Reduction of Wastewater Effluent from On-Site Sewage Facilities (E-FLOW)

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Summary

This research effort addresses one of four eligible projects listed in TCEQ Solicitation 582-21-10767, **RT-2.3.4**, states research is needed to identify technologies and applications that can be:

1. Utilized to eliminate liquid water discharge from on-site sewage facilities; and
2. Coupled with on-site sewage facilities to utilize roof and/or wall space for disposal area.

Under current 285 rules specifications for the design requirements, availability of *adequate and suitable disposal area* will continue to be a challenge for properties served by OSSFs. Residential and commercial properties are constantly faced with choosing between on-site disposal and the use/enjoyment of valuable real estate. In the realm of OSSFs, several aerobic treatment technologies are available to the public, however, adequate, and suitable effluent disposal area is proving to be less than available. The goal of this project is to develop design solutions for alternate disposal areas using Enhanced Vapor Effluent Discharge (EVED) techniques to reduce effluent volume through increased atmospheric discharge. While the results may not reduce costs associated with OSSFs, they will offer the option to trade-off use of valuable real estate space for a disposal system that offers other beneficial usage. EVED technologies, if proven reliable, may offer OSSF solutions for properties that are not currently suitable for development, especially those limited by space (i.e., available land area) through improved OSSF efficiency.

Goals

1. Compare the amount of liquid discharge (i.e., effluent) generated by two experimental wetland cells, one standard and one equipped with an EVED system (i.e., forced-air greenhouse).
2. Collect performance information on exiting green-infrastructure buildings designed to reuse treated wastewater for irrigation on roof top and/or green wall spaces.
3. Prepare final reports describing design parameters and feasibility of the experimental EVED disposal system and current operational experience of green-infrastructure buildings.

Objectives

1. Configure two experimental wetland cells and ATU pump tanks at the AgriLife OSSF center.
2. Install an EVED disposal system one of two experimental wetland cells.
3. Foster research synergism between the TOGP E-Flow and Drip projects by leveraging resources (i.e., dose wetland cells with ATU effluent using drip lines used for the Drip project).
4. Design, measure, and document wetland cell effluent
5. Develop a model describing wetland effluent discharge to examine reductions attributable to EVED system using wetland sizing criteria from 285 rules.
6. Prepare detailed and summary reports along with PowerPoint presentation for submittal.

Research Questions

Q1: What effect does an EVED installed on a wetland cell have upon effluent reduction?
Q2: What is the operating experience of existing green-infrastructure buildings using green-roofs and onsite wastewater systems, in terms of reductions in liquid effluent discharge?
Q3: What modifications, if any, are needed in 285 regulations to allow use of EVED technologies, such as a forced-air greenhouse?

Deliverables

1. Two experiment wetland cells, complete with vegetation and influent sewage connections.
2. An affordable, experimental EVED (i.e., climate controlled, forced-air greenhouse) system for comparing effluent flow differences between experimental wetland cells.
3. Flow measurement devices to measure the influent and effluent flow rate, as average gallons per day, on a monthly basis, for two experimental wetland cells.
4. A water-balance model describing liquid discharge reduction efficiencies for experimental wetland cells and determining EVED technology effect.
5. Quarterly progress and budgetary reports.
6. Final report describing all results and findings.