

Putting Recycled Water to Work in Maryland Agriculture

A Public-Private Partnership for Agricultural Water Reuse

"It's just good, clean water."

-Franklin Dill, Piccadilly Farm



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Though farming practices are constantly advancing, crop production in many places is still largely reliant on weather, particularly rain. Given the unpredictable nature of rainfall, some farmers install irrigation systems to have more control over how much water goes on their fields. One possible water source for farm irrigation systems is recycled water – highly treated municipal wastewater. Twenty-nine percent of recycled water in the United States is already used for agricultural irrigation, including in Maryland (1).

Municipal wastewater treatment plants often discharge or send the treated water back into nearby bodies of water like streams, rivers, and oceans. Wastewater treatment plants are interested in reusing recycled water to meet regulations on how and where their effluent is discharged.

Wastewater managers in Kent County, Maryland realized that recycled water offers a reliable, cost-effective, and highly regulated water source for farmers. Sending recycled water to a

reuse site has many benefits for both wastewater treatment plants and farmers.

The Kent County wastewater managers began searching for a farmer interested in spraying effluent water onto crop fields. However, finding a farmer to partner with was difficult. Farmers were concerned about using treated wastewater, particularly over whether it was safe enough for their crops.

Franklin Dill and his family had been operating their farm, Piccadilly Farm, since the 1970's. Dill had lived through lean years where yields were low because of drought and had been looking for ways to increase the amount of water on his farm. On-farm creeks were not able to supply enough water, and he knew that “water is the key to growing crops” (F. Dill, interview, October 2018).

After learning more about the advanced water treatment processes at the wastewater treatment plant, including visits to the plant and



Figure 1. A field on Piccadilly Farm that is irrigated with recycled water.

reviewing water quality information, Dill was convinced the water was suitable for his corn and soybean operation. After working through the permitting process and construction of pipes and irrigation infrastructure, the effluent was delivered to Dill's fields, providing his crops with much-needed water (Figure 1).

This report details how an innovative partnership led to the creation of a dynamic, mutually beneficial water reuse system, with important implications for the environment and the future of food production.

Wastewater Treatment Plant Must Secure a Permit from Maryland Department of Environment to Discharge Effluent Water to Farms

Greg Swartz acting division chief of the Kent County Department of Water and Wastewater, likes to say that his work in wastewater management has the ultimate job security; as long as people flush toilets, he'll have work to do (G. Swartz, interview, July 2018). Maryland Department of Environment (MDE) encouraged the county to look into discharging effluent onto a farm field during

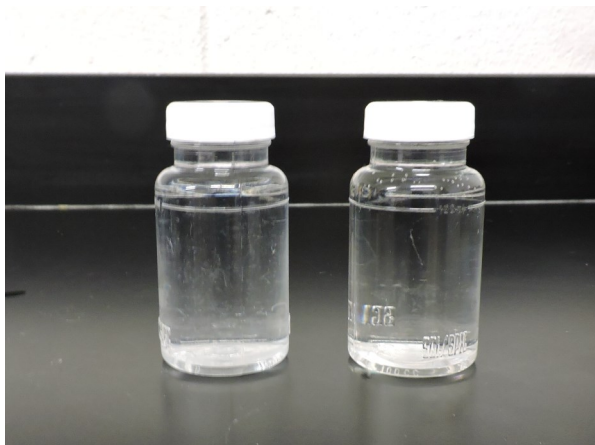


Figure 2. The effluent at Worton-Butlertown Wastewater Plant is highly treated. When the treatment process is complete, the water (L) looks the same as tap water (R), but it is not drinkable.

construction of a new wastewater treatment plant, as it would reduce the amount of water going to local waterways.

The Worton-Butlertown plant is an advanced wastewater treatment plant that uses membrane filtration and ultraviolet light to treat wastewater to a high degree (figure 2). After finding a willing partner in Dill, the wastewater treatment plant obtained a spray irrigation discharge permit, issued by MDE. The permit:

- requires detailed analyses, including soil and water testing, nutrient monitoring, and ensuring the fields would be able to absorb or uptake all the water and nutrients.
- requires detailed ongoing reports about how much effluent is discharged to the fields, when, and to which parts of the field the effluent is being sent (2).
- states exactly what the water quality must be, such as levels of turbidity, pH, and total nitrogen. The treatment plant is responsible for monitoring the water quality.

Once the permit was approved, construction on the piping and irrigation system began. In order to send out the water, the treatment plant needed to own and operate the receiving spray irrigation system. Building the irrigation system cost approximately \$3 million, on top of the \$19 million upgrade to the plant. The funds came from a combination of county, state, and grant funding. Once the system was fully built and running, the wastewater treatment plant was able to send its effluent to the fields.

Using Effluent Water for Irrigation Requires Partnership and Cooperation

The wastewater treatment plant is responsible for controlling the effluent, which means a certified operator needs to know when to send it through the system. Cory Boynton, the lead operator of the Worton-Butlertown Wastewater Treatment Plant, stays in constant communication with Dill to know when to send the water. When deciding to have the effluent on his field, Dill noted that it was important to him to have control. “I don’t have to take the water when I don’t need it. I wouldn’t do it if I didn’t have control over it.” (F. Dill, interview, July 2018). As Boynton jokes, though he controls and maintains the irrigation system, monitors the water quality, and ultimately sends the water through the system, he at least has not yet been tasked with planting the crops (C. Boynton, interview, July 2018).



Figure 3. These ears of corn were grown in two different fields in the same season. During a dry period, the ear on the left did not develop fully due to the lack of rain. The ear on the right was irrigated with recycled water so it grew despite the lack of rain.

According to Boynton, Dill “saw the future” when he partnered with the treatment plant. Due to the importance of getting water to a crop at certain phases of its growth, working with the treatment plant gives Dill more security than relying on rainfall alone.

Both Boynton and Dill emphasized the importance of open communication in the success of this process. “You have to have a two-way partnership, and I am lucky to have Cory who does an excellent job.” (F. Dill, interview, October 2018). For Boynton, this innovative system also has a personal impact. Growing up on a farm in Utah, Boynton recalls water being a problem for his family farm. As a result, he has “a compassion for [Dill]” that shapes their relationship and “makes it work for both parties” (C. Boynton, interview, October 2018).

Benefits for the Farmer Include Higher Yields

Dill has seen increased yields since having the effluent irrigation system. During a dry year, Dill recalled using 18 million gallons of water from the plant, which was most of the effluent they produced. Dill said, “I’d like to see them put some more in because we’ve got another farm up the road we could use it on!” (F. Dill, interview, October 2018). Dill noted that in years with average precipitation, the additional irrigation on the cornfields yields approximately 30 additional bushels more per acre. In dry years, Dill estimates that the irrigation leads to 100 bushels or more of corn per acre than without the irrigation system. On double-cropped soybeans in dry years, using the irrigation system leads to 11-12 additional bushels

per acre.

In addition to higher yields, another benefit to the farm operation is having a reliable, high-quality water source that is monitored by the wastewater treatment plant. With the new federal agriculture water standards of the Food Safety Modernization Act, documented water testing is becoming more important for all farmers. For Dill, there is assurance that the water coming from the Worton- Butlertown wastewater treatment plant has to meet strict standards for nitrogen, salinity, pathogens, and other parameters for water quality.

As Precipitation and Water Resources Become More Variable, Future of Maryland Agriculture Depends on Finding Forward-thinking, New Solutions

The Piccadilly Farm and Worton-Butlertown Wastewater Treatment Plant partnership is an example of a new way to think about water management in Maryland. Bringing private and public partners together has helped create a new source of water for agriculture in Kent County. This partnership has been successful because of the strong working relationship between Dill and the plant operators, especially Boynton. The relationship is mutually beneficial to the plant and the farm and provides important environmental and economic benefits to the community.

References

1. Bryk J, Prasad R, Lindley T, Davis S, Carpenete G: National Database of Water Reuse Facilities: Summary Report. Alexandria, VA: WaterReuse Foundation, 2011.
2. Maryland Department of the Environment. (2016). Guidelines for use of Class IV reclaimed water: High potential for human contact (MDE-WMA-002-07/15). Baltimore, MD.

Watch the short documentary about this partnership here:

<https://go.umd.edu/wsR>

or scan the code:



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