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Designed For Combined Common Effluent Treatment Plant Of Tarapur Midc

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Abstract: *The population growth in India is immense. Accordingly, the water supply amount is enormous which, in return generates large amounts of wastewater. One such region is the Palghar Boisar region whose population growth according to calculations will sky rocket. But the amount of sewage treatment plants present is only one for a particular area. So, to combat this we decided to construct another Sewage treatment plant per another area. In this project we will discuss the population growth of the region, design parameters, the method selection for design, introduction and the complete design of a sewage treatment plant for Tarapur MIDC. The treatment procedure has been developed to treat sewage and reuse the water for various purposes like water to gardening, toilet flushing, farming and other requirements for Sewage treatment plant, Tarapur MIDC.*

Keywords – *Storage ,Storage Tank, Clariflocculator*

I. Introduction

Sewage is a type of waste water that is produced by community of people.

It is characterized by volume or rate of flow, physical condition, chemical and toxic constituents, and its bacteriologic status like which organisms it contains and in what quantities.

It consists mostly of greywater from sinks, bathtubs, showers, dishwashers, and clothes washers, blackwater the water used to flush toilets, combined with the human waste that it flushes away); soaps and detergents; and toilet paper less so in regions where bidets are widely used instead of paper.

Sewage treatment also called as wastewater treatment is the process of removal impurities from wastewater before they reach natural bodies such as rivers, lakes, oceans.

Sewage treatment includes physical, chemical and biological process to remove these contaminants and produced environmentally safer treated waste water.

In most of cases sewage contain waste mostly coming from domestic areas. This type waste contains mostly water and very few quantities of other contaminants.

II. Headings

2.1 TYPE OF TREATMENT OF SEWAGE

The treatment of sewage consist many complex processes Treatment process are often classified are as follow:

1. Primary Treatment
2. Secondary Treatment
3. Tertiary Treatment

1. Primary Treatment:

Primary treatment removes material that will either float or readily settle out by gravity. It includes the physical processes of screening, comminution, grit removal, and sedimentation. Screens are made of long, closely spaced, narrow metal bars. They block floating debris such as wood, rags, and other bulky objects that could clog pipes or pumps. In modern plants the screens are cleaned mechanically, and the material is promptly disposed of by burial on the plant grounds. A comminutor may be used to grind and shred debris that passes through the screens. The shredded material is removed later by sedimentation or flotation processes.

Secondary Treatment:

Secondary treatment removes the soluble organic matter that escapes primary treatment. It also removes more of the suspended solids. Removal is usually accomplished by biological processes in which microbes consume the organic impurities as food, converting them into carbon dioxide, water, and energy for their own growth and reproduction. The sewage treatment plant provides a suitable environment, albeit of steel and concrete, for this natural biological process. Removal of soluble organic matter at the treatment plant helps to protect the dissolved oxygen balance of a receiving stream, river, or lake.

Tertiary Treatment:

The purpose of tertiary treatment is to provide a final treatment stage to further improve the effluent quality before it is discharged to the receiving environment. More than one tertiary treatment process may be used at any treatment plant. If disinfection is practised, it is always the final process. It is also called "Effluent Polishing". This process is proved to be expensive. Sometimes it is doubled the cost of secondary treatment. It is only used in special conditions.

2.2 Need of ETP

1. To clean industry effluent and recycle it for further use
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3. Reduce transportation and off-site treatment costs
4. Reduce supply costs by recovering production materials out of the waste-stream for re-use.
5. To prevent pollution in Banganga river and arabian ocean.

2.3 Objectives

1. To study the physical, chemical and biological characteristic of sewage.
2. Preservation of water quality in public bodies.
3. To study the various advance wastewater treatment.
4. To study about impurities, present in wastewater and process to make it reusable.
5. Design of sewage treatment plant by designing all its appropriate units.

2.4 Sewage Treatment Plant

Sewage treatment plant is a facility where collection and treatment of sewage is done along with purifying and returning the water to the environment. Sewage treatment plant is a cornerstone to the public health and safety. It has become an essential aspect of sanitation and water infrastructure.

A typical sewage treatment works by employing several physical, chemical, and biological treatment barriers. Sewage usually travels from building plumbing into the sewer, which will carry it elsewhere, or to the onsite sewage treatment facility via piping and in flow guided by gravity or pumps whichever is necessary and further treatment is carried out. Treatment as done by employing several physical, chemical and biological barriers. Depending on season and local practices type treatment is decided.

With increasing population pressure and the need for sustainable water supplies, there is growing interest in the application of recycled water for various purposes including irrigation. Recycled water can be produced by employing sewage treatment plants following conventional or advance sewage treatment to further purify it to a level appropriate for the intended reuse. Additional filtration and disinfection steps may be added prior to piping the water for non-potable applications such as irrigation of crops and recreational fields. If the water is intended for

potable application, then more aggressive treatments may be employed like reverse osmosis. Another waste water treatment technology is the use of Advance oxidation processes which are more aggressive than UV and Chlorination.

III. METHODOLOGY

3.1 SELECTION OF APPROPRIATE UNITS: -

The first step in modern wastewater treatment, primary treatment removes solids that are suspended in the wastewater. First the waste is passes through screens both coarse and fine to removes larger object like floating debris like wood, rags, gravels, and other object which may clog the pumps or pipes. Fine grit particles are removed in Grit Chamber.

Pumping stations are built when sewage must be raised from a low point to a point of higher elevation or where the topography prevents downhill gravity flow. Special no clogging pumps are available to handle raw sewage. They are installed in structures called lift stations. There are two basic types of lift stations: dry well and wet well. A wet-well installation has only one chamber or tank to receive and hold the sewage until it is pumped out. Specially designed submersible pumps and motors can be located at the bottom of the chamber, completely below the water level. Dry-well installations have two separate chambers, one to receive the wastewater and one to enclose and protect the pumps and controls. The protective dry chamber allows easy access for inspection and maintenance. All sewage lift stations, whether of the wet-well or dry-well type, should include at least two pumps. One pump can operate while the other is removed for repair.

Trickling Filter:

In this process the waste water dispended upon `a bed of media such as rocks stones, plastic or salts. Modern filters use a type of rockwool. The effluent flows through the material at slow enough rates to allow microbial growth on the surface of the media creating a layer of film. The spacing of the media allows air to circulate throughout the trickling system. Once microbial growth takes place additional wastewater flow has contact with microorganisms; this contact ensures that the organic matter in the primary treatment effluent is broken down. Despite being cheap in construction it can occupy a larger area and require high maintenance.

Moving Bed Bio Reactor [MBBR]: -

A moving bed biofilm reactor is a biological process, meaning it is natural process that uses biofilm to remove waste from sewage. Microorganisms attached to media in the water consume unwanted waste, leaving cleaner water. This becomes a popular due to some benefits it offers. This process provides safe and environmentally sustainable means of removing organic substances, reducing BOD as well as achieving nitrification and denitrification. MBBR is the best solution for space constraints. It is as easy to use unit and requires less maintenance. It works finely with low hydraulic retention time.

Oxidation Pond:

Oxidation ponds are large and shallow; a typical depth would range from 1-2.5m. The ponds are composed of microorganisms, which feed on the organic matter received from primary effluent. Algae are a key feature in the oxidation pond system. The only problems with this system that it is a slow process and requires sunlight. In rainy season this process is not that effective as compare to other process.

Up flow Anaerobic Sludge Blanket Reactor [UASB]: -

The Up flow Anaerobic Sludge Blanket Reactor [UASB] is a single tank process. Wastewater enters the reactor from the bottom, and flows upward. A suspended sludge blanket filters and treats the wastewater as the wastewater flows through it. The UASB is a Centralized Treatment technology that must be operated and maintained by professionals. A skilled operator is required to monitor the reactor and repair parts, e.g., pumps, in case of problems. Desludgingis infrequent and only excess sludge is removed every 2 to 3 years. This process requires long start-up time to work at full capacity and a constant source of electricity which is expensive and difficult in

the areas where power cut frequently occur.

3.2 DETAILED INFORMATION OF SELECTED UNITS:-
Screening:

Screen is the first unit operation in wastewater treatment plant. This is used to remove larger particles of floating and suspended matter by coarse screening. This is accomplished by a set of inclined parallel bars, fixed at certain distance apart in a channel. The screen can be of circular or rectangular opening. The screen composed of parallel bars or rods is called a rack. The screens are used to protect pumps, valves, pipelines, and other appurtenances from damage or clogging by rags and large objects.Sump Well:
The purpose of providing sump well is to form a suction pit from which pump may draw sewage through the suction pipe. It also acts as an equalizing basin to minimize the load fluctuations on the pump. A float connected to a switch is provided in this sump well in such way that when the sewage rises above the float level, the switch gets pressed and pump automatically starts functioning, thus pumping sewage. This designed level of the sewage in the sump well is kept above the pump level, which avoids priming of the pump.

The capacity of the sump well should be about 15 to 30 min of the peak flow. If its capacity is less, the operation of power unit shall have to be done at frequent intervals, with the result that the operation becomes expensive in case of electrically operated plant; it means increased cost of current, as the starting current is more than the full load current.

Sometimes capacity of the sump well also includes the capacity of the foul sewer back to the sump at the time of cleaning of wells, unless a separate washout is provided.

GRIT CHAMBER: -Grit chamber is the second unit operation used in primary treatment of wastewater and it is intended to remove suspended inorganic particles such as sandy and gritty matter from the wastewater. The grit chamber is used to remove grit, consisting of sand, gravel, cinder, or other heavy solids materials that have specific gravity much higher than those of the organic solids in wastewater. Grit chambers are provided to protect moving mechanical equipment from abrasion and abnormal wear; avoid deposition in pipelines, channels, and conduits; and to reduce frequency of digester cleaning.

IV. Conclusion

This report reviews the necessity for establishing another Sewage treatment plant in the Vasai Virar region. It also sheds light on the vast population growth to be experienced by the region. It helped determine the actual methods to be used for the design of the STP. The reports also plot the wastewater treatment procedures in India and the various other environmental aspects.

The main intention of this report is to make contribution towards solving the problems posed by contaminated water. Different methods for treatment of water with their conditions are also discussed in this report.

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