

Aiken Storm Water Flush

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An important aspect of the Rubenstein School's Net Zero Energy plan is using potable water as sustainably as possible. As part of the Net Zero Water work, this group is advancing the use of stormwater to flush toilets in the Aiken Center. Previous groups estimated that we can save up to 50% of the total potable water use if we can use non-potable stormwater to flush toilets.

Introduction

We are working on finishing up the project that has been spearheaded by groups in previous years. Our ultimate goal is to use the already-established plumbing in the Aiken Center to take stormwater from the green roof and use it to flush toilets in the building instead of the outside-sourced fresh water that is used now. By doing this, we will greatly reduce the need for clean water and only use it in settings like sinks, water refill stations, and labs.

Our group work fits into the Rubenstein School of Environment and Natural Resources' (RSEN) sustainability and Net Zero Energy Plan by eliminating a source of energy use in the building and, instead, finding a way to recycle energy through collecting gray water and repurposing it to flush toilets. This project works towards the goal to offset Aiken's use of energy and become completely reliant on itself to produce energy.

We hope that this project will save energy by bypassing the need to pump fresh water to toilets. Rather, we would use existing gray water from the Aiken green roof to reduce our footprint. At the moment, we are not sure how much energy (if any) will be saved, as we will still need to pump the stormwater into

the toilets. The potential for saving energy would be a reduction in the amount of potable water needing to be pumped into Aiken.

Our primary goal is to divert stormwater from the green roof and use it to flush toilets throughout the Aiken Center. To accomplish this, we need to first determine the amount of water that is used annually to flush toilets by tracking the amount of times bathroom doors are opened with counters. Once that data is recorded, we can compare it with last year's data and present it to an engineer to understand the viability of the transition.

Current Work

Now that we have re-adjusted the door sensors, we can start collecting data for the spring semester. Since it will take time to collect rainwater and toilet flushing data for the spring, we will be looking at data from spring 2022 to compare with the data we collect for this semester.

Our first task is to check out the water collection tank in the basement of the Aiken Center that will hold the gray water coming from the green roof. So far, we have learned about the different components that make up this process of using gray water. It begins at the green roof where the water is collected through the eight different watersheds, then drains into the building where it flows through the tipping buckets on the third floor of the Aiken Center. Next, it moves to the basement where a container stores the collected water. Finally, this enables the water to be used in the plumbing system. The water is then filtered and exposed to UV light before it goes into pressure tanks before entering the gray water plumbing system. Finally, the water is moved through the gray water plumbing system and used to flush toilets.

It is difficult to find an accurate method of collecting data on the amount of times the toilets flush that is both financially reasonable and physically reliable. So, for the coming weeks we will be collecting door sensor data and working with the green roof team to determine the amount of storm water coming through the green roof. While collecting the data, we will also be working with an engineer to figure out how to best divert the gray water into the collection tank. Currently the gray water collection tank holds approximately 800 gallons which will hopefully be enough, but there is a chance another tank is needed.

When our group work is done, we hope to have a greater understanding of gray water use in a real setting, not just in a theoretical sense. And we hope to have a better understanding of the difference in energy consumption and the sustainable positives of using gray water instead of clean water. We also hope to learn the results of an engineering study that will provide an estimate of the cost to divert stormwater from the Aiken Center green roof into the gray water plumbing system and ultimately to use gray water to flush toilets.