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ASSESSMENT OF PREVAILING WATER SOURCING, SUPPLY, DISTRIBUTION AND SANITATION MEASURES IN A TYPICAL HOUSING PROJECT – A CASE STUDY

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Abstract

Our Country’s economy is fast growing, and so is the problem of sanitation. Once the water is consumed, it reappears as wastewater causing pollution problems. Ever since the Water (Prevention & Control of Pollution) Act, 1974 promulgated, many industries have achieved remarkable progress in mitigating pollution and responding to “Reuse & Recycle” measures. However, the problem of municipal & township sewage is an unsolved issue even today. The Ministry of Environment & Forests and Ministry of Urban Development consider that this problem could be tackled, if a decentralized approach is effectively introduced for various infrastructure projects at the project stage itself. As a result of this, the recent notification seeking EIA formalities for a project discharging 50000 litres/day and above or Population Equivalent 1000 and above or a Project value Rs 50 Crore and above require a “Think Differently” approach. It will be wiser to tackle the sanitation problems through a three pronged strategy, viz a) On-site plant implementation b) Zonal plant implementation and c) Terminal STP implementation. The affordable group for “ON-SITE” sanitation improvement will include a host of players like Star hotels, builders, institutions, IT parks, theme parks, caterers, industrial estates, commercial complexes, resorts, hospitals, etc. Hence as part of the developmental process, these players are requested to tackle the wastewater problem proactively. In this article, an attempt has been made to present an actual case study, of how beneficial it is for a builder to incorporate on-site sewage reclamation at the project stage itself and “set a trend” for effective water management and sanitation improvement in one go. The financial implication to the “users” is also highlighted.

1.0 BACKGROUND

Water is becoming a scarce resource and the available quality is also getting deteriorating day-by-day. The Government on its part has visualized the seriousness of this matter and promulgated notifications to Building community to adopt:

- Water Conservation through grey water (Bathing, Kitchen and Laundry wastewater) treatment cum recycling for toilet flushing
- RWH, including aquifer recharge

The above notification is applicable throughout Tamilnadu vide Gazette No 672 dated October 11, 2002. Implementation of such scheme is possible only if the Builders are able to integrate:

- a) Segregation of grey water by changing the plumbing works
- b) On-site STP with dedicated Overhead Tanks (OHT) for its reuse to Toilet flushing and
- c) Adopt Rainwater Harvesting (RWH) and aquifer recharge with excess available treated wastewater.

This assessment report is prepared based on prevailing water management situation in an on-going Housing Project in Chennai. This information should assist all stakeholders to have better understanding on Water Management.

2.0 BRIEF ABOUT THE PROJECT

The Housing project is in three Phases; Phase-I with 104 Flats; Phase-II with 179 Flats and Phase-III with 88 Flats, thus making a total number of Flats of 371 or 3,48,000 Square Feet of Plinth Area.

The soil strata at this area is rocky beyond a depth of 18 feet and water is available even at a depth of 2 to 3 feet, but not fit for any domestic use (TDS is beyond 25000 mg/l).

2.1 WATER SOURCING

Though Bore Wells were sunk, its usage for domestic purpose is totally futile. There is a plan to tap water supply from an existing Pond/Lake at the back of the Complex through local Panchayat's approval. On this premises, a 3 Lakh capacity ESR has been already built. It is expected that the quality of the water will not be fit for direct use due to commercial & Industrial activities around the pond. Hence an on-site Water Treatment (conventional WTP or Filtration and disinfection, as per quality) will be required, if supply is secured. Neither the ground is potable nor the pond supply is secured. Thus currently water is being supplied by engaging Water Tankers. The TDS in such purchased water is beyond 850 mg/l.

2.2 STORAGE AND DISTRIBUTION

Each block has an underground sump and OHT (with partition for 15000 and 5000 litre capacity). About 12 Tankers of water per day is currently supplied catering to 251 Flats. This is equivalent to 575 Litres/Flat/day or a Per capita Supply of 115 to 150 LPCD or an average of 135 LPCD.

To meet the Drinking water requirement alone, an on-site RO system has been installed to treat the purchased water, with an operating capacity of 3000 l/hr (reported to operate for 3 hours a day). The residents are required to collect the drinking water at Ground Floor level and no distribution is effected. The intention of the RO Plant seems to lure the prospective House Buyers, rather than to provide “Good Water Supply for all domestic needs”

However the other requirements of water is met through the individual sump, transfer pump and OHT networks.

2.3 WASTEWATER COLLECTION AND DISPOSAL

There is no segregation of grey water and fecal matter for the entire Housing complex. However, the combined wastewater is reported to be treated in two different Sewage Treatment Plant system (STP-1 catering to four blocks A to D and STP-2 catering to remaining other blocks) and disposed off in to adjoining Nullah.

The installed STP system is a conventional one, requiring continuous presence of man power and maintenance. It will also consume huge energy and spare parts, if put in to sustainable operation. The presence of “Algae” growth in aeration tank of STP is an indication that the installed system is not put in to operation for the intended objective. In Financial Parlance, one can say that NPA (Non Performing Asset) has been created.

3.0 RECOMMENDATIONS FOR EFFECTIVE WATER MANAGEMENT

- 3.1 The total water requirement for the fully developed & occupied complex will be 2,75,000 Litres/day, equivalent to 23 Tankers. At present, the water is being purchased at the rate of Rs 400/Tanker, which is equivalent to a monthly expense of Rs 750/Flat. This does not include other expenses like RO treatment and other energy bills. If Panchayat water supply is secured, then supply norms will prevail for the pricing of water for domestic consumption at Rs 2 to 4.5/KL (equivalent to Rs 100/Flat/Month), depending on the location. However, availability of this water is highly questionable and its allocation will be on priority basis.
- 3.2 The area available for landscaping is restricted to play ground area of 26,500 Sqft and lawn area of about 7000 Sqft. A maximum water requirement for landscaping is around 6000 litres/day only. The water requirement for pavement washing and for Car/Scooter washing will be about 5000 litres/day. This water can be met from a well operated “STP system delivering recycle grade water”.

- 3.3 If Notification is strictly followed, then the toilet flushing water can be met from “STP system delivering recycle grade water”. However the Builder has to incorporate dedicated plumbing works for effective segregation of grey & fecal wastewater. For a fully developed & occupied complex, the toilet flushing water requirement alone is about 1 Lakh Litre/day, equivalent to 8 to 9 Tankers.
- 3.4 Thus promotion of 3.2 & 3.3 will conserve a total fresh water requirement of 1,11,000 litres/day, equivalent to 9 Tankers saving Rs 290/Flat/Month
- 3.5 The prevailing STP will incur an O & M cost of Rs 12 to 15/KL or equivalent to Rs 330/Flat/Month, if operated effectively and regularly. Once it is operated regularly, there will be Noise nuisance, besides very high O & M cost.
- 3.6 Thus it is prudent to contemplate a state-of-art Technology for meeting “Recycle Grade Water”. At the moment, the ownership role among various stakeholders is missing to secure appropriateness & right kind of “On-Site Reclamation” system.
- 3.7 It is in this respect, many Developed Nations have resorted to Pre-Engineered Package Treatment concept to promote on-site sanitation and reuse & recycle measures. Amongst them, Japan has master minded in standardising and enforcing the right kind of technology for “House Hold Applications”. Rotating Biological Contactor (RBC) is one such Technology that has high degree of acceptance. This technology will have a capital Cost of Rs 15000 to 20000/Flat and incurring O & M cost of Rs 25 to 30/Flat/Month only.
- 3.8 For this particular project location, the following are the potential possibilities:
- If 3 Lakh Litre OHT cannot be made use of for receiving Panchayat water supply, then it can be used for holding & distributing treated water to Toilet flushing, Car washing, pavement washing, landscaping, etc
 - If Tanker supply is only feasible, then the number of Tankers could be reduced from 23 to 14 per day.
 - If water supply from Panchayat source is feasible, even then the demand can be reduced from 275 cum/day to 165 cum/day. In such case, a dedicated treated water OHT has to be constructed for its subsequent distribution. The water cost to local Panchayat can be reduced from Rs 100 to Rs 60/Flat/Month

An actual site assessment of this nature is expected to generate “WATER MANAGEMENT AWARENESS” among Builders, House Owners and Service Providers (like Architects, Municipal/Local Bodies, Plumbers etc). For instance, the

water supply situation in this project site is in total Chaos and the “Users” will have day-to-day problem in getting water and incur high “Water Cost”, if TWH (Treated Water Harvesting) is not practiced. Due to high water table and rocky structure in the sub-soil strata, RWH (Rain Water Harvesting) is not feasible.

Though the Gazette notification advocates the need to practice TWH & RWH, the Builders are ignorant in its familiarity. The Ultimate Users must be sensitive enough to secure both RWH and TWH to manage the water effectively (Refer Box and Figures for information clarity)

WATER HARVESTING WHAT IS BEST SUITED FOR URBAN WATER MANAGEMENT RWH OR TWH?

There is too much publicity and sensational news about “Rain Water Harvesting”, so much so there is a flourishing growth of “Rain Centers” across the City. The original intention of this concept was to popularize aquifer recharge and expand Catchment areas for harvesting Rain Water.

Though RWH is a good concept for protecting “Ground Water Resources”, as it fits aptly for improving the catchments area, but cannot be visualized as a solution for Urban Water Management!!

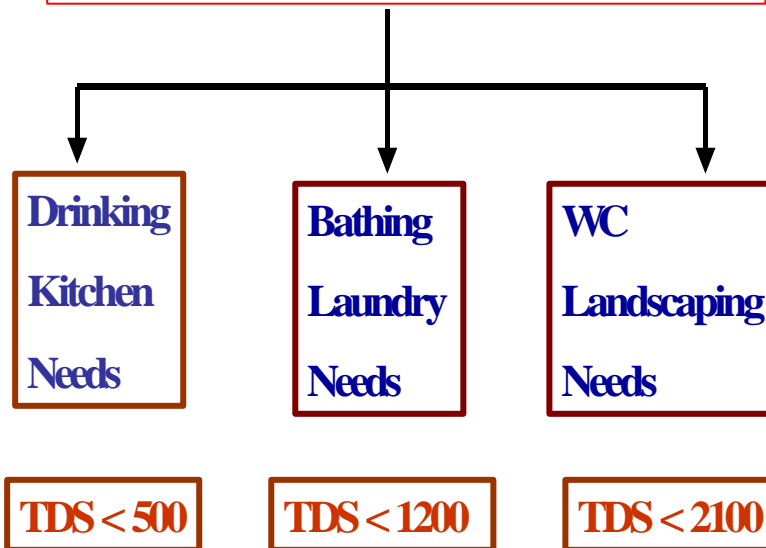
RWH can answer only part requirements of the "Total Water Demand", that too if open area availability is adequate, whereas if one integrates on-site sanitation improvement with the Treated Water Harvesting (TWH) concept, it will answer to both water demand as well as sanitation improvement. If one looks at the quantum of water consumed and wasted in any Urban conglomerations, people will not talk about RWH but give more stress to TWH.

RWH can be practiced only if it rains, whereas "Treated Water Harvesting (TWH)" can be practiced everyday. RWH does not answer to sanitation improvement, whereas TWH does it in full spirit. TWH can promote optimum utilisation of water resources, integrating conservation and Hygienic aspects.

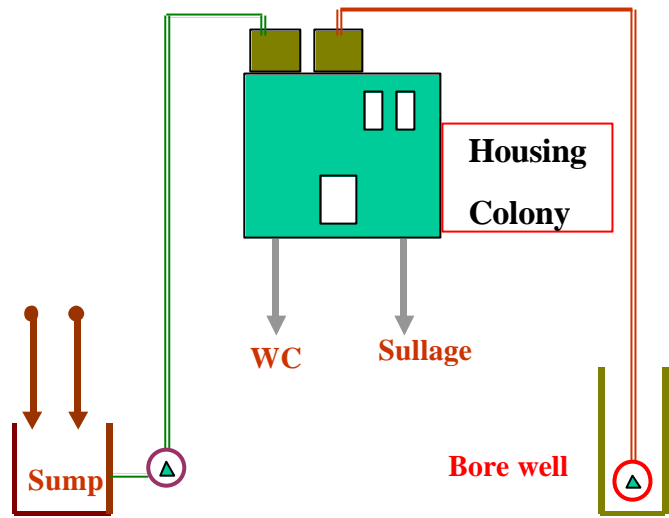
It has become a fashion to talk and write about RWH, but its success rate has not been thoroughly evaluated, particularly in the Urban context. It is time that experts & Policy Bodies give more focus on TWH rather than RWH. Sanitation is an ignored field in the arena of "Total Water Management". RWH can promote alternate water resource creation avenue, whereas TWH can promote both water conservation and wastewater treatment for long term sustainability.

If the “Building Community” is enlightened on the need for TWH. the service provider

House Hold Water Supply



PRESENT WATER MANAGEMENT SYSTEM



ENVISAGED NEW WATER MANAGEMENT

