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**Assessment of Performance of Sewage Treatment Plant (STP) on Weekdays v/s Weekend Days at Amanora Park Town**

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**Abstract**

Air, water, food, and shelter are just a few of the many components that life on Earth must have in for survival. One of the most valuable natural resources and a necessity for human existence is water. Without water, it is impossible to envisage life existing on any planet throughout the cosmos. As 80 percent of the protoplasm in the majority of living cells is made up of water, water is seen as being necessary to support life. In this study we are assessed the performance of Sewage Treatment Plant (STP) on weekdays verses weekend days of Amanora Park Town. Data regarding flow, pollution load in terms of COD, BOD, suspended solids, pH are to be collected for Weekdays (Monday to Friday) and Weekend days (Saturday & Sunday) were collected. The major parameters were analysed such as Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD) and pH by scientific methods. Considering the average sewage generation of weekend days (02 days i.e., Saturday and Sunday) was more as compared to weekdays. In weekend days the COD and BOD of treated effluent were slightly at higher level compared COD and BOD values of Weekdays.

**Keywords:** sewage generation; STP; BOD; COD.

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**Introduction**

Nowadays, there is an urgent need to save water in order to protect the environment and the future of humanity. Our world is expanding to new heights as a result of the advancement of humanity, society, science, and technology, but the price we are paying now or will be paying in the near future will undoubtedly be too costly. Unhealthy environments are one of the effects of fast expansion. According to the UNESCO-published United Nations Global Water Development Report, the home, industrial, and agricultural sectors use 70, 22 and 8% of the fresh water supply, respectively, and as a result, a lot of wastewater is produced. The word "sewage" comes from the French verb "essouier," which meaning to drain [1,2]. The term "wastewater" has mostly supplanted "sewage," which is now considered to be archaic. Sanitary, domestic, industrial, or agricultural wastewater or runoff can all be considered sewage. Excretory waste, washing water, bathing waste (soaps and dirt),

laundry waste (primarily dirt and surfactants), and kitchen waste make up the majority of domestic sewage [3].

Sewage wastewater generation and its treatment is a big concern, as India generates 60.0 to 62.0 million litres per day of sewage and out of it only 12.0 to 13.0 million litres undergo for treatment as per National Green Tribunal (30/04/2019 and updated on 08/05/2019) regarding sewage discharge standards. As per latest survey, in India only one-third of wastewater is currently being treated else rest of it leads to water borne diseases. Urban water access is much higher than rural areas, thus significant gaps remain across the country [4-5].

About one-third of the wastewater generated in India is now treated, and only about 70% of the states treat more than half of their wastewater production. Just 65% of the urban wastewater in Punjab, Gujarat, Maharashtra, and Uttar Pradesh may possibly be treated. Despite this, many other states lack the installed treatment capacity

to even treat half of their wastewater, including Bihar, Madhya Pradesh, and Andhra Pradesh [6-7]. Moreover, the capacity for wastewater treatment is inadequate or non-existent in certain North-Eastern and Himalayan states. Different locations generate different types and amounts of sewage. This is due to climatic variance, socioeconomic conditions, and the classification of home garbage [8-9].

Sewage wastewater comprises of water together with inorganic solids and organics solids. In sewage wastewater, organic substances are protein, carbohydrates, fatty acids, synthetic detergents, lignin and other organic products. Inorganic substances comprise of toxic levels of elements such as cadmium, arsenic, copper, zinc etc. Generation and treatment of wastewater have a big gap in India. Not only that, the existing treatment capacity are not capable to handle the waste due to oversizing of plant, non-availability of skilled manpower and also not effectively operation of plant [10-13]. In India, water resources are very finite and fragile which are depleting faster due to increase in multi sectoral water demand from sustained economic growth (over 8%) which is also coupled with increased energy and consumption. As per the European Business and Technology Centre (EBTC-2011), per capita accessibility of water will be less than 1000 litre by 2020 if left unchecked and we will face variability in water resources throughout the country just because of exponentially increasing need for water due to population growth, industrial and agricultural use [14-16].

### **Study Area**

Amanora Park Town is a residential township project based in Hadapsar, Pune. The project is developed by the City Corporation Limited. spread over 400 acres, the township is self-containing with schools, state-of-the-art hospital, restaurants, sports, shopping arcade and entertainment centers all within walking distance. Number of flats in Amanora Park Township : proposed are 14000 numbers and existing are 7000 numbers. Total Population in Amanora Park Township : Proposed is 75000 numbers , existing is 30000 numbers; Total Daily floating population in Amanora Township Mall in weekdays : 30000 numbers and Total Daily floating population in Amanora

Township Mall in week end days : 45000 numbers.

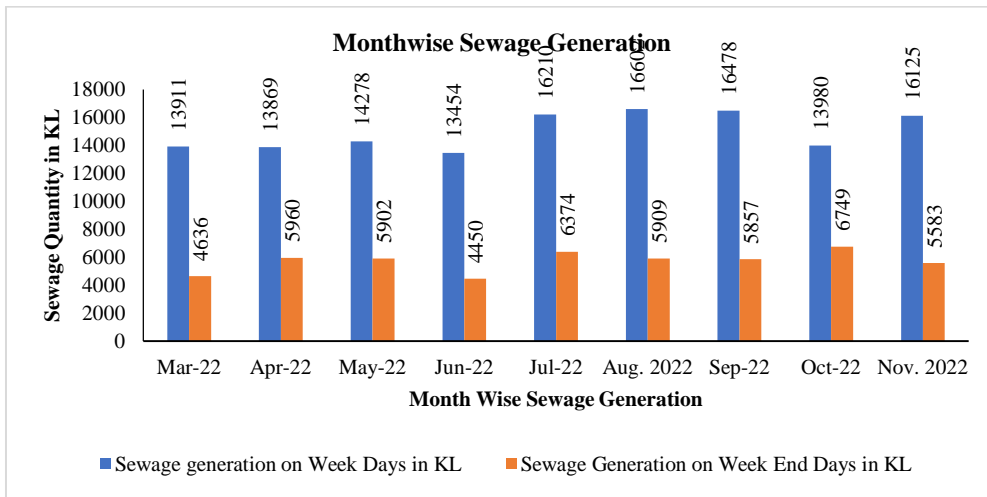
### **Material and Methods**

The study area is influenced by various developmental activities leading to the generation of quantity and quality of waste. Visit to the selected STPs, their background study, collection of raw and treated wastewater samples and their analysis. Identifying and studying important components to enhance STP efficiency. All the precaution and necessary preservative steps were taken during and after the collection of the samples (APHA, 2012). The liquid samples (Before treatment and after treatment sewage wastewater) were collected in pre-cleaned, sterilized, polyethylene bottles of two litter capacity and stored at 4 °C. The COD estimated by titration with ferrous ammonium sulfate on hot reflux and BOD was analysed by Winkler's method. The DO of the incubated bottles was determined after five days by the same method [16-18].

### **Result and Discussion**

#### *Process Description*

The process sewage from all the raw sewage first enters the bar screen chamber to eliminate the coarse material present which could potentially damage subsequent process equipment, reduce overall treatment process reliability and effectiveness. The screened sewage shall then enter the oil trap to separate floating oil from the sewage. Necessary baffles, side chamber, slotted pipe will be provided. Then sewage shall enter the grit chamber which shall be designed to maintain a velocity so as to provide sufficient time for grit particles to settle to the bottom of the channel. The grit-free sewage shall be then fed to the equalization/neutralization tank equipped with floating Aerators to achieve flow equalization. The overflow from the settling tank shall flow to the Aeration tank provided with retrievable type membrane diffuser arrangement and air blowers. The organic matter shall be brought into intimate contact with sludge from the secondary clarifier and nutrients (Urea and DAP) shall be added using nutrient dosing System. The microorganisms would utilize the oxygen transferred by membrane diffusers and convert the organic matter into stabilized low energy compounds such as NO<sub>3</sub>, SO<sub>4</sub>, CO<sub>2</sub>, and synthesize new bacterial cells.

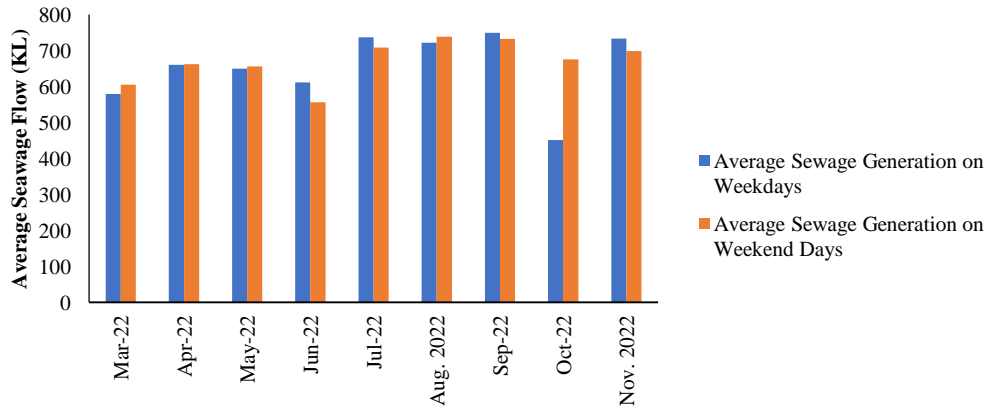


**Figure 1: Month Wise Sewage Generation**

Figure 1 shows the weekday and weekend days of sewage generation. Considering the average sewage generation of weekend days (02 days i.e., Saturday and Sunday) was more as compared to weekdays (05 days Monday to Friday) in the months of July, August, September, and November 2022. The quantity of sewage generation during the weekday was 16478, 16602, 16478 and 16125 KL respectively. However, considering the comparisons among the

weekend days sewage generation quantity it was observed that quite high in months of July, August, September and November 2022 is the values are 6374, 5909, 5857 and 5583 KL respectively. This reading of sewage generation indicated that high load sewage in weekend days on STP, which need to be more focused on smoothly operation of STP due to increasing in hydraulic load and subsequently pollution potential load [19].

**Average Sewage Flow on Weekdays V/S Week End Days**



**Figure 2: Average Sewage Flow on Weekdays v/s Weekend Days**

The data regarding sewage generation from Amanora Park Township was collected from the month of March 2022 to November 2022 period. The daily sewage generation readings were measured with the help of digital flow meters installed at STP inlet and outlet. Figure 2 shows that sewage generation on weekdays verses weekend days which depicted that the weekdays sewage generation was minimum as compared to weekend days. This happens because of the increasing floating population in Amanora Park Township mall people/citizens used to

visit in weekend days. Which results in maximum hydraulic load/ sewage generation. Which need to be more focused on smoothly operation of STP due to increasing in hydraulic load and subsequently pollution potential load.

Table 1: Average Weekend v/s Weekdays Raw Sewage Parameters

Sr. No.	Parameter	Unit	March 2022		April 2022		May 2022	
			Week days	Weekend Days	Week days	Weekend Days	Week days	Weekend Days
01	pH	--	7.5	7.64	7.12	7.03	7.25	7.11
02	COD	mg/L	240	260	220	240	220	200
03	BOD	mg/L	116	125	118	110	100	96

Sr. No.	Parameter	Unit	June 2022		July 2022		August 2022	
			Week days	Weekend Days	Week days	Weekend Days	Week days	Weekend Days
01	pH	--	7.26	7.25	7.41	7.48	7.32	7.37
02	COD	mg/L	260	240	200	180	240	200
03	BOD	mg/L	136	124	98	82	112	102

Sr. No.	Parameter	Unit	September 2022		October 2022		November 2022	
			Week days	Weekend Days	Week days	Weekend Days	Week days	Weekend Days
01	pH	--	7.31	7.38	7.32	7.26	7.34	7.46
02	COD	mg/L	240	260	180	200	220	240
03	BOD	mg/L	124	132	86	100	110	120

Due to high load of sewage generation during in weekend days which affected on effluent parameters such as pH, BOD and COD. In weekend days the COD and BOD of treated effluent were slightly at higher level

compared COD and BOD values of other days which need to be more focused on smoothly operation of STP due to increasing in hydraulic load and subsequent pollution potential load.

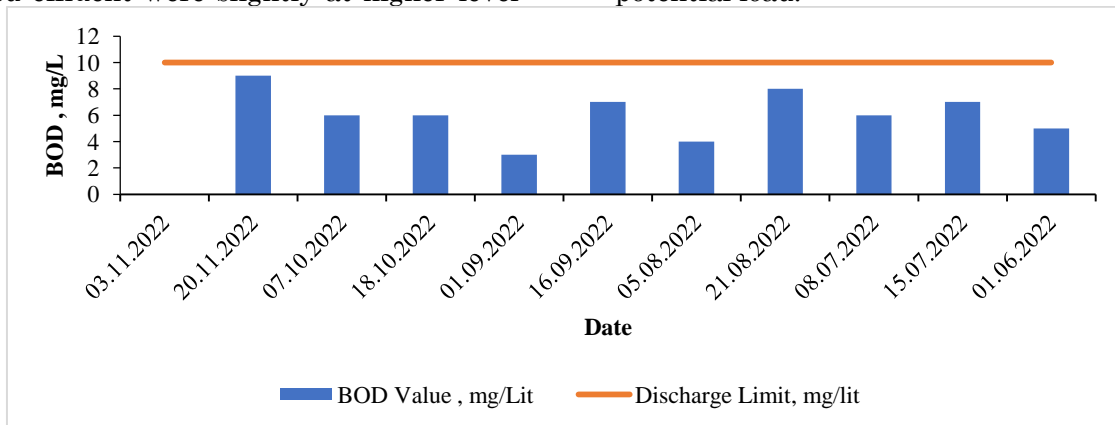


Figure 3: Treated Sewage BOD Value Against Discharge Norms

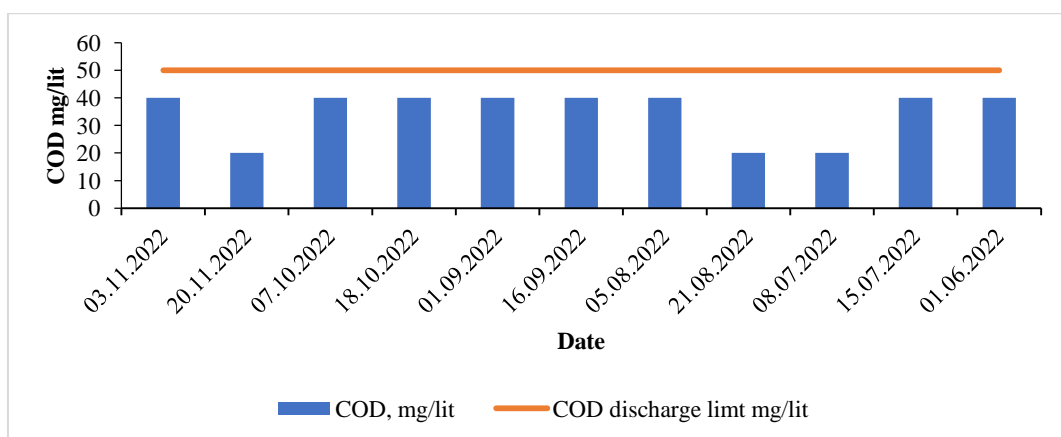


Figure 4: Treated Sewage COD Value Against Discharge Norms

Figure 3 shows BOD values of treated sewage effluent. There is no major deviation observed in the BOD values. However, the COD values of weekend days are at higher level as compared to COD values of other days (Figure 4) which need to be more focused on smoothly operation of STP due to increasing in hydraulic load and subsequently pollution potential load.

#### Summary and Conclusion

There is much variation in average sewage flow on weekdays v/s weekend days. Average COD/BOD values of weekend days are sometimes higher than the COD/BOD values on weekdays. The STP is giving constant output in terms of pH, COD & BOD values irrespective of variation in flow and pollution load on weekdays as well as weekend days. Treated sewage is meeting the general discharge norms laid down by Maharashtra Pollution Control Board (MPCB) as well as Central Pollution Control Board (CPCB).

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