Journal for Research in Applied Sciences and Biotechnology

www.jrasb.com

ISSN: 2583-4053

Volume-3 Issue-2 || April 2024 || PP. 162-164

https://doi.org/10.55544/jrasb.3.2.29

Planning a Sewage Treatment System for Smart Housing Societies: A Review

Priyabrata Sahu

M.Tech. Student, Department of Civil Engineering (Urban and Town Planning), Sri Rawatpura Sharkar University, Raipur, CG, INDIA.

Corresponding Author: priyan223@gmail.com

www.jrasb.com || Vol. 3 No. 2 (2024): April Issue

Received: 18-04-2024	**Revised:** 23-04-2024	**Accepted:** 06-05-2024

ABSTRACT

Smart housing societies are increasingly incorporating sustainable practices, including on-site sewage treatment. This paper reviews key considerations for planning a sewage treatment system in such communities. Factors like resident population, water usage patterns, and available space are analyzed. Different treatment technologies, including activated sludge, constructed wetlands, and membrane bioreactors, are evaluated for their suitability in smart housing contexts. The integration of smart monitoring and control systems for optimizing treatment processes and water reuse is discussed. Finally, the importance of adhering to local regulations and involving residents in the planning process is highlighted.

Keywords- Sewage treatment, Smart housing, Sustainable practices, Water reuse, On-site treatment.

I. INTRODUCTION

The growing trend of smart housing societies necessitates a focus on sustainable infrastructure development. One crucial aspect is managing wastewater effectively. Traditional approaches of relying on centralized sewage systems can be inefficient and environmentally damaging. On-site sewage treatment plants offer a viable alternative, particularly for smart housing communities. Sewage treatment systems are the backbone of sanitation in residential areas managed by housing boards. Effective planning is crucial to ensure these systems can handle the demands of growing populations while minimizing environmental impact. This review explores the planning methodologies, technologies, and regulatory frameworks used to develop sewage treatment systems within housing society's communities.

II. KEY CONSIDERATIONS

2.1 Population Estimation: Accurately estimating the resident population within the housing complex is paramount. This data forms the basis for calculating the anticipated wastewater flow and designing a system with adequate capacity [1].

2.2 Effluent Characteristics: Understanding the composition of wastewater is crucial. Factors like organic matter content, nutrient levels, and presence of industrial effluents might influence the chosen treatment technology [2].

2.3 Effluent Discharge Regulations: Local regulations regarding treated wastewater quality must be strictly adhered to. These regulations dictate the level of treatment required to ensure safe disposal into the environment [3].

2.4 Site Constraints: Available space within the housing complex is a critical factor. The chosen treatment system

Journal for Research in Applied Sciences and Biotechnology

www.jrasb.com

ISSN: 2583-4053

Volume-3 Issue-2 || April 2024 || PP. 162-164

https://doi.org/10.55544/jrasb.3.2.29

needs to fit within the designated area while considering future expansion possibilities [4].

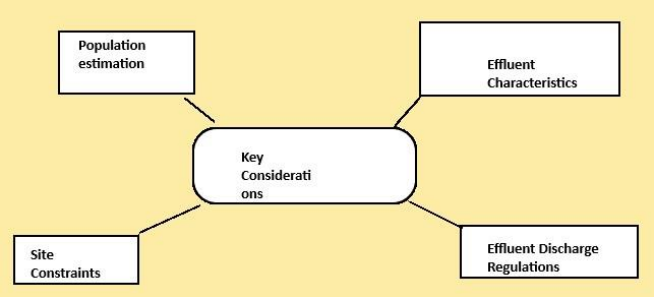

Figure 1: Key factors of consideration during planning of a sewage treatment system of smart housing societies.

III. TREATMENT TECHNOLOGIES

Several sewage treatment technologies are suitable for smart housing societies, each with its advantages and limitations:

- ***Activated Sludge Process:*** The activated sludge process is one of the most widely used biological wastewater treatment methods. It's a complex but effective system that utilizes microorganisms to break down organic matter present in sewage. This widely used biological treatment method is effective but requires skilled operation and maintenance [5].
- ***Membrane Bioreactors (MBRs):*** Membrane bioreactors (MBRs) are a promising technology for sewage treatment in smart housing societies. They combine the effectiveness of the activated sludge process with membrane filtration, offering several advantages over conventional systems. MBRs combine activated sludge with membrane filtration, producing high-quality effluent and requiring less space [5].
- ***Constructed Wetlands:*** These natural systems offer a low-maintenance and eco-friendly approach but have a larger footprint requirement [6].
- **Decentralized Wastewater Treatment Systems:** These modular systems are suitable for retrofitting existing infrastructure and treating wastewater at the source, but may require higher monitoring frequency [4].

IV. INTEGRATION OF SMART SYSTEMS

Smart housing societies can leverage technology to optimize sewage treatment:

- ***Real-time Monitoring:*** Sensors can monitor key parameters like flow rate, pH, and oxygen levels, enabling proactive adjustments to the treatment process [7].
- ***Automated Control Systems:*** Automation can regulate processes like aeration and sludge pumping, improving efficiency and reducing operational costs [8].

Figure 2: Outline diagram of sewage treatment system of smart housing societies.

Water Reuse: Treated wastewater from the on-site plant can be reused for non-potable purposes like irrigation or toilet flushing, further reducing reliance on freshwater resources [9-10].

V. RESIDENT INVOLVEMENT AND REGULATIONS

- Engaging residents in the planning process through awareness campaigns can foster a sense of ownership and ensure responsible water usage patterns.
- Adherence to local regulations regarding effluent discharge standards and obtaining necessary permits is crucial for smooth operation.

VI. CONCLUSION

Planning a sewage treatment system for smart housing societies requires careful consideration of several factors. This includes resident population, water usage, available space, and local regulations. A combination of factors like treatment technology selection, smart monitoring systems, and potential water reuse opportunities should be explored. Resident involvement and compliance with regulations are equally important for successful implementation. By adopting a strategic approach and utilizing innovative technologies, smart housing societies can contribute to a cleaner environment and efficient water resource utilization.

REFERENCES

[1] Malmqvist, P. A., Heinicke, G., Korrman, E., Stenstrom, T. A., & Svensson, G. (2006). *Strategic planning of sustainable urban water management*. IWA publishing.

[2] Dash, A. K. (2013). Characterization of domestic wastewater at Bhubaneswar, Odisha, India. *Development*, *25*, 27.

ISSN: 2583-4053

Volume-3 Issue-2 || April 2024 || PP. 162-164

https://doi.org/10.55544/jrasb.3.2.29

[3] Schellenberg, T., Subramanian, V., Ganeshan, G., Tompkins, D., & Pradeep, R. (2020). Wastewater discharge standards in the evolving context of urban sustainability–The case of India. *Frontiers in Environmental Science*, *8*, 30.

[4] Jones, A. et al. (2019). "Challenges and Opportunities in the Design and Implementation of Decentralized Sewage Treatment Systems." Water Research, 55, 225-237.

[5] Kumar, S., et al. (2016). Technological Innovations in Sewage Treatment: A Review of Recent Advances. Environmental Science & Technology, 52(10), 5678-5692.

[6] Chen, H. (2011). Surface-flow constructed treatment wetlands for pollutant removal: applications and perspectives. *Wetlands*, *31*(4), 805-814.

[7] Ramadhan, A. J., Ali, A., & Kareem, H. (2020). Smart water-quality monitoring system based on enabled real-time internet of things. *J. Eng. Sci. Technol*, *15*(6), 3514-3527.

[8] Zhang, P., Cai, Y., & Wang, J. (2018). A simulation-based real-time control system for reducing urban runoff pollution through a stormwater storage tank. *Journal of Cleaner Production*, *183*, 641-652.

[9] Galkina, E., & Vasyutina, O. (2018, June). Reuse of treated wastewater. In *IOP Conference Series: Materials Science and Engineering* (Vol. 365, No. 2, p. 022047). IOP Publishing.

[10] lbana, T. A., Bakr, N., & Elbana, M. (2019). Reuse of treated wastewater in Egypt: Challenges and opportunities. *Unconventional Water Resources and Agriculture in Egypt*, 429-453.