Exploring the Benefits of Using Treated Water for Maintenance and Services in an Industrial Research and Development Center

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ABSTRACT

Water scarcity is one of the major problems in the world and millions of people have no access to freshwater. Untreated wastewater is widely used for agriculture in many countries. This is one of the world-leading serious environmental and public health concerns. Instead of using untreated wastewater, treated wastewater has been found more applicable and ecofriendly option. Moreover, environmental toxicity due to solid waste exposures is also one of the leading health concerns. Therefore, intending to combat the problems associated with the use of untreated wastewater, we propose in this review a multidisciplinary approach to handle wastewater as a potential resource for use in agriculture. We propose a model showing the efficient methods for wastewater treatment and the utilization of solid wastes in fertilizers. The study also points out the associated health concern for farmers, who are working in wastewater-irrigated fields along with the harmful effects of untreated wastewater. The consumption of crop irrigated by wastewater has leading health implications also discussed in this review paper. This review further reveals that our current understanding of the wastewater treatment and use in agriculture with addressing advancements in treatment methods has great future possibilities

Keyword: - *STP, WTP, FL, TREE REPLANTATION….*

1. STP

Sewage is a water-carried waste, in solution or suspension that is intended to be removed from a community. Also known as domestic or municipal wastewater, it is characterized by volume or rate of flow, physical condition, chemical and toxic constituents, and its bacteriologic status (which organisms it contains and in what quantities)[1,2]. It consists mostly of grey water (from sinks, tubs, showers, dishwashers, and clothes washers), black water (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), where sewer line and gray water line is not provided separately. It also contains surface runoff depends on the design of sewer system.

1.1 SEWAGE TREATMENT PLANT-MBR

The STP proposed for this facility is a modular MBR Type wastewater treatment plant designed and developed for treatment as well as reclamation and reuse of treated sewage for non-potable purposes [3]. The system uses the most advanced and efficient technology of MBR combining activated sludge process treatment with submerged membrane filtration. The membranes with a pore size of around 0.1 – 0.06 micron separate all the solids in the process giving away the solids free clear water. This system is the most compact one among all other systems eliminating the secondary treatment of clarification and tertiary treatment of Pressure Sand Filtration and Activated Carbon Filtration [4].

In the MBR type sewage treatment system, the activated sludge formed in the bioreactor is at remarkably high levels of MLSS. The excess sludge to be removed is more concentrated thus lowering the disposal cost. The MBR Type system proposed is a simple and reliable system, tolerant to organic and hydraulic fluctuations producing steady high quality with minimal technician attendance.

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1.2 STP TREATMENT PROCESS

The sewage generated from the facility will be passed through a screen chamber provided with a set of coarse screen and bar screen for separation of solids.

The sewage free from the large solids will be treated for removal of oil and grease in a tank. The oil and grease being lighter will float on the surface of the tank from there it can be skimmed manually.

The sewage free from oil and grease will be collected in a tank which will be termed as Equalization tank for holding and homogenizing the sewage.

The membrane bio reactor unit consists of anoxic and aeration tank. The screened sewage from equalization tank is pumped to anoxic tank for removal of nitrogenous compounds contributing to the Total Nitrogen

The sewage from the anoxic tank enters the aerobic tank for removal of carbonaceous compounds contributing to BOD & COD. The membrane modules are immersed inside the aerobic tanks where organic contents in the sewage will be biologically degraded by activated sludge[5].

The MLSS (Mixed Liquor Suspended Solid) concentration in the MBR system is higher as compared to conventional activated sludge systems, thus the retention time required will be much less than the conventional system. Through recirculation of MLSS from aerobic tank to anoxic tank, nitrate content is removed.

The membranes also separate suspended solids from liquid through the filtration process. As the pore size of the membrane is ≤ 0.1 μn, not only suspended solids but also the bacteria such as coliform bacteria are also removed. The excess sludge drained will be collected in the sludge holding tank from where it will be carried out to sludge dewatering system

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2. MBR

We have considered the MBR (Membrane – Bio Reactor) Type Sewage Treatment Plant for the proposed Philips R & D facility.

The Water Calculation put forth in the document is worked on the basis of NBC 2016 recommendations and on the basis of which the STP capacity is derived [6].

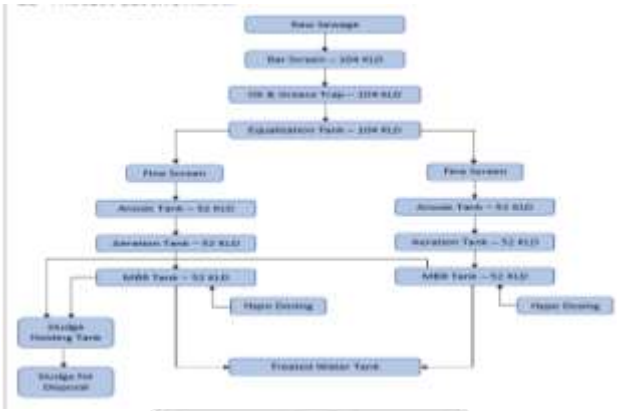

Fig -1: Process Block Diagram

DESIGN CONSIDERATIONS

The sewage treatment system will be designed with following consideration of parameters pertaining to the wastewater generated from the facility.

Table -1: Water Quality Parameters

Parameter	Units	STP Inlet	STP Outlet
pH	-	6.0 – 8.5	6.0 – 7.5
BOD5 @ 20°C	mg / Ltr	350	≤ 5
COD	mg / Ltr	700	≤ 30
TSS	mg / Ltr	200	≤ 5
O & G	mg / Ltr	50	BDL
Turbidity	NTU	-	≤ 1
Total Nitrogen	mg / Ltr	40	≤ 10
Ammonical Nitrogen	mg / Ltr	35	≤ 5
Total Phosphates	mg / Ltr	8	≤ 2
E-Coli	100 MPN / 100 ml	-	BDL

Design Flow considerations: -

Flow	104 m3 / Day.
Operating Hours	24 Hrs.
Average Flow	4.33 m3 / Hr.
Peak Factor	3.0
Peak Flow	12.99 m3 / Hr.
Peak Duration	5 Hrs.

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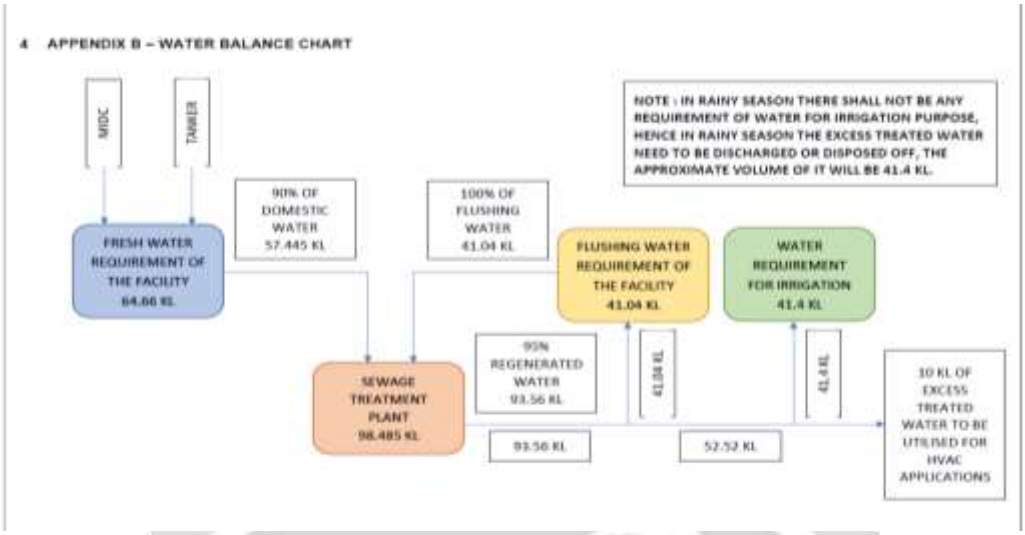

Fig -2: Water Balance Chart

4. CONCLUSIONS

1. Treated water is used for tree plantation and land scaping purposes ,it can considerably prove beneficial to plant health and soil quality .
2.Study on flood situation on site, get maximum discharge natural water at PCMC strom water line.
3.Maximum benefit to client saving cost in water for Tree plantation.
4.Target achievable point for Leed Platinum Certificate.

5. ACKNOWLEDGEMENT

The authors can acknowledge any person/authorities in this section**. This is not mandatory.**

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