

# Change in Regulation Impacts Sand Filter Wastewater Systems in the Upper Falls Watershed

Julie Davidson  
December 18, 2018  
Agri-Waste Technology, Inc.

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# Abstract

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The Falls Water Supply Nutrient Strategy has created a significant change to how sand filter discharge waste systems are permitted. Interpretations of these rules create a complicated situation for homeowners with these advanced wastewater systems in the Upper Falls Watershed.

## Introduction

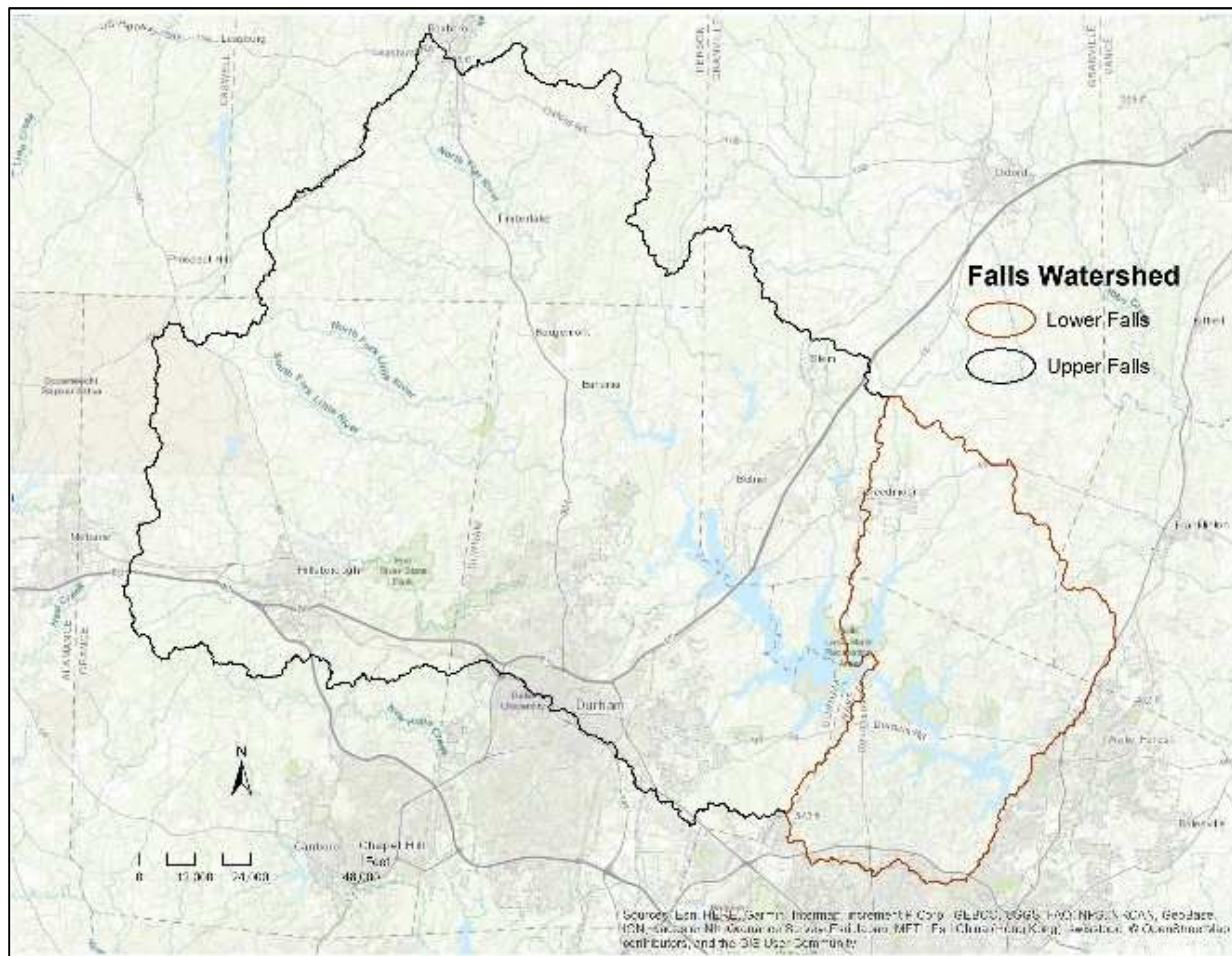
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The creation of the Falls Water Supply Nutrient Strategy has brought about complicated restrictions for discharging wastewater systems. Discharging wastewater systems typically refer to wastewater systems serving a single family residence that include a sand filter that treat the wastewater prior to the effluent being discharged to land surface or a waterway. Discharging wastewater systems are permitted through the NC Department of Environmental Quality (DWQ) and are covered by a General Discharge Permit or via an NPDES Individual Permit. One of the factors in determining the type of permit required (General Discharge vs. Individual Discharge) is the designated stream classification of the receiving stream. The receiving stream is the water course to which the discharge effluent drains, 15A NCAC 02B.0279. If the receiving stream has the designation of High Quality Water (HQW) the General Discharge Permit is not applicable and the NPDES Individual Discharge Permit is required.

When a single family residence is required to receive an NPDES Individual Discharge Permit the effluent parameters called by the Fall Lake Nutrient Strategy are restrictive compared to the General Permit. Previous interpretation of the Stream Classification allowed for General permits to be issued to systems discharging to HQW. Current permit requirements for wastewater systems discharging to HWQ require an NPDES Individual permit thereby complying with the Falls Lake Nutrient Strategy.

The Falls Water Supply Nutrient Strategy includes the Upper and Lower Falls Watershed. Figure 1 is a map of the Falls Watershed. The strategy was created to decrease nutrient amounts flowing into the drinking water supply of Falls Reservoir. 15A NCAC 02B.0275

Figure 1. Falls Watershed



Historically sand filter discharge wastewater systems were permitted and maintained by local county government. There were hundreds of these systems permitted by the county regulatory agency. Today the permitting agency is the DEQ. It is known there were hundreds of previously installed sand filter systems that have not achieved permit compliance through the DEQ. The most common scenario for a residence to begin the permitting process is when a system fails or when the existence of the sand filter system is realized through a home inspection conducted at time of sale.

The focus of this study was to determine the impact of the interpretation of the permit requirements and to compare and contrast the effluent threshold requirements for the General Permit verses the NPDES Individual Discharge Permit. Then use the results to understand how these restrictions impact home owners with sand filter discharge wastewater systems. Moreover, use GIS to locate these systems in reference to High Quality Water (HQW) in the Upper Falls Watershed.

# Methods

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## *Data*

This study began with a comprehensive list of sand filter locations developed by Durham County Environmental Health Department. Included were systems that have and have not been permitted. Open source data of the Upper Falls Watershed and Surface Water Classification was obtained from NC Department of Environmental Quality. Digital elevation model data from NC Flood Risk Information System was used.

## *GIS Analysis*

Sand filter wastewater system locations were geocoded (Durham Co.). All HQW within the Upper Falls Watershed was selected from the Surface Water Classification geodatabase. ArcHydro was used with the digital elevation model to complete a watershed delineation for the HQW. This created a HQW watershed boundary. The boundary provided important context to where sand filters wastewater systems were located in the Upper Falls Watershed. Ultimately non-permitted sand filter locations were located.

The remainder of this study was a comparison of the effluent threshold requirements for the General versus the NPDES Individual Permit for sand filter discharge systems as they pertain to the Falls Water Supply Nutrient Strategy.

# Results

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## *Nutrient Thresholds*

A comparison of the General Permit to the NPDES Individual Discharge Permit shows a significant change in effluent discharge thresholds. Table 1 shows how much these thresholds have changed. In the case of the BOD, 5-day threshold changed from 45 mg/L to 5 mg/L. The TSS parameter decreased by almost half from 45 mg/L to 20 mg/L. Additionally, Phosphorus and Ammonia parameters are required for the Individual Permit. Finally, the General Discharge Permit will not allow discharge into HQW. All of this greatly impacts the un-permitted sand filter systems inside the HQW watershed. As the new rules are interpreted, these systems will have to obtain an Individual Permit to be compliant.

Table 1. Nutrient Thresholds for Permits

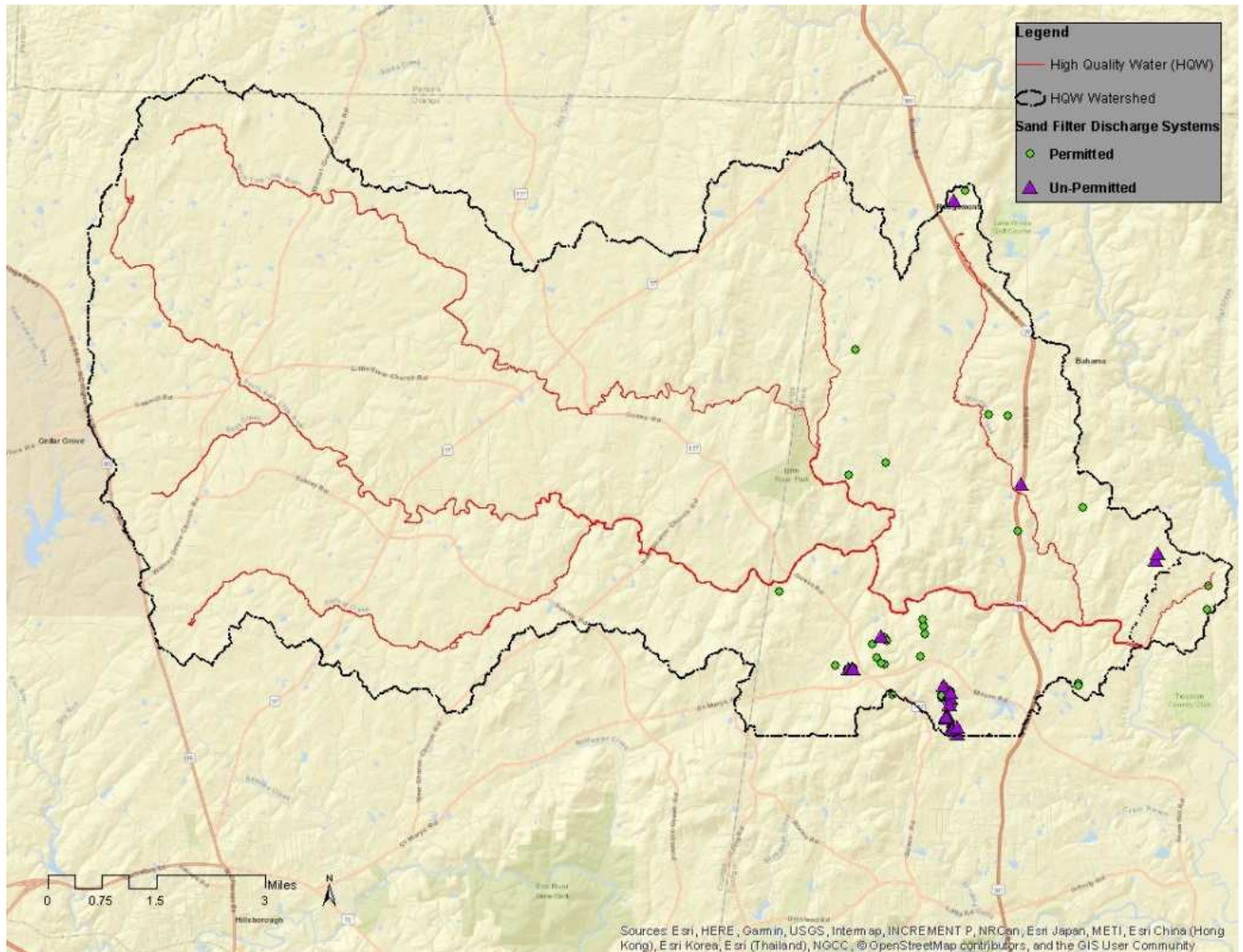
Nutrient/Parameter	Individual Permit	General Permit
Where	Discharge to WS II (HQW)	No Discharge to HWQ
Total Nitrogen (TN) mg/L	3.5	Not a Requirement
Phosphorus (P) mg/L	1.0	Not a Requirement
BOD, 5-Day mg/L	5	45
TSS mg/L	20	45

### GIS

Results from the HWQ watershed analysis found 104 sand filter systems inside the watershed (in Durham County). Eighty of those systems are permitted under the General permit. Twenty four systems are not permitted. These systems will be held under the Individual permit requirements.

Figure 2. is a map of the final GIS analysis. In the map the HQW is shown as red lines. The HWQ watershed is delineated in a dotted black line. Inside the watershed are the sand filter systems. The green dots are permitted (80) while the purple triangles are not permitted (24). The un-permitted systems are mostly found to the south and east of the HQW watershed. The analysis was only for sites located in Durham County.

Figure 2. HWQ Delineation Results



## Discussion

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Previously it was determined acceptable to permit sand filter discharge waste systems that drain into HQW. Now because the interpretation of HQW; Twenty-four sand filter systems (located in Durham County) are going to have an extremely difficult time permitting their system. The thresholds required for residential wastewater systems are not realistic. Under the recent interpretation residential waste flow is held by the same threshold requirements as a Municipal Wastewater Treatment facility. In actuality a residential sand filter system will discharge just a fraction of what a wastewater treatment facility would. And as discussed in the

introduction; the discharge point does not necessarily mean directly into a stream. It is the water course that the discharge drains to. This means the discharge could be a ditch.

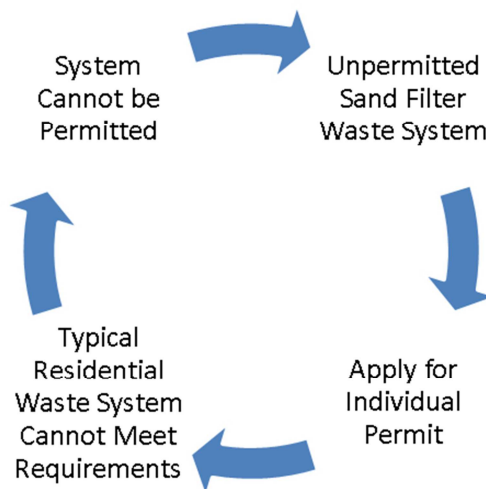
## Conclusion

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According to this analysis; there are at least 24 residences (in Durham County) with an un-permitted sand filter discharge wastewater system. This list could expand as new systems are discovered when they fail or are inspected for point of sale. It is unlikely a buyer would be interested in purchasing a home with a wastewater system that is not compliant. In this case the homeowner could be left waiting for the rules to change in order to sell their home.

From this study General Permit requirements for residential sand filter discharge should be re-evaluated. Under the current interpretation these systems are not properly represented therefore leaving homeowners in a difficult situation without a resolution. Figure 3. is a representation of the challenging situation homeowners are left with an un-permitted sand filter discharge wastewater system.

Figure 3. Homeowner Challenge with an Un-permitted Sand Filter Wastewater System



**Work Cited**

1. 15A NCAC 02B.0275 FALLS WATER SUPPLY NUTRIENT STRATEGY: PURPOSE and SCOPE REQUIREMENTS
2. NPDES General Permit NCG550000: NC Department of Environmental Quality Division of Water Resources
3. 15A NCAC 02B.0279, FALLS WATER SUPPLY NUTRIENT STRATEGY: WASTEWATER DISCHARGE