
| RESEARCH ARTICLE

Geomembranes to Prevent Swallowing

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| ABSTRACT

The high intensity of rain increases the runoff of the mine area so that the water flowing through the drainage channel carries erosion so that the sediment pond very quickly silts up. The impact is that the water flowing from the sediment pond to the river will be cloudy, disturbing biodiversity in the river. This study aimed to evaluate the effectiveness of using geomembranes in preventing siltation in sediment ponds. This research was conducted in the monkey area of PT Antareja Mahada Makmur Site Multi Harapan Utama. This study used qualitative research methods. Data were collected through field surveys by directly observing the waters where geomembranes have been installed. The collected data were analyzed through three stages: data reduction, presentation, and conclusion drawing. The results showed that using geomembrane in drainage can reduce erosion and siltation in wastewater settling ponds. The innovative use of geomembranes in settling ponds positively impacts the environment, cost efficiency, and team understanding within the company.

| KEYWORDS

Geomembrane, Prevention, Siltin

| ARTICLE INFORMATION

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1. Introduction

High-intensity rains lead to an increase in surface water runoff, which can affect the mine area. Rainwater will flow over the ground surface when heavy rains occur and collect water in the mine area. This can lead to increased water flow leaving the mine, known as runoff.

Increased mine area runoff can have negative impacts, such as soil erosion, environmental pollution, and damage to infrastructure. Rainwater flowing over the ground can carry soil and mine waste into waterways, contaminating rivers and aquatic ecosystems. In addition, strong water flows can also damage roads, bridges, and other mining facilities. Therefore it is necessary to control the runoff produced by high rain intensity.

Efforts to control runoff can be made in various ways, including the creation of good drainage channels, the construction of water retaining embankments, and proper vegetation management to reduce soil erosion (Maryono, 2020). In drainage, one media that can be used is the geomembrane. Geomembrane is a material in the form of a plastic sheet used to cover or cover the surface of land, mining soil, or other storage materials. This material is made of synthetic polymers resistant to water, chemicals, and gas penetration. Geomembranes are often used in various applications such as waterproof construction, sewage treatment, water storage, and environmental pollution control (Didin et al. I, 2023).

Geomembranes are impermeable or resistant to the movement of water or other liquids. With this ability, geomembranes can prevent leakage, infiltration, or contamination between the layers of soil or material beneath it and the surrounding environment.

In addition, geomembranes can also assist in controlling soil erosion and maintaining environmental sustainability by protecting groundwater and other natural resources from contamination (Geosinindo, 2022).

In previous research (Widiyono, 2019), geomembranes were used to prevent infiltration. Another study conducted by (Thiel et al., 2003) used geomembranes for landfills. While researching (Cunning et al., 2008), geomembranes are used as layers for dam construction. Because there has been no research examining the use of geomembranes to prevent silting, this is a novelty in this study. This study aimed to evaluate the effectiveness of using geomembranes in preventing siltation in sediment ponds.

2. Method

This research was conducted in the work area of PT Antareja Mahada Makmur Site Multi Harapan Utama. This study used qualitative research methods. According to (Sugiyono, 2018), the qualitative research method is based on philosophy used to research scientific conditions (experiments) where researchers as instruments and data collection techniques and analyze qualitatively to put more emphasis on meaning. Data was collected through field surveys by directly observing the waters installed with geomembranes. The data that has been collected is then analyzed through three stages, namely data reduction, data presentation, and conclusion.

3. Discussion

Geomembrane is a sheet made of High-Density Polyethylene (HDPE) with water-resistant properties. Its function is to prevent water flow from hitting the ground in the drainage area to prevent erosion. Installing a geomembrane in the drainage area helps maintain soil stability and protects the drainage structure from damage due to strong water flows (Setiawan, 2016). One of the ultimate goals of using geomembranes in drainage is to direct water flow toward settling ponds. The settling pond is a temporary storage area for water before it is discharged into rivers or other waterways. In settling ponds, particles of silt or sediment can settle and not directly contaminate rivers or waterways so that the flowing water has better clarity and does not disturb the surrounding biodiversity (Linggasari, 2022).

The importance of using geomembranes in drainage is to maintain environmental sustainability and protect water resources; by preventing erosion in drainage areas and controlling the flow of water containing silt or sediment through settling ponds, the negative impact on aquatic life in rivers can be reduced. In addition, using geomembranes also helps reduce the potential for environmental damage due to strong water flows and erosion, which can damage the soil, vegetation, and ecosystems around the drainage (Lufira & Asri, 2021).



Figure 1. Geomembrane Implementation

Figure 1 is a visualization of the implementation of the geomembrane as an effort to prevent siltation. The implementation of geomembranes in drainage has various positive impacts, including the following:

1. Impact of Innovation on the Environment

Using geomembranes in settling ponds prevents siltation and reduces the risk of river water pollution. Thus, this innovation positively impacts environmental sustainability as it can maintain better water quality and protect aquatic life in the vicinity.

2. Impact of Innovation on Efficiency or Cost Savings

The use of geomembranes in settling ponds can reduce maintenance costs or reduce settling ponds; by preventing siltation, the frequency and costs of cleaning settling ponds can be reduced. For example, by using a geomembrane, the cost that can be saved is estimated at Rp. 350,000,000.

3. The Impact of Innovation on Other Aspects

This innovation also impacts the company's engineering and operational teams. With the use of geomembranes, the team has a better understanding of this technology's benefits and positive impacts. They will be more skilled and trained in designing, managing, and maintaining settling pond systems equipped with geomembranes.

4. Program Reach

This innovation is implemented internally within the company, which means using geomembranes in settling ponds occurs within the company. This program is designed to improve the company's operational efficiency and maintain the sustainability of the surrounding environment.

The innovation of using geomembranes in settling ponds has a positive impact on the environment, cost efficiency, and team understanding within the company; by reducing the siltation of settling ponds, clean water can be channeled into rivers, maintenance costs can be reduced, and teams become more skilled in managing the system.

The use of geomembranes in wastewater-settling pond drainage systems can potentially reduce erosion and siltation. This has important implications for achieving the TPB/SDGs (Sustainable et al.), which are global and national commitments in efforts to improve the welfare of society as a whole (Hadrian & Andry, 2020). Some of the points in the TPB/SDGs objectives related to the use of geomembranes in wastewater settling pond drainage include:

1. Healthy and Prosperous Life

To reduce erosion and siltation in wastewater settling ponds, using geomembranes can help maintain the cleanliness and quality of wastewater. This impacts improving the health of the people who use the wastewater, reducing the risk of disease, and increasing the overall quality of life.

2. Clean Water and Proper Sanitation

Using geomembranes in wastewater-settling pond drainage can prevent water pollution and contamination. Thus, the goal of ensuring the availability of clean water and proper sanitation for all people can be achieved.

3. Sustainable Cities and Settlements

Implementing geomembranes in wastewater drainage systems is one of the efforts to create sustainable cities and settlements. By reducing erosion and siltation, using geomembranes can minimize negative impacts on the environment, maintain the sustainability of water resources, and create a cleaner and safer environment.

So the use of geomembrane in the drainage of wastewater settling ponds has an impact that is in line with several points in the SDGs/TPB goals, such as a healthy and prosperous life, clean water, and proper sanitation, as well as sustainable cities and settlements.

4. Conclusion

The use of geomembranes in wastewater-settling pond drainage systems can potentially reduce erosion and siltation. This has important implications for achieving the TPB/SDGs (Sustainable et al.) goals, which are global and national commitments to improve the welfare of society as a whole, including healthy and prosperous life, clean water and proper sanitation, sustainable cities, and settlements. The innovation of using geomembranes in settling ponds has a positive impact on the environment, cost efficiency, and team understanding within the company. By reducing the siltation of settling ponds, clean water can flow into the river, maintenance costs can be reduced, and the team becomes more skilled in managing the system.

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