FLOOD CONTROL OF LAMONG RIVER, GRESIK DISTRICT

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Abstract
Lamong River is located in East Java Province. The discharge of the Lamong River tends to be large, but it cannot be drained properly, so that the river overflows and causes Gresik Regency to experience flooding almost every year.

The existing condition of the Lamong River is not able to accommodate the flood discharge. Therefore, it is planned to build a polder in the flood-prone areas of the Lamong River to accommodate the discharge that occurs. Polder on the Lamong River is planned with an entry discharge into the retention pool of 85% using a pump with a suction capacity of 5 m$^3$/s and 3 m$^3$/s. The dimensions of the Polder pond used in pond I are 530 m long, 530 m wide, 8 m deep, II pool size 540 m long, 540 m wide, 8 m deep, pool size III is 550 m long, 550 m wide, depth 8.5 m, the size of pool IV is 580 m long, 580 m wide, 9 m deep, for V pool size is 600 m long, 600 m wide, 9 m deep, and for pool VI size is 600 m long, 600 m wide, 9 m depth. Each pool has 3 sluice gates with a size of 2 m per door with a door opening height of 1.32 m and a drain dimension of 3 m long, a channel width of 8 m, and a channel height of 3.46 m.

Keywords: flood control, river, polder

INTRODUCTION

Lamong River is located in East Java Province. The discharge of the Lamong River tends to be large, but it cannot be drained properly, so that the river overflows and causes Gresik Regency to experience flooding almost every year.

The existing condition of the Lamong River is not able to accommodate the flood discharge. Therefore, it is planned to build a polder in the flood-prone areas of the Lamong River to accommodate the discharge that occurs. Polder on the Lamong River is planned with an entry discharge into the retention pool of 85% using a pump with a suction capacity of 5 m$^3$/s and 3 m$^3$/s. The dimensions of the Polder pond used in pond I are 530 m long, 530 m wide, 8 m deep, II pool size 540 m long, 540 m wide, 8 m deep, pool size III is 550 m long, 550 m wide, depth 8.5 m, the size of pool IV is 580 m long, 580 m wide, 9 m deep, for V pool size is 600 m long, 600 m wide, 9 m deep, and for pool VI size is 600 m long, 600 m wide, 9 m depth. Each pool has 3 sluice gates with a size of 2 m per door with a door opening height of 1.32 m and a drain dimension of 3 m long, a channel width of 8 m, and a channel height of 3.46 m.

RESEARCH METHOD

The steps for this study are as follows:

1. Collecting secondary data, such as rainfall, topographic maps, channel sections.
2. Analyze rainfall data
3. Calculate the regional average rainfall
4. Calculate the rainfall plan
5. Calculate the flood discharge plan
6. Schematic the drainage system
7. Calculating the capacity of the lamong river with hec ras
8. Calculating the flood control design in this case using a polder
RESULT AND DISCUSSION

From the calculation of the area average rainfall, the planned rainfall in the Lamong river basin is as follows:

**Table 1. Rainfall Plan**

<table>
<thead>
<tr>
<th>R (mm)</th>
<th>K (mm)</th>
<th>Log R (mm)</th>
<th>R tahunan (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.002</td>
<td>1.645</td>
<td>44.132</td>
</tr>
<tr>
<td>5</td>
<td>0.836</td>
<td>2.056</td>
<td>113.762</td>
</tr>
<tr>
<td>10</td>
<td>1.281</td>
<td>2.085</td>
<td>121.758</td>
</tr>
<tr>
<td>25</td>
<td>1.748</td>
<td>2.134</td>
<td>136.069</td>
</tr>
<tr>
<td>50</td>
<td>2.049</td>
<td>2.190</td>
<td>155.044</td>
</tr>
</tbody>
</table>

Based on the division of segments as shown in Figure 9, a flood search was carried out from the upstream to the downstream of the Lamong River. This search is to estimate the hydrograph in each segment that has been carried out.

**Figure 2. Schematic of River Sub-Basin Distribution Lamong.**

The results of the calculation of the Nakayasu method will be applied with the help of the HEC RAS software which can be seen in the following figure.

**Figure 3. Nakayasu hydrograph**

The first step is to determine the existing capacity of the Lamong River using the HEC-RAS program. The river discharge capacity in the existing condition is done by trial and error in each segment. The results of the existing capacity in segment 1 are 125 m³/s, in segment 2, segment 3 and segment 4 are able to accommodate the existing discharge of 115 m³/s, and in segment 5 and segment 6 are only able to accommodate a discharge of 100 m³/s. The schematic and the output of the river HEC-RAS can be seen in the figure.

**Figure 4. The schematic and the output of the river HEC-RAS**
CONCLUSION

Based on the results of the existing Lamong River flood control plan, it can be concluded as follows:

With the help of Hec-Ras v.4, several alternatives were carried out on the Lamong River, namely alternative 1 by 50%, alternative 2 by 60%, and alternative 3 by 70% there was still flooding in almost all river bodies and in alternative 4, which was equal to 85% of river water is pumped into the polder pond where there is no more flooding, so the alternative to be used is alternative 4, where 85% of river water is pumped into the polder pond. Water will be pumped into the pond using 2 pumps with a pump capacity of 5 m³/s and 2 pumps with a pump capacity of 3 m³/s. The dimensions of the Polder pond used in pond I are 530 m long, 530 m wide, 8 m deep, II pool size 540 m long, 540 m wide, 8 m deep, pool size III is 550 m long, 550 m wide, depth 8.5 m, the size of pool IV is 580 m long, 580 m wide, 9 m deep, for V pool size is 600 m long, 600 m wide, 9 m deep, and for pool VI size is 600 m long, 600 m wide m, 9 m depth. Each pool has 3 sluice gates with a size of 2 m per door with a door opening height of 1.32 m and dimensions of a drain 3 m long, channel width

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REFERENCES


