

**CITY OF TSHWANE
NOISE MANAGEMENT POLICY**

**APPENDIX G:
ADDITIONAL NOISE STANDARDS**

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Noise standards not dealt with in other sections of this Policy are provided in this Appendix. Three categories of noise standards are reviewed, namely:

- Noise standards related to railway noise.
- Assessment criteria for ground-borne (re-radiated) noise impact.
- Guideline assessment criteria for construction noise impact.

G1. STANDARDS RELATED TO RAILWAY NOISE

G1.1. South Africa

As there are no railway related noise impact criteria and standards in South Africa it has been necessary for this project to review the situation and to make recommendations for appropriate standards to be used as the reference base. The following were some of the basic considerations for the recommended:

- i) The noise impact standards needed to be realistic.
- ii) The railway noise impact criteria needed to take into consideration the underlying rationale of the Gauteng and North West Provinces' Noise Control Regulations in order to allow for their future assimilation into these Regulations with minimal, if any, changes.
- iii) International railway noise criteria have been tested in practice and are considered to be applicable as the basis for the recommendations.

The following South African legislation (Acts, Regulations and Codes of Practice) form the noise related legislative background that has been used to guide the formulation of the railway noise impact criteria:

- Environment Conservation Act, 1989 (Act No 83 of 1989).
- Environmental Management Policy for South Africa.
- Bill of Rights in the Constitution of the Republic of South Africa Act, 1996 (Act No 108 of 1996).
- National Environmental Management Act (Act No. 107 of 1998).
- The Standards Act, 1982 (Act No 30 of 1982).
- The Occupational Health and Safety Act, 1993 (Act No 85 of 1993).
- National Transport Policy.
- The Environmental Impact Assessment (EIA) Regulations.
- Noise Control Regulations (Gauteng Provincial Government), August 1999.
- South African National Standard SANS 10103:2003, *The Measurement and Assessment of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication*.
- South African National Standard SANS 10328:2003, *Methods for Environmental Noise Impacts*.
- International Standards Organisation Code of Practice ISO 3095, *Measurement of Noise Emitted by Railbound Vehicles*.

Although there are references to railway noise in the South African legislation (either directly or implied) this is non-specific. There are also conflicts in this legislation on the requirements for

environmental impact assessments of railway projects in general versus the requirements for the noise impact assessment of such projects, namely:

- i) The EIA Regulations identify *railways* as an *activity with the potential for a substantial detrimental effect on the environment* and the construction of any new facility will require a comprehensive environmental investigation. Refer to Schedule 1, Item 1(d) of the Regulations.
- ii) The Gauteng and North West Provinces' Noise Control Regulations, however, either explicitly or by omission exclude railways as an aspect for consideration in the management and control of noise by the Province itself or the local authorities within their respective areas of jurisdiction. This may be due to the fact that the former South African Transport Services operated from a National para-statal level. It should be noted that the National Noise Control Regulations, even before being devolved to provincial level, also did not deal with railway noise issues.

G1.2. International Railway Noise Impact Criteria

The current approach taken to determining land use noise impact criteria as related to rail transport in the United Kingdom (UK), European countries, the United States of America (USA), Australia, Japan, Korea and Hong Kong are all similar in that the *noise sensitivity* of various land use type areas are used to provide the primary indicator of an acceptable noise impact level. Specific maximum noise levels (L_{\max}) or sound exposure levels (SEL) and equivalent noise levels (L_{Aeq}) for given periods of the day as related to these noise sensitive areas are specified. These time periods normally relate to a daytime and a night-time period, although an evening period is also used as a control period in some countries.

Railway noise level impact criteria have been legislated or specified in all the aforementioned countries and these are indicated in Table G1. All the values given are exterior noise levels at the receptor sites.

G1.3. Recommended Railway Noise Impact Criteria

The basic rationale behind the proposed railway noise impact criteria is one that will ensure the adequate protection of existing sensitive land uses. At the same time these criteria should be of a nature that will not detract from stimulating a complementary land use change along and within the area of influence of the railway corridors.

These criteria are focussed directly on the land use component and thus only indirectly on the train, track and infrastructure technical specifications, and the operational specifications. Noise emissions from the train will however need to be of an appropriately low value to meet the land use noise impact criteria either directly or by means of the implementation of appropriate attenuation measures in the intervening ground between track and noise sensitive receptor sites.

TABLE G1: RAILWAY NOISE IMPACT CRITERIA

COUNTRY	PERIOD (T)	L_{Amax} (dBA)	L_{Aeq,T} (dBA)
Australia	06h00 – 06h00	85	60
Austria	06h00 – 22h00 22h00 – 06h00		60 50
Denmark	06h00 – 06h00	88	60
France	06h00 – 22h00 22h00 – 06h00		60 55
Germany	06h00 – 22h00 22h00 – 06h00		59 49
Hong Kong	07h00 – 23h00 23h00 – 07h00		65 - 70 55 - 60
Italy	06h00 – 22h00 22h00 – 06h00		55 45
Japan	07h00 – 22h00 22h00 – 07h00	70 70	60 55
Netherlands	07h00 – 19h00 19h00 – 23h00 23h00 – 07h00	73 73 73	55 (60) 50 45 (50)
Norway	06h00 – 06h00		60
South Korea	06h00 – 22h00 22h00 – 06h00		65 55
Sweden	06h00 – 06h00		63
Switzerland	06h00 – 22h00 22h00 – 06h00		55 – 60 45 – 50
UK	06h00 – 24h00 24h00 – 06h00	85 85	68 63
USA	1hr 06h00 – 06h00		67 55 (L _{dn})

The following maximum sound pressure levels are therefore proposed as the railway noise impact criteria for the defined noise sensitive land uses along the project corridors with the railway reserve boundary (that is at the interface between the reserve and the first row of impacted properties) as reference control point:

Period of Day (T)	L_{Aeq,T} (dBA)	L_{Amax} (dBA)
• 06h00 – 22h00 (daytime/evening):	60	85
• 22h00 – 06h00 (night-time):	50	85

The defined noise sensitive areas are:

- i) Outdoor noise sensitive areas:
 - Parks.
 - Historic sites used for interpretation.
 - Amphitheatres.
 - Recreation areas.
 - Playgrounds.
 - Cemeteries.
- ii) Residences:
 - Single family residences.
 - Multifamily residences (apartment buildings, simplex and duplex housing complexes).
- iii) Indoor noise sensitive areas:
 - Places of worship.
 - Educational facilities (schools, universities, technicons, other places of instruction).
 - Creches.
 - Hospitals/hospices.
 - Concert halls/auditoriums/theatres.
 - Libraries.
 - Recording/broadcast studios.
 - Museums and specific historic buildings.
 - Hotels/motels/B&B establishments.

G2. ASSESSMENT CRITERIA FOR GROUND-BORNE (RE-RADIATED) NOISE IMPACT

Ground-borne noise is a direct result of ground-borne vibration. The ground-borne noise impact criteria used in the USA are as indicated in Table G2.

TABLE G2: GROUND-BORNE NOISE IMPACT CRITERIA

Land Use Type/ Type of Building or Room	Ground-borne Noise Impact Level (dBA)	
	Frequent Events	Infrequent Events
Residences and buildings where people normally sleep	35	43
Institutional land uses with primarily a daytime use	40	48
Buildings where vibration could interfere with interior operations	N/A ^(a)	N/A ^(a)
Concert halls	25	25
TV and recording studios	25	25
Auditoriums	30	38
Theatres	35	43
Notes: i) <i>Frequent Events</i> is defined as more than 70 vibration events per day. ii) <i>Infrequent Events</i> is defined as fewer than 70 vibration events per day. iii) (a) Vibration-sensitive equipment is not sensitive to ground-borne noise.		

The reason why the limits for ground-borne noise impact criteria are set at lower (more stringent) levels than those for the airborne noise is that, in using the A-weighted sound level (the only effective descriptor of community noise assessment), sounds dominated by low frequency components (as is typical of ground-borne noise) are perceived to be louder than broadband sounds that have the same A-weighted level.

B5. GUIDELINE ASSESSMENT CRITERIA FOR CONSTRUCTION NOISE IMPACT

Construction sites have special characteristics compared with other major noise generators. Construction is in the open, is usually of a temporary duration, and the noise is produced by several different types of noise source. Noise levels created by operating construction equipment can vary greatly and depend on factors such as type of equipment, the specific model, the operation being performed, and the condition of the equipment. The equivalent sound level of the construction activity also depends on the fraction of time that the equipment is operated over the time period of construction. Construction equipment operates in two modes, namely stationary and mobile. Stationary equipment operates in one place for one or more days at a time, with either fixed power operation (pumps, generators, compressors) or a variable noise operation (pile drivers, pavement breakers). For these, noise is assumed to emanate from a

single point of operation. Mobile equipment moves around the construction site with power applied in a cyclic fashion (bulldozers, loaders), or to and from the site (trucks).

Besides having daily variations in activities, major construction is accomplished in several different phases with each phase having a specific equipment mix dependant on the work to be accomplished during that phase.

There are no standardised criteria for assessing construction noise impact and consequently such criteria must be determined on a project specific basis. Once construction methods for the project are finally identified, the situation to limit the noise impact will need to be reviewed. The project construction noise criteria should take into account the existing noise environment, the absolute noise levels during construction activities, and the adjacent land use. The following provide guidelines as to the criteria that practically should be considered for this project.

In the USA, the criteria that are suggested as the basis of assessment of construction noise impact are given in Table G3 (General Assessment Criteria) and Table G4 (Detailed Assessment Criteria).

TABLE G3: CRITERIA FOR GENERAL ASSESSMENT OF CONSTRUCTION NOISE

Land Use	One-hour L_{Aeq} (dBA)	
	Day	Night
Residential	90	80
Commercial	100	100
Industrial	100	100

Note: Estimate of combined noise level of the 2 noisiest items of plant on site operating at the same time over 1-hour period.

TABLE G4: CRITERIA FOR DETAILED ASSESSMENT OF CONSTRUCTION NOISE

Land Use	8-hour L_{Aeq} (dBA)		L_{dn} (dBA)
	Day	Night	30-day A_v
Residential	80	70	75 ^(a)
Commercial	85	85	80 ^(b)
Industrial	90	90	85 ^(b)

Notes:

(a). In urban areas with very high ambient noise levels ($L_{dn} > 65\text{dB}$), L_{dn} from construction noise should not exceed existing ambient by +10dB.

(b). 24-hour L_{Aeq} not L_{dn} .

The following are recommended:

- i) The USA criteria should be used as guidelines for assessing impact.
- ii) Specific noise sensitive land uses will need to be taken into account in the construction programme.
- iii) Construction times on surface in general should for noisy activities be limited to the hours between 06h30 and 20h00 on weekdays and between 07h00 and 14h00 on Saturdays. No noisy construction work should be allowed in noise sensitive areas on Sundays. Quiet construction activities would be allowed at all times.
- iv) Night-time construction may be allowed in areas where impact is limited.
- v) The effect of the selected tunnelling construction method on the noise climate should be adequately assessed before allowing construction activities outside the hours indicated for surface construction.