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An Analysis of the Noise Level at the Residential Area as the Impact of Flight Operations at the International Airport of Sultan Hasanuddin Maros In South Sulawesi Province

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Abstract: *International Airport of Sultan Hasanuddin in Maros is one of the airports with dense activity, causing noise disturbance for the surrounding area. This study aims to analyze the increase of noise level in 8 residential areas between 2011 and 2016 due to airport operational activities and appropriate noise level protection in the residential area. This research is descriptive qualitative and quantitative using WECPNL noise analysis. The results showed that there was an increase in noise, and the protection that was done by planting Polyathialongitalia trees. It could be the basis to overcome the noise level in housing around the International Airport of Sultan Hasanuddin.*

Keywords: *Noise, Settlement Area, Air Traffic, Noise protection*

I. INTRODUCTION

Makassar city is as the gateway of Eastern Indonesia, requires air transport infrastructure capable of providing service to the users of the airline service, for that required airport with international standard both air side facilities and ground side facilities. Development of the International Airport of Sultan Hasanuddin has been done since 1937 with the run way 08-26, then in 1942 built a new run way with run way 13-31 and the last direction in 2009 built run way 03-21 and stretched from the north South to avoid obstacles. [1]

In general, the plane which will take off always at threshold 03 position will cause high noise impact on Batang Ase and Maccopa area of Maros Regency while at landing position on threshold 03. [2], so that the noise impact on Sudiang Housing area, Bumi Tamalanrea Permai (BTP), and Housing Lecturer of Hasanuddin University and several Housing Regions within Makassar City.

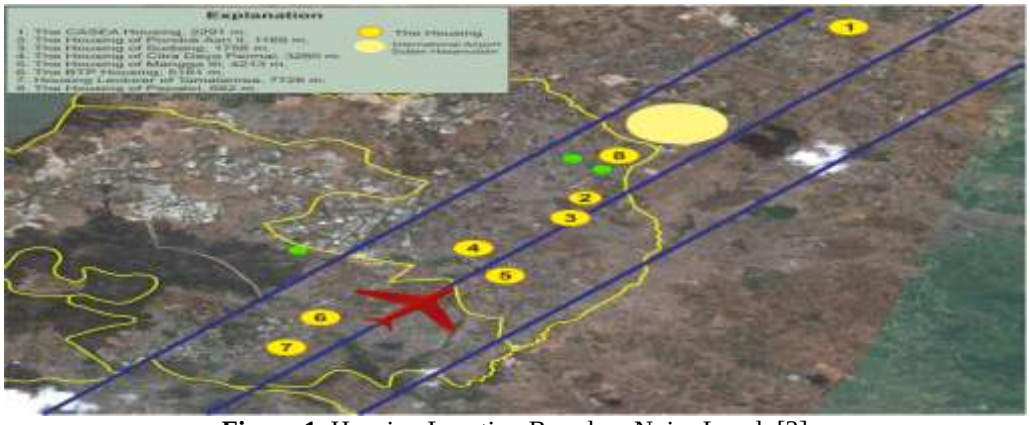

Figure 1. Housing Location Based on Noise Level. [3]

The standard of noise level and the recommended category level for buildings conducting social activities is 55 dBA [5.5].

Airport services in 2011 to 2016 experienced an average growth of aircraft movement of 1.67%, even in 2015/2016 last increased 5.46%, the number of daily movement of 298 flights per day. So that the frequency of noise received by the community in residential areas of course has increased. [2]. Noise levels in 8 residential areas in 2011 show that in the Area of Aviation Engineering Academy and Safety of 69.24 dB and in Housing Griya Asri Sudiang 67.97 dB [6]. Based on the results of the research it is necessary to re-measurement to find out whether there is a relationship between the movements of aircraft with the increasing impact of noise received by the community on 8 residential areas.

The impact of noise generated by aircraft movement during approach and takeoff positions is greatly felt by people in the take-off, landing and lateral areas of airports. It is suspected that the impact of

environmental noise is due to the movement of the aircraft. [7]. This research intends to analyze the noise level analysis of residential area as the impact of flight operations of the International Airport of Sultan Hasanuddin Maros.

II. METHODOLOGY

The method used in this research is an analysis of Weighted Equivalent Continuous Perceived Noise Level (WECPNL), Source Government Regulation no. 40 of 2012 [5.9]

$$WECPNL = dB(A) + 10 \log N - 27$$

$$db(A) = 10 \log ((1/n)\ 10\ Li/n)$$

$$N = N2 + 3\ N3 + 10\ (N1 + N4)$$

N1: Airplane frequency from 00.00 to 07.00 am
N2: Frequency of aircraft at 07.00 am to 19.00 pm
N3: Airplane frequency from 19.00 to 22.00 pm
N4: Airplane frequency from 22.00 pm to 00.00 am

N: Number of arrivals and departures for 24 hours
Li: Read the highest dBA in one measurement time
dBA: Noise level
Measurements are made using a sound level meter when the aircraft passes for 24 hours

Measurement of noise level is done in 8 residential areas compared to back between 2011 and 2016. Measurement of noise for each observation point Take off Noise area is the noise area in the aircraft takeoff lane. The Noise approach area is the noise area in the approach plane path when it comes to landing, and the Lateral Noise area is the noise area which is parallel to the runway spaced approximately 500 meters. Measurement of noise level is done in the place where there is a complaint or there is permanent monitoring of noise caused by the main factor of aircraft activity.

III. RESULTS AND DISCUSSION

Based on the results of the measurements in Table 1, it shows the noise levels at the research sites in 2011 and 2016. The housing that has the highest noise level is the civil aviation safety and engineering (*CASEA*) Housing with a noise level of 69.24 dB (A). This housing is located on the Take Off Noise area is 2,291 meters from the end of the airport runway. The housing area which has the lowest noise level is Lecturer Housing of Hasanuddin University with noise level of only 46.79 dB (A) and Pepabri Housing of 55.69. Both of these housing meet the criteria of noise level in accordance with the maximum standard quality standard set at 55 dB (A). [4]. Noise levels in 2016 can be seen in Table 1.

Table 1. Noise Level of the Research Site

No.	Measure Point	Location	Housing Distance From Airport	Noise Level in 2011 dB (A)	Noise Level in 2016 dB (A)	Noise Rise 2011-2016 dB (A)	Description of Housing Area
1	P1	CASEA Housing	2.291 m	69,24	81,40	12,16	Take off area
2	P2	The Housing of Asri II Sudiang	1.169 m	67,97	69,45	1,47	Approach Area
3	P3	National Housing Sudiang	1.758 m	64,84	66,89	2,04	Approach Area
4	P4	The Housing of Citra Daya Permai	3.260 m	61,10	64,59	3,49	Approach Area
5	P5	The Housing of Mangga Tiga	4.213 m	59,80	63,03	3,26	Approach Area
6	P6	The BTP Housing	5.181m	56,25	61,62	5,36	Approach Area
7	P7	Lecturer Housing	7.728m	46,79	48,69	1,90	Approach Area
8	P8	Pepabri Housing	662m	55,69	60,50	4,09	Lateral Area

Note: The standard quality of residential noise is 55dB. [4]
Source: Measurement results, 2016

Noise levels at the research sites in 2016 show that the highest noise housing is found at the civil aviation safety and engineering (*CASEA*) housing with noise level of 81.40 dB(A). This housing is Take off Noise area 662 distance from the end of the airport runway. Residential area with low noise level is the Lecturer Housing of Hasanuddin University with noise level only 48,69 dB (A).

The residential area around the airport based on the 2016 measurement as a whole does not conform to the 55dB (A) quality standard of housing. [4].

It can be concluded that there is an increase in noise level of 3% up to 20%. This has an adverse impact on housing around the airport.

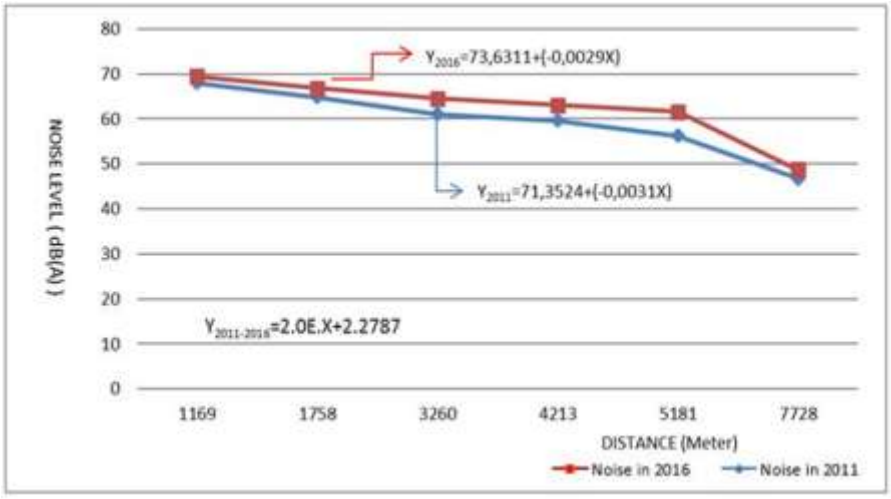

Figure 2. Comparison of Noise Level

Source : Analysis Result, 2016

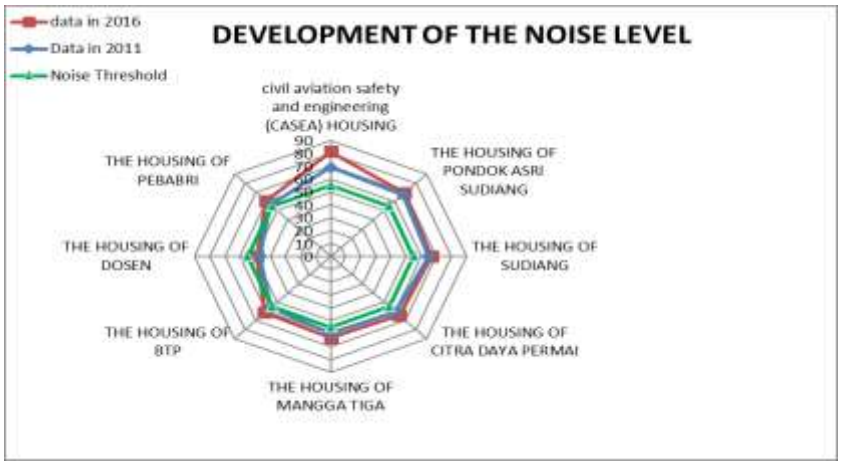

Figure 3. The Development of Noise Level

Source: Analysis Result, 2016

Based on Table 1 and Figure 3, it can be concluded that there is a significant increase in the noise impact of housing around the airport. Noise in the housing around the airport is generally influenced by factors are the distance to the sound source, the movement of the aircraft, the type of aircraft, as well as the housing conditions associated with the density of the building and the amount of vegetation that can reduce noise, wind and weather.

Residential areas that have noise levels above the 55dB (A) quality housing standard. [4]. Requires noise protection to neutralize noise-affected area noise. The alternative can be done is planting Polyathia longitali tree, using dampening material in the form of material fitted together with the wall of the building, but it requires reconstruction that causes considerable cost and requires extra maintenance, and perform landing and takeoff procedures that can reduce noise. [8]

IV. CONCLUSION

The noise level in residential areas during the period of 2011 to 2016, especially on the civil aviation safety and engineering (*CASEA*) Housing is 17,56%, there is an increase of about 4,23%, so that noise protection is needed in the form of planting Polyathialongitalia tree, using the latest aircraft that have low noise level, Performing landing and takeoff procedures that can reduce noise. [8].

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