Sound from Trains Environmental Analysis Method, published in 1990, Reference [4]. The descriptors used in the assessment are the 16-hour day-time and the 8-hour night-time equivalent sound levels, L_{eq} (16) and L_{eq} (8).

The impact of railway traffic noise and the requirement for control measures are assessed similarly to the road traffic noise. The noise level is to be assessed in an Outdoor Living Area, such as a rear yard or a patio, and in Indoor Living Areas, such as bedrooms and living rooms, and compared with the Ministry's guidelines. No noise control measures are required if the sound level estimated in the Outdoor Living Area is 55 dBA or less during the day-time and 50 dBA or less in the plane of bedroom windows during the night-time.

The outdoor noise impact is assessed in the Outdoor Living Area during day-time hours, 07:00 to 23:00, considering a combination of only two sources of rail traffic noise, namely the locomotive and the wheel-rail interaction. Whistle noise is not included in the outdoor noise impact assessment. The indoor noise impact is assessed in sleeping quarters during night-time hours, 23:00 to 07:00, and in living rooms or similar areas during day-time hours, 07:00 to 23:00. The assessment must consider the combination of all three railway noise sources, i.e. locomotive, wheel-rail and whistle.

The characteristic of railway noise is its high pass-by sound level for short periods and a major low frequency component produced by the operation of the diesel locomotive. This special character of the sound needs to be taken into account, particularly when assessing the indoor sound levels. Consequently, in order to account for

the special character of railway sound, the indoor sound level criteria, Table 2, are 5 dB lower than the indoor sound level criteria for road traffic noise. This difference results in a requirement for acoustically better architectural components such as windows and walls.

A.2.4 AIRCRAFT NOISE

The Ministry assesses the impact of aircraft noise on planned noise sensitive land uses and the suitability of development. The noise impact assessment is based on the NEF/NEP contours, approved by Transport Canada.

The NEF rating is based on the Effective Perceived Noise Level (EPNL) which is given by the Perceived Noise Level (PNL), adjusted for the duration of fly-over and the presence of discrete tones. The PNL is the maximum perceived noise level calculated from the third octave band noise levels. The NEF value is then calculated from the EPNL for each fly-over, the number of fly-overs and adjustments for day-time and night-time operations. The NEP is similar to the NEF with the exception that the NEP uses a longer time frame. Neither NEF nor NEP can be measured directly and can only be calculated from measured quantities.

Where the noise impact exceeds the applicable criteria, warning clauses and mitigation measures for indoor spaces such as architectural design, special building components and/or central air conditioning are necessary. The indoor NEF/NEP values, specified in Tables 4 and A-2, are related to the actual "outdoor" values and their difference accounts for the acoustical insulation provided by the building. The indoor NEF values are calculated by converting the indoor sound levels, expressed as $L_{eq}(24)$ (dBA), using the expression $NEF = L_{eq}(24) - 31$ dBA.

A.3. NOISE ASSESSMENT CRITERIA

The criteria in Publication LU-131 have been designed to minimize the adverse effects of noise; they are intended to assist in the planning of land uses where noise may have a potential impact on future occupants. People's response to noise depends not only on a person's physiological reaction to the sound but on a number of other factors including the type of noise source, the character of the sound, and the community's as well as the individual's economic and social relationship to the source.

Two basic philosophies exist for establishing environmental noise criteria:

- Relative criterion, where the acceptable sound level of the source under investigation is related to (and limited by) the background sound level. The primary reference for this type of criterion is the work performed in the nineteen sixties by the National Physical Laboratory in the United Kingdom and, subsequently, the standards published by the International Organization for Standardization, ISO R-1996.¹
- Absolute criterion, where the acceptable sound level is given by an absolute sound level limit. The primary reference for this type of criterion is the work of the United States Environmental Protection Agency, conducted in the early nineteen seventies.²

The foremost advantage of the relative method is that it is more directly related to human annoyance. The principal advantage of the absolute method is its simplicity of application. The relative approach is most appropriate in situations where there is an identifiable difference between the background noise and the noise of the source under investigation. In view of the fact that the background noise is generally caused by road traffic, this approach cannot be applied to establish criteria for road traffic, as there is no clear difference between the two cases. The absolute method is best applied in situations where the noise impact is caused by a "general,

¹ ISO R-1996, Assessment of Noise with Respect to Community Response, 1971.

² US EPA, Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, Report No. 550/9-74-004, 1974.

prevailing" noise and where a simple assessment method is required. This method provides the same "yardstick" for all situations and does not account for a variance in people's response to different noise or circumstances.

Both of the above two approaches to establishing noise criteria are correct and their suitability depends on circumstances such as the type of noise and the character of the community. Consequently, this Ministry as well as other agencies resolved to use both the relative and the absolute methods, and utilize them in conditions for which they are most suitable. In fact, the MOE has been successfully using both these methods since the late nineteen seventies. The absolute method has been adopted by this Ministry to assess the impact of road traffic and other transportation sources; the relative method has been adopted by this Ministry to assess stationary sources of sound such as industrial sources.³

Certain generalizations can be made about the differences in people's response to noise from stationary sources and transportation sources. People are typically more annoyed by noise from stationary sources because they perceive that practical alternatives are available to reduce or eliminate the noise at the site of the stationary source. Furthermore, tolerance of the source, which is usual for road traffic due to its general usefulness to the community, is very uncommon in the case of stationary sources of sound. The other aspects associated with the operation of stationary noise sources which contribute to adverse community reaction include the conveyance of a message of fear, a startle effect or a reminder of other adverse environmental effects.

A.3.1 CRITERIA FOR STATIONARY NOISE SOURCES

In principle, noise produced by stationary sources is annoying when it is heard over and above the level of the "background" or surrounding environmental noise climate. The noise impact of stationary sources is therefore expressed as the difference between noise from the source and the background noise.

A.3.1.1 Application of Criteria

The sound level criteria for stationary noise sources in Tables 5, 6 and 7 are given in terms of minimum values, such as 50 or 45 dBA, that may be adjusted up to the level of the road traffic noise at that location. This implies that if the minimum hourly $L_{eq}(1)$ during time period in question, 19:00 to 23:00 for example, is 51 dBA, the sound level criterion becomes 51 dBA instead of 45 dBA. It should be emphasized that the noise of rail traffic and air traffic is not considered to contribute to the "background" sound level and, therefore, cannot be used to adjust the sound level criteria.

The outdoor sound level criteria, Section 4.4, apply to an outdoor point of reception at any location in any usable area. Where it can be clearly demonstrated that the area in question is not a usable area, being too small or unsuitable for use for example, the criteria need not be applied.

The plane of a window sound level criteria, Section 4.5, apply to a location in the plane of any window in living/dining areas (living rooms, dining rooms, eat-in kitchens, etc.) during day-time, and to bedrooms during night-time. The criteria need not be applied to windows in other areas such as staircases, corridors, bathrooms, closets, utility rooms, etc. In cases where central air conditioning is found as an acceptable mitigation measure, see Section A.2.1.4, the plane of a window sound level criteria do not apply.

The Ministry may in individual cases allow a certain latitude in the application of sound level criteria. However, this latitude will only be considered in cases where it can be clearly demonstrated that it is not technically feasible to achieve the criteria, and that it is not precedent setting for other cases.

³ The absolute method has also been adopted to assess the impact of impulsive noise produced by metal working operations, based on research performed by this Ministry; see *Impulsive Noise from Forging Operations, Reaction of Some Communities in Ontario*, Ontario Ministry of the Environment, 1979.

- Flexibility may be used in assessing the noise impact from a stationary source that exceeds the sound level criteria in the plane of a window, given in Tables 6 and 7 of Section 4.5. The Ministry may accept a marginal excess not exceeding 5 dB;
- In some cases, the maximum hourly sound level produced by the stationary source is lower than the long term average of the background sound level, but is higher than the lowest hourly background sound level. In addition, the operation of the stationary source is intermittent so that the potential of the maximum hourly stationary source sound level coinciding with lowest background hourly sound is very low. In such cases, the Ministry may allow a certain latitude in assessing the impact of the stationary source and accept a marginal excess over the sound level criteria;
- The Ministry may use some flexibility in assessing the impact from a stationary source that operates for only a very limited period of time within a year. For example, if the operation produces a noise impact within a period of only one or two weeks in one year, the Ministry may accept a marginal excess.

A.3.2 CRITERIA FOR TRANSPORTATION NOISE SOURCES

The sound level criteria for transportation sources are based on sociological surveys of large numbers of people and represent what is considered to be the onset of significant degradation of the noise environment relative to the expectations of the general population. The outdoor sound level criteria represent the beginning of a significant interference with normal conversation. The indoor sound level criteria reflect potential commencement of sleep interference; they also ensure a comfortable indoor living environment.

Transportation noise in general and road traffic noise in particular is the main contributor to the environmental noise climate in Class 1 Areas. Despite the prevalence of road traffic noise in a community, people exposed to it develop a tolerance of the noise because they recognize the usefulness of this mode of transportation.

A.3.2.1 Application of Criteria

The transportation noise criteria apply to the development of noise sensitive land uses affected by noise produced by road, rail and aircraft traffic. Recognizing the variation of human response to transportation noise and, at the same time, the possible difficulties of implementing noise control measures in some situations, the Ministry allows a certain flexibility in the transportation sound level criteria in the Outdoor Living Areas. The application and the allowable flexibility of the criteria is described below.

In case of a marginal excess over the criteria, the prospective occupants of the new land use should be notified by means of a warning clause. This clause should be included in the Agreements of Purchase and Sale, and incorporated into the Development Agreements which are registered on title of the property.

(a) Road and Rail

Reference [1] provides assessment details. If the day-time sound level in the Outdoor Living Area is 55 dBA or less and the night-time level in the plane of bedroom windows is 50 dBA or less, no further assessment is required.

Where it can be clearly demonstrated that it is not technically feasible to achieve the Ministry's outdoor sound level criterion for road and rail traffic, a tolerance not more than 5 dB above the stated criteria may be allowed, providing the prospective occupants of the new land use are notified by means of a warning clause. The tolerance, and the accompanying warning clause, is only allowable in conjunction with the sound levels in the Outdoor Living Area; the tolerance is not allowable for the indoor sound level criteria.

(b) Aircraft

Policy 1.1.3 g) of Reference [13] states:

1. *New residential development and other sensitive land uses will not be permitted in areas near airports above 30 NEF/NEP, as set out on maps (as revised from time to time) approved by Transport Canada; but*
2. *Redevelopment of existing residential uses and other sensitive land uses or infilling of residential and other sensitive land uses may be considered above 30 NEF/NEP if it has been demonstrated that there will be no negative impacts on the long term function of the airport.*

If the outdoor NEF/NEP value is less than 25, no further assessment is required. If the proposed development is located within the NEF/NEP contour of 25, there are requirements for appropriate ventilation, acoustically designed building components and warning clauses for prospective occupants, as specified in Reference [1].

If the municipality, in accordance with Reference [13], approves the development in the NEF/NEP range above NEF/NEP 30, the noise sensitive land uses should be provided with acceptable ventilation, acoustically designed building components and warning clauses for prospective occupants, as specified in Reference [1].

A.4. SUPPLEMENTARY NOISE CRITERIA

Criteria for noise sensitive land uses that are assessed by the Ministry are specified in the main body of Publication LU-131, Tables 2 and 4. The following Tables A-1 and A-2 are an extended version of Tables 2 and 4, and present guidelines for acceptable indoor sound levels that are applicable to developments which may not be assessed by this Ministry. The specified values are minimum requirements and apply to the indicated indoor spaces with the windows and doors closed. The criteria in Tables A-1 and A-2 are presented by this Ministry as good design objectives.

TABLE A-1
Indoor Sound Level Criteria
Road and Rail

Type of Space	L_{eq} (Time Period) (dBA)	
	Road	Rail
General offices, reception areas, retail stores, etc. (Time period: 16 hr, 07:00 - 23:00)	50	45
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, day-care centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc. (Time period: 16 hr, 07:00 - 23:00)	45	40
Sleeping quarters of hotels/motels (Time period: 8 hr, 23:00 - 07:00)	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc. (Time period: 8 hr, 23:00 - 07:00)	40	35

TABLE A-2
Indoor Aircraft Noise Criteria (Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
General offices, reception areas, retail stores, etc.	15
Individual or semi-private offices, conference rooms, etc.	10
Living/dining areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, day-care centres, places of worship, etc.	5
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	0

* The Indoor NEF/NEP values listed in Table A-2 are not obtained from NEF/NEP contour maps. The values are representative of the indoor sound levels and are used as assessment criteria for the evaluation of acoustical insulation requirements, see Reference [1].

A.5. DEFINITIONS

Construction

"construction" includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, moving, land clearing, earth moving, grading, excavating, the laying of pipe and conduit whether above or below ground level, street and highway building, concreting, equipment installation and alteration and the structural installation of construction components and materials in any form or for any purpose, and includes any work in connection therewith; activities associated with the operation at waste and snow disposal sites are excluded;

Construction Equipment

"construction equipment" means any equipment or device designed and intended for use in construction, or material handling, including but not limited to, air compressors, pile drivers, pneumatic or hydraulic tools, bulldozers, tractors, excavators, trenchers, cranes, derricks, loaders, scrapers, pavers, generators, off-highway haulers or trucks, ditchers, compactors and rollers, pumps, concrete mixers, graders, or other material handling equipment;

Conveyance

"conveyance" includes a vehicle and any other device employed to transport a person or persons or goods from place to place but does not include any such device or vehicle if operated only within the premises of a person;

Highway

"highway" includes a common and public highway, street, avenue, parkway, driveway, square, place, bridge, viaduct or trestle designed and intended for, or used by, the general public for the passage of vehicles;

Motor Vehicle

"motor vehicle" includes an automobile, motorcycle, and any other vehicle propelled or driven otherwise than by muscular power, but does not include the cars of diesel, electric or steam railways, or other motor vehicles running only upon rails, or a motorized snow vehicle, traction engine, farm tractor, self-propelled implement of husbandry or road-building machine within the meaning of the Highway Traffic Act;

Motorized Conveyance

"motorized conveyance" means a conveyance propelled or driven otherwise than by muscular, gravitational or wind power.