Decentralized Wastewater Treatment

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Promoting Watershed Health, Recycling Water Upstream, Saving Money, and Facilitating Off-Grid Homebuilding

Editor's Note: When addressing the challenge to provide abundant clean energy and water, decentralized solutions are becoming increasingly attractive. By distributing the infrastructure of everything from energy generation to wastewater treatment, you avoid the costly necessity to maintain a grid. Whether it is the electric power grid or underground pipes that deliver water and remove sewage, the more decentralized solutions there are, the more the public infrastructure can be downsized.

This decentralized wastewater treatment plant has the capacity to serve 150 households.

In this report by Tom Bartlett[i], the economic benefits of small-scale sewage treatment plants are explained. The cost per home to construct a neighborhood sewage treatment plant is about $2,500 - $3,000 and these small-scale plants will last at least 50 years, with minimal maintenance other than a weekly inspection, and sludge removal every two years. Compare this with the costs to lay "big pipe" to huge, centralized water treatment plants - an option that becomes prohibitively expensive the further a development is from an urban center.

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With respect to sewage treatment, decentralized solutions often can yield better environmental benefits as well. By treating the water upstream, neighborhood assets requiring irrigation can receive the treated discharge, which in-turn can percolate underground and help refill aquifers. Large-scale sewage treatment plants are often unable to make use of the treated water and instead of being recycled and returned to the aquifers upstream, much of it is discharged into rivers.

> *Because of recent technological advances, spanning the gamut from affordable photovoltaics to nano-tech water filtration membranes, decentralized solutions to energy and water supply are better than ever. This belies the conventional wisdom that we are entering an age of resource scarcity, as energy and water is being harvested and reused more efficiently than ever. This also changes the game of development and public infrastructure. With green cars and off-grid energy and water solutions, appropriate developments don't necessarily have to be within the footprint of existing cities, or within existing centralized public infrastructure. - Ed "Redwood" Ring*

One of the biggest challenges to implementing comprehensive land use plans is how to accommodate new development in locally designated growth areas that do not have public sewers. Many rural and suburbanized towns in the US face this question.

They want to direct growth to the most suitable areas of town - near existing services, such as fire stations and schools, for example - but have no prospect of gaining access to public sewer lines. New development must rely on soils, usually on a lot-by-lot basis, to handle wastewater. The conventional wisdom says that means low densities of development, negating the effectiveness of a growth area.

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However, towns and counties without public sewer systems have options that they may not realize.

Additionally, watersheds in the United States reflect tremendous diversity of climatic conditions, geology, soils, and other factors that influence water flow, flora and fauna. There is equally great variation in historical experience, cultural expression, institutional arrangements, laws, policies and attitudes. With regards to wastewater issues, it would be a mistake to impose a standard model from the federal level to address the needs on a local level. Correspondingly, centralized sewer systems are aging, frequently under funded with respect to replacement costs and expensive to maintain. In addition, centralized sewer strategies are increasingly challenged by environmental and social considerations such as inter-basin transfer issues, aquifer depletion, nutrient loading and urban sprawl.

Decentralized wastewater management has the potential to be the catalyst for the re-creation of our institutions, to support a new agenda, and for rapidly building a flexible infrastructure to sustain the integrity of the natural systems that are essential to a healthy economy. The new emerging civic agenda of smart growth, community preservation, open space planning, ecologically sound economic development, resource conservation, and watershed management demands that we re-think what constitutes assets and liabilities. These are economic, with a capacity of roughly 200,000 gallons per day, these off-grid plants can be constructed at a cost of well under $3,000 per home. Environmental and quality of life issues and they do not lend themselves to single purpose solutions. They require local community-based consideration within the context of flexible multipurpose planning.

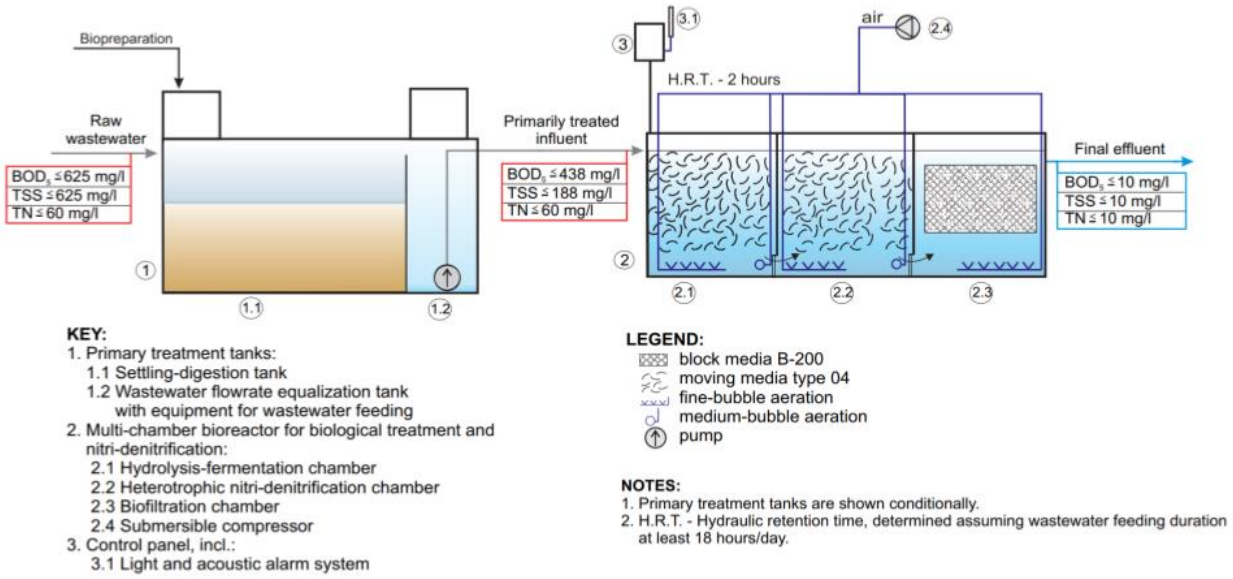

Diagram for a commercial or mixed-use system treating very contaminated influent to a high standard.

Statistics have shown us that within the U.S., 25% of existing residential real estate and 47% of new construction are served by onsite treatment systems. Many of these systems are acknowledged to be inadequate with respect to soil absorption, nutrient removal, resource protection and public health. Ironically, despite these demographics and EPA policy changes, most regulatory codes as well as most

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municipal and commercial planning continue to consider onsite systems to be temporary solutions awaiting a conventional sewer hookup.

Looking beyond the traditional assumption that wastewater is simply a matter of safe disposal and the public health; the real contemporary wastewater issues are the economic and environmental issues in which the public has a primary interest:

1 - Drinking water quality

2 - Deterioration of recreational water resources and other natural systems services

3 - Property Values

4 - Economic development in small and rural communities

5 - Urban sprawl

Decentralized wastewater management is not just about the disposal of wastewater and the public health. It has the potential to contribute to the formation of an infrastructure to sustain watershed integrity. Decentralized wastewater treatment is about the "watershed agenda" and the principles of "community preservation" and "sustainable development". When approaches to the real wastewater issues are successfully accomplished everyone benefits.

1 - Local communities win open space zoning, water quality and supply protection, increased development capacity and an expanding tax base.

2 - Natural systems are sustained through prudent zoning and reduction of non-point pollution.

3 - Developers win additional lots for development and higher margins typically associated with conservation subdivision design and municipal infrastructure.

4 - Regulation wins because it gains partners in compliance management such as the municipality and perhaps a watershed authority.

5 - Citizens and homeowners win because property values are enhanced with municipal infrastructure, water quality and supply management is improved, and economic development and quality of life issues are not restricted by infrastructure limitations.

There are no major obstacles to a decentralized infrastructure for wastewater treatment.

New technologies in a properly managed context provide the opportunity for a land-based watershed initiative that could significantly reduce small flow point source discharges such as those associated with onsite treatment systems. A decentralized wastewater management infrastructure should include:

1 - Clustered, performance-based, decentralized wastewater management systems

2 - Industrial & commercial pretreatment prior to discharge to existing sewage treatment systems

3 - Wastewater reuse systems

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Estimates suggest that this infrastructure is achievable with technologies that require 50% to 70% less space with corresponding reductions in cost of 40% to 50%. For citizens in small and rural communities these reductions represent opportunities to preserve water quality, to stimulate economic development and job formation and to restore property values. Essentially, we are shifting from large sewage collection systems and centralized treatment plants to small and decentralized management systems. Keep in mind also that this is not an alternative to centralized sewer. Rather, it is a complimentary adjunct to the existing infrastructure.

Moreover, the decentralized solution is coming from local community and watershed needs. It is not coming from the bureaucracy. It is essentially good old bottoms up American pragmatism. It is important, therefore, that community people remain committed to the decentralized approach. We must find a suitable mechanism to accelerate the progress to support watershed management. If we cannot find such a mechanism, we run the risk of letting the limited existing strategies (centralized and onsite) dominate the next 20-to-30-year cycle.

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[i] Tom Bartlett is the CEO of Aqua Tech Systems Inc. Founded in 1999, Aqua Tech Systems Inc. and its affiliates are professionals dedicated to providing wastewater solutions for the growing needs of today's communities, providing the necessary resources to allow their clients to make decisions that are economically sound, environmentally responsible, and socially equitable. Based in Arkansas and servicing clients all over North America, Aqua Tech Systems Inc. can be reached by contacting Tom Bartlett 479-530-7922 or emailed at tom.bartlett53@gmail.com