Woodlawn Mechanical Biological Treatment Facility

Project Approval (06_0239)

Condition 28 - Noise Audit Report

Report Number 610.17454-R01

30 November 2017

Veolia Environmental Services (Australia) Pty Ltd

Cnr Unwin and Shirley Streets

Rosehill NSW 2142

Version: v1.0

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PREPARED BY:

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
2 Lincoln Street
Lane Cove NSW 2066 Australia
(PO Box 176 Lane Cove NSW 1595 Australia)
+61 2 9427 8100 +61 2 9427 8200
sydney@slrconsulting.com www.slrconsulting.com

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.17454-R01-v1.0	30 November 2017	John Sleeman	Glenn Thomas	John Sleeman

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Veolia Environmental Services (Australia) Pty Ltd (Veolia) to conduct a noise audit of the Woodlawn Mechanical Biological Treatment Facility (MBTF). Project Approval (06_0239) for the MBTF was granted by the then Minister for Planning on the 6 November 2007 under Section 75J of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the development of the MBT.

Project Approval (06_0239) Condition 28 requires Veolia to prepare a noise audit within 3 months of commencement of operations, or as directed by the Director-General. Condition 28, states:

> ***Monitoring***
>
> *Within 3 months of commencement of operations, or as directed by the Director-General, the Proponent shall:*
>
> *a) commission a suitably qualified and experienced expert whose appointment has been approved by the Director-General to audit the noise generated by the project during normal operations against the noise and road traffic noise criteria in this approval;*
>
> *b) send a copy of the audit report to the Department and DECC within 7 days of completion of the audit.*

Noise monitoring surveys have been conducted at the noise assessment locations identified as the nearest residences on privately owned land as specified in the Project Approval Condition 25, and the results compared with the noise criteria nominated in the approval.

All noise levels presented in this report are in dBA re 20 micro Pascals (μPa)

Acoustic Terminology used in the report is provided in **Appendix A**.

2 SITE DESCRIPTION

Veolia owns and operates the Woodlawn MBTF, which is located adjacent to and north of the old Woodlawn mine, being approximately 8.5 km West of Tarago and 50 km south of Goulburn NSW, as illustrated in **Figure 1**. Adjacent to and south of the old Woodlawn mine is located the Veolia Bioreactor and Bio Energy power station.

The Woodlawn MBTF is located in an undulating rural setting. To the northeast of the MBTF site the topography rises to a high point of 1000 metres (m) AHD falling away to a height of 690 m AHD to the south-west. To the south-east of the MBTF and directly south of the old Woodlawn mine void, a topographic ridge extends to a height of 880 m AHD, upon which several wind turbines are located. Beyond this, the land falls away to a height of 740 m AHD.

The nearest privately-owned residential receivers to the MBTF are: *Willeroo* 4.4 km to the north-west; *Torokina* 3.1 km to the south-west; and *Pylara* is owned by Veolia 5.6 km to the south-east, and representative of the nearest residence to the road between the Crisps Creek Intermodal Terminal and the site access road.

2.1 Operations

Waste from the Sydney Metropolitan Area is transported by container on rail to the Crisps Creek Intermodal Terminal, located 7 km to the south-east of the MBTF, where it is loaded by forklift to trucks. The mixed waste is transported by road from the terminal to the MBTF to enable the extraction of recyclable material and produce compost. The MBTF includes the following infrastructure:

- Site access road;
- Weighbridge;

- Office and amenities;
- Biological Refining System (BRS) drums
- Waste processing buildings;
- Fermentation building and compost storage area.
- Water infrastructure
- Biofilters

After the waste is transported by truck to the MBTF it is unloaded and then transferred to the rotating BRS drums where it is sorted before being transported by conveyors to the waste processing building, and then the fermentation building. The sorting and material processing provides recyclable and non-recyclable material and organic material which is processed to produce compost for onsite mine rehabilitation.

Figure 1 Woodlawn MBTF and the Surrounding Nearest Residential Receivers

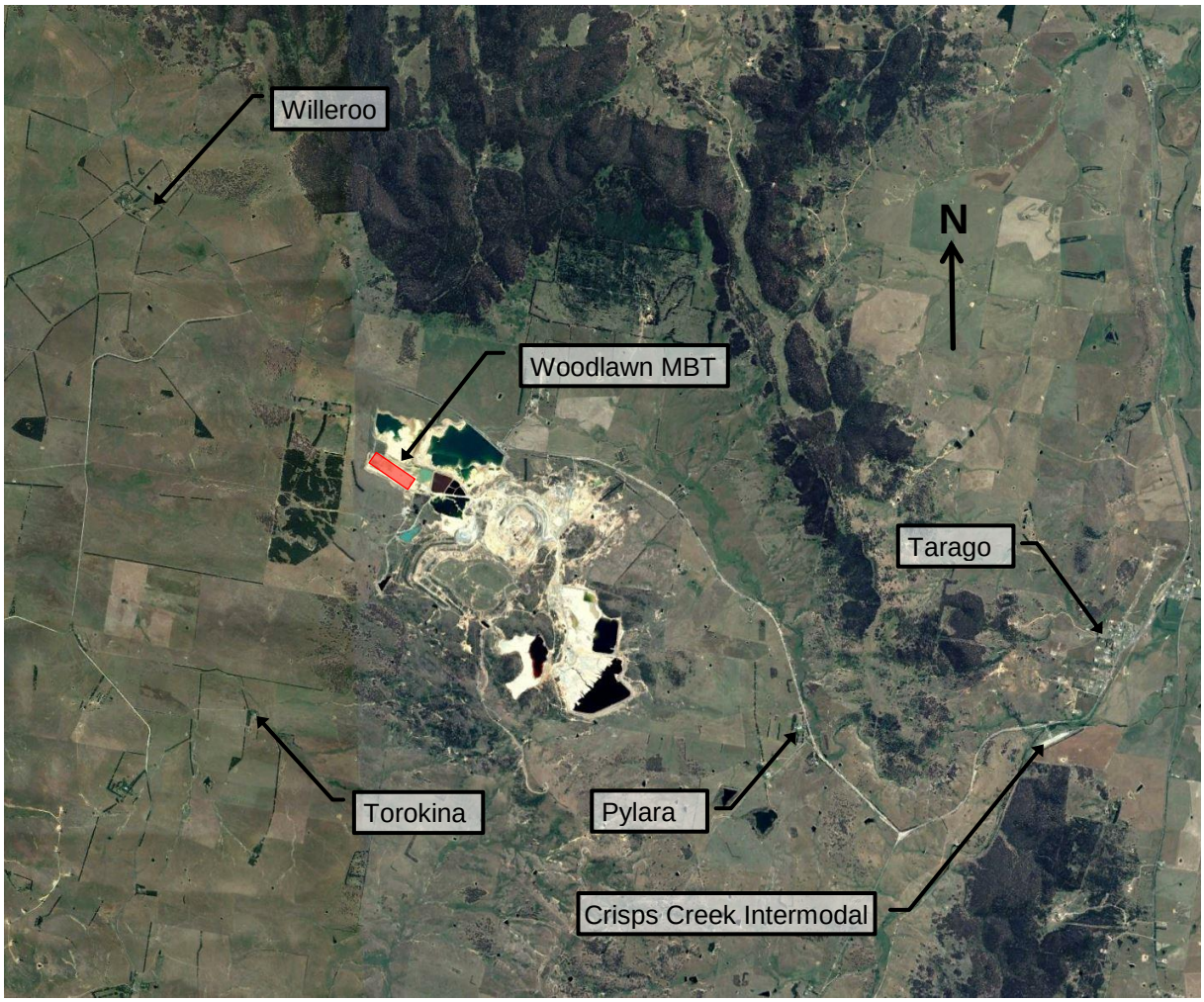


Image compliments of Google Earth

3 PROJECT APPROVAL OPERATIONAL NOISE CRITERIA

Project Approval (06_0239) Conditions 25 and 26 nominate the maximum allowable noise contributions for operations on the site, as follows:

Noise Impact Assessment Criteria

25 The Applicant shall ensure that the noise generated by the development does not exceed the limits in Table 4.

Table 4 –Noise impact assessment criteria (dBA)

Receiver	***Day/Evening/Night*** $L_{Aeq\ (15\ minute)}$
Residences on privately owned land (during construction)	*40*
Residences on privately owned land (during operations)	*35*

Notes:

a) Noise from the development is to be measured at the most affected point on or within the site boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary, to determine compliance with the LAeq(15minute) noise limits in the above table. Where it cannot be demonstrated that direct measurement of the noise from the project is impractical, the DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise where applicable.

b) The noise emission limits identified in the above table under the meteorological conditions of:

- *wind speeds up to 3 m/s^{-1} at 10 metres above ground level; or*
- *temperature inversion conditions up to 3^{o}C/100 metres and wind speeds up to 2 ms^{-1} at 10 metres above ground level*

Road Traffic Noise Impact Assessment Criteria

26. The Proponent shall ensure that the traffic noise generated by the project on the road between the Crisps Creek Intermodal Terminal and the site access road does not exceed 60 dBA LAeq(1hour) at any residence on privately owned land.

Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in the DECC's Environmental Criteria for Road Traffic Noise.

The two nearest privately-owned residential receivers to the MBTF are: *Willeroo* 4.4 km to the north-west; and *Torokina* 3.1 km to the south-west. These two nearest potentially affected residential receivers were selected to assess the operational noise compliance from the MBTF.

There are also residential receivers potentially affected by road traffic noise generated by the MBTF, Pylara and the dwelling 400 m south of Pylara. Both residences are located 75 m west of the road between the Crisps Creek Intermodal Terminal and the site access road.

4 NOISE MEASUREMENT AND MONITORING SURVEYS

4.1 Noise Monitoring Survey Procedures

The noise measurement procedures employed throughout the monitoring program were in accordance with the requirements of Australian Standard (AS) 1055-1997 "*Acoustics - Description and Measurement of Environmental Noise*" and the NSW Environment Protection Authority's (EPA's) *Industrial Noise Policy* (INP) (EPA, 2000).

Noise monitoring for the Woodlawn MBTF consisted of operator-attended noise measurements. The operator-attended noise measurements were conducted to obtain direct results at the assessment locations.

4.2 Operator-Attended Noise Measurements

The operator-attended noise measurement locations are listed in **Table 1** together with the monitoring programme. The survey locations are also identified on **Figure 1**.

Operator-attended noise measurements were conducted for 15 minute periods during the daytime, evening over 2 calendar days (Monday 2 October 2017, and Tuesday 3 October 2017) at location 1 Willeroo and location 2 Torokina as listed in **Table 1** to quantify and qualify the noise environment in the vicinity of the Woodlawn MBTF. The time periods were selected to be representative of the approved hours of operation of 6 am to 10 pm, noting the same noise assessment criteria of 35 dBA applies to the daytime, evening (and night-time but only as required in an emergency). The noise survey days were selected following several weeks of monitoring of wind conditions for the area such that meteorological conditions during the survey corresponded to little or no wind. It is noted there are several wind turbines adjacent with wind being a feature of the area.

Truck pass-by measurements were conducted at location 3 Pylara, to determine compliance with the Road Traffic Assessment Criteria with a total of 20 truck pass-bys recorded.

Table 1 Noise Monitoring Survey Locations and Noise Survey Programme

Location ID	Location Description	Operator-Attended Measurement Surveys	
		Daytime	Evening
1	Willeroo	3 surveys	1 survey
2	Torokina	3 surveys	1 survey
3	Pylara	1 survey (truck pass-bys)	

Notes

4.3 MBTF Operations during the Noise Monitoring Surveys

Veolia advises that the MBTF was operating normally throughout the survey period. Truck deliveries of waste from the Crisps Creek Intermodal Terminal occurred during the survey periods, and the waste sorting and organic processing facilities were operating normally.

4.4 Instrumentation and Measurement Parameters

All acoustic instrumentation employed throughout the monitoring programme complied with the requirements of AS IEC 61672.1-2004 "*Electroacoustics - Sound Level Meters – Specifications"*, and carried current National Association of Testing Authorities calibration certificates.

Descriptions of the instrumentation, designated type and serial numbers are presented in **Table 2**, with calibration of the sound level meter confirmed prior to and at the completion of each measurement survey period.

Table 2 Acoustic Instrumentation Schedule

Description	Type or Class	Serial Number
Brüel & Kjær 2250 Precision Sound Level Meter	Type 1	3005904

5 OPERATOR-ATTENDED NOISE MEASUREMENT RESULTS

5.1 Operational Noise Compliance Results

The operator-attended measurements results are presented in **Table 3** and **Table 4** at the nominated assessment locations. The measurement duration was 15 minutes, with the sound level meter paused during significant localised noise events, such as bird noise, when required.

At location 1 Willaroo measurements were conducted at the Willaroo woolsheds residence, which is 600 m north-east of the main homestead and at higher elevation and therefore potentially more exposed to operational noise levels from the MBTF. At location 2 Torokina noise measurements were conducted 20 m south-east of the residence, with the exception of the early morning survey on the 3 October 2017, which was conducted 75 m south-east to minimise the influence of noise from birds at trees surrounding the residence.

Table 3 Location 1 Willeroo

Period/Date/Start Time Weather		Primary Noise Descriptor (dBA)					Typical Maximum Noise Levels (dBA)
		L_{Aeq}	L_{Amax}	L_{A1}	L_{A10}	L_{A90}	
Daytime 2/10/2017 4:30 pm 0 okta Wind at 1.5 m : Calm until 4.40pm then 0-0.5 m/s No rain	Ambient	32	55	43	34	25	Ambient by birds typically 30-40 and up to 45 on occasion Bellbird 55
	MBTF	estimated to be less than 30 dBA					MBTF not audible
Evening 2/10/2017 8:01 pm 0 okta Wind at 1.5 m : 0-1 m/s No rain	Ambient	31	39	35	33	30	Ambient by distant frogs and crickets
	MBTF	estimated to be less than 30 dBA					MBTF not audible
Daytime 3/10/2017 6:59 am 0 okta Calm No rain	Ambient	47	73	59	48	34	Ambient by birds typically 40-50 and up to 45 on occasion Whipbird 73
	MBTF	not able to be estimated due to significant levels of bird noise during the survey					MBTF not audible
Daytime 3/10/2017 7:14 am[1] 0 okta Calm No rain	Ambient	35	47	43	37	31	Ambient by birds
	MBTF	not able to be estimated due to significant levels of bird noise during the survey					MBTF not audible
Daytime 3/10/2017 11:16 am 0 okta Wind at 1.5 m : Calm until 11:25 am then 0-0.5 m/s No rain	Ambient	31	52	39	33	27	Ambient by birds typically 30-35 and up to 50 on occasion Bellbird 52
	MBTF	estimated to be less than 30 dBA					MBTF not audible

Note 1: A second morning 15 minute measurement was conducted at location 1 Willeroo with the sound level meter paused during loud bird noise events, to determine the underlining intrusive noise level.

Table 4 Location 2 Torokina

Period/Date/Start Time Weather		Primary Noise Descriptor (dBA)					Typical Maximum Noise Levels (dBA)
		L_{Aeq}	L_{Amax}	L_{A1}	L_{A10}	L_{A90}	
Daytime 2/10/2017 5:34 pm 0 okta Wind at 1.5 m : Calm and occasionally 0-0.5 m/s No rain	Ambient	30	50	42	31	22	Ambient by birds typically 20-40 Insects (buzz) audible Cows 28-29 Woodpecker 28, 30
	MBTF	estimated to be less than 30 dBA					MBTF not audible
Evening 2/10/2017 8:53 pm 0 okta Wind at 1.5 m : 1-2 m/s No rain	Ambient	38	51	42	40	35	Ambient by frogs and crickets typically 38-39 and up to 44-45
	MBTF	not able to be estimated due to significant levels of frog and cricket noise during the survey					MBTF not audible
Daytime 3/10/2017 7:46 am[1] 0 okta Calm No rain	Ambient	35	53	43	38	28	Ambient by birds, typically 30 to 50 Aeroplane 43, bird 53
	MBTF	not able to be estimated due to significant levels of bird noise during the survey					MBTF not audible
Daytime 3/10/2017 12:08 pm 0 okta Wind at 1.5 m : 0-1 m/s No rain	Ambient	31	49	38	33	27	Ambient by birds, crickets, frogs typically 30-35 and up to 50 on occasion Bird 49
	MBTF	estimated to be less than 25 dBA					MBTF not audible

Note 1: The early morning noise survey as conducted 75 m south-east of the residence to minimise the influence of noise from birds at trees surrounding the residence.

5.1.1 Discussion

The operator-attended noise measurement results are further discussed and summarised as follows:

- Location 1 Willaroo (woolsheds residence). This location is located 4.2 km to the north-west of the MBTF in an undulating rural setting. For the two daytime surveys of 4:30 pm and 11:16 am the measured ambient L_{Aeq} noise level was 32 and 31 dBA, with the MBTF not audible and the ambient noise environment influenced by the natural rural sounds of birds and insects. During the early morning survey at 6:59 am a higher level of 47 dBA was recorded as a result of significant localised bird activity during this period. In addition at the completion of the early morning survey a second 15 minute survey was conducted with the sound level meter paused during significant bird events and an ambient L_{Aeq} of 35 dBA recorded. During the evening survey at 8:01 pm an ambient L_{Aeq} of 31 dBA was recorded with the ambient noise resulting from distant frogs and crickets. During all surveys at the Location 1 Willaroo (woolsheds residence) the Woodlawn MBTF was not audible, and the resultant MBTF intrusive noise level contribution at this location will be less than 30 dBA. This estimated noise level is below the criterion of 35 dBA.
- Location A3 Torokina (residence). This location is located 3.2 km to the south-west of the MBTF in an undulating rural setting. For the two daytime surveys of 5:34 pm and 12:08 am the measured ambient L_{Aeq} noise level was 30 dBA and 31 dBA, with the MBTF not audible and the ambient noise environment influenced by the natural rural sounds of birds and insects. During the early morning survey at 7:46 am a marginally higher level of 35 dBA was recorded as a result of bird activity during this period. During the evening survey at 8:53 pm an ambient L_{Aeq} of 38 dBA was recorded with the ambient noise resulting from frogs and crickets from the creek located 80 m north east of the residence. During all surveys at the Torokina (residence) the Woodlawn MBTF was not audible, and the resultant MBTF intrusive noise level contribution at this location will be less than 30 dBA. This estimated noise level is below the criterion of 35 dBA.

5.2 Traffic Noise

Pass-by noise measurements were conducted at the location 3 Pylara residence to determine the L_{Aeq} noise levels for trucks travelling to and from the Crisps Creek Intermodal Terminal. A total of 20 pass-by measurements where conducted of trucks travelling to the Woodlawn MBTF, and the Woodlawn Bioreactor, which both use the same heavy vehicle model. The maximum hourly movements to and from the Crisps Creek Intermodal Terminal to the Woodlawn MBTF is six (6). The calculated façade reflected $L_{Aeq(1hour)}$ noise level for these movements is 38 dBA. This noise level complies with the 60 dBA criterion of Condition 26 of the Project Approval (06_0239).

6 CONCLUSION

SLR has been engaged by Veolia to conduct a noise audit of the Woodlawn Mechanical Biological Treatment Facility (MBTF). The Woodlawn MBTF is located in an undulating rural setting, with the nearest privately-owned residences being Willaroo 4.2 km to the north-west, and Torokina 3.2 km to the south-east.

The MBTF Project Approval (06_0239) Condition 25 specifies a Noise Impact Assessment Criteria of $L_{Aeq(15minute)}$ for the day/evening/night of 35 dBA at residences on privately owned land during operations. Ambient noise measurements have been conducted at the two locations as identified as the nearest residences on privately owned land, as specified in the MBTF Project Approval (06_0239) Condition 25. The results of the operator-attended measurements confirm the Project Approval (06_0239) noise criteria is complied with at the nearest residences on privately-owned land, with $L_{Aeq(15minute)}$ noise levels recorded below 35 dBA at both locations. The operator-attended measurements also recorded levels higher than $L_{Aeq(15minute)}$ 35 dBA, and in these instances the ambient noise environment was due to natural sounds such as birds, insects and frogs.

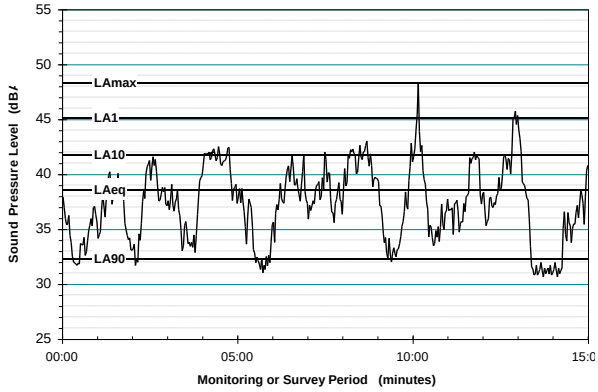
Traffic noise levels were calculated at the nearest residence to the road between the Crisps Creek Intermodal Terminal and Woodlawn MBT, for comparison with the Traffic Noise Impact Assessment Criteria specified in the approval. The results of the operator-attended measurements and calculation confirm the Project Approval (06_0239) noise criteria is complied with at the nearest residence on privately-owned land.

ACOUSTIC TERMINOLOGY

This Report makes repeated reference to certain noise level descriptors, in particular the L_{A10}, L_{A90} and L_{Aeq} and L_{Amax} noise levels.

- The L_{A10} is the A-weighted sound pressure level exceeded 10% of a given measurement period and is utilised normally to characterise typical maximum noise levels.
- The L_{Aeq} is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound over the same measurement period. The $L_{Aeq(15minute)}$ is the measurement parameter used to describe the industrial noise level during the assessment period of the daytime, evening or night-time. The $L_{Aeq(period)}$ is the measurement parameter used to describe the industrial or road traffic noise level over the entire period of daytime (7:00 am to 6:00 pm), evening (6:00 pm to 10:00 pm) or night (10:00 pm to 7:00 am). Similarly, the $L_{Aeq(1hour)}$ is the measurement parameter used to describe the industrial or road traffic noise level during the loudest 1-hour period during the daytime, evening or night-time periods.
- The L_{A90} noise level is the A-weighted sound pressure level exceeded 90% of a given measurement period and is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the "background" level.
- The L_{Amax} noise level is the maximum A-weighted noise level associated with road traffic movements.

Graphical Display of Typical Noise Indices



Typical Noise Levels

The following table presents examples of typical noise levels.

Typical Noise Levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130 120 110	Threshold of pain Heavy rock concert Grinding on steel	Intolerable Extremely noisy
100 90	Loud car horn at 3 m Construction site with pneumatic hammering	Very noisy
80 70	Kerb side of busy street Loud radio or television	Loud
60 50	Department store General Office	Moderate to Quiet
40 30	Inside private office Inside bedroom	Quiet to Very quiet
20	Unoccupied recording studio	Almost silent

A-Weighting or dBA Noise Levels

The overall level of a sound is usually expressed in terms of dBA, which is measured using the "A-weighting" filter incorporated in sound level meters. These filters have a frequency response corresponding approximately to that of human hearing. People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the "loudness" of that sound. Different sources having the same dBA level generally sound about equally as loud, although the perceived loudness can also be affected by the character of the sound (eg the loudness of human speech and a distant motorbike may be perceived differently, although they are of the same dBA level).

Sensitivity of People to Noise Level Changes

A change of up to 3 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness.