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Design of Sewage Treatment Plant for Dhule City

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Abstract— The earth is divided into the lithosphere or land masses and the hydrosphere or the oceans, lakes, streams and underground waters. The hydrosphere includes the entire aquatic environment. Our world both lithosphere and hydrosphere is shaped by varying life forms. Permanent forms of life create organic matter and in combination with inorganic materials help establish soil. Plants cover the land and reduce the potential for soil erosion – the nature and rate of erosion affects the distribution of materials on the surface of the Earth. Two environments, biotic (living environment or community) and abiotic (non living environment), combine to form an ecosystem.
Keywords : environment, Panzara, hydrosphere, lithosphere, soil erosion

I. Introduction

Dhulia city is an ancient city which is situated on the bank of river "Panzara". Old part of Dhulia city; generally called as old Dhulia is well planned according to civil engineering point of view. The planning of Dhulia city is done by Bharat-ratna sir. M. Vishweshwarayah. Because of this the Dhulia city is awarded by "Guinese Book of World Record" for "Well Planned City". Now a days Dhulia city is at developing stage having population up to 4 to 5 lacks but till now the Sewage Treatment Plant is not constructed in Dhulia city. The whole waste water is carried from main drainage line in old Dhulia and Sushi Nallah in Deopur region and further meets at Panzara River because of this pollution is increasing day by day and peoples are facing many diseases. So, it is needed to construct Sewage Treatment Plant at place where sewage water meets to the Panzara River.

Methods of forecasting population:
1. Arithmatical 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

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

- The design period should be taken between 25 to 30 years.
- 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.
- Instead of providing one big unit for each treatment more than two numbers small units should provided, which will provide in operation as well as no stoppage during maintenance and repair of the plant.
- Overflow weirs and the bypasses should be provided to cut the particular operation if desired.
- Self cleaning velocity should develop at every place and stage.

Population of Dhule City from 1951 to 2011

YEAR	POPULATION
1951	76,880
1961	98,893
1971	1,37,129
1981	2,10,759
1991	2,78,317
2001	3,41,473
2011	4,18,446

Design Of Treatment Units

Population as calculated by decrease rate method: 8,16,728
Sewage: 85lit/day/capita
Quantity of effluent in lit/day:

$$\frac{85\times 816728}{3}$$
$$= 23140626.67 \approx 23140627$$

Volume of sewage: $\frac{23140627}{1000} = 23140$ m3/day

Design of screen chamber :
Total flow of sewage = 23140 m3/day
Standing period of screen chamber is 10 minutes.
$\therefore$ Volume of screen chamber = 160.69 $\approx$ 161m3.
If we considered screen chamber of 2m height, then size will be 12.5m×6.5m×2m.

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Design of grit CHAMBER:

Total flow of sewage = 23140 m^3/day

Standing period of grit chamber is 10 minutes.

∴ Volume of one grit chamber = 160.69 ≈ 161m^3.

Design of storage tank:

Total flow of sewage = 23140 m^3/day

Standing period of storage tank is 2 hours.

∴ Volume of storage tank is 1928.33 m^3

If we considered height of storage tank is 9m then diameter of storage tank will be 17m.

Design of settling tank and aeration and skimming facility:

Total flow of sewage = 23140 m^3/day

Standing period of settling tank is 6 hours.

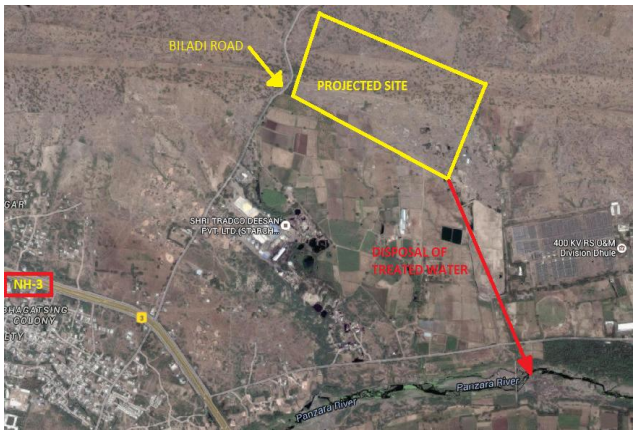
∴ Volume of settling tank is 5785$m^{3.}$

We assume three settling tanks then volume of one settling tank will be 1930$m^{3.}$

If we considered height of settling tank is 8m then diameter of tank will be 18 m.

We assume free board 100 cm.

If We Considered Grit Chamber Of 2m Height , Then Size Will Be 12.5m×6.5m×2m.



CONCLUSION:

Gas collection from sludge digestion tank From the sludge digestion tank various gases are collected such as methane (CH4), carbon-dioxide and hydrogen sulphide (H2S). The main combustion constituent in gas is methane i.e. 60%-70%. Sludge gas having 70% methane has a fuel value.

This gas can be used for following purposes:

- For heating the plants of digester, buildings, incinerators and hot water supply.
- For plant power production-pumping, air and gas compressors.
- For gas supply to small factories and institutions.
- Motor fuel for municipal cars and trucks.

Effluent disposal and utilization :

The degree of treatment provided to the sewage is governed by the specific purpose for which the sewage effluent is to be used. The sewage effluent is preferably used for irrigation of crops with precautions. The effluent can also be used for the artificial recharging of ground water or for industries as process or cooling water. Another use of the effluent may be at the treatment plant itself for purposes, such as flushing and foam control, chlorinator injector water, lawn sprinkling, fire protection and general plant operation.

Effluents after the treatment can be diluted and released into the flowing river, lake, pond, sea or in the irrigation canal using necessary precautions.

Location Of Treatment Plant:

The treatment plant should be located as near to the point of disposal as possible. If the sewage as 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 as 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.

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BIOGRAPHIES

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