Water Treatment Installation Network Design In Kali Veda Housing - Merauke

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Abstract, The rapid population growth that makes Merauke Regency need to be anticipated, especially in the amount of waste that can damage infrastructure such as roads, bridges, drainage, good health. To find out the dimensions of a wastewater installation by considering the capacity of the house needed from a house in the planning location. The research method used is the calculation, calculation and design According to the population to Obtain the population, the dimensions of construction of the WWTP and the design results According to the population. The results of the study of wastewater in the residential area of Kali Veda in Merauke vary greatly, ranging from floating in light gray, brown to black, starting from the smell of waste water (replace). The amount of wastewater is determined to be 60-80%. The value of community sanitation in the score is not good Because The ideal average value (Mi) is <37.25 with a value of 37.13%. Communal wastewater with a plan for 20 years. The population is 1,875 people, the criteria is 80 L / person / day. The average discharge is 42 liters / day / person, peak discharge is 75.6 liters / day / person. Processing capacity of 142.8 m3 in 2037. The design of the fat separator volume is 29.54 m3, the reservoir Leveling / wastewater design has a volume of 47.27 m3, the initial settling tank has a volume of 29.54 m3, settling volume 29, 54 m. Filter media is used as a medium for the plastic material, durable, has a large specific area, light and Also has a large volume of the cavity so that the deadlock media is very small. The pipe diameter of (black water) is 100 mm, material from PVC, Pipe diameter (gray water) is 100 mm, material from PVC. The diameter of the main pipe is 150 mm.

Keywords: Design, Water Treatment Installation, WWTP

1. Introduction

Wastewater Treatment Plant (WWTP) serves disposal of urban household waste water to a city by means of it to pass through the ground or through the subsurface to be dumped into the river, sea or lake. Wastewater Treatment Plant is processing or filtering channel system that serves to neutralize the wastewater disposal of residential, industrial liquid waste, prevent puddles, etc.[1], Thus in case of environmental pollution caused by wastewater in an area of the local drainage channel conditions necessary to the wastewater treatment plant. Stagnant water is not immediately handled waste can have negative impacts such as disturbance of the activity of the population, the environment dirty, smelly, and the potential to cause disease[2]
Merauke district with an area of 46791.63 km²[3], With an average altitude of 0-100 m above sea level, with a fairly high rainfall. Merauke Regency is a regency Indonesia's most eastern end of the area is still developing and requires a coordinated development governance. With the rapid population growth makes Merauke district needs to be alert, especially in the level of the amount of wastewater that can pollute the environment which could damage government infrastructure such as roads, bridges, drainage, good health. Therefore the need for a wastewater treatment system in order to avoid the adverse impact of the disposal of domestic waste water, it is necessary to design domestic wastewater treatment plant which serves to lower the concentration of contaminants before the waste water discharged into the receiving water. Steps should be taken to achieve better sanitation and complete is to plan the design of Wastewater Treatment Plant (WWTP) that will serve to cater to the domestic sewerage in the housing[4]

2. Methodology

Area of research is in the Vedic Kali residential district of Merauke, Merauke

![Map Location Research](image)

To analyze the data network planning wastewater treatment plant in the Vedas housing Merauke time researchers used a method Arithmetic[5], Population projections for the year 2018 with the arithmetic method is calculated using the formula:

\[ P_n = P_o + (nq) \]

3. Result and Discussion

3.1. Total Life in Housing Kali Weda

From the results of a survey done in the field of researchers obtained the number of inhabitants in a residential district of Merauke District Vedas times are totaled 125 homes, and there are 125 households. The number of people who are on housing as many as 625 times Vedas soul

3.2. Types and Sources of Wastewater

The types of waste water and household waste water source that existed at the study site can be seen in the following table:
Table 1. Type and source of waste water

| Sample Air 1 | Domestic | Water used washing | Water used to cook | Used water bath |
|--------------|----------|--------------------|--------------------|-----------------|
| **Air Samples 2** | Domestic | Water used washing | Water used to cook | Used water bath |
| **Water samples 3** | Domestic | Water used washing | Water used to cook | Used water bath |
| **Water samples 4** | Domestic | Water used washing | Water used to cook | Used water bath |
| **Water samples 5** | Domestic | Water used washing | Water used to cook | Used water bath |

3.3. Population projections for the next 20 years with the Arithmetic method
Population projections until 2038 was calculated by the method of arithmetic. The number of initial population of 625 residents, the number of 20-year-year plan in order to obtain a population of 1875 residents plan year.

3.4. Debit calculate average Wastewater
Calculating the average discharge can be calculated using the formula:
\[
Q_{\text{average wastewater}} = (70-80\%) \times Q_{\text{water}} \\
= (70-80\%) \times 60 \\
= 42 \text{ liters}
\]

3.5. Debit calculate peak
Peak discharge (Q peak) can be calculated using the following formula:
\[
Q_{\text{peak wastewater}} = 1.8 \times Q_{\text{average wastewater}} \\
= 1.8 \times 42 \text{ liter} \\
= 75.6 \text{ liters}
\]

3.6. Calculating the Minimum Wastewater Discharge (Q min)
\[
Q_{\text{min wastewater}} = 0.5 \times Q_{\text{average wastewater}} \\
= 0.5 \times 42 \text{ liters} \\
= 21 \text{ liters}
\]

3.7. The capacity of the WWTP
The capacity of the WWTP is calculated as:
\[
= Q_{\text{peak}} \times P_n \\
= 75.6 \times 1875 \\
= 141 \ 750 \text{ lt.}
\]
= 141.8 m³ / day

3.8. Bak equalization / Sump Wastewater
Volume required = HRT / 24 X Processing capacity
Volume required = (8 hours) / 24 x 141.8
= 47.27 m³

3.9. Bak Precipitation Early
volume bathtub = (Time Live In Bak) / 24 x Processing capacity
volume bathtub = (5 hours) / 24 x 141.8 m³
= 29.54 m³

3.10. Bak Fat Separator Dirt
Volume = (Retention time) / 6x24 x Processing capacity
volume bathtub = (30 minutes) / 6x24 x 141,750
= 29.54 m³

3.11. Bak precipitator End
volume bathtub = (Time Live In Bak) / 24 x Processing capacity
volume bathtub = (5 hours) / 24 x 141.8
volume bathtub = 29.54 m³

Wastewater discharge from the calculation above, the researchers gave the recapitulation of the dimensions of the wastewater treatment plant in the residential time Vedas Merauke presented in the following table according to the results of planning calculations.

| No. | name Bak                                      | Volume Calculations Planning | Vol. Building the necessary Planning | dimensions Bak | High free space (m) | Vol. effective (m³) |
|-----|-----------------------------------------------|------------------------------|--------------------------------------|----------------|---------------------|---------------------|
| 1   | Bak equalization                              | 47 250                      | 47.25                                | 6 4 2          | 0.75 48             |
| 2   | Early precipitator Bak                        | 29 531                      | 29.5                                 | 6 2.5 2        | 0.5 30              |
| 3   | Contactors Bak / Bak Dirt Separator (Infiltration) | 29 531                      | 29.5                                 | 6 2.5 2        | 0.5 30              |
| 4   | Water bath deposition                         | 29 531                      | 29.5                                 | 6 2.5 2        | 0.5 30              |
3.12. *Pipe Network System*

A sewerage system installation follow the path of the residential complex which is used as a research location. To tilt the pipe, which is 0.2% - 1%. This plan requires a 0.2% slope value of the planned pipeline distance from the starting point of the pipe to the end of the pipe. With the longest distance of 233.5 meters pipe, the slope of the pipe at the entry point of the building WWTP is 0.2% x 233.5 m = 0.4 m (40 cm).

From the measurement results, the height of the ground in the pipe is obtained by the difference in height at the start point and end point, with a decrease in height of 23 cm.

4. **Conclusion**

Based on the results of this study concluded Dimensions communal WWTP with the 20-year plan with the wastewater treatment capacity of 141750 m / 1250 / day. The separator body design has a volume of 29.5 m3 equalization basin design / waste water tank has a volume of 47.27 m3, initial deposition bath has a volume of 29.5 m3, Final sedimentation basin has a volume of 29.5 m3.

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