

# **Findings of Fact & Reclassification Order**

## **Proposed Groundwater Reclassification For the Brandon Fire District #1 Brandon, Vermont**

December 9, 2011

Prepared by:

The Vermont Agency of Natural Resources  
and the  
Vermont Groundwater Coordinating Committee

**Findings of Fact & Reclassification Order  
Brandon Fire District #1, Brandon, Vermont**

**INTRODUCTION**

This document represents the Vermont Agency of Natural Resources findings and determination to reclassify groundwater from Class III to Class II at the Brandon Fire District #1 located in Brandon, Vermont. The reclassification area is shown in map view in Figure #1. The findings are based on the considerations outlined in Section 12-403 of the Vermont Groundwater Protection Rule and Strategy, effective February 1, 2005. A copy of the rule is available online at [www.vermontdrinkingwater.org](http://www.vermontdrinkingwater.org) or by contacting the Department of Environmental Conservation, Drinking Water and Groundwater Protection Division.

Copies of the petition to reclassify and other supporting documents are available at the Department of Environmental Conservation, Drinking Water and Groundwater Protection Division. Much of the information contained here was obtained from the petition to reclassify groundwater, prepared by Vermont Rural Water Association, April 2011, and in cooperation with the Brandon Fire District #1.

**BACKGROUND**

The Brandon Fire District #1 (BFD #1) was formed in 1856 to provide fire protection and drinking water to the village of Brandon, eventually expanding its service area to include the Forest Dale area of Brandon where many businesses and residences are located. The BFD #1, public community water system serves an estimated population of 3,865 people through 1,175 service connections. The average daily demand of the system is approximately 471,000 gallons per day (gpd) based on water meter readings, and the maximum day demand is approximately 707,000 according to the Permit to Operate for the water system. The first gravel well (Well #1) for the water system was constructed in the Forest Dale area in August 1952 approximately 1,000 south of the Neshobe River. Well #1 is only 59 feet deep and is within a sand and gravel aquifer with a safe yield of 450 gallons per minute (gpm). The water system discontinued use of its surface water sources and began relying solely on groundwater sources with the installation of its second gravel well (Well #2) in the fall of 1971, also located in the Forest Dale area, approximately 600 feet north of the Neshobe River. Well #2 is 100 feet deep and terminates in sand, gravel, and clay. From production records it is estimated Well #2 has a safe yield of 625 gpm. A third gravel well (Well #3) located proximal to Well #2 was constructed in December 1997 and has a permitted safe yield of 630 gpm. The combined yield of the three gravel wells is 1,705 gpm (1.23 M gal/day) which will continue to be an adequate supply for the Brandon Fire District #1 service area for the foreseeable future.

The Source Protection Area (SPA) for the BFD #1 consists of 3 zones as per the Water Supply Rule, Chapter 21. Zone I is a two hundred foot circle around each well where impacts from potential sources of contamination are likely to be immediate and certain. Zone II is defined by groundwater monitoring of the recharge area where there will be probable impacts from potential sources of contamination. Zone III is the remaining recharge area to the wells where there may be impacts from potential sources of contamination. In addition, as specified in Section VII of

the Procedure for Class I and II Groundwater Reclassification, the Class II groundwater boundary is equivalent to the SPA boundary.

The three wells serving BFD #1 and the gravel well serving Brandon Fire District #2 (Forrest Brook development) are all completed in the aquifer system represented by deltaic, lake sand, and kame moraine deposits in the vicinity of the wells. Mapping conducted by the Vermont Geological Survey (VGS) indicates that there is a considerable thickness of ice contact and deltaic sand and gravel to the east of Wells #2 and #3 across the buried Neshobe Valley. This area is likely the most extensive overburden aquifer in Brandon.

Recharge potential to the overburden aquifer around the BFD #1 wells has been categorized as having the highest recharge potential to the overburden aquifer since there are permeable areas of ice contact deposits, glacial lake deposits, and recent alluvium. The Zone 2 area of the SPA is comprised primarily of this highest recharge potential area. The glacial till areas to the east of the wells associated with the Green Mountains are classified as areas of low recharge potential, small areas of which are included in the Zone 3 area of the SPA.

Groundwater flow in the overburden aquifer in the vicinity of the BFD #1 wells is generally west-southwestward based on an evaluation of groundwater elevations in the overburden aquifer developed during the VGS mapping study and an aquifer evaluation for Well #3 completed during the permitting process for this well. The groundwater flow mimics the flow direction of the Neshobe River in this area. Groundwater elevation information from the VGS mapping study and the aquifer testing completed for Well #3 estimated the hydraulic gradient in the area to the east of the wells at between 0.02 and 0.03 ft/ft (i.e., 2 and 3 percent).

Groundwater flow direction indicates that potential sources of contamination (PSOC) to the east of the wells may be more likely to pose a risk to the water quality of the wells if contaminants were released at these PSOCs. However, groundwater pumping at each of the three wells likely influences the groundwater flow in the vicinity of these wells via the development of cones of depression around the wells. Major PSOCs, identified as having a high risk rating in the most recent Source Protection Plan developed by BFD #1 personnel are of three types. Agricultural cropland is one source of potential contamination with its use of corresponding pesticides and herbicides. There are several commercial facilities that store volatile organic chemicals. In addition, two gravel extraction facilities exist that may pose some risk to groundwater. Much of the area included in the SPA for the three BFD #1 wells is served by a municipal sewer system; however, there are also unsewered areas within the SPA where properties have on-site septic systems. However, water quality results strongly suggest that there has been no adverse impact on the excellent character of groundwater serving the public community wells.

Water quality in the aquifer in which the three Brandon FD #1 PCWS gravel wells exist are best represented by the historical water quality testing results. There have been no detections of any of the volatile organic chemicals or synthetic organic chemicals above analytical detection limits. For those analytes detected at BFD #1 above the analytical detection limits, there have been no exceedences of the MCLs specified in Subchapter 21-6 of the Water Supply Rule.

## **AGENCY REVIEW**

Below is the Agency of Natural Resources' review of the BFD #1 reclassification petition with respect to the Groundwater Protection Rule and Strategy Section 12-403, Groundwater Reclassification Process. This information is based on the following document:

*Petition for Class II Groundwater Reclassification, Brandon Fire District #1, Brandon, Vermont. April 28, 2011*

In determining whether or not to reclassify groundwater as Class I, II, III, or IV, the Secretary shall consider the following:

(1) The use or potential future use of the groundwater as a public water supply source

As mentioned the BFD #1 was formed in 1856 to provide fire protection and drinking water to the village of Brandon and surrounding area. Wells #1, 2, and #3 are the only sources serving the BFD #1 public community water system. All wells are used as public community water sources.

(2) The extent of activity which poses a risk to the groundwater

According to statute, a Class II groundwater area may be exposed to land uses that pose a risk to a public water supply but at the same time the groundwater must be of uniformly excellent character. As with many SPAs a variety of residential, agricultural, commercial, and public land uses exist within the proposed Class II groundwater area. However, water quality results from the drinking water sources have shown no adverse impacts from surrounding land uses. This condition exists even though an on-site septic system occurs within the two year time of travel zone. A two year time of travel zone is the calculated distance through which a pathogen could enter groundwater (for example, via onsite disposal of sewage) and migrate to a public water supply source within two years. Most viruses are expected to die off within two years and become nonthreatening. As mentioned, the water quality results of the water system do not indicate any impacts from this septic system or any others and it has therefore been determined that there is no direct hydraulic connection between the sources of the proposed Class II and septic systems in the area.

(3) The current water quality of the groundwater

The current groundwater quality from the three gravel well sources serving the BFD #1 are excellent, with no detections of volatile organic chemicals or synthetic organic chemicals above laboratory detection limits. There have been detections of some primary and secondary inorganic compounds along with radionuclides. These analytes were found to be consistently below maximum contaminant levels.

(4) The availability of groundwater in quantities needed for beneficial use

The BFD #1 serves 3,865 people from 1,175 connections. The average daily demand of the systems is approximately 471,000 gallons per day and the maximum daily demand is 707,000 gallons per day. The combined yield of the three gravel wells is about 1,705 gallons per minute. This yield will continue to be an adequate supply for the BFD #1 service area for the foreseeable future.

(5) The consequences of potential groundwater contamination and the availability of alternate sources of water

BFD #1 has a profound interest in the designation and protection of future municipal water source areas, and has already completed some hydrogeologic investigations to that end. In addition to the detailed surficial geologic and groundwater mapping completed for Brandon on a

town-wide scale, additional geophysical survey work was completed by VGS personnel in the McConnell Road area of Brandon in 2007 to identify an area potentially suitable for future gravel well source(s). Based on the results of this investigation it appears favorable areas for groundwater development exist in the gravel aquifer. Additional investigations, including test well drilling, could likely result in well sites for potential future use by BFD #1. However, if the proposed Class II area were to become contaminated, depending on the severity of contamination, thousands of people could be adversely impacted. Clean-up costs, the corresponding time associated with mitigation, and the expense of an available alternative supply may be devastating to the community.

(6) The classification of adjacent surface waters

According to the current Water Quality Standards issued by the State of Vermont Natural Resources Board, the Neshobe River is classified as Class B, as are the vast majority of all surface waters in the Town of Brandon.

(7) The probability for use as a public water supply source

The site is in use as a public community water supply source.

(8) Other factors relevant to determining the maximum beneficial use of the groundwater

The site will continue to operate as a public community water system for now and for the foreseeable future.

### RECLASSIFICATION AREA

The reclassification area has been delineated in accordance with the Department of Environmental Conservation guidance document entitled "Procedure for Class II Groundwater Reclassification." The Class II Groundwater Area is shown on the map, Figure #1,

### **Boundary Delineation Methodology**

The boundary delineation for the Class II Groundwater Area was based in part on the SPA delineated by the Department of Environmental Conservation in 1981. At that time, only Well #1 and #2 existed and consideration for the SPA was given to the topography, well completion reports, the groundwater favorability maps, soils, bedrock, field investigations, a flow net analysis, and pumping test information. An aquifer analysis of Well #3 became available in 1997 when this well was drilled. This information did not result in modification of the boundary for the original SPA. Afterwards, surficial geologic mapping was performed by the VGS and the Environmental Protection Agency (Region I) completed hydrogeological mapping associated with Wells #2 and #3.

The updated surficial geology maps along with field investigations conducted by Vermont Rural Water Association provided sufficient information to reduce the eastern Zone 3 and Zone 2 boundaries of the SPA for Well #1. These changes were based both on the local topography and the surficial geology of the area. Also, the area surrounding Burnell Pond was removed from the original SPA because of a bedrock ridge that acts as a boundary between Wells #2 and #3 and the pond. These modifications are proposed for both the SPA and the Class II Groundwater area (Figure#1).

## MONITORING AND MANAGEMENT REQUIREMENTS

Restrictions on groundwater use and additional monitoring requirements for the BFD #1 may be applicable under Sections 12-401(7) of the Groundwater Protection Strategy (Chapter 12), which states:

*Any classification or reclassification decision issued by the Secretary may include special conditions for the management of the classified groundwater area which shall apply to activities regulated by the Secretary.*

The BFD #1 will continue to be responsible for complying with regulations governing ongoing public community water systems operations per the Water Supply Rule, Chapter 21.

### **Rationale for Reclassifying Groundwater at the Brandon Fire District #1, Brandon, VT**

The following is a listing of reasons for reclassifying the groundwater at the BFD #1 in Brandon, Vermont.

1. The groundwater of the proposed Class II Groundwater Area is suitable for a public water supply and is currently used as a source of water for a public community water system.
2. The groundwater is of uniform and excellent character as demonstrated by years of water quality sampling.
3. The Brandon Fire District #1 has a profound interest in protecting the groundwater that recharges their public community water sources.
4. The groundwater is exposed to activities which may pose a risk to its current or potential use as a public water supply source, although current land use has been of acceptable risk.
5. Local surface waters that receive groundwater discharges are classified by the State of Vermont as Class B.
6. The reclassification area will continue to operate as a public community water system for now and the foreseeable future.

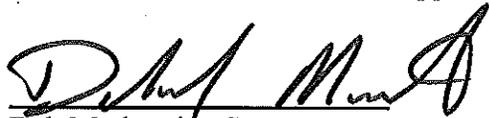
### **Findings of Fact**

1. Since 1856 the Brandon Fire District #1 has been providing drinking water to the residents of Brandon, VT.
2. The Brandon Fire District #1 is permitted to supply up to 1.23 million gallons of drinking water per day to the residents of Brandon now and for the foreseeable future.
4. The Agency of Natural Resources reviewed the petition and determined that the

groundwater recharging the wells serving the BFD #1 is of uniform and excellent character and meets the criteria for reclassification from Class III to Class II in accordance with the Groundwater Protection Rule & Strategy and 10 V.S.A. Chapter 48.

5. A public information meeting was held to receive comments from the public and of the public members attending the meeting no opposition to the Class II designation was voiced.

I hereby make the Findings of Fact identified above and reclassify the groundwater to Class II for the area as described and mapped for the Brandon Fire District #1 in Brandon, VT.



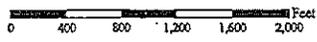
Deb Markowitz, Secretary  
Agency of Natural Resource

Date 12-20-11



- Legend**
- Brandon Fire District #1 Gravel Wells
  - Source Protection Area/Proposed Class II
    - Zone 1
    - Zone 2
    - Zone 3
  - Two-Year Time-of-Travel Zone

**Figure 1**  
**Brandon Fire District #1**  
**Public Community Water System WSID #5211**  
**Proposed Source Protection Area/Class II Groundwater Area**



LEGGETTE, BRASHEARS & GRAHAM, INC.  
 76 PEARL STREET, SUITE 203  
 ESSEX JUNCTION, VT 05452  
 802-288-9600  
 FAX 802-288-9381  
 www.lbgweb.com

Sources: Boundary, transportation, information, and topographic features from  
 Vermont Center for Geographic Information (aerial data available at VCGI.org)  
 \*SRA/Class II from VRWA is applied, 2011.  
 2/15/2012 10:56:00 AM FDI/Brandon/Class II