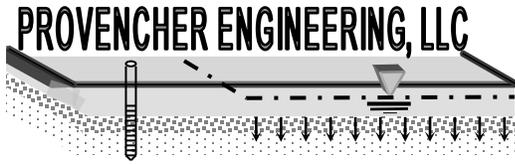


# MEMORANDUM



Donald A. Provencher, PE  
6 Wasserman Heights  
Merrimack, NH 03054

Phone / fax: (603) 883-4444  
E-mail: Don@Provencher.com  
ProvencherEngineering.com

TO: Chris Claussen, Village at Sudbury Station, LLC  
FROM: Donald A. Provencher, P.E.  
DATE: May 18, 2016  
REFERENCE: Summary of Wastewater Treatment & Effluent Disposal Design  
Village at Sudbury Station – Sudbury, Massachusetts  
Project No. PE271.01

---

## **Background:**

The Village at Sudbury Station (the site) is proposed to generate approximately 48,000 gallons per day (GPD) of domestic wastewater, which will require a Groundwater Discharge Permit (GWDP) from Massachusetts Department of Environmental Protection (DEP)'s Northeast Regional Office in Wilmington, for a proposed on-site Wastewater Treatment Plant (WWTP) and treated effluent Soil Absorption System (SAS) leach field. Permitting for the WWTP will be under the DEP General Programmatic Permit for small wastewater systems, and will not require an individual permit. The GWDP permit process is under way, via the submission of a "Hydrogeologic Scope of Work – Project Proposal Report", prepared by Provencher Engineering, LLC (PE), dated December 9, 2015. That report included the results of an unwitnessed soil evaluation conducted by PE on May 7, 2015, as well as a summary of research on public and private wells and other sensitive receptors within one-half mile of the proposed SAS. Copies of this report are available at the Sudbury Board of Health (BOH).

Following DEP's review of that report, we attended a Scope of Work meeting with DEP on December 16, 2015, to review the proposed scope of work, and we obtained DEP approval to proceed with the hydrogeologic investigation as proposed in the report. That DEP Scope of Work approval was noticed to the public via the February 10, 2016 Environmental Monitor. The public notice indicated that the public could request a copy of the report from us.

On December 22, 2015, a witnessed soil evaluation was conducted by PE in the presence of Mr. Bruce Bouck of DEP and Mr. Bill Murphy of the BOH. That soil evaluation documentation included test pit and percolation test logs which were subsequently submitted to DEP and the BOH on January 11, 2016; and were submitted to the Zoning Board of Appeals on February 25, 2016 as part of the Comprehensive Permit Application, and remain on file with those entities, available for public review.

In summary, suitable soils were identified in and around the primary and reserve SAS footprint depicted on the site plans. The soils consisted of coarse sand to depths of approximately 10 feet, with seasonal high groundwater between 42 and 84 inches deep. Percolation rates were all observed at less than 2 minutes per inch.

### **Preliminary SAS Design:**

Based on the witnessed soil evaluation, we designed the primary and reserve SAS outlines shown on the plans. We used a leaching rate of 3.0 GPD/SF as provided in the DEP's "Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment facilities With Land Disposal" (Guidelines), and we propose the use of plastic chambers by Infiltrator Systems, Inc., model Arc-36, which are 34 inches wide x 60 inches long x 13 inches high. In bed / field configuration, as proposed, each chamber contains 4.80 square feet (SF) of effective bottom area per linear foot of chamber length, based on the innovative / Alternative (I/A) General Use approval by DEP for those specific chambers.

Therefore, each chamber includes 24 SF of effective leach area (i.e. 4.80 SF/LF x 5 LF). Consequently, we designed for two equal primary leach fields, each with 340 chambers, and 8,160 SF of effective area (i.e. 340 x 24 SF). Therefore, the design capacity is 24,480 GPD for each primary SAS (i.e. 8,160 SF x 3.0 GPD/SF), with a combined capacity of 48,960 GPD for both primary SAS fields. The 340 chambers in each primary field will be arranged with 17 rows of 20 chambers per row. Each field width will be 48.17 feet (i.e. 17 rows x 34 inches wide x 1 ft / 12 inches). Each field length will be 100.00 feet (i.e. 20 chambers x 5 Ft).

In accordance with the Guidelines, we provided a 50% reserve area, consisting of two equal fields, each containing 182 chambers, 4,368 SF effective leaching area, and 13,104 GPD design capacity, for a total reserve design capacity of 26,208 GPD, which exceeds 50% of the 48,000 GPD design flow. Each reserve SAS includes 13 rows of 14 chambers per row, for a width of 36.83 feet, and a length of 70 feet.

### **Preliminary WWTP Design:**

The proposed WWTP is proposed to include a membrane bioreactor (MBR) treatment system, with the membranes, circulation pumps, and controls to be located within a shipping container structure. A screen building is also proposed to screen the influent raw wastewater. Subsurface tanks, including an equalization basin, sludge storage, trash trap, and bioreactors are proposed to be installed around the MBR container, and will be used with the MBR treatment system to produce a high quality effluent which will be stored in a final effluent dosing tank for ultimate pumping to the primary SAS for subsurface disposal.

Daily staffing at the WWTP is proposed by a licensed operator 5 days per week (Monday through Friday excluding Holidays) for approximately 2.0 hours per day. A maintenance technician will spend approximately 4.0 hours per month at the facility performing preventative maintenance. Additionally, the project manager, chief operator and/or assistant chief operator will spend time reviewing monthly operation and maintenance of the facility and addressing other issues as needed. The certified wastewater operator stand by staff will provide 24/7 emergency coverage as needed. Monthly or bi-monthly sludge removal is proposed from the sludge storage tank by a licensed hauler with delivery to a municipal wastewater treatment plant.

**Final Design, Analyses, & Permitting of WWTP & SAS:**

Final design and analyses for the WWTP and SAS are anticipated upon completion of the comprehensive permit process, and will include execution of the final approved hydrogeologic scope of work. Specifically, soil borings and monitoring wells will be installed, groundwater elevations will be read in those monitoring wells and correlated to seasonal high groundwater using the Frimpter method, along with using soil mottles from test pits. An existing conditions seasonal high groundwater contour map will be produced in the vicinity of the SAS.

Hydraulic conductivity testing will be conducted in the monitoring wells, and a groundwater mounding analysis will be conducted. The groundwater mound will be superimposed onto the seasonal high groundwater contour map, and a proposed mounded groundwater contour map will be created. The bottom of the SAS will be set at 4 feet above the mounded groundwater surface.

A final Hydrogeologic Report will be prepared based on all of the groundwater analyses, and will be submitted to DEP with a permit application BRPWP83 (Approval of Hydrogeologic report). A final design for the WWTP site, including all underground tanks, piping, grading, and WWTP MBR container will be prepared and submitted to DEP with a BRPWP 80 or 81 (General Groundwater Discharge Permit) application.