

Design of Sewage Treatment Plant for Trimbakeshwar

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Abstract

A Study on domestic waste water characterization has been performed followed by the design of sewage treatment plant. A sewage treatment plant is quite necessary to receive the domestic and commercial waste and removes the material which poses harm for general public. Its objectives is to produce an environmentally safe fluid waste stream (or treated effluent) and a solid waste (or a treated sludge) suitable for disposal or reuse (usually as farm fertilizer).

Keywords: STP Sewage Treatment Plant

INTRODUCTION

Trimbakeshwar has religious importance in INDIA as one of the twelve “Jyotirlingas” which is the place of holy pilgrims and worship for Lord Shiva. All pilgrims activities, exponentially increases in the form of visitors as floating population, this responsible for creating pressure on the environmental assets of the town. This is process of removing contaminants from

wastewater and household sewage, both effluents and domestic.

It includes physical, chemical, biological processes to remove physical, chemical, biological contaminant. A sewage treatment is quite necessary to receive the domestic and commercial waste and removes the material which harmful for public health.

OVERVIEW

It is needed to construct suitable capacity Sewage Treatment Plant at place where sewage water meets to the Godavari River. Trimbakeshwar is an ancient city which is situated on the bank of river "Godavari". Now a day Trimbakeshwar city is at developing stage having population up to 12056 but till now the Sewage Treatment Plant fails to work. The whole waste water is carried from main drainage line in Trimbakeshwar and further meets at Godavari River because of this pollution is increasing day by day and peoples facing lots of problems.

LOCATION OF TREATMENT PLANT

The treatment plant should be located as near to the point of disposal as possible. If the sewage has to be disposed finally in to the river, the plant should be located near the river bank. Care should be taken while locating the site that it should be on the downstream side of the city and sufficiently away from water intake works. If finally the sewage has to be applied on land, the treatment plant should be located near the land at such a place from where the treated sewage can directly flow under gravitational forces toward the disposal point.

Points To Be Considered In Design

Following points are considered during the design of sewage treatment unit:

- 1) The design period should be taken between 25 to 30 years.
- 2) The design should not be done on the hourly sewage flow basis, but the average domestic flow plus the maximum industrial flow on the yearly record basis.
- 3) The Sewage treatment plant should be located near to the river bank.

POPULATION OF TRIMBKESHWAR CITY FROM 1951 TO 2011

YEAR	POPULATION
1951	4135
1961	4814
1971	5495
1981	6759
1991	7883
2001	9804
2011	12056

Methods of Forecasting Population-

- 1) Arithmetical increase method
- 2) Geometrical increase method
- 3) Decrease rate method
- 4) Incremental increase method
- 5) Simple Graphical method
- 6) Comparative Graphical method
- 7) Logistic curve method

Out of seven methods, in the present study, the population is forecasted by first four methods.

“The population is forecasted by four methods and compared. Based on the comparison, it is observed that the incremental increase method gives most appropriate results for forecasting the population.

Design of Treatment Unit:

Population as calculated by Incremental increase method: 21064

Sewage: 85lit/day/capita

Quantity of effluent in lit/day:

$$85 \times 21064/3 = 596813$$

Volume of sewage: $596813/1000 = 596$
m³/day

Design of Screen Chamber

Total flow of sewage = 596 m³/day

Standing period of screen chamber is 10 minutes

Volume of screen chamber = 2.6 m³.

If we considered screen chamber of 1m height, then size will be 2m×0.8m×1m.

Design of Grit Chamber

Total flow of sewage = 596m³/day

Standing period of grit chamber is 10 minutes.

Volume of one grit chamber = 2.6m³.

If we considered grit chamber of 2.5m height, then size will be 3.6m×3.6m×2.5m

Design of MBBR

Design flow = 3000m³/day

No of MBBR unit = 2 no.

If we considered MBBR, then size will be 13.70m×6.90m×4.50m.

Design of Clarifier

Avg. flow = 3 MLD

Side water depth = 3.50m

Diameter = 12m

F.B. = 0.50

Total Depth = 4m.

Design of Sludge Holding Tank

Sludge quantity = 10200 liters/day

HRT = 8hrs

If we considered sludge holding tank, then size will Be 3.20m×3.20m×4m.

CONCLUSION

As per the modern day facilities and system, we see the various problems in the Trimbakeshwar village regarding sewage treatment and its disposal. As per our project we propose sewage treatment plant. Present day population of village and future forecasted population are both taken into account for the design of the plant.

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