Jurnal Ekologi, Masyarakat dan Sains
E-ISSN: 2720-9717
Volume 4, Nomor 2, 2023
ECOTAS
https://journals.ecotas.org/index.php/ems
https://doi.org/10.55448/ems

Artikel

Analysis and Management of Senayan PLTD Noise Pollution

Aco Wahyudi Efendi[1]

[1]Jurusan Teknik Sipil, Fakultas Teknik Universitas Tridharma Balikpapan, Jl. AW Syahrani No. 7 Balikpapan.
Penulis koresponden: aw.efendi2018@gmail.com

Riwayat Artikel:

Masuk: 14-01-2023
Diterima: 02-03-2023
Dipublikasi: 04-07-2023

Cara Mengutip:

Analysis and Management of Senayan PLTD Noise Pollution. *Jurnal Ekologi, Masyarakat dan Sains*. 4, 2, 54–63. DOI:https://doi.org/10.55448/kt0bf693.

Abstrak: Kegiatan PLTD harus memperhatikan kondisi lingkungan terhadap dampak penting yang terjadi, khususnya mengenai dampak kebisingan yang terjadi dari pengoperasian mesin. Tujuan studi ini adalah untuk mengukur sejauh mana pengoperasian PLTD Senayan 101 MW berdampak buruk pada tingkat kebisingan lingkungan. Metode penelitian dilakukan dengan mungumpulkan data hasil survey kebisingan dengan metode tak merusak (NDT) dan selanjutnya memetakan rona dampak hasi pengujian dan melakukan penanganan untuk meredam kebisingan yang berdampak ke masyarakat. Jenis Kebisingan Konstan memiliki rentang frekuensi yang luas. Disarankan untuk memasang penghalang yang terbuat dari balok beton 200 x 200 x 400 mm dengan ketebalan 300 mm setinggi 6000 mm dan jarak 3000 mm di daerah yang tingkat kebisingannya di atas 70 dB.A. Ini akan membantu mengurangi polusi suara sebesar 20,05 dB.A, menurunkan tingkat kebisingan awal menjadi 68,65 dB.
Kata Kunci: dinding peredam, kebisingan, NAB, polusi

Abstract: *PLTD activities must pay attention to environmental conditions on the important impacts that occur, specifically regarding the impact of noise that occurs from the operation of the machine. This study's intention is to quantify the degree to which the Senayan 101 MW PLTD's operation has an adverse effect on the neighborhood's noise levels. The study technique involves gathering data from noise survey findings using the non-destructive method (NDT), visualizing the effect of the test results, and implementing noise-reduction steps that have an impact on the community. Constant Noise Type having a broad frequency range. It is advised to install a barrier made of concrete blocks 200 x 200 x 400 mm with a thickness of 300 mm as high as 6000 mm and a distance of 3000 mm in areas where the noise level is above 70 dB.A. This will help to reduce noise pollution by 20.05 dB.A, bringing the initial noise level down to 68.65 dB. A.*
Keywords: *dampening wall, noise, NAV, pollution*

1 INTRODUCTION

The Senayan Pembangkit Listrik Tenaga Diesel (PLTD) conducts a noise study in this effort to find the best solution for handling environmental conditions that occur (A. W. Efendi 2022, 8). The amount of noise is one of the main markers of environmental degradation. This has forced this research on the public's view of environmental noise pollution, its sources, impacts, and mitigation methods. Methods: The population was approximated, and 385 structured surveys were created and distributed using random purposive selection. A total of 358 surveys were obtained. SPSS and Excel statistical tools were used to evaluate the data. Results: Approximately 90.2% of respondents were conscious of the impacts of environmental pollution, while 9.8% were unaware. The Likert measure was used to rate traffic, generators, business and light industry noise sources, and their severity (Idoko Apeh Abraham et al., n.d.).

The building of the 101 MW Senayan PLTD Infrastructure, from the planning stage to the working stage of PLTD activities, must pay attention to environmental conditions for the major effects that occur, particularly the impact of sounds from machine operation. The neighboring community feels the impact of this cacophony because of the occurrence of several noise pollution effects that occur in the community and interfere with the everyday activities of the surrounding community.

This study's intention is to quantify the degree to which the Senayan 101 MW PLTD's operation has an adverse effect on the neighborhood's noise levels.

The research method is carried out by collecting data from noise survey results using the Non-Destructive Method (NDT) and then mapping the impact of the test results and carrying out measures to reduce noise that has an impact on the community.

It is planned that data would be made available that can depict the impacts of the Senayan 101 MW PLTD's operation on the noise that affects the surrounding environment and offer suggestions for managing the noise impact.

2 RESEARCH METHOD

The 101 MW Senayan PLTD's operation has an influence on the environment, and noise inspection aims to discover the best way to handle those situations. When performing noise research, the following guidelines and tests are used (Kaldellis, Garakis, and Kapsali 2012; Fredianelli et al. 2017; Gozalo and Morillas 2016; Helldin et al. 2013; Forney et al. 2017; A. W. Efendi 2022): (1) General recommendations for noise studies: (2) Law of the Republic of Indonesia No. 32 of 2009; Environment Protection and Management (3) Environmental Audit Guidelines, Decree of the Minister of the Environment No. 30 of 2001 (4) Threshold Value; KEPMENAKER No. Kep-51/MEN/1999 (5) Noise Level Standard, Minister of Environment Decree No. 48 of 1996 (6) ACGIH 2008 (7) SNI 16-7063-2004 (8) Physics and Chemistry Factor Minister of Manpower and Immigration Regulation No. 13/X/2011 The Workplace's Threshold Values.

The following were the results of the experiments on vibration and noise studies:

1. Topographic Analysis
   A technique for locating both man-made and natural features on the ground is topographic surveying. Terrain configurations are also determined through topographic surveys. Topographic surveys are used to gather the information required to create topographic maps. A topographic map will be created using the combined data's map pictures. The common marks on a topography, as well as the horizontal distances between features and their individual elevations above a certain datum, reveal the vegetation's nature. Direct measurements are taken on the earth's surface using terrestrial survey equipment as part of the topographical mapping process itself. The advancement of science and technology has coincided with the development of mapping tools.
   The measurement procedure has grown more rapid and accurate because to the introduction of electronic soil measuring equipment. GIS technology has made calculations simpler and faster, and drawings can now be generated automatically. Surveys are often conducted on a flat plane, i.e., without taking the curvature of the globe into consideration. The earth's slight curvature can be overlooked in surveying efforts by utilizing calculations based on a simple formula. The curvature of the globe, however, cannot be disregarded while working on long-distance projects since geodetic surveying is involved in these circumstances.
2. Noise Assessment.
   Noise is unwelcome sound from a company or activity at a specific volume and time that can be disruptive to people's health and the comfort of their surroundings (A. W. Efendi 2022).

Noise level

Suma'mur P.K. (1996:58) lists the many kinds of noise that are frequently heard as follows:

1. Constant noise with a broad frequency range (steady state wide band noise). Consider appliances, fans, and kitchens with incandescent lighting.
2. Constant noise with a constrained frequency range (steady state narrow band noise). For instance, gas valves and circular saws.
3. Sporadic sounds. For instance, traffic and jet noise at airports.
4. Sudden loud noise (impact or impulsive noise). An explosion, for instance, or a shotgun.
5. Constant, erratic noise. For instance, the company's forging machine.

Meanwhile, there are two main categories of noise in the workplace (I. A. W. Efendi 2022):

1. Fixed noise (stationary noise), which is split into two types: discrete frequency noise, which takes the form of pure "tones" at different frequencies; and broad band noise, which has a more variable cutoff frequency (not a pure "tone").
2. Unsteady noise, which is broken down into three categories: (a) Fluctuating noise, which

varies constantly over a set amount of time; (b) Intermittent noise, which is intermittent and whose amplitude can alter, such as traffic noise; (c) Impulsive noise, such as the sound of a gun explosion, is made by loud sounds that are created quickly and with great intensity.

Noisy Source

Increased noise levels are a result of better processes in industry. Jobs that produce high levels of noise are often found in textile factories (weaving, spinning), power plant factories (PLTU, PLTG, PLTD, etc.), which use equipment such turbine engines and generators that produce high levels of noise. Three categories of sources can be used to categorize noise (Gozalo and Morillas 2016; Forney et al. 2017; Fredianelli et al. 2017; Helldin et al. 2013; Iglesias-Merchan, Diaz-Balteiro, and Soliño 2015; Kaldellis, Garakis, and Kapsali 2012):

1. Devices
The need for noise control stems from the possibility that the engine's noise and vibration are the result of faulty bearings and mounts for the engine. Several factors affect the machine's sound, including: (a) Cylinder count; the more cylinders, the louder the engine will be; - Motor rotation; the more motor revolution, the louder the engine will be; (b) The motor's specific gravity; the higher the specific gravity, the louder the motor; (c) The number of propeller blades; the noise level increases with the number of blades; (d) Machine age: As a rule of thumb, noise levels increase with machine age.
2. Instruments (vibration)
Noise that results from the usage of tools for the job. The sound is produced when pieces of work equipment, which are often formed of hard or metal things, collide or impact.
3. Flow of Gas or Air
Noise is produced as a result of friction and pressure brought on by the movement of air or gas. According to the noise's origin, the following categories might be made: Electric Motor, Compresor dan engines, Gear Box, Blower and Fans, Pumps, Gas dan steam turbines, Control valve, flow meter, piping systems, Steam ejector dan condensers

Boundary Value (NAV)

The threshold value (KEPMENAKER No. Kep-51 MEN/1999) is a workplace factor standard that is acceptable to employees without endangering their health or causing them to miss more than eight hours of work per day or forty hours per week. The NAV of noise in the workplace is the maximum sound intensity that, during continuous work duration of no more than 8 hours per day and 40 hours per week, is still tolerable to the workforce without resulting in irreversible hearing damage. For an exposure period of 8 continuous hours, 85 dBA is the allowable noise threshold value.

Table 1. Noise NAV in accordance with the Physical Factor Threshold Values in the Workplace Decree of the Minister of Manpower No. Kep-51/MEN/1999.

Waktu pemajanan / Hari	Intensitas kebisingan (dB.A)	Waktu pemajanan / hari	Intensitas Kebisingan (dB.A)
8 jam	85	28,12 detik	115
4 jam	88	14,06 detik	118
2 jam	91	7,03 detik	121
1 jam	94	3,52 detik	124
30 menit	97	1,76 detik	127
15 menit	100	0,88 detik	130
7,5 menit	103	0,44 detik	133
3,75 menit	106	0,22 detik	136
1,88 menit	109	0,11 detik	139
0,94 menit	112	Tidak boleh	*140

The value of noise intensity that happens with exposure time is explained in several units of time in Table 1. The quicker the length of the feeding time, the higher the noise intensity.

Table 2. NAV of Noise according to the Decree of the State Minister for the Environment No. 48 of 1996 concerning Noise Level Standards.

Peruntukan Kawasan / Lingkungan Kesehatan	Tingkat Kebisingan dB (A)
a. Peruntukan Kawasan.	
Perumahan dan Pemukiman	55
Perdagangan dan Jasa	70
3. Perkantoran dan Perdangan	65
4. Ruang Terbuka Hijau	50
5. Industri	70
6. Pemerintahan dan Fasilitas Umum	60
7. Rekreasi	70
8. Khusus:	
– Bandar Udara	
– Stasiun Kereta Api	60
– Pelabuhan Laut	70
– Cagar Budaya	
b. Lingkungan Kegiatan	
1. Rumah Sakit atau sejenisnya	55
2. Sekolah atau sejenisnya	55
3. Tempat Ibadah atau sejenisnya	55

Analysis and Management of Senayan PLTD Noise Pollution. *Jurnal Ekologi, Masyarakat dan Sains*. 4, 2, 54–63. DOI:https://doi.org/10.55448/kt0bf693.

Table 2 shows the noise threshold values in a healthy setting based on the region classification.

Sound Level Meter

How noise is measured, typically done according to the goal rather than the measurement itself, including: (1) Metrics are exclusively used to regulate the workplace environment. (2) measurement to ascertain the impact on the workforce in question

A Sound Level Meter (SLM) is the tool used to measure noise, and the decibel is the measurement result unit (dB).

A frequency analyzer may also be added to the Sound Level Meter at the octave, half-octave, and third-octave levels. A Sound Level Meter must be calibrated once every three months in order for the measurements to be as accurate as possible. (Nanda 2012; Li et al. 2019; Tao et al. 2019; Strait et al. 2013).

Method for Retrieving Noise Data

The following are the measuring techniques used in data collection: (1) Adjust the sound level meter's calibration (SLM) (2) The Sound Level Meter must first be calibrated in accordance with ANSI SI 40−1984 and IEC 942: 1988 standards by selecting 94 or 114 dB and 250 or 1000 hz for the verification of the weighing filter and (-) 20 dB attenuator. (3) Following Sound Level Meter calibration with "rapid" continuous set time, A-weighting filter, threshold range of 80-140 dBA, and noise measurement run time (Laq, Lmin, Lmax) (4) Select the sample location. Planning and preparation of the site are required before the noise level can be measured. With a minimum noise level of 80 dBA, measurement points are established starting from the source (or noise point) to the work area (or work environment). Measurements are made starting from the source point and moving away to the end of the word area or place with a level of 78 dBA. The radius utilized is 5.m from the source and from one measurement point to another. (5) Calculate the runtime. It may depict fluctuating noise readings for a run time of 1 minute when utilized in that manner. The noise measurement report immediately records the measured noise levels, and internal memory records can also be made that can be printed. (6) Maps. In addition to being carried out, the data from the measurement of noise levels in the work area also has to be created of noise maps and contours. (7) Several readings are performed, the more the better. (8) Average value in relation to the norm/NAV.

Figure 1 Sound Level Meter

3 RESULTS AND DISCUSSION

The stages in the research are as follows: (1) Secondary information gathering. (2) Survey of topographic maps. With the help of the topographic mapping survey, locations in the study location will be able to be mapped and measurements will be taken to create a topographic map of the Senayan PLTD area. The output for topographic mapping implementation consists of: Information from topographic mapping measurements, Drawings of topographic measurements and Mapping and zoning of the findings of topographic measurements. (3) Noise Analysis. Noise is undesired sound produced by a company or activity at a certain volume and time that can be disruptive to people's health and the comfort of their surroundings. Measurements of noise are made using sampling points and contour maps, respectively. The output that will be produced in the implementation of topographic mapping includes: Measurement Map and Noise Measurement Results

Topographic Data

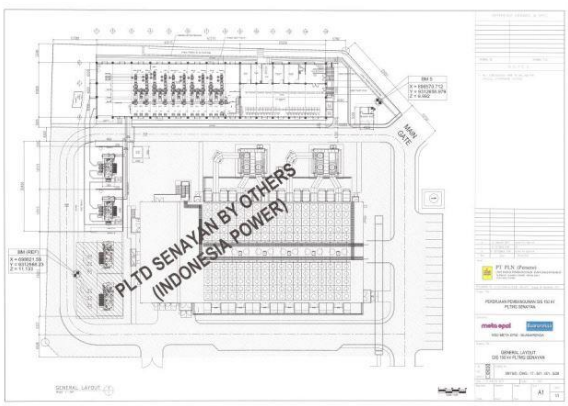

Figure 2 Research sites

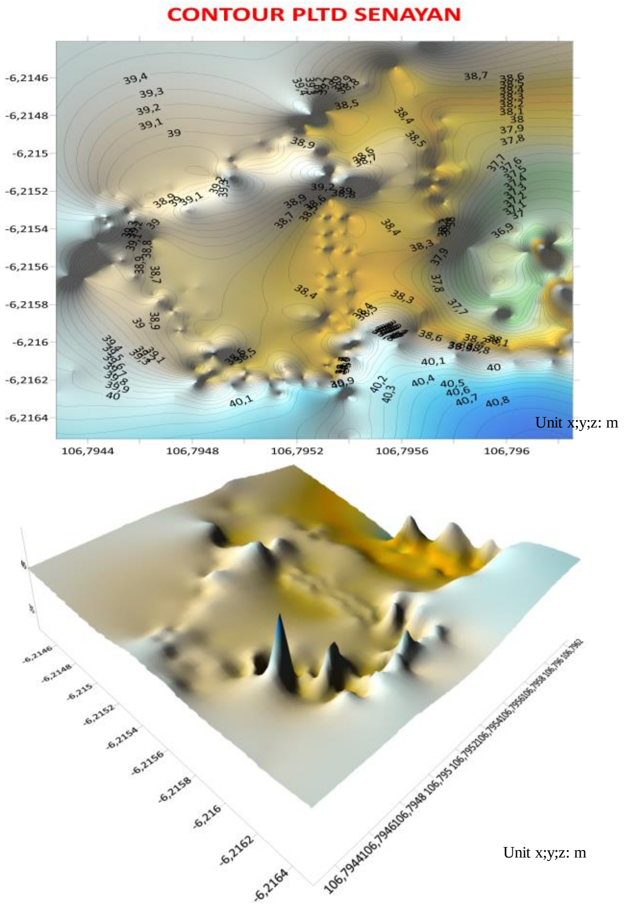

Figure 2 Topographic Analysis Results

Noise Survey Data

The research location is determined by a maximum distance of 100 m from the PLTD engine building to the residential area and the test points are taken every 25 m distance interval.

Zoning Noise Analysis 1

Figure 3. Zoning Sampling Layout 1

Table 3. Zoning Noise Data 1

POINT	POWER LOAD (%)			
	100	75	50	0
	NOISE VALUE (dB.A)			
1	95.10	93.33	89.10	77.23
2	91.07	86.17	81.33	68.20
10	86.13	83.67	82.43	66.40
11	86.28	75.73	74.93	64.90
Threshold	70.00	70.00	70.00	70.00

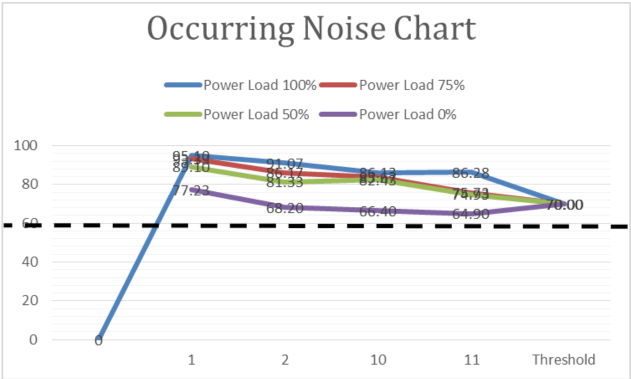

Figure 4. shows that zone 1 experiences a noise impact.

According to the study, a noise value of more than 70 dB.A is indicated with a load power of 50% to 100%, specifically with a nominal value of 74.93 dB.A to 95.10 dB.A, and at the state of the machine with 0% load power, only at a distance of 25 m, does a value below the threshold exist.

Analysis and Management of Senayan PLTD Noise Pollution. *Jurnal Ekologi, Masyarakat dan Sains*. 4, 2, 54–63. DOI:https://doi.org/10.55448/kt0bf693.

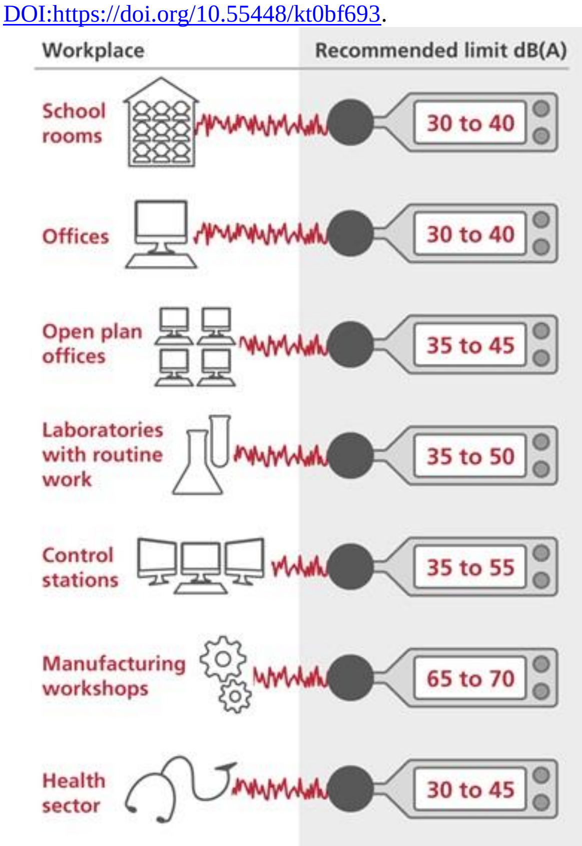

Figure 4. Noise values of some equipment and environment

Zoning Noise Analysis 2

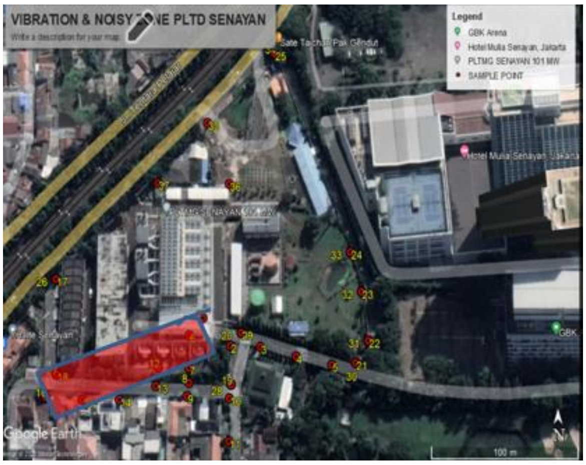

Figure 5. Zoning Sampling Layout 2

Table 4. Zoning Noise Data 2

POINT	POWER LOAD (%)			
	100	75	50	0
	NOISE VALUE (dB.A)			
1	95.10	93.33	89.10	77.23
6	91.93	89.53	88.63	83.80
12	91.03	85.22	83.63	65.97
18	83.63	86.50	76.67	65.77
Threshold	70.00	70.00	70.00	70.00

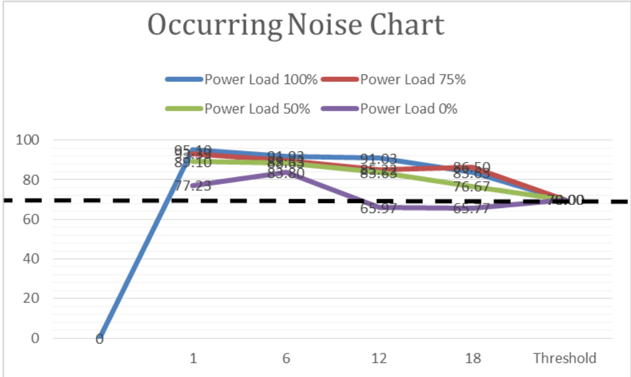

Figure 6. shows that zone 2 experiences a noise impact.

According to the study, a noise value of more than 70 dB.A is indicated with a load power of 50% to 100%, or a nominal value of 76.67 dB.A to 95.10 dB.A, and at the state of the machine with 0% load power only at a distance of 25 m, or 65.77 dB.A-65.97 dB.A, has a value below the threshold.

Controlling and Handling Noise Impact

The following noise risk management measures can be used, in accordance with PERMANAKER No. 05/MEN/1996, in relation to the Occupational Health and Safety Management System (SMK3): A control measure to lessen the risk through engineering is called an engineering control (engineering/engineering). You can exercise this control by: (a) Elimination is the process of getting rid of or entirely removing harmful substances, procedures, or technology to make them safer for both the environment and employees. (b) The practice of substituting materials or technologies with a lower degree of hazard to make them safer for employees and the environment is known as substitution (replacement). (c) Reducing the quantity of hazardous materials utilized or stored is known as minimization (reduction).

Noise Control Using Barriers

One method of attempting to reduce noise is to use barriers or artificial obstacles. A noise barrier is an efficient technique for reducing noise levels caused by engines from vehicles such motorized vehicles, trains, aircraft, and industrial noise sources that have continuous production operations (I. A. W. Efendi 2022).

There are a number of things to take into account while planning to build a barrier:

First, Placement or position. Determining the location or position of the barrier is crucial since it is simple to change the location of the barrier in a wide area but more challenging in a confined one. The laying of the barrier is described below.

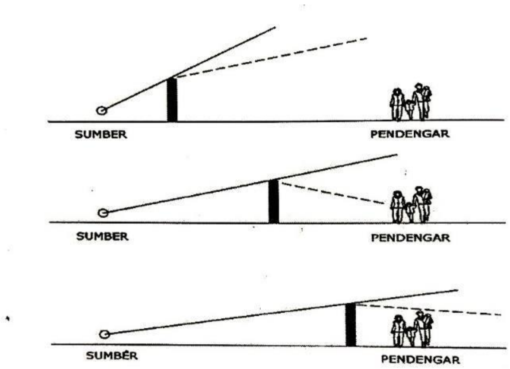

Figure 7. using a barrier to control noise pollution

Second, Measurements. Dimensions of a barrier are length (or breadth) and height. The rewinder machine is the source in this research, hence if the barrier is employed, it must be taller than the source if it is closer to the source.

Third, Resources. It is preferable to use a barrier material with a significant surface density, thickness, and is permanently attached firmly because sound waves can pass through extremely small fissures or fractures and are capable of vibrating items.

Fourth, Aesthetics. The aesthetic aspect is not very important, but if a barrier is constructed in front of a structure, architectural aesthetics are quite important since it might obstruct the building's front view.

1. Typical installation of a barrier with a barrier height of 6 m and a barrier distance of 3 m from the building.

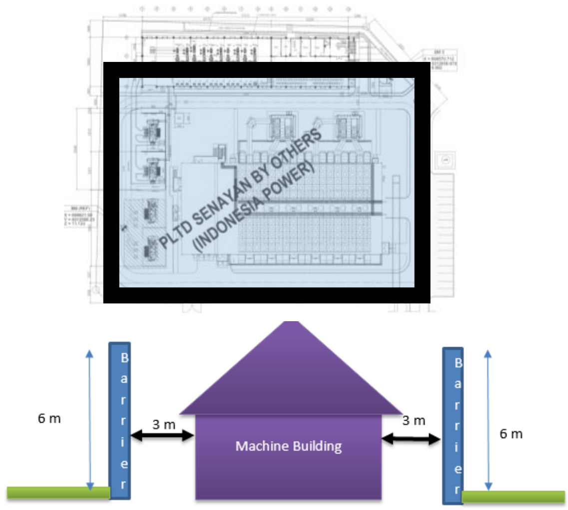

Figure 8 Typical Barrier Installation

Table 5. Selection of Barrier Materials for Isolation and Noise Reduction
(see attachment)

According to the chart above, concrete block material is the best material to use when installing a barrier since it can reduce noise to levels below the threshold of 70 dB.

A typical installation of a barrier is seen in Figure 9.4, which surrounds the isolated structure and has a height of 6 m and a distance of 3 m from it. by employing 300 mm-thick concrete blocks as building blocks, as in the figure 8 (Efendi 2022).

2. Typical installation of a barrier with a barrier height of 10 m and a distance of the barrier from the building is 7 m.

Table 6. Selection of Barrier Materials for Isolation and Noise Reduction
(see attachment)

The suggested materials for barrier installation may be found in the table above. These alternatives include a variety of materials that can suppress noise to levels below the threshold of 70 dB.

A typical installation of a barrier is seen in Figure 9.5, which surrounds the isolated building and is surrounded by a barrier that is 10 meters high and 7 meters wide. by employing 300 mm-thick concrete blocks as building blocks, as in the figure 9.

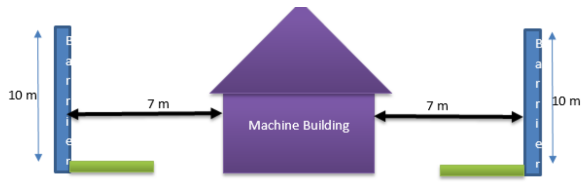

Figure 9 Typical Barrier Installation

4 CONCLUSION

According to study on the circumstances brought on by noise, settlements are significantly impacted by the region since the average noise level exceeds the threshold of 70 dB.A, which is in the extremely upsetting range. Constant Noise Type having a broad frequency range. It is advised to install a barrier made of concrete blocks 200 x 200 x 400 mm with a thickness of 300 mm as high as 6000 mm and a distance of 3000 mm in areas where the noise level is above

70 dB.A. This will help to reduce noise pollution by 20.05 dB.A, bringing the initial noise level down to 68.65 dB. A.

REFERENCES

Efendi, Aco Wahyudi. 2022a. "Noise Exposure Impact Zone Hue Modeling Using Lisa Fea V. 8." *Teknik: Jurnal Ilmu Teknik Dan* …. Http://Journal.Stiestekom.Ac.Id/Index.Php/Teknik/article/view/153.

Efendi, I. A. W. 2022b. "Simulasi Rona Zonasi Dampak Paparan Kebisingan Menggunakan Surfer." *Oktal: Jurnal Ilmu Komputer Dan Sains*. https://journal.mediapublikasi.id/index.php/oktal/article/view/18.

Forney, K. A., B. L. Southall, E. Slooten, S. Dawson, and ... 2017. "Nowhere to Go: Noise Impact Assessments for Marine Mammal Populations with High Site Fidelity." *Endangered Species* …. https://www.int-res.com/abstracts/esr/v32/p391-413.

Fredianelli, L., P. Gallo, G. Licitra, and ... 2017. "Analytical Assessment of Wind Turbine Noise Impact at Receiver by Means of Residual Noise Determination without the Wind Farm Shutdown." *Noise Control* …. https://www.ingentaconnect.com/content/ince/ncej/2017/00000065/00000005/art00005.

Gozalo, G. Rey, and JM Barrigón Morillas. 2016. "Analysis of Sampling Methodologies for Noise Pollution Assessment and the Impact on the Population." *International Journal of* …. https://www.mdpi.com/139706.

Helldin, J. O., P. Collinder, D. Bengtsson, and J. Askling. 2013. "Assessment of Traffic Noise Impact in Important Bird Sites in Sweden–A Practical Method for The Regional Scale." *Oecologia* …. revistas.ufrj.br. https://revistas.ufrj.br/index.php/oa/article/viewFile/8255/6753.

Idoko Apeh Abraham, Stephen James Ijimdiya, Igboro Bamedele Sunday, Sani Badrudden Saulawa, and Umar Alfa Abubakar. n.d. "Public Perception on Environmental Noise Pollution: A Case Study in Zaria City, Kaduna State, Nigeria." *Environmental Health Engineering and Management*.

Iglesias-Merchan, C., L. Diaz-Balteiro, and M. Soliño. 2015. "Transportation Planning and Quiet Natural Areas Preservation: Aircraft Overflights Noise Assessment in a National Park." … *Research Part D* …. https://www.sciencedirect.com/science/article/pii/S1361920915001303.

Kaldellis, J. K., K. Garakis, and M. Kapsali. 2012. "Noise Impact Assessment on the Basis of Onsite Acoustic Noise Immission Measurements for a Representative Wind Farm." *Renewable Energy*. https://www.sciencedirect.com/science/article/pii/S0960148111006112.

Li, J., P. R. White, J. M. Bull, and T. G. Leighton. 2019. "A Noise Impact Assessment Model for Passive Acoustic Measurements of Seabed Gas Fluxes." *Ocean Engineering*. https://www.sciencedirect.com/science/article/pii/S0029801818318018.

Nanda, S. K. 2012. *Noise Impact Assessment and Prediction in Mines Using Soft Computing Techniques*. ethesis.nitrkl.ac.in. http://ethesis.nitrkl.ac.in/4560/.

Strait, D. L., A. Parbery-Clark, S. O'Connell, and ... 2013. "Biological Impact of Preschool Music Classes on Processing Speech in Noise." *Developmental Cognitive* …. Elsevier. https://www.sciencedirect.com/science/article/pii/S187892931300042X.

Tao, Z., Y. Wang, C. Zou, Q. Li, and Y. Luo. 2019. "Assessment of Ventilation Noise Impact from Metro Depot with Over-Track Platform Structure on Workers and Nearby Inhabitants." *Environmental Science and Pollution* …. https://doi.org/10.1007/s11356-019-04378-w.

Analysis and Management of Senayan PLTD Noise Pollution. *Jurnal Ekologi, Masyarakat dan Sains*. 4, 2, 54–63. DOI:https://doi.org/10.55448/kt0bf693.

Lampiran

Table 5. Selection of Barrier Materials for Isolation and Noise Reduction

No.	Material	Thickness	Height	distance of noise source to barrier (m)	Noise reduction value	Result of Noise Value after Barrier is installed	Status		
		mm	**m**		**B(db)**	**(db)**	**(db)**		
1	*Polycarbonate*	12	4.00	3.00	18.57	70.13	> 70 db	…	Not OK
2	*Acrylic Poly-Methyl-Meta-Acrylate (PMMA)*	15	4.00	3.00	18.57	70.13	> 70 db	…	Not OK
3	*Concrete Block 200 x 200 x 400 light weight*	300	6.00	3.00	20.05	68.65	< 70 db	…	OK
4	*Dense Concrete*	100	4.00	3.00	18.64	70.06	> 70 db	…	Not OK
5	*Light Concrete*	150	4.00	3.00	18.68	70.02	> 70 db	…	Not OK
6	*Light Concrete*	100	4.00	3.00	18.64	70.06	> 70 db	…	Not OK
7	*Brick*	150	4.00	3.00	18.68	70.02	> 70 db	…	Not OK
8	*Steel, 18 ga*	1.27	4.00	3.00	18.56	70.14	> 70 db	…	Not OK
9	*Steel, 20 ga*	0.95	4.00	3.00	18.56	70.14	> 70 db	…	Not OK
10	*Steel, 22 ga*	0.79	4.00	3.00	18.56	70.14	> 70 db	…	Not OK
11	*Steel, 24 ga*	0.64	4.00	3.00	18.56	70.14	> 70 db	…	Not OK
12	*Aluminium Sheet*	1.59	4.00	3.00	18.56	70.14	> 70 db	…	Not OK
13	*Aluminium Sheet*	3.18	4.00	3.00	18.56	70.14	> 70 db	…	Not OK
14	*Aluminium Sheet*	6.35	4.00	3.00	18.57	70.13	> 70 db	…	Not OK
15	*Wood*	25	4.00	3.00	18.58	70.12	> 70 db	…	Not OK
16	*Plywood*	13	4.00	3.00	18.57	70.13	> 70 db	…	Not OK
17	*Plywood*	25	4.00	3.00	18.58	70.12	> 70 db	…	Not OK
18	*Absorptive Panels With Polyester Film Backed by Metal Sheet*	125	4.00	3.00	18.66	70.04	> 70 db	…	Not OK
19	*Plexiglass*	6	4.00	3.00	18.57	70.13	> 70 db	…	Not OK
20	*Gypsum*	10	4.00	3.00	18.57	70.13	> 70 db	…	Not OK

Analysis and Management of Senayan PLTD Noise Pollution. *Jurnal Ekologi, Masyarakat dan Sains*. 4, 2, 54–63. DOI:https://doi.org/10.55448/kt0bf693.

Table 6. Selection of Barrier Materials for Isolation and Noise Reduction

No.	Material	Thickness	Height	distance of noise source to barrier (m)	Noise reduction value	Result of Noise Value after Barrier is installed	Status
		mm	**m**		**B(db)**	**(db)**	**(db)**
1	*Polycarbonate*	12	10.00	7.00	18.95	69.75	< 70 db … OK
2	*Acrylic Poly-Methyl-Meta-Acrylate (PMMA)*	15	10.00	7.00	18.95	69.75	< 70 db … OK
3	*Concrete Block 200 x 200 x 400 light weight*	300	10.00	7.00	19.04	69.66	< 70 db … OK
4	*Dense Concrete*	100	10.00	7.00	18.98	69.72	< 70 db … OK
5	*Light Concrete*	150	10.00	7.00	18.99	69.71	< 70 db … OK
6	*Light Concrete*	100	10.00	7.00	18.98	69.72	< 70 db … OK
7	*Brick*	150	10.00	7.00	18.99	69.71	< 70 db … OK
8	*Steel, 18 ga*	1.27	10.00	7.00	18.94	69.76	< 70 db … OK
9	*Steel, 20 ga*	0.95	10.00	7.00	18.94	69.76	< 70 db … OK
10	*Steel, 22 ga*	0.79	10.00	7.00	18.94	69.76	< 70 db … OK
11	*Steel, 24 ga*	0.64	10.00	7.00	18.94	69.76	< 70 db … OK
12	*Aluminium Sheet*	1.59	10.00	7.00	18.94	69.76	< 70 db … OK
13	*Aluminium Sheet*	3.18	10.00	7.00	18.94	69.76	< 70 db … OK
14	*Aluminium Sheet*	6.35	10.00	7.00	18.95	69.75	< 70 db … OK
15	*Wood*	25	10.00	7.00	18.95	69.75	< 70 db … OK
16	*Plywood*	13	10.00	7.00	18.95	69.75	< 70 db … OK
17	*Plywood*	25	10.00	7.00	18.95	69.75	< 70 db … OK
18	*Absorptive Panels With Polyester Film Backed by Metal Sheet*	125	10.00	7.00	18.98	69.72	< 70 db … OK
19	*Plexiglass*	6	10.00	7.00	18.95	69.75	< 70 db … OK
20	*Gypsum*	10	10.00	7.00	18.95	69.75	< 70 db … OK