

Study to Determine the Potential Need for a Community Wastewater Management System for the Hamlet of Shokan

This sampling plan is submitted in accordance section 3.3 Community Wastewater Management Program of the 2013 New York City Filtration Avoidance Determination: Mid-Term Revisions to the 2007 Surface Water Treatment Rule Determination for New York City's Catskill/Delaware Water Supply System, which states: "the City will study the potential need for a community wastewater management system for the Hamlet of Shokan."

October 2013

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1. Introduction

Section 3.3 of the Final Draft Mid-Term Revisions to the 2007 Filtration Avoidance Determination (FAD) for New York City's Catskill/Delaware Water Supply System (August 2013) contained a provision whereby the City is to study the potential need for a community wastewater management system for the hamlet of Shokan, NY. This plan describes the water quality monitoring of a stream in the Hamlet of Shokan together with a review of development history and septic remediation status within the Shokan area intended to satisfy this FAD requirement.

Shokan is located in the Ashokan basin of the Catskill/Delaware System of the NYC water supply. Currently, wastewater from homes and businesses in Shokan is treated by individual septic systems. The objective of this study is to determine whether or not those systems are impacting surface water that drains to the Ashokan Reservoir in this area. In order to differentiate between human influence and background fecal concentrations originating from wildlife, a microbial source tracking technique, i.e. analysis for *Bacteroides* HF183, will be employed.

The data collection outlined in this water quality monitoring plan will be used to complete the study that is due by December 31, 2015 to determine the potential need for a community wastewater management system for the Hamlet of Shokan.

2. Location

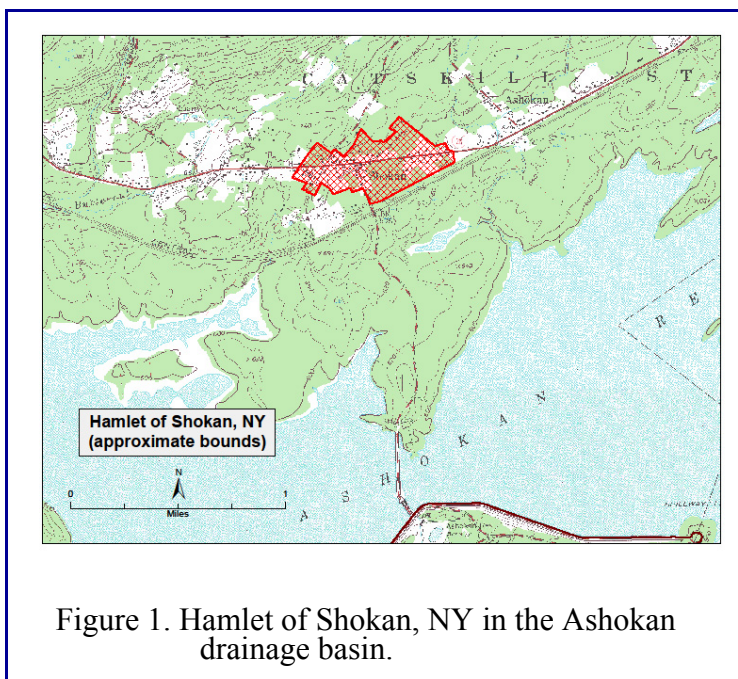
Shokan

Shokan is located in the Town of Olive in Ulster County, NY, and covers an area of 3.9 square miles (10.1 km²) (Figure 1). As of the 2010 census, the population of Shokan was 1,281. Shokan is located entirely within the Ashokan drainage basin.

3. Monitoring Plan

3.1 Objective

The purpose of this monitoring program is to identify whether or not the leachate from septic systems in the hamlet of Shokan impacts stream water quality in the area.



3.2 Sampling location

Sampling will occur at a new site location (SHOKAN). The SHOKAN sampling site was selected for the study due to the conditions of the catchment area providing a good representation of the Hamlet of Shokan. The SHOKAN sampling site captures input from a portion of Shokan with land use that might be expected to produce potential water quality impairments, if they exist. These conditions include:

- high density of development;
- relatively low number of vacant parcels; and
- a mix of both commercial and residential land uses.

The stream site drains a large portion of the hamlet of Shokan, and is a tributary of Ashokan Brook, which flows into the East Basin of the Ashokan Reservoir. A preliminary assessment of the catchment area that would drain toward the SHOKAN sampling site can be found in Figure 2.

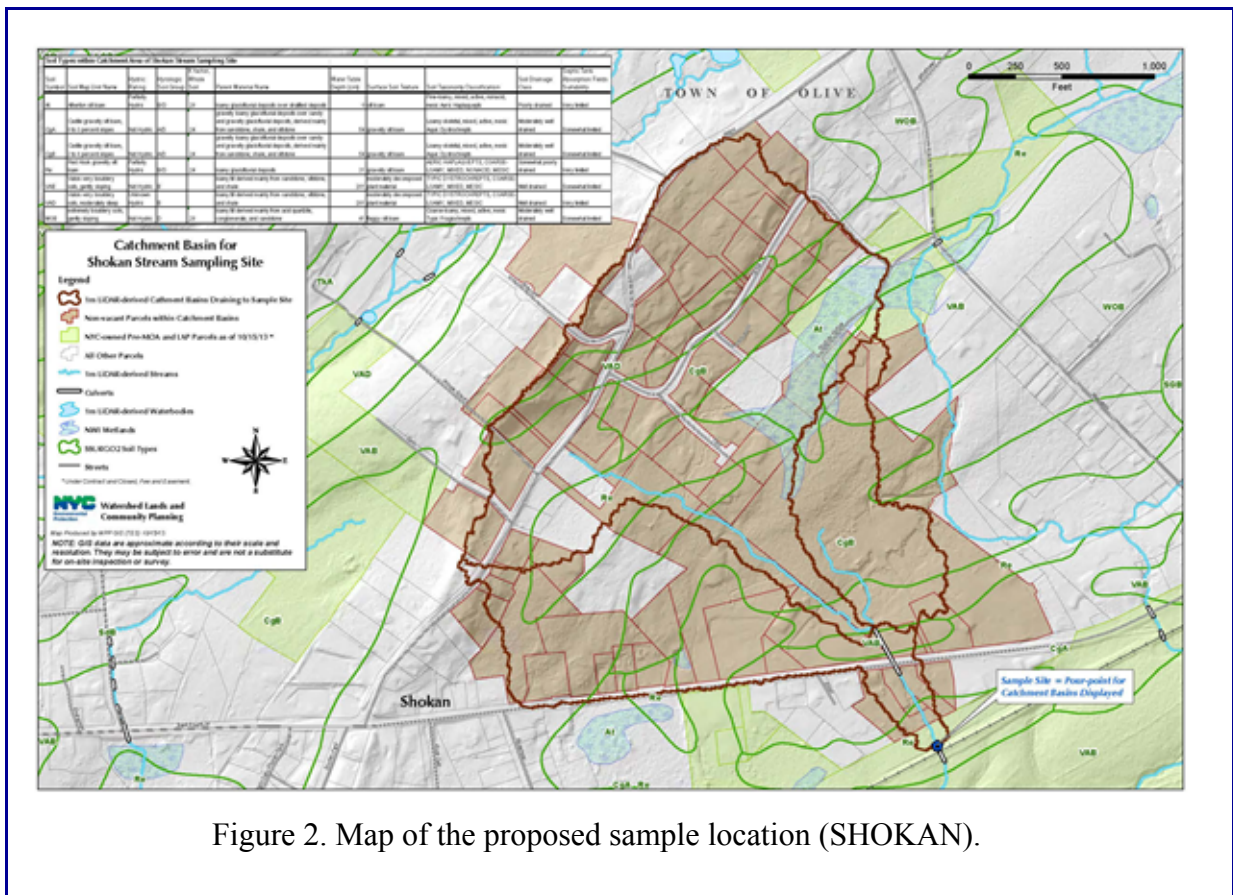


Figure 2. Map of the proposed sample location (SHOKAN).

3.3 Study Design

Water quality monitoring will occur for one full year. The anticipated commencement of the monitoring will be on or about January 1, 2014 and conclude on or about December 31, 2014. A summary of monitoring requirements is presented in Table 1.

Table 1.1: List of analytes.

Site	Physicals	Fecal Coliform	<i>Bacteroides</i>
SHOKAN	Twice per month/ Storm Events (specific conductance only)	Twice per month/ Storm Events	Baseline/Storm Events; Samples selected based on fecal coliform levels (up to a maximum of 15 samples for the year)



Figure 3. A picture of the study stream during a reconnaissance survey.

3.4 Sampling frequency

Grab samples will be collected twice monthly (routine, fixed frequency samples) to characterize baseline conditions. It is during baseflow that a signal from septic contamination would most likely be observed. In addition samples will be collected from selected storm events during the year. Fecal coliform counts are normally higher during storm events, whether from contamination or overland flow (e.g. wildlife sources). The storm samples may help to determine if contamination only occurs during storms, and, if so, microbial source tracking may help determine if the source is human or not. Timing of storm events cannot be predicted more than a few days in advance. Samples will be submitted for analysis from approximately five events collected during the year. Samples will be submitted to cover the ranges of flows observed over the storm hydrograph, i.e. rising limb, peak, and falling limb of the hydrograph. An autosampler will be installed at the site to collect the storm event samples. Samples will be selected from baseline and storm samples for *Bacteroides* analyses based on fecal coliform concentrations and best professional judgment.

Samples will be collected by DEP staff in accordance with appropriate and approved Standard Operating Procedures.

3.5 Analytes

Analytes were selected based on their ability to help detect the presence of wastewater impacts from human sources. The fecal coliform results will serve as a screening tool to provide an indication of contamination, while *Bacteroides* HF183 analysis is proposed as a source tracking tool for human impact specifically. For the purposes of this plan, *Bacteroides* analysis will be used selectively only when fecal coliform counts are elevated. The physical analytes will provide basic information on the condition of the stream at the time of sampling. Also elevated specific conductance may be an indicator of contamination, and can be used as an initial screening tool for possible septic contamination. The complete list of analytes (Table 1) for this study will include:

- Physical analytes (temperature, pH, dissolved oxygen, and specific conductance)
- Fecal Coliform
- *Bacteroides*
- stream stage height

Sample analyses will be conducted by DEP staff or a contract laboratory (*Bacteroides*) in accordance with appropriate and approved Standard Operating Procedures.

4. Shokan Septic Systems

Wastewater from homes and businesses in Shokan is currently treated by individual septic systems. Properties within the 60-day travel time or 250 feet of a watercourse are eligible to participate in the septic repair programs managed by the Catskill Watershed Corporation (CWC). Currently, approximately 80% of parcels within the densely developed portion of Shokan are eligible to participate in a septic repair program. Since 1997, approximately 25% of the septic systems in Shokan have participated in one of the septic repair programs. Additionally, beyond the septic repair programs, the Shokan area was identified as a candidate for CWC's Cluster System Program.

If water quality monitoring suggests septic systems may be impacting water quality, DEP will review the septic conditions of the area. This review will include an assessment of the number of residential and commercial septic systems in the area and identify and quantify the systems that have already been addressed or could be addressed through the existing septic repair programs, or could be addressed through the Cluster System Program. DEP will also review the soil conditions and lot sizes of the parcels within the area to assess the suitability of the parcels in the area to treat wastewater on-site. This information would be used to assess the degree to which the existing programs have addressed the needs for Shokan or if there is any unmet need. If there is a need to address on-site wastewater disposal, DEP will assess the extent to which a community wastewater system would be the most effective approach.

5. Reporting

A report on the findings of this study will be prepared for submission to DOH by December 31, 2015.

