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ANALYSIS OF TREATMENT UNIT SELECTION IN THE DESIGN OF THE WATER TREATMENT PLANT (III) KARAWANG BRANCH, EAST KARAWANG DISTRICT

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Abstract: The Drinking Water Treatment Plant (III) Karawang Branch was developed to increase production capacity and ensure an adequate water supply for the Karawang Service Area. The raw water for this plant is sourced from the West Branch North Tarum Channel (STUB) and has a design production capacity of 100 L/s. The design aims to implement optimal treatment processes to meet the required drinking water quality standards. This study investigates the selection of treatment units for the plant, focusing on raw water quality as the primary criterion to meet the drinking water standards stipulated by Ministry of Health Regulation No. 2 Year 2023. Key water quality parameters that do not meet these standards include total suspended solids (TSS), total dissolved solids (TDS), chemical oxygen demand (COD), biochemical oxygen demand (BOD), dissolved oxygen (DO), sulfide, color, detergent, fecal coliform, and total coliform. The selection of treatment units was conducted using the Water Quality-Based Approach, which considers specific contaminants in the raw water, along with the Literature-Based Approach, involving a review of existing water treatment plants and their efficiency in similar settings. The chosen treatment units include an intake system, hydraulic coagulation, hydraulic flocculation, sedimentation with plate settlers, dual-media rapid sand filtration, chlorination disinfection, and a ground reservoir for water storage. This study contributes to ensuring a sustainable and safe drinking water supply for the Karawang region through an integrated water treatment system.

Keywords: drinking water treatment plant, Karawang, raw water, treatment plant unit

I. INTRODUCTION

Water plays an essential role in global development (Sani et al, 2020). Drinking water is vital for the survival and well-being of living organisms and daily human activities. It must meet the requirements of quality, quantity, continuity, and affordability. Specifically, water quality must adhere to health standards to prevent adverse health impacts, quantity must meet demand, continuity ensures uninterrupted supply, and affordability provides broad community access (Praga et al, 2018).

Over recent decades, global water demand has risen substantially, driven by population growth and increasing water scarcity (Sani et al, 2020).

Water treatment plants (WTP) are essential infrastructures designed to ensure water safety through a series of processes that remove contaminants from raw water. These processes, arranged in a "treatment train," typically include coagulation-flocculation,

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sedimentation, filtration, and disinfection, each contributing to the overall quality of treated water (Adiyanti, 2016).

In Karawang Regency, the water supply system is managed by Perumdam Tirta Tarum, which serves 20 service areas across the region. As of December 2023, the system's total treatment capacity is 1,368 liters per second, with 136,967 house connections. The WTP Karawang Branch is the largest facility, producing 395 L/s and supplying a significant portion of the region's drinking water. However, the increasing population and economic activities have escalated water demand, necessitating an upgrade in production capacity.

According to the Regional Action Plan on Drinking Water and Environmental Health (RAD AMPL) for 2020–2024, as stipulated in Peraturan Bupati Karawang Nomor 77 Tahun 2020, the production capacity of the Karawang Branch must be increased to 500 L/s to meet regional development goals. Currently, the WTP (III) Karawang Branch operates at 395 L/s, creating a gap of 105 L/s. This shortfall could lead to supply disruptions, particularly during peak demand periods, highlighting the urgent need for capacity expansion.

To address this gap, Perumdam Tirta Tarum plans to construct an additional 100 L/s treatment facility in Adiarsa Timur Village, East Karawang District. This new facility is expected to complement the existing WTP ini Karawang Branch, ensuring an adequate supply of drinking water while meeting quality standards outlined in Ministry of Health Regulation No. 2 Year 2023. These standards specify acceptable levels of various contaminants and physicochemical properties to safeguard public health.

This study focuses on selecting and designing appropriate treatment units for the new facility while optimizing the existing system at WTP Karawang Branch. By adhering to Indonesia National Standard (SNI) 6774-2008 concerning the design of water treatment plant package units, this research aims to deliver a sustainable and reliable water treatment system capable of fulfilling the growing demands of Karawang Regency.

II. METHODOLOGY

The stages of designing a drinking water treatment plant (WTP) include an initial survey, inventory of data, literature review, data processing, selection of treatment alternatives, and design of treatment units. The selection of treatment units was based on two main methods: the Water Quality-Based Approach and the Literature-Based Approach. The Water Quality-Based Approach focuses on analyzing the raw water quality to choose the appropriate treatment processes for removing contaminants. The Literature-Based Approach involves reviewing existing treatment plant designs to find best practices for similar water quality conditions. Combining these approaches helps ensure an effective and suitable design for the treatment plant.

2.1. Preliminary Site Survey

The preliminary site survey was carried out by making direct observations at the location that will be used for WTP land which is useful for knowing the existing conditions at the planning location and the raw water to be used.

2.2. Data Collection

Sampling was conducted using the grab sampling method, following the guidelines of SNI 8995:2021 on Water Sampling Methods for Physical and Chemical Testing. Samples were taken from the West Branch North Tarum Channel, which serves as the raw water source for this study. Four sampling points were selected along the channel, corresponding to the water flow rates, which range between 5 and 150 m³/s. Sampling was conducted twice to represent both the dry and rainy seasons, aiming to capture variations in raw water conditions across these two distinct seasons. The raw water quality analysis was performed on samples collected during both the dry and rainy seasons to provide a comprehensive overview of seasonal water quality fluctuations. All analyses were carried out at the Perum Jasa Tirta II Laboratory.

2.3. Literature Study

Literature study is carried out to obtain the basic theory used as a reference in planning and to obtain design criteria that are in accordance with the characteristics of the raw water used, such as literature containing existing WTP design criteria in Indonesia. Design criteria are used as a basis for consideration in designing treatment units that are following the discharge and quality of the raw water used.

2.4. Selection and Determination of Water Treatment Units

The determination of the treatment unit aims to produce a series of treatment processes that effectively and efficiently treats the West Branch North Tarum Canal raw water in order to meets drinking water quality standards according to the Minister of Health Regulation No. 2 Year 2023.

2.5. Design of Water Treatment Unit

Criteria design of treatment units are determined based on literature studies derived from text books, journals, and several other references that can treat water to meet the drinking water quality standards. The design of WTP (III) Karawang Branch uses the following equation (Qasim, 2000):

$$v = \frac{Q}{A} \tag{1}$$

$$t_d = \frac{V}{Q} \tag{2}$$

$$G = \sqrt{\frac{P}{\mu \times V}} \tag{3}$$

$$P = \rho \times g \times H_L \times Q \tag{4}$$

$$N_{Re} = \frac{v_p \times R}{v} \tag{5}$$

$$N_{Fr} = \frac{v_p{}^2}{g \times R} \tag{6}$$

$$H_L = \left(\frac{Q}{0.2785 \times C \times D^{2.63}}\right)^{1.85} \times L \tag{7}$$

$$H_L = n \times k \times \frac{v^2}{2 \times g} \tag{8}$$

Where:

v	= water velocity (m/s)
A	= surface area (m^2)
Q	= raw water discharge (m^3/s)
td	= detention time (s)
G	= gradient velocity (/s)
NRe	= Reynold number
NFr	= Froude number
HL	= headloss (m)
g	= percepatan gravitasi (m/s^2)
V	= volume (m^3)
μ	= absolute viscosity (kg/m.s)
R	= hydraulic radius (m)
v	= kinematic viscosity (m^2/s)
G	= velocity gradient (/s)
ρ	= density (kg/m^3)

In designing the WTP (III) Karawang Branch, a water quality-based approach and literature-based approach were employed to ensure compliance with drinking water standards. Hydraulic and treatment calculations were conducted to optimize the design of each unit. The water velocity was calculated to maintain optimal flow rates across channels and treatment units, ensuring effective processes such as sedimentation and filtration. Detention time was determined to provide sufficient residence time for sedimentation and floc formation. Gradient velocity was used to assess the intensity of mixing during coagulation and the gentle stirring required for flocculation. Reynolds number (NRe) and Froude number (NFr) were analyzed to ensure proper flow characteristics laminar flow for flocculation and controlled turbulence for mixing. Headloss was calculated to evaluate pressure losses due to friction in pipes and localized fittings, ensuring the system maintains adequate hydraulic performance. Additionally, the power required for pumping (P) was estimated to meet the energu demans for water conveyance. These calculations were based on raw water quality parameters and tailored to the selected treatment units, including coagulation, flocculation, sedimentation, filtration, and disinfection. By integrating these hydraulic and treatment criteria, the design achieves efficient operation and compliance with Ministry of Health Regulation No. 2 Year 2023. This methodology ensures the WTP can meet the increasing water demand in the Karawang Service Area while maintaining optimal treatment performance.

III. RESULT AND DISCUSSION

3.1 Water Quality of West Branch North Tarum Canal

The raw water source is the West Branch North Tarum Channel, with 100 L/sec intake capacity, since the quantity and quality of these raw water are meet the requirement.

Raw water measurement was carried out using the grab sampling method which represent the dry season and the rainy season, i.e on March 8, 2024 and May 20, 2024 respectively. Water quality tests were conducted at the Perum Jasa Tirta II Environmental Laboratory.

The raw water quality data is used to select the appropriate unit treatments. The quality standard used to assess the raw water quality class is the Government Regulation No. 22 Year 2021 Appendix 6 for Water Class I standards and the drinking water quality standard used is the Minister of Health Regulation No. 2 Year 2023. The results of the raw water quality analysis can be seen in Table 1. Based on the comparison of raw water quality against the Government Regulation No. 22 Year 2021 and the Minister of Health Regulation No. 2 Year 2023, several contaminants contain in the raw water are TSS, TDS, BOD, COD, DO, sulfide, color, turbidity, detergent, fecal coliform, and total coliform. These parameters that do not meet the drinking water quality requirements must be removed to meet the drinking water quality.

3.2 Alternative Drinking Water Treatment Unit

Water treatment units that can remove parameters that do not meet the criteria can be seen in Table 2.

Table 1. Raw Water Quality of North Tarum Channel

Parameters	Units	Quality Standard	Requirements	Quality Tes Results		Prelimininaries	Efficiency
		Government Regulation No. 22 Year 2021	Minister of Health Regulation No. 2 Year 2023	08/03/2024	20/05/2024		
TSS	mg/L	40	-	73	16	33	45.20%
TDS	mg/L	1000	<300	170	340	40	11.80%
BOD	mg/L	2	-	7	4	5	71.40%
COD	mg/L	10	-	15	10	5	33.30%
DO*	mg/L	6	-	6.4	4.5	1.5	25%
Sulfide (H_2S)	mg/L	0.002	0.002	0.01	<0.004	0.008	80%

Parameters	Units	Quality Standard	Requirements	Quality Tes Results		Prelimininaries	Efficiency
		Government Regulation No. 22 Year 2021	Minister of Health Regulation No. 2 Year 2023	08/03/2024	20/05/2024		
Colour	mg/L	15	10	13	-	3	23.10%
Turbidity	NTU	-	3	66.7	43.4	63.7	95%
Detergent	mg/L	0.2	-	0.5	0.3	0.3	60%
Fecal coliform	MPN/100mL	100	0	12906	1.827	12906	100%
Total *coliform*	MPN/100mL	1000	0	12906	12908	12906	100%

Description:
*: minimum permissible limit value to be present in water

Table 2. Unit Treatment Required to Remove Contaminants

No	Parameters	Quality Tes Results		Units	Efficiency					Primary Processing			Specialised Processing				
		Dry Season	*Wet Season*		S	PC	PS	A	LS	CS	RSF	SSF	P	SC	AC	SCT	SWT
1	TSS	73	16	mg/L						✓	✓	✓					
2	TDS	170	340	mg/L			✓			✓	✓	✓					
3	BOD	7	4	mg/L			✓	✓		✓	✓	✓					
4	COD	15	10	mg/L				✓		✓	✓	✓					
5	DO*	6.4	4.5	mg/L				✓		✓		✓					
6	Sulfide (H2S)	0.01	<0.004	NTU			✓			✓	✓	✓					
7	Colour	13	-	mg/L						✓	✓	✓					
8	Turbidity	66.7	43.4	Pt.Co				✓		✓	✓	✓			✓		
9	Detergent	0.5	0.3	mg/L				✓		✓	✓	✓					
10	*Fecal coliform*	12906	1.827	MPN/100mL						✓	✓	✓	✓				
11	Total *coliform*	12906	12908	MPN/100mL						✓	✓	✓	✓				

Description:

* : minimum limit value in water
√ : units used
S : Screening
PC : pre-chlorination
PS : prasedimentation
A : aeration
LS : lime softening
CS : coagulation-sedimentation
RSF : rapid sand filter
SSF : slow sand filter
P : post chlorination
SC : super chlorination
AC : activated carbon
SCT : special chemical treatment
SWT : salt water treatment

An analysis of raw water quality revealed several parameters exceeding the drinking water standards in Indonesia's Ministry of Health Regulation No. 2 of 2023. Elevated

Total Suspended Solids (TSS) indicate significant suspended particles, while high Total Dissolved Solids (TDS) reflect excessive dissolved substances. Elevated Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) suggest organic matter that may foster pathogenic growth. Excessive turbidity and high coliform levels indicate fine particles hindering disinfection and potential biological contamination, posing health risks without proper treatment.

To address these issues, an integrated treatment system is proposed, comprising an intake, hydraulic jump coagulation, hexagonal baffled flocculation, sedimentation with plate settlers, rapid sand filtration, chlorine disinfection, and a ground reservoir.

The intake removes coarse sludge and debris. Hydraulic jump coagulation mixes coagulants with raw water, initiating particle agglomeration, followed by hexagonal baffled flocculation to form stable flocs (Zhao et al, 2021). Sedimentation with plate settlers accelerates particle removal using inclined plates, improving efficiency and reducing space needs (Xiang et al, 2020).

Rapid sand filtration removes fine particles and microorganisms (Baghapour et al, 2022), and chlorine disinfection eliminates pathogens while maintaining residual protection (WHO, 2022). Treated water is stored in a ground reservoir before distribution. This system ensures the water meets safety standards for consumption.

The series of treatment units of consists of intake, coagulation, flocculation, sedimentation, filtration, in Figure 1.

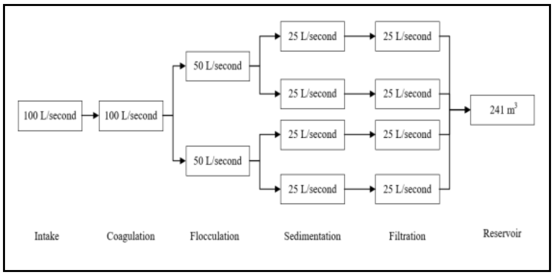

Figure 1. Layout Plan of WTP (III) Karawang Branch

1. Intake
   The design of 100 L/s intake unit is consists of a bar screen, sluice gate, conveyance channel, and collecting well. Raw water will be pumped to the treatment plant since the intake is located lower than the treatment plant. The intake design can be seen in Table 3 and Figure 2.

Table 3. Design of WTP (III) Karawang Branch Intake

Treatment Unit	Description	Dimension
Intake	Barscreen dimensions	0.5 m x 3.03 m
	Carrier channel dimensions	35 m x 0.5 m x 3.03 m
	Dimension of collecting well	2.3 m x 4.6 m x 4.06 m
	Intake pump	Centrifuges

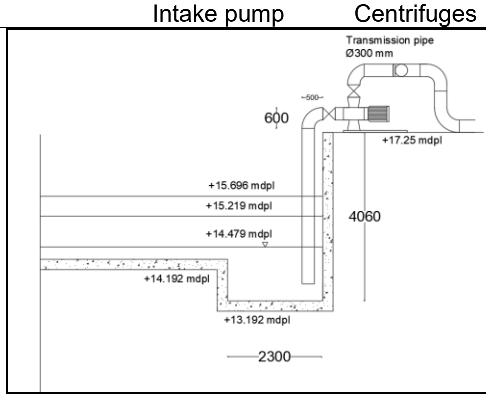

Figure 2. Design of WTP (III) Karawang Branch Intake

2. The hydraulic coagulation

   Hydraulic coagulation was chosen since it does not require complicated operation and maintenance. The type of hydraulic coagulation used is a plunge type with rectangular weir. The hydraulic coagulation design is presented in Table 4 and Figure 3.

Table 1*.* Design of WTP (III) Karawang Branch Coagulation Unit

Treatment Unit	Description	Dimension
Coagulation	Dimension of receiving well	1.8 m x 1.8 m x 1.5 m
	Coagulation basin dimension	0.9 m x 1.8 m x 1 m
	Weir dimension	0.8 m x 0.5 m
	Coagualant dosage	25 mg/L ($Al_2(SO_4)_3$)
	Detention time	9.05 second
	G	745.48 /second
	G.td	6746.6

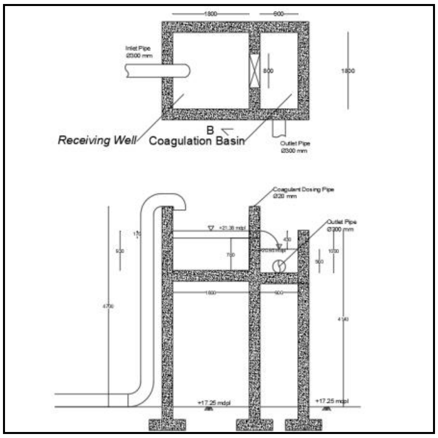

Figure 1*.* Design of WTP (III) Karawang Branch Coagulation Unit

Hydraulic coagulation is operationally simple and cost-effective compared to mechanical coagulation. It utilizes water flow and cascade structures, eliminating the need for electricity or mechanical components, making it suitable for regions with limited infrastructure and energy resources. This method facilitates natural mixing for effective coagulant distribution, achieving floc formation without the need for complex speed control mechanisms (Mahmood et al, 2020).

Additionally, hydraulic coagulation enhances dissolved oxygen content. As water flows through cascades or baffled structures, turbulence increases air exposure, promoting oxygen diffusion into the water. This process mitigates undesirable odors or tastes and supports the oxidation of contaminants, such as organic substances, aiding in reducing water color. This aeration effect is particularly advantageous for raw water sources with low oxygen levels, making hydraulic coagulation well-suited for improving raw water quality (Ali et al, 2021). These factors collectively establish hydraulic coagulation as a suitable choice for deployment in developing regions.

Total Dissolved Solids (TDS) reflect excessive dissolved substances. Elevated Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) suggest organic matter that may foster pathogenic growth. Excessive turbidity and high coliform levels indicate fine particles hindering disinfection and potential biological contamination, posing health risks without proper treatment.

3. The hydraulic flocculation

   The hydraulic flocculation used is an up-down flow baffled channel with a hexagon shape. Hydraulic flocculation was chosen because it is suitable for the developing planning area, which does not require complicated operation and maintenance. The number of flocculation basins is 2 units with each unit totalling 6 compartments. The design of the flocculation unit can be seen in Table 5 and Figure 4.

Table 2. Design of WTP (III) Karawang Branch Flocculation Unit

Treatment Unit	Description	Dimension
Flocculation	Detention time	22.24 minutes
	Number of compartments	6 compartements
	Height of basin	2.5 m
	Side length	1.5 m
	Surface area	5.85 m^2
	Compartment 1	G_1 = 66.21 /s Td_1 = 243.3 s
	Compartment 2	G_2 = 59.77 / s Td_2 = 232.6 s
	Compartment 3	G_3 = 56.33 / s Td_3 = 224.3 s
	Compartment 4	G_4 = 53.5 / s Td_4 = 217.2 s
	Compartment 5	G_5 = 48.24 / s Td_5 = 211 s
	Compartment 6	G_6 = 37.55 / s Td_6 = 206.1 s

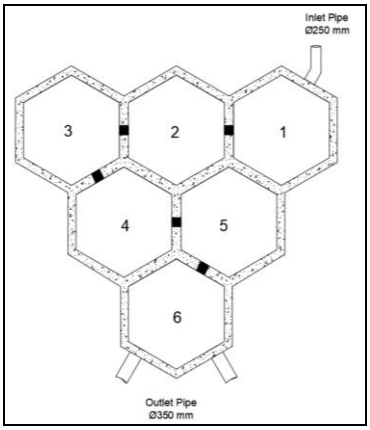

Figure 2. Design of WTP (III) Karawang Branch Flocculation Unit

The preference for hydraulic flocculation over mechanical flocculation stems from its energy efficiency and operational simplicity. Hydraulic flocculation leverages natural water flow through baffles, removing the need for mechanical components or electricity. This design makes it particularly effective in areas with limited infrastructure. Under consistent raw water conditions, the system reliably forms stable flocs, enhancing sedimentation efficiency (Smith et al, 2020).

Its cost-effectiveness and low maintenance are additional benefits. Without motors or agitators, the system reduces the risk of mechanical failure, translating to lower operational costs. In contrast, mechanical flocculation involves higher maintenance and intensive monitoring. Hydraulic flocculation thus provides a practical, low-cost solution for developing regions, offering effective performance with minimal operational complexity (Brown et al, 2021). Additionally, its simple design makes it easier to implement and adapt for community-based water treatment facilities, further enhancing its applicability in decentralized water management systems (Morris et al, 2022).

4. The Plate-settler Sedimentation
   The sedimentation unit used is rectangular with horizontal flow. This type of sedimentation is better able to manage hydraulic shock loading compared to other sedimentation types. According to Kawamura (2000), this type of sedimentation can accommodate flows 50% to 100% above its design capacity without compromising the quality of treated water. A high-rate sedimentation settler with plates installed at a 60° angle is applied in this design to facilitate the settling of floc into the sludge compartment. Four sedimentation tanks are planned. The sedimentation design is presented in Table 6 and Figure 5.

Table 3. Design of WTP (III) Karawang Branch Sedimentation Unit

Treatment Unit	Description	Dimension
Sedimentation	*Surface loading* (So)	5.2 m^3/m^2/hour
	Number of plate	792 pieces
	Dimension of basin	7.1 m x 3.1 m x 3.5 m
	Height of sludge chamber	0.5 m
	Froude number	1.17 x 10^{-5}
	Slope of the plate	60^o
	Plate thickness	3 mm
	Dimension of the plate	1.8 m x 1.5 m
	Reynolds number	50.65

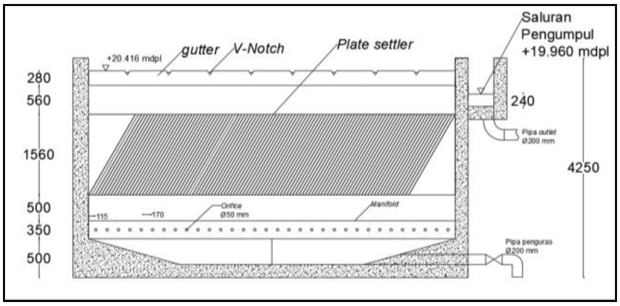

Figure 3. Design of WTP (III) Karawang Branch Sedimentation Unit

In sedimentation technology, several options are available, including conventional sedimentation, upflow, lamella, and high-rate sedimentation with plate settlers. Conventional sedimentation operates with horizontal flow, requiring significant detention time and space, making it less efficient for limited land areas (Fair & Geyer, 1968). Upflow sedimentation uses a vertical flow that is more compact but is less effective for treating water with high TSS concentrations (Droste, 1997). Lamella sedimentation, with inclined plates, increases settling surface area within a small space and accelerates particle separation, though it requires intensive maintenance (Reynolds & Richards, 1996). Among these options, the high-rate settler with plate settlers excels in high processing capacity within a compact space, utilizing inclined plates to accelerate sedimentation, making it suitable for fluctuating flow rates.

The selection of a high-rate settler with plate settlers is based on space efficiency and adaptability to variable flow rates. With limited area, plate settlers offer an ideal solution for treating water with high TSS levels without requiring large tanks and are more effective in managing hydraulic loading. This technology ensures stable treatment quality in rapidly developing regions, where processing capacity and efficiency are top priorities.

5. Filtration
   This design utilizes rapid sand filtration with a dual-media filter composed of anthracite and silica sand, supported by a gravel layer. According to Reynolds & Richards (1996), dual-media filters offer a higher filtration rate and a longer filter run time between backwashes compared to single-media filters. This design includes four filtration tanks, each equipped with a gullet. The filtration unit design is presented in Table 7 and Figure 6.

Table 4. Design of WTP (III) Karawang Branch Filtration Unit

Treatment Unit	Description	Dimension
Filtration	Filtration rate	5.14 m^3/m^2/hour
	Dimension of the basin	7.5 m x 2.5 m x 4.1 m
	Number of basin	4 basin
	Discharge per basin	0.025 m^3/s
	Thickness of sand	40 cm

Treatment Unit	Description	Dimension
	media	
	Thickness of anthracite media	40 cm
	Thickness of gravel media	35 cm

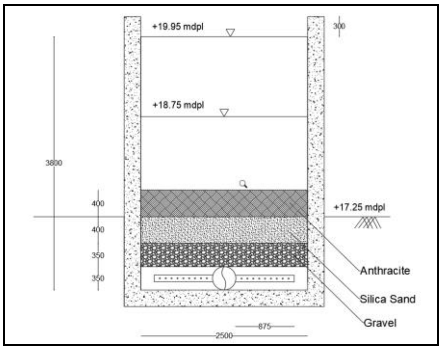

Figure 4. Design of WTP (III) Karawang Branch Filtration Unit

Rapid and slow sand filters each offer unique advantages and limitations in water treatment. Rapid sand filters are characterized by high-speed operation and large treatment capacities, making them ideal for urban areas with significant water demands. Their use of dual media, such as anthracite and silica sand, improves fine particle removal and extends intervals between backwashing. However, these filters require regular maintenance and backwashing, increasing operational costs and making them more sensitive to fluctuations in raw water quality (Jones et al, 2020).

Conversely, slow sand filters offer low operational costs, do not require backwashing, and enable natural purification through a biological layer. While effective for smaller-scale operations, their slower filtration rate and larger land requirements limit their applicability in high-capacity systems. Additionally, their efficiency may decline in colder climates (Green et al., 2021).

Rapid sand filtration is selected for the WTP (III) Karawang Branch due to its ability to handle high-capacity demands with a compact design and high filtration overflow rate. This system ensures the efficient treatment of large water volumes to meet urban needs. The integration of dual media enhances filtration performance, though it increases operational costs due to frequent backwashing requirements. Despite this, rapid sand filtration is the optimal choice given the limited land availability and the need for stable, sustainable water supplies (Miller et al., 2022).

6. Disinfection
   The disinfection planned for the WTP WTP (III) Karawang Branch plant utilizes calcium hypochlorite, or chlorine powder ($Ca(OCl)_2$), based on its existing use at Perumdam Tirta Tarum.
7. Reservoir
   The reservoir type selected is a ground reservoir with a capacity of 241 m³. The design of the disinfection unit and reservoir at WTP (III) Karawang Branch can be seen in Table 8.

Table 5. Design of Disinfection and Reservoir of WTP (III) Karawang Branch

Treatment Unit	Description	Dimension
Disinfection	Dosage of disinfectant	5 mg/L
	Type of disinfectant	Khlorine ($Ca(OCl)_2$)
	Chlorine content	60%
	Number of tanks	4 pieces (2 backup, 2 operation)
	Tank diameter	0.88 m
	Diameter of forming pipe	25 mm
Reservoir	Dimension of basin	7.8 m 7.8 m x 4.5 m
	Detention time	40.12 minutes
	Number of basin	1 basin

IV. CONCLUSION

The need for a new Water Treatment Plant (WTP) in the WTP (III) Karawang Branch area is driven by the increasing water demand resulting from rapid population growth and urbanization within the region. The existing treatment capacity of 395 liters per second is no longer sufficient to supply the growing population with a continuous and reliable supply of clean drinking water. As the demand for water continues to rise, it is imperative to expand the treatment capacity to meet the future needs of the community.

In response to this challenge, the design of a new WTP with a capacity of 100 liters per second has been proposed. This new plant will help ensure a sustainable and uninterrupted water supply to the Karawang service area, addressing both current and future water needs. The raw water for the WTP (III) Karawang Branch is sourced from the West Branch of the North Tarum Canal (STUB), a critical water source that channels water from various upstream areas. This source will undergo several stages of treatment at the WTP to meet the drinking water quality standards set forth by Ministry of Health Regulation No. 2 Year 2023.

The treatment process at the WTP (III) Karawang incorporates conventional water treatment methods that have been proven effective in removing contaminants. These include hydraulic coagulation, a six-compartment up-down flow baffled channel for flocculation, four sedimentation tanks equipped with plate settlers, dual-media rapid sand filtration using silica sand and anthracite, and disinfection with calcium hypochlorite at a dose of 5 mg/L. These treatment units are carefully selected based on raw water quality and the required output to achieve drinking water quality that meets regulatory standards.

By increasing the treatment capacity and improving the overall treatment process, the new WTP will play a crucial role in ensuring a reliable supply of safe drinking water, enhancing public health, and supporting the ongoing development of the Karawang region. This expansion is essential not only to address the current shortfall in water supply but also to accommodate future growth and ensure the sustainability of the water infrastructure for the long term.

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