

# Onsite Wastewater Treatment Systems: A Technical Review

## Reasons to Treat Wastewater Onsite

### Utilities:

- **Demand reduction** through non-potable reuse and discharge avoidance.
- **Peak condition mitigation** through dispersed storage capacity.
- **Deferred costs and expenses** of expanding infrastructure to meet demand.

### Owners:

- **Capital cost and expense reduction** from limited use of municipal treatment services.
- **Receipt of grants and incentives** from government agencies.
- **Increased market value** of building stock and property value.
- **Market distinction** resulting from third party certification (LEED) and environmental press.

## Applications of Wastewater Treatment

- **What water resources are available?** Rainwater, groundwater, greywater and sewage are all resources that can be treated and reused.
- **What is the destination of effluent?** Treated effluent can be reused for non-potable water, support local habitat, recharge groundwater, or be discharged.
- **What are the opportunities to reuse water?** Sewage conveyance, irrigation, laundry, HVAC makeup, fire suppression, and process water.

## Function of Wastewater Treatment Systems

- **Preliminary treatment components:** removal of bulk constituents from the waste stream.
- **Primary treatment components:** flow equalization and initial settling of suspended solids.
- **Secondary treatment components:** processes of biological treatment and secondary settlement and removal of particulates.
- **Tertiary treatment components:** final treatment of effluent before it is reused.

## Operation & Maintenance

- **Operations Labor:** Visual inspection (daily), water sampling (daily), component cleaning (semi-annually), system adjustment (variable), and response to alarms (variable).
- **System Operation Expenses:** Energy required to run pumps, treatment, disinfection, and monitoring equipment.
- **Equipment Replacement:** Cost of replacing filters/membranes (15+ years) and mechanical components (20+ years).
- **Waste Removal:** Cost to dispose of or discharge constituents (biosolids, oils, and grease) and sludge.

## Public Agency Concerns

- **Design for System Redundancy:** Design of systems with multiple means to prevent failure.
- **Long-term Ownership and Maintenance:** Owners have long term responsibility for the maintenance of system.
- **Compliance with Future Regulation:** System can meet or exceed water quality standards.

## Affects to Infrastructure Development

- Onsite treatment has potential to reduce water consumption in modern buildings 48-95% and reduce the discharge of wastewater by 60-95%.
- Onsite treatment scales more directly with demand, which reduces investment risk.

## Leveraging Costs and Benefits

Capitol costs, expenses, and revenue are transferred from the utility to the owner. The balance of these factors should be studied in depth when developing an incentive structure.

## Financial Support

- **Incentives** – reduced permitting costs, connection fees, utility fees, indirect expenses.
- **Grants** – funding given to projects that align to water resource initiatives.
- **Loans** – borrowed funds to offset capital costs.