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Evaluation of the Effectiveness of Sewage Treatment Plant Performance in GKM Green Tower Building

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Abstract-- *Wastewater or wastewater is the remaining water that is disposed of, originating from households, industries, offices, and other public places. A sewage treatment plant (STP) is a process of reusing wastewater and removing contaminants from wastewater. This study evaluates the Sewage Treatment Plant system in the GKM Green Tower Building. This study aims to analyze the performance of the Sewage Treatment Plant (STP) in the GKM Green Tower building and to determine the effectiveness of the performance of the Sewage Treatment Plant (STP) in the GKM Green Tower building. The parameters used in this study were pH (acidity), COD, BOD, TSS, oil and grease, Total Coliform, and Ammonia, which complies with Domestic Wastewater Quality Standards Based on the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number: P.68/ Menlhk-Setjen/2016. Recycled water in the GKM Green Tower building is used to flush closed urinals and water plants. It was found that the results of clean wastewater management in the GKM Green Tower building still look cloudy and smelly. Based on the results of domestic wastewater monitoring tests at GKM Green Tower in August / prior to analysis, several parameters exceeded the quality standards, namely TSS and Total Coliform. The maintenance carried out so far on the Sewage Treatment Plant (STP) system in the GKM Green Tower Building is still not good, which is the cause of the ineffectiveness of the wastewater that has been managed so far. The results of the second test conducted in November showed a decrease in the numbers between the TSS 4 and Total Coliform parameters between 1100. So that they were in accordance with the quality standards set by the government Ministry of Environment*

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1. INTRODUCTION

As the capital city of Jakarta develops, more and more towers and high-rise buildings are built. The proliferation of office buildings will increase the need for clean water, as well as increase the amount of wastewater city residents [2]. In general, wastewater contains materials and substances that can endanger human health and pollute the environment. Liquid waste, before being discharged into the river, the environment must go through a treatment process so as not to cause environmental pollution that can endanger human life. [3].

Failure to properly treat wastewater causes problems for the local community. The system used for this purpose is called a sewerage system, and it is used before being returned to the environment to prevent contamination of environmental pollution [2]. Domestic Waste Pollution Handling Standards in DKI Jakarta Article 122 of DKI Jakarta Governor Regulation No.2005 regulates everything related to domestic waste disposal in residential areas, offices, as well as commercial areas and markets (Pergub DKI Jakarta, 2005).

Of course, it is very important to treat wastewater properly according to the water quality standards set by the government and find indications of problems due to the presence of cloudy and dirty water in the STP installation found in the STP system that is currently running. In addition, the target of this research is also the environment around the Ciliwung River.

Therefore, the need for assessment and action to overcome this problem requires an initial step to identify the overall problem. The purpose of this activity is to identify the problems found in the GKM Green Tower Building and find ways to overcome these problems. From this description, the author conducted research to evaluate the performance of the Sewage Treatment Plant (STP) of the GKM Green Tower Building, with the title "Evaluation of the Effectiveness of Sewage Treatment Plant Performance at the GKM Green Tower Building".

2. METHODOLOGY

The stages of the process that will be carried out in this study through several stages to get the appropriate research results, and to describe these stages the meal is described in the flow chart as follows:

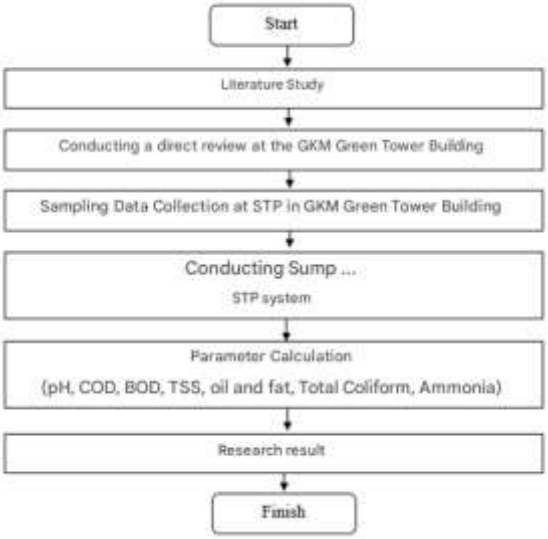

Figure 1. Flowchart of Final Project Preparation

2.1 TOOLS AND MATERIALS

a. Tools

- Gloves
  Gloves are used to protect hands and maintain the sterilization/cleanliness of materials in the research sample test.
- Container for sample
  Containers for samples are used as a place to contain samples to be tested.
- Analysis tools
  In situ analytical tools used for research, such as thermometers and pH meters.

b. Material

- Wastewater Sample
  The sample used in this research test is wastewater in the GKM Green Tower Building.

3. RESULT AND DISCUSSION

This chapter will explain more about the Sewage Treatment Plant (STP) machine and its efficiency at GKM Green Tower. The data explored are specification data and also actual data that occurs in the field. The specification data is taken from GKM Green Tower. At the same time, actual data on the installation status of wastewater treatment equipment for the sewage treatment plant (STP) machine was generated on-site. In addition to the data from the drainage survey, the actual data was obtained before the analysis in August 2022 and after the analysis in November 2022.

From the results of the research analysis, several were found to be the focus of the problem in this study, namely to see the effectiveness of the Sewage Treatment Plant (STP) machine in the GKM Tower Building. However, the results of clean wastewater management at GKM Green Tower are still cloudy and smelly, so this research will analyze the causes of wastewater management problems at GKM Green Tower. In addition, during the research period, researchers conducted an analysis to help

improve wastewater management through the Sewage Treatment Plant (STP) machine in the GKM Green Tower building.

From the data found, previously, the GKM Green Tower Building had conducted domestic wastewater quality monitoring where the test was carried out on August 10, 2022:

Table 1. Wastewater Test Result Data August 2022

No	Parameter	Unit	Test Results	quality standards	Test Method
1	pH		7.0	6-9	SNI 6989.11.2019
2	Suspended Solids	mg/L	36.0	30	No. 45/IKM (Spektrofotometri)
3	Ammonia (NH3-N)	mg/L	1.38	10	SNI 06-6989.30-2005
4	Oils and Fats	mg/L	<0.54	5	No. 47/IKM (Spektrofotometri)
5	COD (Dichromat)	mg/L	41.0	100	No. 44/IKM (Spektrofotometri)
6	BOD 5	mg/L	19.40	30	SNI 6989.72.2009)
7	Total Coliform	Amount/100mL	$4.10x10^6$	3000	No. 40/IKM (Petrifilm)

Based on the analysis results, the parameters of the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.68/Menlhk/Setjen/Kum.1/8/2016 concerning Domestic Wastewater Quality Standards. The results of domestic wastewater monitoring at GKM Green Tower show that several parameters exceed the allowed quality standards. The results of the analysis show that the TSS and Total Coliform index exceeded the quality standards tested in August, as well as the condition of the Recycle Water used in the building for closed flushing and urinals, it is also used to water turbid-colored plants in the past few months. For this reason, the author analyzes the Sewage Treatment Plant (STP) wastewater treatment system in the GKM Green Tower Building to analyze the cause of the building's recycled water, which is slightly brown. To improve the quality of wastewater at GKM Green Tower. One of the researcher's goals is to improve the Sewage Treatment Plant (STP) installation machine maintenance system as follows:

1. Carry out daily inspection of the condition of the basket screen
2. Performed grease trap cleaning of grease
3. Performed sludge removal
4. Perform routine pump inspection and maintenance
5. Inspect the chain and transmission components every 3 months.
6. Backwash sand filters and carbon filters every week.
7. Conducting wastewater inspection to BPLH every 3 months.
8. Conduct a water test kit to measure Ph and Chlorine levels 8.

After analyzing the Sewage Treatment Plant (STP) machine maintenance system, the researcher analyzed several parameters that exceeded the quality standards for total suspended solids (TSS) and total coliform. In addition, dead sludge needs to be cleaned regularly because dead sludge that accumulates in the basin can cause poor wastewater quality. The process can minimize the occurrence of blockages in the treatment from sludge or dead sludge.

After the analysis was carried out along with the wastewater management improvement experiment at GKM Green Tower, the researcher then conducted a second domestic wastewater quality test to compare with the results of the previously conducted wastewater test on November 14, 2022

Table 2. Wastewater Test Result Data November 2022

No	Parameter	Results	Standar**	Unit	Method
1	pH	6.81	6-9		SNI.6989.11.2019
2	Biological Oxygen Demand (BOD5)	10.23	30	mg/L	SNI.6989.72.2009
3	Chemical Oxygen	22.37	100	mg/L	SNI.6989.2.2019

	Demand (COD)				
4	Total Suspended Solid (TSS)	3.20	30	mg/L	SNI.6989.3.2019
5	Oils and Fats	1.11	5	mg/L	SNI.6989.10.2011
6	Amonia (NH3-N)	2.58	10	mg/L	SNI 06-6989.30.2005
7	Total Coliform	300	3000	Amount/100mL	APHA 9221B ED 22nd

Table 3. Wastewater Test Result Data Before and After Analysis

No	Parameter	Unit	quality standards	August 2022	November 2022
1	pH		6-9	7	6.81
2	TSS	mg/L	30	36.0	32
3	Ammonia	mg/L	10	1.38	2.58
4	Oils and Fats	mg/L	5	<0.54	1.11
5	COD	mg/L	100	41.0	22.37
6	BOD	mg/L	30	19.40	10.23
7	Total Coliform	Amount/ 100mL	3000	4100	3000

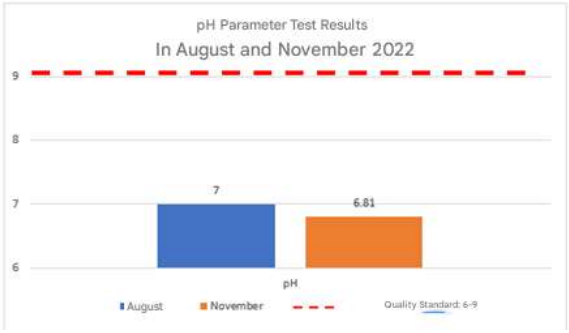

Figure 2. Graph of pH Parameter Test Results After Analysis

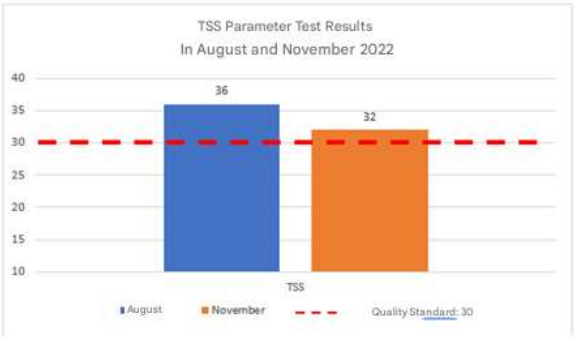

Figure 3. TSS Parameter Test Result Graph after Analysis

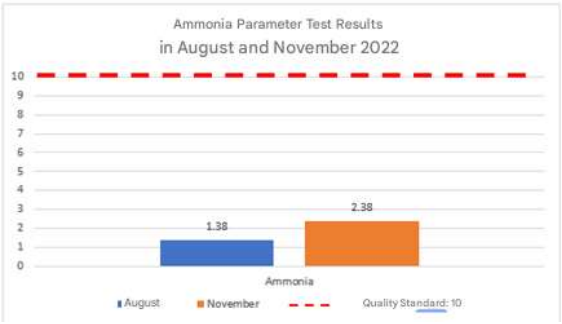

Figure 4. Ammonia Parameter Test Result Chart After Analysis

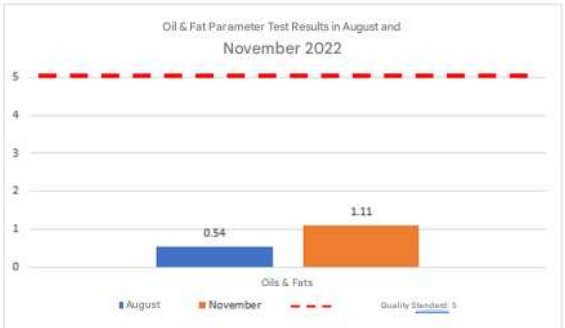

Figure 5. Parameter Test Result Chart Oil & Fat After Analysis

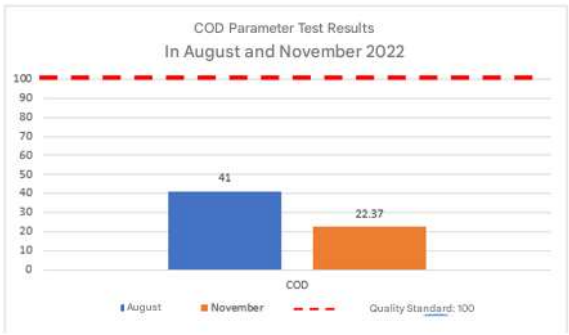

Figure 6. Graph of COD Parameter Test Results After Analysis

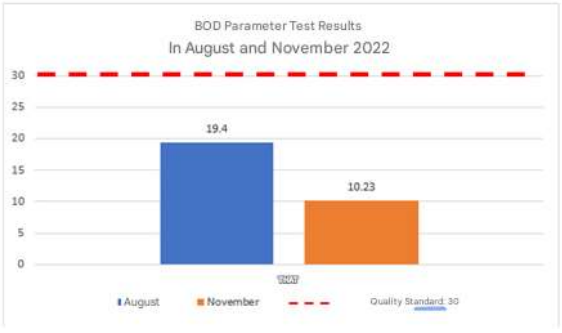

Figure 7. Parameter Test Result Graph BOD After Analysis

Figure 8. Parameter Test Result Chart Total Coliform After Analysis

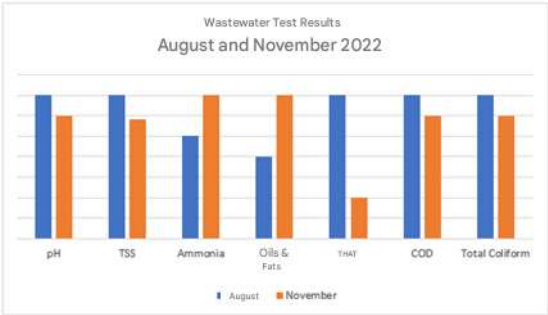

Figure 9. Graph of Increase and Decrease in Parameter Test Results

From these results, it can be seen that there was a decrease and an increase in the results of wastewater tests conducted before conducting research, namely in August 2022 and those conducted after conducting research, namely in November 2022.

The test data and graphs from August and November show that the pH, ammonia, COD, BOD, oil, and fat parameters remain at the quality standard. While TSS and Total Coliform, which in August exceeded the quality standards after cleaning dead sludge and adding Chlorine and monitoring every week after testing again in November, showed a decrease in the number of TSS and Total Coliform parameters, ensuring that it has met the quality standards set, by the government.

After following the above procedures, we hope that the BOD and COD levels can meet the wastewater quality standards set by the government so that our wastewater does not pollute the environment. At the same time, recycling will involve us in preserving nature by saving water, thus helping to protect our environment.

4. CONCLUSION

This research is a study that analyzes the Sewage Treatment Plant (STP) system in the GKM Green Tower Building. Researchers have conducted field analysis for 6 months to analyze the data found in the field. Based on the research results, the following conclusions can be drawn:

1. Recycle water in the GKM Green Tower building is used for closed flushing and urinals and is also used for watering plants in the building.
2. It was found that the results of clean wastewater management in the GKM Green Tower Building still look cloudy and smelly.
3. Based on the results of domestic wastewater monitoring tests at GKM Green Tower in August / before analysis, there are several parameters that exceed the quality standards, namely TSS and Total Coliform.
4. The maintenance carried out so far on the Sewage Treatment Plant (STP) system in the GKM Green Tower Building is still not good, so this is the cause of the lack of effectiveness of the wastewater managed so far.
5. The results of the second test conducted in November showed a decrease in numbers among the TSS and Total Coliform parameters so that they were in accordance with the quality standards set by the government.
6. During the analysis, researchers have made several efforts to help evaluate and provide innovations to make the existing wastewater management in the GKM Green Tower Building more effective.

7. Some of the steps taken by researchers are cleaning dead sludge in tanks, performing a backwash process on the Sand Filter, adding Chlorine to the Effluent Tank and recycle tank, and checking with a water test kit.

After several stages were carried out by researchers, they also conducted wastewater tests in November with the aim of seeing changes in the Sewage Treatment Plant (STP) system.

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