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# Analysis of Clean Water Procurement Investment between Regional Owned Business Entities (PDAM Tirta Benteng Kota Tangerang) and Providing Business Entities

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**ABSTRACT:** From the results of population projections using the geometry method beginning in 2016 until 2021 the population of Tangerang City experienced a growth rate of 0.43%, while the demand for clean water, with the provision of clean water which in turn would lead to limited distribution and distribution of clean water to community, in order to increase the need for clean water in the zone 2 service area of Tangerang City, an adequate system is needed in the management of clean water. Thus for users of clean water can meet their clean water needs. As a Regional Owned Enterprise, PDAM Tirta Benteng City of Tangerang, besides having a mission to serve clean water needs that meet health requirements for the community, must also be managed as a company that always considers the feasibility aspects of an investment plan, operations and maintenance (operation and maintenance). The purpose of this study is to obtain a perspective of the picture and information about the feasibility of investing in the procurement of clean water with existing investment criteria in calculating and testing the feasibility of the investment and testing how much influence the income of PDAM Tirta Benteng Tangerang City and Tangerang City Regional Revenue. Therefore the form of the research design is descriptive analysis. Descriptive research is a study that aims to obtain an overview of the analysis of the feasibility of investment in clean water procurement at PDAM Tirta Benteng City of Tangerang. From investment valuation methods namely Net Present Value (NPV), Internal Rate Of Return (IRR), Payback Period (PP) and Profitability Index (PI) all methods can be concluded as feasible for PDAM Tirta Benteng's water supply project in the Zone 2 City service area Tangerang.

**KEYWORDS:** Procurement water investment of clean

## I. INTRODUCTION

The increase in population growth and development in the City of Tangerang, causes the demand for clean water to increase. Clean water is a very vital need in human life and is a fairly expensive and rare item in the city of Tangerang. The National Medium-Term Development Plan, plans that 100% of Indonesians will have access to drinking water by 2019, to achieve this target, additional production capacity and a large distribution network are required. The development of clean water management infrastructure can be carried out through a funding investment strategy by encouraging the participation of the private sector and banks, and other non-government sources of funds in the development of the Drinking Water Supply System (SPAM).

Based on the background of the problem, a problem formulation can be expressed as follows: 1. How big is the investment in the clean water supply project at PDAM Tirta Benteng, Tangerang City; 2. To what extent is the investment feasibility of a clean water supply project at PDAM Tirta Benteng Tangerang City; 3. Does the cooperation of Regional Owned Enterprises (PDAM Tirta Benteng Tangerang City) with the Provider Business Entity contribute to the economic value for the Tangerang City Government?

In accordance with the existing problems, the research objectives to be achieved are as follows: 1. Conduct an investment feasibility analysis between the Regional Owned Enterprises (PDAM Tirta Benteng Tangerang City) and the Provider Business Entities in the Tangerang City clean water supply project; 2. Conduct cash flow analysis to

calculate the investment cost requirement; 3. Calculate the contribution of the clean water supply investment project to the revenue of the Tangerang City Government.

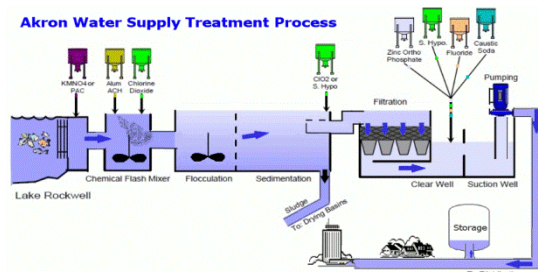
## II. LITERATURE REVIEW

The need for clean water in a plan needs to pay attention to several things, namely domestic and non-domestic water needs, fluctuations in clean water needs and water loss. The results of the calculation of water requirements affect the good or bad of a plan. By considering these things, the acquisition of clean water needs is close to real results. These results are used as a basic reference for planning and developing a clean water distribution network system. According to Kindle and Russell (1984), the need for water for housing (domestic needs) includes all water needs for residents' needs. Meanwhile, non-domestic water needs are clean water needs other than household needs. Non-domestic water demand is influenced by the amount of consumption by non-domestic consumers which is divided into two, namely general use and commercial and industrial use. The total number of needs needs to be calculated in accordance with the existing facilities. This need can reach between 20% - 25% of the total domestic water demand. Fluctuations in water demand It is the percentage of water use per hour depending on the activities of the population, habits of the population and the pattern of urban planning so that the water demand is not the same every time. water loss, which means the difference between the amount of water produced in the treatment unit and the amount of water consumed from the distribution network. Loss of water can be technical and non-technical. In general, in planning the value of the loss that has occurred has been included in the calculation. The amount of water loss is limited to 15% of the total demand for clean water, both domestic and non-domestic.

Raw water is water that is distributed in the provision of clean/consumable water which must meet certain quality standards as raw materials for clean/consumption water. Raw water can be obtained from several water sources such as rainwater, ground water, springs and surface water. In planning, before determining which raw water source to use, the quality, quantity, and continuity of the raw water source must be considered. This is because each raw water source has a different character so it needs to be planned properly.

In planning clean water services, it is necessary to pay attention to population conditions and population growth patterns. The selection of the projection method that will be adjusted to the criteria can be done statistically by using the standard deviation formula (SD) and the correlation coefficient formula (r). The use of the correlation coefficient is intended to indicate the high degree of relationship between two variables (x and y), therefore the value of the correlation coefficient must be close to 1 or -1, and the smallest value of the standard deviation is chosen. The population projection method is calculated using 3 methods for comparison. The three methods include: 1. Arithmetic Method; 2. Geometry Method; 3. Least Square Method.

Government Regulation No. 16 of 2005 concerning the Drinking Water Development System states that the drinking water supply system consists of a raw water unit, a production unit, a distribution unit, a service unit, and a management unit.



The series of pipes in the distribution of clean/drinking water is called a pipe network. The shape of the piping network system depends on the existing road pattern and the road plan. In addition, it also depends on the topography, the pattern of development of the service area and the location of the processing installation. Basically there are two patterns of distribution network systems, namely the branch system and the loop system.

The term investment is an investment (fixed or non-fixed capital) used in the production process to obtain a company's profits.

Investment is linking resources in the long term to generate profits in the future (Mulyadi, 2001). In investing in any business we must pursue it and must know the future prospects of the business that we will live. There are several things to consider when investing, including: return, Capital, cash flow.

To analyze an investment from the financial aspect in this study, it can be done using the Net present value (NPV), Payback Period (PP), Internal Rate Of Return (IRR), Profitability index (PI) methods.



## III. METHODOLOGY

PDAM Tirta Benteng Tangerang City is a BUMD in the management of drinking water in Tangerang City. The object of this research is limited to the drinking water service zone of PDAM Tirta Benteng Tangerang City for zone 2 (two). The following is an overview of service areas in Tangerang City. In 2016 the population of Zone 2 was 601,854 people divided into 4 sub-districts

Fig III.1 Tangerang City service area map

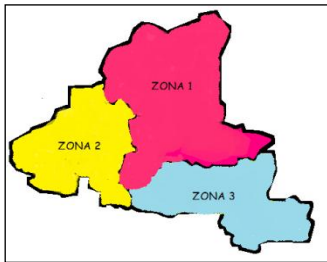


Table III.1 Total Population of Zone 2 Tangerang City in 2016

| No                                      | Kecamatan    | Jumlah Penduduk Tahun |         |         |         |         |         | LPP 2011-2016 |
|---|--------------|-----------------------|---------|---------|---------|---------|---------|---------------|
|   |              | (jiwa)                |         |         |         |         |         |               |
|   |              | 2011                  | 2012    | 2013    | 2014    | 2015    | 2016    |               |
|   |              | 1                     | 2       | 3       | 4       | 5       | 6       |               |
| Wilayah Pelayanan Zona 2 Kota Tangerang |              |                       |         |         |         |         |         |               |
| 1                                       | Karawaci     | 195.676               | 176.556 | 176.670 | 177.907 | 178.989 | 180.564 | -1,72%        |
| 2                                       | Jatiuwung    | 166.699               | 120.767 | 121.360 | 121.420 | 121.493 | 121.748 | -7,45%        |
| 3                                       | Cibodas      | 115.190               | 148.032 | 148.698 | 150.320 | 151.815 | 153.758 | 5,19%         |
| 4                                       | Periuk       | 137.853               | 136.420 | 138.009 | 140.503 | 142.911 | 145.784 | 1,11%         |
|   | Jumlah Total | 615.418               | 581.775 | 584.737 | 590.150 | 595.208 | 601.854 |               |

This research is an approach from management science that focuses on financial management, The purpose of this study is to obtain an overview perspective and information about the feasibility of drinking water management investment with investment criteria, in calculating and testing the feasibility of the investment and testing how much influence it has on the revenue of PDAM Tirta Benteng, Tangerang City.

Table III.2 service level in zone 2 Tangerang City

| No     | Kecamatan | 2016<br>(jiwa) | Jaringan Perpipaan      |           |                      |                        |           |                      | Bukan Jaringan Perpipaan |                      |
|--------|-----------|----------------|-------------------------|-----------|----------------------|------------------------|-----------|----------------------|--------------------------|----------------------|
|        |           |                | PDAM TKR Kab. Tangerang |           |                      | PDAM TB Kota Tangerang |           |                      | (Sumur Dalam)            |                      |
|        |           |                | Penduduk<br>dilayani    | Pelanggan | Tingkat<br>Pelayanan | Penduduk<br>dilayani   | Pelanggan | Tingkat<br>Pelayanan | Penduduk<br>dilayani     | Tingkat<br>Pelayanan |
| 1      | Karawaci  | 180.564        | 21.735                  | 4.347     | 12%                  | 375                    | 75        | 0,21%                | 100                      | 0,06%                |
| 2      | Jatiuwung | 121.748        | 54.605                  | 10.921    | 45%                  | 590                    | 118       | 0,48%                | 2.800                    | 2,30%                |
| 3      | Cibodas   | 153.758        | 48.505                  | 9.701     | 32%                  | -                      | -         | 0,00%                | 1.900                    | 1,24%                |
| 4      | Periuk    | 145.784        | 87.105                  | 17.421    | 60%                  | 2.700                  | 540       | 1,85%                | 6.000                    | 4,12%                |
| JUMLAH |           | 601.854        | 211.950                 | 42.390    | 37%                  | 3.665                  | 733       | 0,64%                | 10.800                   | 1,93%                |

- Interest rate;
- Assumed tariff (Rp/m<sup>3</sup>);
- Escalation of tariff increase, tariff increase period;
- Income tax rate

The type of data used in this study is secondary data obtained from evidence in the form of writing (documentation), journals or reports from experts or researchers, and related agencies, especially those related to the discussion in writing this research.

Data collection techniques in this study were obtained by conducting field research and utilizing a feasibility study report in the form of a technical study that had been made by the PDAM Tirta Benteng team as well as writings, articles, journals and reports related to the problem being researched in order to obtain reliable data. accurate, complete and up-to-date and supplemented with literature studies by reading, exploring, and reviewing various literatures related to the problems of this research.

The analytical method used in achieving the objectives of this research is a feasibility study method in terms of financial analysis, namely by comparing the results of the calculation of the data collected using capital budgeting analysis, among others with the following methods: (Husein Umar, 1999)

- Payback period (PP),
- Net Present Value (NPV),
- Internal Rate Of Return (IRR),
- Profitability index (PI),

The research design uses projected data as a tool in data processing, including:

- Population Projection;
- Projection of Average Amount of Water Needs;
- Projected Number of Direct Connections;
- Projected Operational and Maintenance Costs;
- Financial projections, with several assumptions adjusted to the achievement of investment returns, including:

## IV. DISCUSSION RESULT

## 1. Population Projection

To determine the amount of water demand, it is necessary to calculate the projected population based on data from the City of Tangerang in 2012-2017 figures and statistical data for each sub-district in the figures for 2012-2017, especially in the zone 2. In 2016 the population of Zone 2 was 601,854 people.

Table IV.1 Tangerang City Population Data Service Area 2011-2016

| No                                      | Kecamatan     | Jumlah Penduduk Tahun<br>(jiwa) |           |           |           |           |           | LPP 2011-2016 |
|---|---------------|---------------------------------|-----------|-----------|-----------|-----------|-----------|---------------|
|   |               | 2011                            | 2012      | 2013      | 2014      | 2015      | 2016      |               |
|   |               | 1                               | 2         | 3         | 4         | 5         | 6         |               |
| Wilayah Pelayanan Zona 1 Kota Tangerang |               |                                 |           |           |           |           |           |               |
| 1                                       | Ciledug       | 135.346                         | 161.604   | 166.798   | 173.265   | 179.824   | 186.450   | 6,06%         |
| 2                                       | Larangan      | 159.155                         | 176.229   | 179.975   | 184.977   | 189.955   | 194.870   | 3,92%         |
| 3                                       | Karang Tengah | 113.463                         | 126.364   | 128.544   | 131.591   | 134.589   | 137.510   | 3,71%         |
| 4                                       | Cipondoh      | 203.134                         | 242.548   | 250.741   | 262.350   | 274.201   | 290.783   | 6,79%         |
| 5                                       | Pinang        | 170.166                         | 174.655   | 179.561   | 185.785   | 192.061   | 198.354   | 3,02%         |
| 6                                       | Tangerang     | 161.078                         | 162.192   | 164.959   | 168.844   | 172.665   | 176.397   | 1,80%         |
| Wilayah Pelayanan Zona 2 Kota Tangerang |               |                                 |           |           |           |           |           |               |
| 7                                       | Karawaci      | 195.676                         | 176.556   | 176.670   | 177.907   | 178.989   | 180.564   | -1,72%        |
| 8                                       | Jatiuwung     | 166.699                         | 120.767   | 121.360   | 121.420   | 121.493   | 121.748   | -7,45%        |
| 9                                       | Cibodas       | 115.190                         | 148.032   | 148.698   | 150.320   | 151.815   | 153.758   | 5,19%         |
| 10                                      | Periuk        | 137.853                         | 136.420   | 138.009   | 140.503   | 142.911   | 145.784   | 1,11%         |
| Wilayah Pelayanan Zona 3 Kota Tangerang |               |                                 |           |           |           |           |           |               |
| 11                                      | Batucapeer    | 125.985                         | 95.162    | 96.089    | 97.634    | 99.107    | 100.489   | -5,40%        |
| 12                                      | Neglasari     | 102.758                         | 108.909   | 110.060   | 111.930   | 113.719   | 115.412   | 2,28%         |
| 13                                      | Benda         | 79.443                          | 89.118    | 90.932    | 93.368    | 95.776    | 98.138    | 4,08%         |
| Jumlah Total                            |               | 1.865.946                       | 1.918.556 | 1.952.396 | 1.999.894 | 2.047.105 | 2.100.257 |               |

## a. Arithmetic Method

$$K_a = (P_{2016} - P_{2011}) / (n - 1)$$

$$K_a = (2.100.257 - 1.865.946) / (6 - 1)$$

$$K_a = 46.862 \text{ Jiwa / tahun}$$

Table IV.2 Calculation of Arithmetic Method Correlation Test

| Tahun         | Penduduk (Yi)     | Xi         | Xi.Yi               | Yi <sup>2</sup>           | Xi <sup>2</sup> |
|---------------|-------------------|------------|---------------------|---------------------------|-----------------|
| 2011          | 1.865.946         | -5         | (9.329.730)         | 3.481.754.474.916         | 25              |
| 2012          | 1.918.556         | -4         | (7.674.224)         | 3.680.857.125.136         | 16              |
| 2013          | 1.952.396         | -3         | (5.857.188)         | 3.811.850.140.816         | 9               |
| 2014          | 1.999.894         | -2         | (3.999.788)         | 3.999.576.011.236         | 4               |
| 2015          | 2.047.105         | -1         | (2.047.105)         | 4.190.638.881.025         | 1               |
| 2016          | 2.100.257         | 0          | -                   | 4.411.079.466.049         | 0               |
| <b>Jumlah</b> | <b>11.884.154</b> | <b>-15</b> | <b>(28.908.035)</b> | <b>23.575.756.099.178</b> | <b>55</b>       |

$$r = \frac{[n * (\sum Xi Yi)] - [(\sum Xi) * (\sum Yi)]}{\sqrt{[n(\sum Xi^2) - (\sum Xi)^2] * [n(\sum Yi^2) - (\sum Yi)^2]}}$$

$$r = \frac{[6(-28.908.035)] - [(-15) * (11.884.154)]}{\sqrt{[6(55) - (-15)^2] * [6(23.575.756.099.178) - (11.884.154)^2]}}$$

$$r = 0,9984$$

$$P_{n2011} = P_t + K_a * X_i$$

$$= 2.100.257 + 46.862 * (-5)$$

$$= 1.865.946$$

Table IV.3 Calculation of Standard Deviation Arithmetic Method

| Tahun         | Penduduk (Yi)     | Xi         | kn     | Yn        | (Yi-Yn)         | (Yi-Yn) <sup>2</sup> |
|---------------|-------------------|------------|--------|-----------|-----------------|----------------------|
| 2011          | 1.865.946         | -5         | 46.862 | 1.865.946 | 0               | 0                    |
| 2012          | 1.918.556         | -4         | 46.862 | 1.912.808 | 5.748           | 33.037.205           |
| 2013          | 1.952.396         | -3         | 46.862 | 1.959.670 | (7.274)         | 52.916.895           |
| 2014          | 1.999.894         | -2         | 46.862 | 2.006.533 | (6.639)         | 44.071.010           |
| 2015          | 2.047.105         | -1         | 46.862 | 2.053.395 | (6.290)         | 39.561.584           |
| 2016          | 2.100.257         | 0          | 46.862 | 2.100.257 | 0               | 0                    |
| <b>Jumlah</b> | <b>10.018.208</b> | <b>-10</b> |        |           | <b>(14.455)</b> | <b>169.586.694</b>   |

$$S_d = \sqrt{\frac{\sum (Y_i - Y_n)^2}{n - 2}} = \sqrt{\frac{169.586.694}{6 - 2}} = 6511.27$$

## b. Geometric Method

population projection calculation geometric method :

$$r = \left( \frac{P_{2016}}{P_{2011}} \right)^{(1/r)} - 1$$

$$r = \left( \frac{2.100.257}{1.865.946} \right)^{(1/5)} - 1$$

$$= 0,024$$

$$P_{n2011} = P_t(1 + r)^n$$

$$= 2.100.257 (1 + 0,024)^{-5}$$

$$= 1.865.946$$

Table IV.4 Calculation of the Geometric Method Correlation Test

| Tahun         | Penduduk (Yi)     | Xi         | ln Yi        | Xi.ln Yi        | Xi <sup>2</sup> | (ln Yi) <sup>2</sup> |
|---------------|-------------------|------------|--------------|-----------------|-----------------|----------------------|
| 2011          | 1.865.946         | -5         | 14,44        | (72,20)         | 25              | 208,49               |
| 2012          | 1.918.556         | -4         | 14,47        | (57,87)         | 16              | 209,30               |
| 2013          | 1.952.396         | -3         | 14,48        | (43,45)         | 9               | 209,80               |
| 2014          | 1.999.894         | -2         | 14,51        | (29,02)         | 4               | 210,50               |
| 2015          | 2.047.105         | -1         | 14,53        | (14,53)         | 1               | 211,18               |
| 2016          | 2.100.257         | 0          | 14,56        | -               | 0               | 211,92               |
| <b>Jumlah</b> | <b>11.884.154</b> | <b>-15</b> | <b>86,99</b> | <b>(217,07)</b> | <b>55</b>       | <b>1261,19</b>       |

$$S_d = \sqrt{\frac{\sum (Y_i - Y_n)^2}{n - 2}}$$

$$= 5147,54$$

## c. Least Square Method

Table IV.5 Calculation of the Least Square Method Correlation Test

| Tahun         | Penduduk (Yi)     | Xi       | Xi.Yi            | Xi <sup>2</sup> | Yi <sup>2</sup>           |
|---------------|-------------------|----------|------------------|-----------------|---------------------------|
| 2011          | 1.865.946         | -5       | (9.329.730,00)   | 25              | 3.481.754.474.916         |
| 2012          | 1.918.556         | -3       | (5.755.668,00)   | 9               | 3.680.857.125.136         |
| 2013          | 1.952.396         | -1       | (1.952.396,00)   | 1               | 3.811.850.140.816         |
| 2014          | 1.999.894         | 1        | 1.999.894,00     | 1               | 3.999.576.011.236         |
| 2015          | 2.047.105         | 3        | 6.141.315,00     | 9               | 4.190.638.881.025         |
| 2016          | 2.100.257         | 5        | 10.501.285,00    | 25              | 4.411.079.466.049         |
| <b>Jumlah</b> | <b>11.884.154</b> | <b>0</b> | <b>1.604.700</b> | <b>70</b>       | <b>23.575.756.099.178</b> |

perhitungan proyeksi penduduk metode Least Square :

$$a = \frac{(\sum Y_i \cdot \sum X_i^2) - (\sum X_i \cdot \sum Y_i)}{(n \cdot \sum X_i^2) - (\sum X_i)^2}$$

$$= \frac{(11.884.154 \times 70) - (0 \times 1.604.700)}{(6 \times 70) - (0)^2}$$

$$= 1.980.692,23$$

$$b = \frac{(n \cdot \sum X_i Y_i) - (\sum X_i \cdot \sum Y_i)}{(n \cdot \sum X_i^2) - (\sum X_i)^2}$$

$$= \frac{(6 \times 1.604.700) - (0 \times 11.884.154)}{(6 \times 70) - (0)^2}$$

$$= 22.924,29$$

The Least Square Method Correlation Test is as follows:

$$r = \frac{[n * (\sum XY)] - [(\sum X) * (\sum Y)]}{\sqrt{[n(\sum X^2) - (\sum X)^2] * [n(\sum Y^2) - (\sum Y)^2]}}$$

$$= \frac{[6 * (1.604.700)] - [(0) * (11.884.154)]}{\sqrt{[6(70) - (0)^2] * [6(23.575.756.099.178) - (11.884.154)^2]}}$$

$$= 0,9984$$

**Table IV.6** Calculation of the Standard Deviation of the Least Square Method

| Tahun         | Penduduk (Yi)     | Xi       | Yn                | (Yi -Yn) | (Yi -Yn) <sup>2</sup> |
|---------------|-------------------|----------|-------------------|----------|-----------------------|
| 2011          | 1.865.946         | -5       | 1.866.071         | (125)    | 15.601                |
| 2012          | 1.918.556         | -3       | 1.911.919         | 6.637    | 44.043.448            |
| 2013          | 1.952.396         | -1       | 1.957.768         | (5.372)  | 28.858.896            |
| 2014          | 1.999.894         | 1        | 2.003.617         | (3.723)  | 13.857.893            |
| 2015          | 2.047.105         | 3        | 2.049.465         | (2.360)  | 5.570.499             |
| 2016          | 2.100.257         | 5        | 2.095.314         | 4943     | 24.435.603            |
| <b>Jumlah</b> | <b>11.884.154</b> | <b>0</b> | <b>11.884.154</b> | <b>0</b> | <b>116.781.940</b>    |

Population projection calculation Least Square method :

$$Y_n = a + b.X$$

$$= 1.980.692,23 + 22.924,29 X$$

$$= 1.866.070,90$$

$$Sd = \sqrt{\frac{\sum(Y_i - Y_n)^2}{n - 2}}$$

$$= \sqrt{\frac{116.781.940}{6 - 2}}$$

$$= 5403,28$$

The following are the results of the calculation of the correlation coefficient and standard deviation of the three methods used:

**Table IV.7** Correlation Coefficient Value and Standard Deviation of the Three Methods

| No | Metode               | Koefisien Korelasi | Standar Deviasi |
|----|----------------------|--------------------|-----------------|
| 1  | Aritmatika           | 0,9984             | 6.511           |
| 2  | Geometri             | 0,9988             | 5.148           |
| 3  | Regresi Least Square | 0,9984             | 5.403           |

With the considerations above, the selected projection method is the Geometry method.

**Table IV.8** Calculation of the projected population using the geometric method

| No                                      | Kecamatan | Metode Geometrik |                |                |                |                | r      |
|---|-----------|------------------|----------------|----------------|----------------|----------------|--------|
|   |           | 2017             | 2018           | 2019           | 2020           | 2021           |        |
|   |           | 1                | 2              | 3              | 4              | 5              |        |
| Wilayah Pelayanan Zona 2 Kota Tangerang |           |                  |                |                |                |                |        |
| 1                                       | Karawaci  | 177.685          | 174.851        | 172.063        | 169.319        | 166.619        | -1,59% |
| 2                                       | Jatiuwung | 114.332          | 107.368        | 100.828        | 94.686         | 88.918         | -6,09% |
| 3                                       | Cibodas   | 162.900          | 172.587        | 182.849        | 193.721        | 205.239        | 5,95%  |
| 4                                       | Periuk    | 147.424          | 149.083        | 150.760        | 152.456        | 154.171        | 1,13%  |
| <b>TOTAL</b>                            |           | <b>602.341</b>   | <b>603.888</b> | <b>606.499</b> | <b>610.182</b> | <b>614.948</b> |        |

## 2. Projection of Clean Water Demand

**Table IV.9** Projection of Clean Water Needs for Zone 2 Tangerang City

| No | Uraian                                 | Satuan   | Tahun   |         |         |         |         |
|----|--|----------|---------|---------|---------|---------|---------|
|    |  |          | 2017    | 2018    | 2019    | 2020    | 2021    |
| 1  | Jumlah Penduduk                        | jiwa     | 602.341 | 603.888 | 606.499 | 610.182 | 614.948 |
| 2  | Jumlah Penduduk                        | jiwa     | -       | -       | 39.000  | 108.500 | 152.750 |
| 3  | Kebutuhan air untuk 1                  | l/hr/org | 170     | 170     | 170     | 170     | 170     |
| 4  | Kebutuhan Air Domestik                 | l/dt     | -       | -       | 51,4    | 143,0   | 201,4   |
| 5  | Kebutuhan Air Non Domestik (13%)       | l/dt     | -       | -       | 10,0    | 27,8    | 39,1    |
| 6  | NRW (Non-Revenue Water) Kehilangan air | l/dt     | -       | -       | 15,3    | 42,7    | 60,1    |
| 7  | Kebutuhan Air Total                    | l/dt     | -       | -       | 76,7    | 213,5   | 300,5   |
| 9  | Kebutuhan Air Rerata                   | l/dt     | -       | -       | 92,1    | 256,2   | 360,7   |
| 10 | Kebutuhan Air                          | l/dt     | -       | -       | 105,9   | 294,6   | 414,8   |
| 11 | Kebutuhan Air Jam                      | l/dt     | -       | -       | 143,7   | 399,6   | 562,6   |

The number of residents who will be served in the clean water supply system in the service area during the planning period in 2019 the service presentation is planned at 7% and will be increased to 19.7% and at the end of the plan period in 2021 it will increase to 29% with a water demand of 170 liters/person/sec.

The following is the calculation of the projected clean water needs in the Tangerang City Service Area Zone 2 in 2021 with the percentage of the population as in IV-9, while the basic data used are as follows:

- The projected population in 2021 is 614,948 people;
- The presentation of services is planned at 29%, so the number of people served in 2021 is 152,750 people;
- The water requirement for each person per day is 170 liters/person/day;
- Number of direct connections (1 SR = 5 people)  
= Number of inhabitants x SR  
= 152,750 people/ 5 souls  
= 30,550 SR
- Domestic water demand (67%)  
= 67% x Number of people served x Needs of each person  
= 67% x 152750 org x 170 lt/org/hr  
= 17,398,225 lt/hr  
= 201.4 lt/sec
- Non-domestic needs (13%)  
= 13% x Total population served x Needs per person  
= 13% x 152750 org x 170 lt/org/hr  
= 39.1 lt/sec
- NRW (Non-Revenue Water)  
= 20% x Number of people served x Needs of each person  
= 20% x 152,750 people x 170 liters/person/day  
= 60.1 lt/sec
- Total Water Demand  
= Domestic Water Needs + Non Domestic Water Needs + NRW  
= 201.4 liters/sec + 39.1 liters/sec + 60.1 liters/sec = 300.6 liters/sec
- Average water requirement  
= Total water requirement + 20% water loss  
= 300.6 liter/sec + (300.6 lt/sec x 20%)  
= 360.6 liters/sec ~ 361 liters/sec

### 3. Rencana Anggaran Biaya

The following is the Budget Plan for the Development of Clean Water Supply in the zone 2 service area of Tangerang City

**Table IV.10** Budget Plan for the Development of Clean Water Procurement in the service area of zone 2 Tangerang City

| No  | URAIAN PEKERJAAN  | VOLUME   | SATUAN                | HARGA SATUAN (Rp. 000) | JUMLAH HARGA (Rp. 000) |
|-----|---|----------|-----------------------|------------------------|------------------------|
| I   | LAHAN   |          |                       |                        |                        |
| 1   | Pembebasan Lahan  |          |                       |                        |                        |
|     | Pembebasan Lahan SITANALA   | JUMLAH I | 14.800 m <sup>2</sup> | 3.000                  | 44.400.000             |
| II  | PENGEMBANGAN  |          |                       |                        |                        |
| A   | Unit Air Baku SITANALA  |          |                       |                        |                        |
| 1   | Pembangunan Intake Kap. 400 L/dt  | 400      | L/dt                  | 12.011                 | 4.804.236              |
| 2   | Pek. Pengadaan dan Pemasangan Pipa Transmisi STEEL dia 600 mm Panjang 100 m | 100      | m                     | 8.826                  | 882.626                |
| 3   | Pompa Air Baku (2 x 600 L/dt)   | 2        | Unit                  | 3.250.815              | 6.501.630              |
| B   | Unit Produksi SITANALA  |          |                       |                        |                        |
| 1   | Pemb. IPA Kap. 400 L/dt   | 1        | Paket                 | 42.037.062             | 42.037.062             |
| 2   | Reservoir 5000 m <sup>3</sup>   | 1        | Unit                  | 9.383.273              | 9.383.273              |
| 3   | Pompa Air Baku (2 x 600 L/dt)   | 2        | Unit                  | 7.251.353              | 14.502.706             |
| 4   | Kantor  | 1        | Unit                  | 1.760.000              | 1.760.000              |
| 5   | Siphon L 200 m dia 600 mm   | 200      | meter                 | 10.500                 | 2.100.000              |
| C   | Unit Distribusi SITANALA  |          |                       |                        |                        |
| 1   | Meier Distrib. Area dia 8 in. 8 Unit  | 8        | Unit                  | 100.500                | 804.000                |
| 2   | Pengadaan & Pemasangan Pipa Distribusi HDPE dia 600 mm                      | 3.484    | meter                 | 8.926                  | 31.099.090             |
| 3   | Pengadaan & Pemasangan Pipa Distribusi HDPE dia 500 mm                      | 3.534    | meter                 | 5.321                  | 18.805.130             |
| 4   | Pengadaan & Pemasangan Pipa Distribusi HDPE dia 400 mm                      | 5.899    | meter                 | 3.600                  | 21.236.441             |
| 5   | Pengadaan & Pemasangan Pipa Distribusi HDPE dia 300 mm                      | 7.935    | meter                 | 1.681                  | 13.340.005             |
| 6   | Pengadaan & Pemasangan Pipa Distribusi HDPE dia 200 mm                      | 5.059    | meter                 | 843                    | 4.262.484              |
| 7   | Pengadaan & Pemasangan Pipa Distribusi HDPE dia 150 mm                      | 1.415    | meter                 | 534                    | 755.950                |
| 8   | Pengadaan & Pemasangan Pipa Distribusi HDPE dia 110 mm                      | 3.153    | meter                 | 200                    | 631.672                |
| 9   | Pengadaan & Pemasangan Pipa Distribusi HDPE dia 75 mm                       | 122.200  | meter                 | 57                     | 6.923.485              |
|     | JUMLAH II   |          |                       |                        | 179.819.879            |
| III | PEMASANGAN SAMBUNGAN BARU   |          |                       |                        |                        |
| 1   | SPAM Zona 2   | 30.550   | SR                    | 2.000                  | 61.100.000             |
|     | JUMLAH III  |          |                       |                        | 61.100.000             |
| IV  | KEGIATAN STUDI  |          |                       |                        |                        |
| 1   | Amali   | 1        | Paket                 | 1.000.000              | 1.000.000              |
| 2   | DED   | 1        | Paket                 | 1.204.599              | 1.204.599              |
| 3   | Pengawasan  | 1        | Paket                 | 1.204.599              | 1.204.599              |
| 4   | Penjualan   | 1        | Paket                 | 300.000                | 300.000                |
| 5   | SIPA  | 1        | Paket                 | 300.000                | 300.000                |
|     | JUMLAH IV   |          |                       |                        | 4.009.198              |
|     | JUMLAH TOTAL (I+II+III+IV)  |          |                       |                        | 289.329.068            |

### 4. Economic Analysis

The calculation of the economic analysis begins with the calculation of cost analysis and benefit analysis to get cash flow (Cashflow) and after that it is analyzed using four parameters, namely NPV (Net Present Value), IRR (Internal Rate Return), Analysis of Returns (Payback Period), and PI (Profitability Index) analysis.

Cost analysis is calculated based on capital costs and against development costs, operational costs, and maintenance costs.

#### 4.1 Capital cost

**Table IV.11** Funding Composition

| No | Uraian              | Satuan | Tahun 0 | Tahun 1 | Tahun 2 | Tahun 3 | Tahun 4 | Tahun 5 |
|----|---------------------|--------|---------|---------|---------|---------|---------|---------|
|    |                     |        | 2017    | 2018    | 2019    | 2020    | 2021    | 2022    |
| IV | SUMBER PENDANAAN    |        |         |         |         |         |         |         |
| 1  | APBN                | 0,00%  | -       | -       | -       | -       | -       | -       |
| 2  | APBD                | 20,00% | 44.400  | -       | -       | -       | -       | 44.400  |
| 3  | PDAM                | 0,00%  | -       | -       | -       | -       | -       | -       |
| 4  | SWASTA              | 80,00% | 1.300   | 221.416 | 21.681  | 330     | 203     | 244.930 |
|    | Ekuitas             | 30,00% | 390     | 66.425  | 6.504   | 99      | 61      | 73.479  |
|    | Pinjaman            | 70,00% | 910     | 154.991 | 15.177  | 231     | 142     | 171.451 |
|    | Komposisi Pendanaan |        | 45.700  | 221.416 | 21.681  | 330     | 203     | 289.330 |

In the composition of investment funding, the role of the regional government is as much as 20% which is used for the provision of land for clean water management units, while 80% of the BUP / private sector is used for development and operational costs for the provision of clean water. The private investor has a composition of 30% Equity and 70% of Bank loans with an interest rate of 12% and a repayment period of 10 years with a grace period of 2 years.

Calculation of the total cost of capital is obtained from the results of calculations in technical studies in accordance with the needs in the annual budget plan. This work is planned in 5 years starting from 2017 and completed in 2021,

**Table IV.11** Capital Cost

| No | Uraian                         | Satuan  | Tahun 0 | Tahun 1 | Tahun 2 | Tahun 3 | Tahun 4 |
|----|--------------------------------|---------|---------|---------|---------|---------|---------|
|    |                                |         | 2017    | 2018    | 2019    | 2020    | 2021    |
| A. | Proyeksi Belanja Modal         |         | 45.700  | 221.416 | 21.681  | 330     | 203     |
| 1  | PEKERJAAN PERSIAPAN SUMBER AIR | Rp.Juta | 44.400  | -       | -       | -       | -       |
| 2  | POMPA                          | Rp.Juta | -       | 2.633   | -       | -       | -       |
| 3  | INSTALASI PENGELOLAAN AIR      | Rp.Juta | -       | 27.909  | -       | -       | -       |
| 4  | TRANSMISI DAN DISTRIBUSI       | Rp.Juta | -       | 137.046 | 21.380  | 330     | 203     |
| 5  | INSTALASI UMUM                 | Rp.Juta | -       | 51.420  | -       | -       | -       |
| 6  | BIAYA ENGINEERING              | Rp.Juta | 1.300   | 2.408   | 301     | -       | -       |

### 4.2 Production, Operation and Maintenance Costs

#### 4.2.1 Labor Cost / Salary

**Table IV.12** Employee Cost / Salary

| No | Uraian                         | Satuan | Tahun 0 | Tahun 1 | Tahun 2 | Tahun 3 | Tahun 4 | Tahun 5 | Tahun 6 | Tahun 7 | Tahun 8 | Tahun 9 |
|----|--------------------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|    |                                |        | 2017    | 2018    | 2019    | 2020    | 2021    | 2022    | 2023    | 2024    | 2025    | 2026    |
| I  | Asumsi Komponen Biaya Karyawan |        |         |         |         |         |         |         |         |         |         |         |
|    | Dibayar Pegawai                | Orang  | -       | -       | 20      | 20      | 20      | 20      | 20      | 20      | 20      | 20      |
|    | Kepi Rata-rata                 | Juta   | -       | -       | 7,3     | 8       | 8       | 8       | 9       | 9       | 10      | 10      |
|    | Dibayar bulanan gaji           | Bulan  | -       | -       | 14      | 140     | 140     | 140     | 140     | 140     | 140     | 140     |
|    | Total Biaya Karyawan           | Bulan  | -       | -       | 2.044   | 2.141   | 2.243   | 2.349   | 2.461   | 2.578   | 2.700   | 2.829   |

#### 4.2.2. Electricity Cost

**Table IV.13** Electrical Components

| Komponen Listrik                                | Unit | kwh        |
|---|------|------------|
| <b>Bangunan Intake</b>                          |      |            |
| Pompa intake                                    |      |            |
| - submersible non clogging pump 17 Kw 3x380 V   | 2    | 63         |
| - panel soft starter 18,5 Kw                    | 1    | 34         |
| <b>Bangunan Aerasi dan Prasedimentasi</b>       |      |            |
| Pompa prasedimentasi                            |      |            |
| - vertical singlestage inline pump 22 Kw 3x380V | 2    | 81         |
| - Panel inverter 2x22 Kw                        | 1    | 81         |
| Pompa lumpur prasedimentasi                     |      |            |
| - submersible non clogging pump 3Kw 3x380V      | 2    | 11         |
| - Panel inverter 2x22 Kw                        | 1    | 40         |
| pompa ultrafiltrasi 18 kw/unit                  | 1    | 543        |
| Untuk kapasitas produksi air 92,1 lt/dt         |      | <b>853</b> |

Untuk tarif listrik sebesar Rp. 281 Rp (liter/tahun)

Biaya listrik = 853 kwh x Rp. 281 x 24 jam x 365 hari  
= Rp. 2.101 M

**Table IV.14** Projected Electricity Costs

| Tahun ke | Tahun | Produksi Air (Lt/dtk) | Daya (kwh) | Tarif Listrik (Rp/Kwh) | Biaya Listrik (Rp.Juta)/Th |
|----------|-------|-----------------------|------------|------------------------|----------------------------|
| 0        | 2017  | -                     | -          | -                      | -                          |
| 1        | 2018  | 50                    | 464        | 514                    | -                          |
| 2        | 2019  | 92,1                  | 854        | 281                    | 2.103                      |
| 3        | 2020  | 256,2                 | 2.376      | 281                    | 5.851                      |
| 4        | 2021  | 360,7                 | 3.345      | 281                    | 8.237                      |
| 5        | 2022  | 360,7                 | 3.345      | 281                    | 8.237                      |
| 6        | 2023  | 360,7                 | 3.345      | 281                    | 8.237                      |
| 7        | 2024  | 360,7                 | 3.345      | 281                    | 8.237                      |
| 8        | 2025  | 360,7                 | 3.345      | 281                    | 8.237                      |
| 9        | 2026  | 360,7                 | 3.345      | 281                    | 8.237                      |
|          |       | 2.562                 | 23.762     | 2.763                  | 57.374                     |

$$\text{Cost of chemicals} = \text{Rp. } 2,219 \times 447,833 \text{ kg} = \text{Rp. } 994 \text{ M}$$

| Tahun ke | Tahun | Produksi Air (L/t/dt) | PAC (Poly Aluminium Chloride)/Tawas (kg) | Kaporit (Kg) | NaOH (kg) | HCl (kg) | Total Bahan (Rp/Kg) | Harga Satuan (Rp/Kg) | Jumlah Harga (Rp) |
|----------|-------|-----------------------|--|--------------|-----------|----------|---------------------|----------------------|-------------------|
| 0        | 2017  |                       |  |              |           |          |                     |                      |                   |
| 1        | 2018  |                       |  |              |           |          |                     |                      |                   |
| 2        | 2019  | 92                    | 445.536                                  | 1.641        | 446       | 209      | 447.833             | 2.219                | 993.810.516       |
| 3        | 2020  | 208                   | 1.008.454                                | 3.714        | 1.011     | 474      | 1.013.652           | 2.219                | 2.249.451.880     |
| 4        | 2021  | 361                   | 1.745.016                                | 6.426        | 1.749     | 820      | 1.754.011           | 2.219                | 3.892.424.522     |
| 5        | 2022  | 361                   | 1.745.016                                | 6.426        | 1.749     | 820      | 1.754.011           | 2.219                | 3.892.424.522     |
| 6        | 2023  | 361                   | 1.745.016                                | 6.426        | 1.749     | 820      | 1.754.011           | 2.219                | 3.892.424.522     |
| 7        | 2024  | 361                   | 1.745.016                                | 6.426        | 1.749     | 820      | 1.754.011           | 2.219                | 3.892.424.522     |
| 8        | 2025  | 361                   | 1.745.016                                | 6.426        | 1.749     | 820      | 1.754.011           | 2.219                | 3.892.424.522     |
| 9        | 2026  | 361                   | 1.745.016                                | 6.426        | 1.749     | 820      | 1.754.011           | 2.219                | 3.892.424.522     |
|          |       | 2.530                 | 11.924.086                               | 43.912       | 11.949    | 5.601    | 11.985.548          | 26.597               | 809.525           |

$$= \text{Rp. } 55,792,871/\text{year}$$

| Tahun ke | Tahun | Produksi Air (L/dtk) | Daya (kwh) | Bahan Bakar (liter) | Jam Operasi 10 jam per hari (liter/tahun) | Harga Satuan (Rp/Liter) | Jumlah Harga (Rp Liter/Th) |
|----------|-------|----------------------|------------|---------------------|---|-------------------------|----------------------------|
| 0        | 2017  |                      |            |                     |   |                         |                            |
| 1        | 2018  |                      |            |                     |   |                         |                            |
| 2        | 2019  | 92,1                 | 56,26      | 15                  | 54.617                                    | 1.022                   | 55.792.871                 |
| 3        | 2020  | 208,4                | 127,35     | 34                  | 123.623                                   | 1.022                   | 126.285.018                |
| 4        | 2021  | 360,7                | 220,36     | 59                  | 213.916                                   | 1.022                   | 218.522.078                |
| 5        | 2022  | 360,7                | 220,36     | 59                  | 213.916                                   | 1.022                   | 218.522.078                |
| 6        | 2023  | 360,7                | 220,36     | 59                  | 213.916                                   | 1.022                   | 218.522.078                |
| 7        | 2024  | 360,7                | 220,36     | 59                  | 213.916                                   | 1.022                   | 218.522.078                |
| 8        | 2025  | 360,7                | 220,36     | 59                  | 213.916                                   | 1.022                   | 218.522.078                |
| 9        | 2026  | 360,7                | 220,36     | 59                  | 213.916                                   | 1.022                   | 218.522.078                |
|          |       | 2.624,5              | 1.604      | 400                 | 1.461.738                                 | 8.172                   | 1.493.210.360              |

$$= 3,484,728 \text{ m}^3/\text{yr}$$

= Rp. 226 M

Production, operational and maintenance costs in this study are calculated starting in 2019 (2nd year of construction), in the 2nd year there is interest expense from loans.

| No | Uraian                    | Satuan | Kondisi awal    | Tahun 0 | Tahun 1 | Tahun 2 | Tahun 3 | Tahun 4 | Tahun 5 | Tahun 6 | Tahun 7 | Tahun 8 | Tahun 9 |
|----|---------------------------|--------|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|    |                           |        | 2016            | 2017    | 2018    | 2019    | 2020    | 2021    | 2022    | 2023    | 2024    | 2025    | 2026    |
|    |                           |        | Masa Konstruksi |         |         |         |         |         |         |         |         |         |         |
|    | Tingkat Bunga             | 12%    |                 |         |         |         |         |         |         |         |         |         |         |
|    | <u>Periode Pembiayaan</u> | 10     |                 |         |         |         |         |         |         |         |         |         |         |
|    | Masa Tenang (tahun)       | 2      |                 |         |         |         |         |         |         |         |         |         |         |
|    | Pinjaman                  |        | 910             | 154.991 | 15.177  | 231     | 142     |         |         |         |         |         |         |
|    | Saldo Pinjaman            |        | 910             | 155.901 | 170.964 | 151.707 | 130.465 | 109.051 | 87.620  | 66.188  | 35.147  | 19.614  |         |
|    | Cicilan                   |        |                 |         | 114     | 19.488  | 21.385  | 21.414  | 21.431  | 21.431  | 21.431  | 21.431  |         |
|    | Bunga                     |        |                 | 109     | 18.708  | 20.516  | 18.205  | 15.656  | 13.086  | 10.514  | 7.943   | 5.375   |         |
|    | <u>Total Pembayaran</u>   |        |                 | 109     | 18.822  | 40.003  | 39.590  | 37.069  | 34.517  | 31.946  | 29.374  | 26.810  |         |

Then get the analysis of production, operational and maintenance cost planning

| Net Cash Flow |  | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 | 2130 | 2131 | 2132 | 2133 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 | 2140 | 2141 | 2142 | 2143 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 | 2150 | 2151 | 2152 | 2153 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 | 2160 | 2161 | 2162 | 2163 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 | 2170 | 2171 | 2172 | 2173 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 | 2180 | 2181 | 2182 | 2183 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 | 2190 | 2191 | 2192 | 2193 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 | 2200 | 2201 | 2202 | 2203 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 | 2210 | 2211 | 2212 | 2213 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 | 2220 | 2221 | 2222 | 2223 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 | 2230 | 2231 | 2232 | 2233 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 | 2240 | 2241 | 2242 | 2243 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 | 2250 | 2251 | 2252 | 2253 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 | 2260 | 2261 | 2262 | 2263 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 | 2270 | 2271 | 2272 | 2273 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 | 2280 | 2281 | 2282 | 2283 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 | 2290 | 2291 | 2292 | 2293 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 | 2300 | 2301 | 2302 | 2303 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 | 2310 | 2311 | 2312 | 2313 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 | 2320 | 2321 | 2322 | 2323 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 | 2330 | 2331 | 2332 | 2333 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 | 2340 | 2341 | 2342 | 2343 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 | 2350 | 2351 | 2352 | 2353 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 | 2360 | 2361 | 2362 | 2363 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 | 2370 | 2371 | 2372 | 2373 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 | 2380 | 2381 | 2382 | 2383 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 | 2390 | 2391 | 2392 | 2393 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 | 2400 | 2401 | 2402 | 2403 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 | 2410 | 2411 | 2412 | 2413 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 | 2420 | 2421 | 2422 | 2423 |
|---------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|---------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|

The income analysis is calculated based on finances obtained from the sale of clean water production starting in the 3rd year, namely 2019. The assumption of water tariffs (Rp/m3) based on initial conditions in 2016 is Rp. 7,454 and the price increases every 3 (three) years by 10% so that in 2019 the water tariff will be Rp. 8,200.

| URAIAN                           | Satuan            | 2014           | 2015           | 2016           | 2019           |
|----------------------------------|-------------------|----------------|----------------|----------------|----------------|
| PRODUKSI INTERNAL                | m <sup>3</sup>    | 3.340.889      | 9.568.071      | 1.312.527      | -              |
| PEMBELIAN AIR CURAH              | m <sup>3</sup>    | 8.869.983      | 1.302.526      | 10.003.990     | 3.484.728      |
| TOTAL PRODUKSI PDAM              | m <sup>3</sup>    | 12.210.872     | 10.870.597     | 11.316.517     | 3.484.728      |
| TOTAL BEBAN USAHA                | Rp                | 73.350.708.104 | 67.071.583.490 | 84.353.314.320 | 47.573.656.819 |
| HARGA AIR                        | Rp/m <sup>3</sup> | 6.007          | 6.170          | 7.454          | 13.652         |
| <b>HARGA POKOK PRODUKSI 2019</b> |                   |                |                |                | <b>13.652</b>  |



=Rp 2.929 M

| Net Cash Flow | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 | 2130 | 2131 | 2132 | 2133 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 | 2140 | 2141 | 2142 | 2143 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 | 2150 | 2151 | 2152 | 2153 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 | 2160 | 2161 | 2162 | 2163 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 | 2170 | 2171 | 2172 | 2173 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 | 2180 | 2181 | 2182 | 2183 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 | 2190 | 2191 | 2192 | 2193 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 | 2200 | 2201 | 2202 | 2203 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 | 2210 | 2211 | 2212 | 2213 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 | 2220 | 2221 | 2222 | 2223 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 | 2230 | 2231 | 2232 | 2233 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 | 2240 | 2241 | 2242 | 2243 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 | 2250 | 2251 | 2252 | 2253 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 | 2260 | 2261 | 2262 | 2263 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 | 2270 | 2271 | 2272 | 2273 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 | 2280 | 2281 | 2282 | 2283 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 | 2290 | 2291 | 2292 | 2293 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 | 2300 | 2301 | 2302 | 2303 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 | 2310 | 2311 | 2312 | 2313 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 | 2320 | 2321 | 2322 | 2323 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 | 2330 | 2331 | 2332 | 2333 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 | 2340 | 2341 | 2342 | 2343 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 | 2350 | 2351 | 2352 | 2353 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 | 2360 | 2361 | 2362 | 2363 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 | 2370 | 2371 | 2372 | 2373 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 | 2380 | 2381 | 2382 | 2383 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 | 2390 | 2391 | 2392 | 2393 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 | 2400 | 2401 | 2402 | 2403 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 | 2410 | 2411 | 2412 | 2413 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 | 2420 | 2421 | 2422 | 2423 | 2424 | 2425 | 2426 | 2427 | 2428 | 2429 | 2430 | 2431 | 2432 | 2433 | 2434 | 2435 | 2436 | 2437 | 2438 | 2439 | 2440 | 2441 | 2442 | 2443 | 2444 | 2445 | 2446 | 2447 | 2448 | 2449 | 2450 | 2451 | 2452 | 2453 | 2454 | 2455 | 2456 | 2457 | 2458 | 2459 | 2460 | 2461 | 2462 | 2463 | 2464 | 2465 | 2466 | 2467 | 2468 | 246 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|

| Net Cash Flow | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 | 2130 | 2131 | 2132 | 2133 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 | 2140 | 2141 | 2142 | 2143 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 | 2150 | 2151 | 2152 | 2153 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 | 2160 | 2161 | 2162 | 2163 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 | 2170 | 2171 | 2172 | 2173 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 | 2180 | 2181 | 2182 | 2183 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 | 2190 | 2191 | 2192 | 2193 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 | 2200 | 2201 | 2202 | 2203 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 | 2210 | 2211 | 2212 | 2213 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 | 2220 | 2221 | 2222 | 2223 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 | 2230 | 2231 | 2232 | 2233 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 | 2240 | 2241 | 2242 | 2243 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 | 2250 | 2251 | 2252 | 2253 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 | 2260 | 2261 | 2262 | 2263 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 | 2270 | 2271 | 2272 | 2273 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 | 2280 | 2281 | 2282 | 2283 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 | 2290 | 2291 | 2292 | 2293 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 | 2300 | 2301 | 2302 | 2303 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 | 2310 | 2311 | 2312 | 2313 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 | 2320 | 2321 | 2322 | 2323 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 | 2330 | 2331 | 2332 | 2333 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 | 2340 | 2341 | 2342 | 2343 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 | 2350 | 2351 | 2352 | 2353 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 | 2360 | 2361 | 2362 | 2363 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 | 2370 | 2371 | 2372 | 2373 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 | 2380 | 2381 | 2382 | 2383 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 | 2390 | 2391 | 2392 | 2393 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 | 2400 | 2401 | 2402 | 2403 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 | 2410 | 2411 | 2412 | 2413 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 | 2420 | 2421 | 2422 | 2423 | 2424 | 2425 | 2426 | 2427 | 2428 | 2429 | 2430 | 2431 | 2432 | 2433 | 2434 | 2435 | 2436 | 2437 | 2438 | 2439 | 2440 | 2441 | 2442 | 2443 | 2444 | 2445 | 2446 | 2447 | 2448 | 2449 | 2450 | 2451 | 2452 | 2453 | 2454 | 2455 | 2456 | 2457 | 2458 | 2459 | 2460 | 2461 | 2462 | 2463 | 2464 | 2465 | 2466 | 2467 | 2468 | 246 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|

1. Local Government 20%;
2. BUP/Private 80% assuming 30% equity (equity) and 70% bank loan;
3. Bank loan interest rate is 12%;
4. The length of the bank loan is 10 years;
5. Calculation of depreciation using the Straight Line Depreciation method;
6. Income tax of 25%;
7. The selling price of clean water is Rp. 8,200/m
8. Benefit Escalation Factor 5%;
9. The investment period is 10 years.

[illegible]

In 2019 in the 3rd (third) year during the construction period there was already a profit from the sale of clean water so that the pre-tax cash flow value was obtained from total expenditure costs (capital costs plus production, operational and maintenance costs) minus income, the result was still negative because income is smaller than total expenses (capital costs and production, operational and maintenance costs), while in 2020 the value of cash flow before tax is positive because income is greater than total expenses.

[illegible]

The contribution to Tangerang City's Original Regional Revenue will be given when the cash flow is positive in 2024, the 8th (eight) year of economic life.

| Net Cash Flow  |                           |              |              |             |             |             |             |             |             |             |             |       |
|--|---------------------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------|
|  | 2017                      | 2018         | 2019         | 2020        | 2021        | 2022        | 2023        | 2024        | 2025        | 2026        | Golden Rule |       |
|  | 1                         | 2            | 3            | 4           | 5           | 6           | 7           | 8           | 9           | 10          |             |       |
|  | Masa Komunikasi (5 Tahun) |              |              |             |             |             |             |             |             |             |             |       |
| Cash Flow Before Taxes (Arus Kas Sebelum Pajak)        | Rp (45.700)               | Rp (221.525) | Rp (133.552) | Rp 38.995   | Rp 83.300   | Rp 107.168  | Rp 117.410  | Rp 128.006  | Rp 157.220  | Rp 169.391  | Rp          | 510   |
| Income Tax Calculation (Perhitungan Pajak Penghasilan) |                           |              |              |             |             |             |             |             |             |             |             |       |
| Depreciation Expense (Beban penyusutan)                | -                         | -            | Rp (22.850)  | Rp (13.556) | Rp (11.544) | Rp (4.402)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp          | 208   |
| Operating Cost (Biaya operasional)                     | -                         | -            | Rp (100)     | Rp (25.893) | Rp (52.896) | Rp (52.435) | Rp (50.003) | Rp (47.715) | Rp (45.574) | Rp (43.074) | Rp (40.876) | 310   |
| Operating Benefit (Manfaat Operasional)                | -                         | -            | -            | Rp (31.302) | Rp (50.202) | Rp 136.009  | Rp 157.203  | Rp 165.104  | Rp 173.380  | Rp 200.254  | Rp 213.307  | 1.160 |
| Corporate Benefit (Manfaat Korporasi)                  | -                         | -            | -            | -           | -           | -           | -           | -           | -           | -           | -           | -     |
| Income Tax Expense (Biaya Pajak Penghasilan)           | -                         | -            | Rp (22.850)  | Rp (13.556) | Rp (11.544) | Rp (4.402)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | 208   |
| Income Tax Expense (Biaya Pajak Penghasilan)           | -                         | -            | Rp (22.850)  | Rp (13.556) | Rp (11.544) | Rp (4.402)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | 208   |
| Earnings After Tax (Arus Kas Setelah Pajak)            | -                         | -            | Rp (22.850)  | Rp (13.556) | Rp (11.544) | Rp (4.402)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | 208   |
| Earnings After Tax (Arus Kas Setelah Pajak)            | -                         | -            | Rp (22.850)  | Rp (13.556) | Rp (11.544) | Rp (4.402)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | Rp (4.443)  | 208   |
| Committed Arus Kas Setelah Pajak                       | Rp (45.700)               | Rp (221.525) | Rp (133.552) | Rp 38.995   | Rp 83.300   | Rp 107.168  | Rp 117.410  | Rp 128.006  | Rp 157.220  | Rp 169.391  | Rp          | 510   |
| Committed Arus Kas Setelah Pajak                       | Rp (45.700)               | Rp (221.525) | Rp (133.552) | Rp 38.995   | Rp 83.300   | Rp 107.168  | Rp 117.410  | Rp 128.006  | Rp 157.220  | Rp 169.391  | Rp          | 510   |

#### 4.5. Economic Analysis Parameters

Parameters of economic analysis used in this planning study are NPV (Net Present Value), IRR (Internal Rate Return), Analysis of Return (Payback Period), and Analysis of PI (Profitability Index).

##### 4.5.1. NPV (Net Present Value)

NPV (Net Present Value) didapatkan dari selisih antara pendapatan dan manfaat operasional dengan biaya pengeluaran. Pada perhitungan NPV (Net Present Value) disesuaikan dengan hasil perhitungan manfaat operasional yang mengalami kenaikan harga tiap 1 (satu) tahun sekali sebesar 5%. Berikut ini adalah contoh perhitungan NPV (Net Present Value):

$$\text{NPV} = -45.700 - 221.525(P/F, i, 1) - 16.072(P/F, i, 2) + 38.995(P/F, i, 3) + 63.593(P/F, i, 4) + 81.487(P/F, i, 5) + 89.168(P/F, i, 6) + 97.115(P/F, i, 7) + 117.942(P/F, i, 8) + 127.053(P/F, i, 9)$$

$$\text{NPV} = \text{Rp. } 40.662 \text{ M}$$

Table IV.26 Net Present Value

| No | Tahun | Pendapatan Bersih Setelah Pajak | disc factor (12%)      | NPV (i = 12%) |
|----|-------|---------------------------------|------------------------|---------------|
| 0  | 2017  | (45.700)                        | -                      | (45.700)      |
| 1  | 2018  | (221.525)                       | 0,893                  | (197.790)     |
| 2  | 2019  | (16.072)                        | 0,797                  | (12.812)      |
| 3  | 2020  | 38.995                          | 0,712                  | 27.756        |
| 4  | 2021  | 63.593                          | 0,636                  | 40.414        |
| 5  | 2022  | 81.487                          | 0,567                  | 46.238        |
| 6  | 2023  | 89.168                          | 0,507                  | 45.175        |
| 7  | 2024  | 97.115                          | 0,452                  | 43.930        |
| 8  | 2025  | 117.942                         | 0,404                  | 47.635        |
| 9  | 2026  | 127.053                         | 0,361                  | 45.817        |
|    |       | 332.057                         | $\Sigma \text{ NPV} =$ | 40.662        |

##### 4.5.2. IRR (Internal Rate Return)

IRR (Internal Rate Return) is obtained from positive interest rates, negative interest rates, positive NPV values, and negative NPV values. The calculation of the IRR (Internal Rate Return) is adjusted to the results of the calculation of operational benefits which experience an increase in prices every 1 (one) year by 5%. The following is an example of calculating the IRR (Internal Rate Return) in the first year:

1. Positive interest rate ( $I'$ ) = 12%
2. Negative interest rate ( $I''$ ) = 16%
3. Positive NPV = Rp. 40,696
4. Negative NPV = IDR - 9,368
5. IRR (Internal Rate Return) =  $12 + (16\% - 12\%) \times 40,696 / (40,696 - (-9,368))$   
= 15.25%
6. IRR (Internal Rate Return) > 12%, then the investment work for the provision of clean water supply zone 2 Tangerang City is economically feasible.

Table IV.27 IRR (Internal Rate Return)

| No | Tahun | Pendapatan Bersih Setelah Pajak | NPV (i)   | NPV (i)   |
|----|-------|---------------------------------|-----------|-----------|
| 0  | 2017  | (45.700)                        | (45.700)  | (45.700)  |
| 1  | 2018  | (221.525)                       | (197.790) | (197.790) |
| 2  | 2019  | (16.072)                        | (12.812)  | (12.812)  |
| 3  | 2020  | 38.995                          | 27.756    | 27.756    |
| 4  | 2021  | 63.593                          | 40.414    | 40.414    |
| 5  | 2022  | 81.487                          | 46.238    | 46.238    |
| 6  | 2023  | 89.168                          | 45.175    | 45.175    |
| 7  | 2024  | 97.115                          | 43.930    | 43.930    |
| 8  | 2025  | 117.942                         | 47.635    | 47.635    |
| 9  | 2026  | 127.053                         | 45.817    | 45.817    |
|    |       |                                 | 40.662    | (9.368)   |

$$\text{IRR} = 12 - \text{NPV}_1 / ((12 - 16) / (\text{NPV}_1 - \text{NPV}_2))$$

$$\text{IRR} = 15,25\%$$

##### 4.5.3. PP (Payback Period)

Analysis of the payback period is obtained from the comparison of the cost of development capital with the difference between income and operational benefits and O&M costs. In the calculation of the Payback Period, it is adjusted to the results of the calculation of operational benefits which increase in price every 1 (one) year by 5%.

Calculation of Analysis of Returns (Payback Period):

Then the payback period can be calculated as follows:

Investment value = Rp. 289,330

proceeds year 1 = Rp. 45,700

Remaining investment year 2 = Rp. 243.630  
Proceed year 2 = Rp. 197.790

Remaining investment year 3 = Rp. 45,480  
Proceed year 3 = Rp. 12,809

Remaining investment year 4 = Rp. 33.030  
proceeds year 4 = IDR 27,764

Remaining investment in 5 years = IDR 5,267

The remainder of the 5th year investment is covered by the 5th year proceeds. The 5th year's remaining investment is covered by the 5th year's proceeds partially from 40,418 which is 5,267 / 40,418 = 0.130 shares. So the payback period (PP) for this investment is 5 years and 1 month.

Table IV.28 PP (Payback Period)

| Keterangan             | PV Process |           | PP        |
|------------------------|------------|-----------|-----------|
| Nilai Investasi        | PV1        | (45.700)  | 289.330   |
| Process 1              | PV2        | (197.790) | (45.700)  |
| Sisa Investasi tahun 2 | PV3        | (12.809)  | 243.630   |
| PV Process tahun 2     | PV4        | 27.764    | (197.790) |
| Sisa Investasi tahun 3 | PV5        | 40.418    | 45.840    |
| PV Process tahun 3     | PV6        | 46.242    | (12.809)  |
| Sisa Investasi tahun 4 | PV7        | 45.179    | 33.031    |
| PV Process tahun 4     | PV8        | 43.934    | 27.764    |
| Sisa Investasi tahun 5 | PV9        | 47.638    | 5.267     |
|                        | PV10       | 45.820    |           |
| PP = 5 tahun + 1 bulan |            |           | 0,130     |

From the calculation above, PP < economic age of 10 years, namely 5 years and 1 month, it can be said that this investment is feasible

##### 4.5.4. PI (Profitability Index) analysis

Table IV.29 PI (Profitability Index)

| No         | Tahun | Pendapatan Bersih Setelah Pajak | disc factor (12%) | PV benefit | PV Cost |
|------------|-------|---------------------------------|-------------------|------------|---------|
| 0          | 2017  | (45.700)                        | -                 |            | 45.700  |
| 1          | 2018  | (221.525)                       | 0,893             |            | 197.790 |
| 2          | 2019  | (16.068)                        | 0,797             |            | 12.812  |
| 3          | 2020  | 39.006                          | 0,712             | 27.756     |         |
| 4          | 2021  | 63.599                          | 0,636             | 40.414     |         |
| 5          | 2022  | 81.494                          | 0,567             | 46.238     |         |
| 6          | 2023  | 89.175                          | 0,507             | 45.175     |         |
| 7          | 2024  | 97.123                          | 0,452             | 43.930     |         |
| 8          | 2025  | 117.951                         | 0,404             | 47.635     |         |
| 9          | 2026  | 127.063                         | 0,361             | 45.817     |         |
| $\Sigma =$ |       |                                 |                   | 296.965    | 256.302 |
| PI =       |       |                                 |                   |            | 1,16    |

From the results of the calculation of PI > 1, it is said to be feasible in this investment

## V. CONCLUSIONS

The results of the projected population at the planned age of 2017 to 2021 of 614,948 people are used in projecting the average water demand, the calculation results of the average water demand are 361 lt/s and the number of direct connections is 30,550 units, the planned water demand is 400 liters/sec. for the investment value of Rp. 289,330 M which is used for 5 (five) years of project life from 2017 to 2021 obtained from 2 (two) funding sources, namely, 20% from the Tangerang City Government and 80% from the Provider Business Entity (BUP) / Private by way of equity 30% and bank loan 70%. From the calculation of the projected Cash Flow analysis, it can be seen that in the 3 (three) year of construction (2019), the profit from the sale of clean water has been obtained so that the investment value that refers to the Budget Plan for the Procurement of Clean Water in the Zone 2 service area of Tangerang City is not fully used in the construction of infrastructure projects. clean water management.

From the analysis of the results of the calculation of the economic feasibility parameters in this planning study, such as IRR (Internal Rate Return), Analysis of Return (Payback Period), and Analysis of PI (Profitability Index), it can be said that it is feasible to invest in clean water supply in the service area of zone 2 Tangerang City, the following are the results of the feasibility analysis:

- a. NPV (Net Present Value) is positive Rp. 40,696 M
- b. IRR > 12 i.e. 15.22%
- c. PP < economic period of 10 years i.e. 5 years 1 month
- d. PI > 1 i.e. 1.16

This investment analysis can contribute to Regional Original Income (PAD) in the City of Tangerang which will be given when the cash flow is positive in 2024, which is the 8th (eighth) year of economic life.

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