

Wellhead Protection District Public Hearing Comment



To: Town of Madbury, Planning Board

Prepared by: Sarah Greenshields,
Owner, Little Tree Education
Owner, Coldstream Properties

SUBMITTED
BY
S. GREENSHIELDS
DURING 15 JAN 20
PUBLIC
HEARING

Subject: Wellhead Protection District Public Hearing Comment

Date: January 15, 2019

I am submitting this document as a written record of my comments in regard to any proposed changes in Wellhead Protection Area Ordinances as part of the record for the public hearing this evening.

As a business and property owner in the Town of Madbury, I respectfully share the enclosed expert comments of a hydrologist, Danna Truslow, and seek answers to my questions below as they pertain to the Public Water Supply we maintain at our school, Little Tree Education at 314 Route 108. After this, I hope you will leave the ordinances as they are currently written and not consider any further amendments.

At Little Tree, we serve one of the most vulnerable populations - infants as young as six-weeks and are licensed to serve children up to 12 years of age. We currently serve children through kindergarten. We have over 100 individuals using our well water, including the teachers and parents. All members of our school community consume our water, but it's critical to note that for infants that consume formula, our water may be their primary source of nourishment while in our care. Because we care so deeply for the children, it is my responsibility to express my concerns, ask questions, and be an active participant within our community. I am here today to ask you to *hold* or *table* your vote in order to allow more time for the Planning Board to engage with scientists, work with a hydrologist, utilize the resources at UNH, to answer the questions that I have outlined. These are important questions that deserve answers in order to protect our drinking water, to prioritize the children, and to serve the greater community.

It is my understanding that this amendment is proposed to you because of the application that was presented to the Planning Board by Johnson Creek in 2018/19. The circumstances surrounding our continued legal pursuit are very different than the proposed changes being discussed here. From the bottom of my heart, I consider these proposed changes as a distinct step backward, contrary to the Town of Madbury's Master Plan, and creating opportunities for undesirable development. My obvious passion on this subject stems from frustrations surrounding a viable solution to the for the applicant's waste water dilemma, utilizing an existing sewer.



I purchased our property because of Madbury's Master Plan, in fact, Policy One protects our water. "The protection and use of water resources are critical concerns to the Town of Madbury. With virtually all residents dependent upon private wells for domestic use, the quantity and quality of available groundwater must be protected from contamination and depletion."

Again, I have sought the expert opinion of Danna Truslow, hydrologist, to help our team at Little Tree better understand and use our well water. Through her, we have learned that Department of Environmental Services standards were designed to serve the entire State, the DES requirements exist to establish minimum requirements. Towns & Cities have a responsibility to their residents, to their Master Plans, and to their natural resources and may have higher standards. Now, having owned a business in Madbury for years now, I know that Madbury has higher expectations, so why would we settle for the status quo for our most fragile natural resource?

By enacting a comprehensive elimination of the 400 ft. wellhead radius requirement today and downgrading to State minimum standards, you will be putting our water at risk. Having high standards is what makes our Town so wonderful! Please do not forget that - I ask you to be smart here for those who live, go to school, and work in Madbury.

You have the autonomy here, and it is in your self-interest to maintain control over the issue of water protection. You do not have to relinquish the Board's future capability to protect our water. DES is a State agency and they cannot understand the unique needs of our community.

As new and emerging science reveals, DES standards are low & even DES wants to increase these standards but they too are stuck. The Department is mired in a political argument of any regulation over the natural environment. As an example, in 2019 DES, "adopted rules that establish health-based drinking water standards or Maximum Contaminant Levels (MCLs) and Ambient Groundwater Quality Standards (AGQS) for four per- and polyfluoroalkyl substances (PFAS)... However, effective December 31, 2019, the Merrimack County Superior Court issued a preliminary injunction barring enforcement of these rules due to the alleged failure of NHDES to appropriately consider the costs and benefits of the rules. NHDES does recommend for health reasons that private wells meet the standards."¹

In 2019, the New Hampshire Department of Environmental Services (NHDES) "EPA's health advisory levels were calculated to offer a margin of protection against adverse health effects to the most sensitive populations: fetuses during pregnancy and breastfed infants. The health advisory levels are calculated based on the drinking water intake of lactating women, who drink

¹ <https://www4.des.state.nh.us/nh-pfas-investigation/?p=1185>

more water than other people and can pass these chemicals along to nursing infants through breastmilk.”²

One more important regulatory note, Madbury is not a Town that the Department of Environmental Services has on record as requiring local approvals. I am confident that this is an oversight but wanted to be sure to mention it here this evening. This is in reference to CHAPTER 485-A, WATER POLLUTION AND WASTE DISPOSAL, Sewage Disposal Systems Section 485-A:32. I have provided the current list of towns in this packet, requesting to be added is simple and instructions are published on this list. All neighboring towns are listed, so it is prudent that Madbury is added. Based on my experiences with site plan approval, I am confident the Planning Board would like to see these plans prior to installation and use.

Yesterday, I had the pleasure of speaking with Kevin J. Kaveny, Compliance Supervisor at the Department of Environmental Services, Land Resource Management Program, Subsurface Systems Bureau and shared the history & timeline of many setbacks. Many of the regulations regarding setbacks that exist today have not been changed since their development in the late 1970's.

Year:

1965 - DES establishes the Island Review

1967 - DES establishes 1,000 surface water & State water

1971 - DES determines water testing for all (not just State)

1978 - DES establishes the first rules

By understanding DES' history, minimum standards, and their current position, I offer you this list of crucial questions:

1. Will my well and other Public Water Supplies be grandfathered? I opened Little Tree and bought the real estate with the confidence of the 400ft protective radius.
2. I am licensed through the Department of Health and Human Services, have you considered how these proposed changes may impact my ability to operate? The same would apply to schools governed by the DOE.
3. Were experts and scientists consulted in the development of these changes?
4. Will you be revising the Master Plan? *PREMIS*
5. Will you be forming a new Water Task Force?
6. By removing protections, how do you plan to educate the residents of this change?

Don't understand

PREMIS P.H.

²

https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf



7. Other communities depend upon our water to nourish their residents, how do you plan to educate those residents?
8. Madbury has several Public Water Supplies, how will you support the wells that are in other towns but their protective radius' would change?
can't enforce in other towns
9. Within the Town, who's responsible for keeping up on water quality issues? With new science emerging, who's keeping up to date with the understanding of these water contaminants?
W.B.
10. Does Madbury have a seat or representative on the Seacoast Drinking Water Commission?
11. Was there a sub-committee formed to look at this prior to these suggested edits?
NOT NEEDED
12. It's my understanding that the Town has worked with Tom Ballestero from UNH among other experts, was he consulted in proposing these changes?
NO

Enclosed you will find:

- Letter dated Jan. 14, 2020 from Danna Truslow, Hydrologist, in regards to the proposed changes here this evening. She has included important data for you to consider & expert opinion against making any changes.
- Map including all public wells in Madbury, including wells that overlap from surrounding communities.
- DES list of communities that require local approval & Section 485-A:32
- DES Fact Sheet
- Letter dated December 19, 2018 from Danna Truslow, Re: Johnson Creek Septic System Placement
- Bedrock Well Groundwater Flow Charts, including Madbury & Dover
- Letter dated December 20, 2018, Re: Supplemental Hydrogeologic Information - Johnson Creek Septic System Placement

To ensure the optimal well radius protection, I would love to buy all the surrounding property. I can't afford to do that today, so I do now and have relied on this established ordinance and well protection radius of 400 ft. We are unique because we care for the most sensitive and vulnerable, but I do believe that there should be an overriding consideration for all residents and business owners. Through my experience here last year, I quickly learned that I had a lot to learn about water. It doesn't just flow downhill. Water and it's protection is complicated. I hope this information here is helpful, reviewed carefully, and part of a greater plan to protect our school, Madbury's water, and our land use. Please do not relinquish your high standards for our Town.

*Thank you!
Sarah*



January 14, 2020

Ms. Sarah Greenshields, Director
Little Tree Education Center and Coldstream Properties LLC
314 Route 108
Madbury, NH 03823

Re: Town of Madbury Aquifer Protection Ordinance Changes

Dear Ms. Greenshields,

Thank you for requesting an evaluation of the recently proposed changes to the Madbury Aquifer Protection Ordinance. The proposed changes include new provisions and guidance from the New Hampshire Department of Environmental Services (NHDES) Model Aquifer Protection Ordinance and elimination of the designated the Primary Wellhead Protection Area as described in Section 6 of the existing ordinance. I support many of the updates suggested, but do not feel that Section 6 should be changed or eliminated.

Section 6 establishes a 400-foot primary wellhead protection radius around all public water supply wells within the Town of Madbury. This adds an extra layer of protection on top of the other aquifer protection measures in the Madbury ordinance and adds further protection beyond the NHDES sanitary protection radius for smaller production wells.

Existing Public Water Supply Wells

Based on a recent review of the NH DES One Stop database, 13 public water supply wells fall within the boundaries of the town (See Table 1). Figure 1 shows the location of these wells and the NHDES designated wellhead protection areas (WHPAs) associated with each. These WHPAs are either designated based on well pumping volumes or on estimated areas of groundwater influence that a well may have on the underlying aquifer. This protection area is different than the NHDES sanitary protection radius and there are different management measures associated with each area. (See the wellhead protection fact sheet WD-DWGB-12-10) for additional information).

**Table 1a
Registered Community or Public Water Supply Wells located in Madbury**

Well Owner Name	Well Located in Madbury?	Well Head Protection Area located in Madbury?	Active
Moharimet School	Yes	Yes	Yes
Madbury Woods Apartments	Yes	Yes	Yes
Madbury Library	Yes	Yes	Yes
Three Sons Camping (Old Stage Campground)	Yes	Yes	Yes
Carriage Hill Assisted Living (fmlly New England Sports Academy)	Yes	Yes	Yes
Tennis Coop	Yes	Yes	Yes
Little Tree Education Center	Yes	Yes	Yes
Dover Water Department (1)	Yes	Yes	Yes
Elliot Rose Company	Yes	Yes	No
City of Portsmouth (Portsmouth Water Works) 4	Yes	Yes	Yes
Table 1b - Registered Community or Public Water Supply Wells located outside of Madbury with designated Well Head Protection Areas within Madbury			
Miss Patty's Childcare	No	Yes	Yes
Johnson Creek homes	No	Yes	Yes
Dover Water Department (4)	No	Yes	Yes

Source: NHDES Drinking Water and Groundwater Bureau and One Stop GIS

One of the listed supply wells is the Moharimet School well, another is the Madbury Library well, and another services Madbury Woods apartments. The other wells service Carriage Hill Assisted Living, the Tennis Coop, Little Tree Education Center, and Old Stage Campground. A well previously listed is the Elliot Rose Company well but it is inactive. Five of the supply wells in Madbury are municipal wells operated by the City of Dover (one well) or the City of Portsmouth, NH (four wells). Several other wells lie outside Madbury but a portion of their designated wellhead protection areas lie within the town lines (See Figure 1).

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Importance of the Current Ordinance Language

Establishment of this ordinance and the more protective 400-foot primary wellhead protection area when the Madbury ordinance was originally crafted was foresighted for a town that appeared to have ample water supply for its residents at that time. However, as the area has grown and potentially harmful contaminants have been identified from a variety of sources, the need for water resource protection has only grown. Today accidental spills, household chemicals, personal care products and pharmaceuticals as well as other persistent chemicals such as per and polyflourinated compounds (PFAS) are of growing concern in our region both from commercial sources and from discharges from septic systems. The ongoing protection of these resources is essential and is getting more attention locally through new regional and state initiatives such as the Seacoast Drinking Water Commission and the Source Water Protection Fund and has initiated new Federal legislation. I would urge that Madbury keep this protection measure rather than eliminating it at this critical time.

Agree with all

When thinking about changing the ordinance, one should ask, when would a public water supply well be installed and how could reducing water quality protection benefit the town in the long run? New wells would typically be installed for a school, a sports or training facility, a restaurant, or for a multi unit residential area when such a facility is outside a municipal water supply service area so further protection rather than reduced protection would be a greater public benefit.

Further, if Section 6 is removed for new wells installed after an ordinance change is made, I believe that the existing Madbury water supply wells, whose users and owners have relied on the protections afforded by the 400 foot to retain their integrity, be grandfathered and retain these valuable protections.

Little Tree Water Supply Well

The Little Tree Education Center is a good example of this type of public water supply well. The well was established when the business was a day care, but it has since expanded into a day care and Montessori school as the demand for care and quality education has expanded in the region. The owners have been careful with monitoring the land use surrounding the well. They have also been careful about maintenance and testing and recently changes service companies to improve well water quality. The 400-foot primary well radius established by Madbury is an important means to safeguard water quality at the school. This protection measure, combined with a comprehensive program for testing and monitoring land use protects the water supply. This population is especially vulnerable to the threat of



emerging contaminants in household products, cleaning chemicals, and pharmaceutical products that are discharged to septic systems and can impact physical and mental development of babies and young children.

Septic System Pre-Approval

As a additional water quality protection measure, the town should consider adoption of prior local approval for sewage and waste disposal systems as allowed by RSA 485-A: 32. This requires that an applicant obtain approval for sewage and waste disposal systems under local regulations and ordinances prior to the septic system approval by NHDES. The RSA and a list of cities and towns already requiring this pre-approval are attached. Adoption of this measure requires approval by the Madbury Board of Selectmen.

I hope this evaluation was helpful. Please feel free to contact me with additional questions.

Sincerely,

Danna B. Truslow, P.G., C.G.
Principal Hydrogeologist

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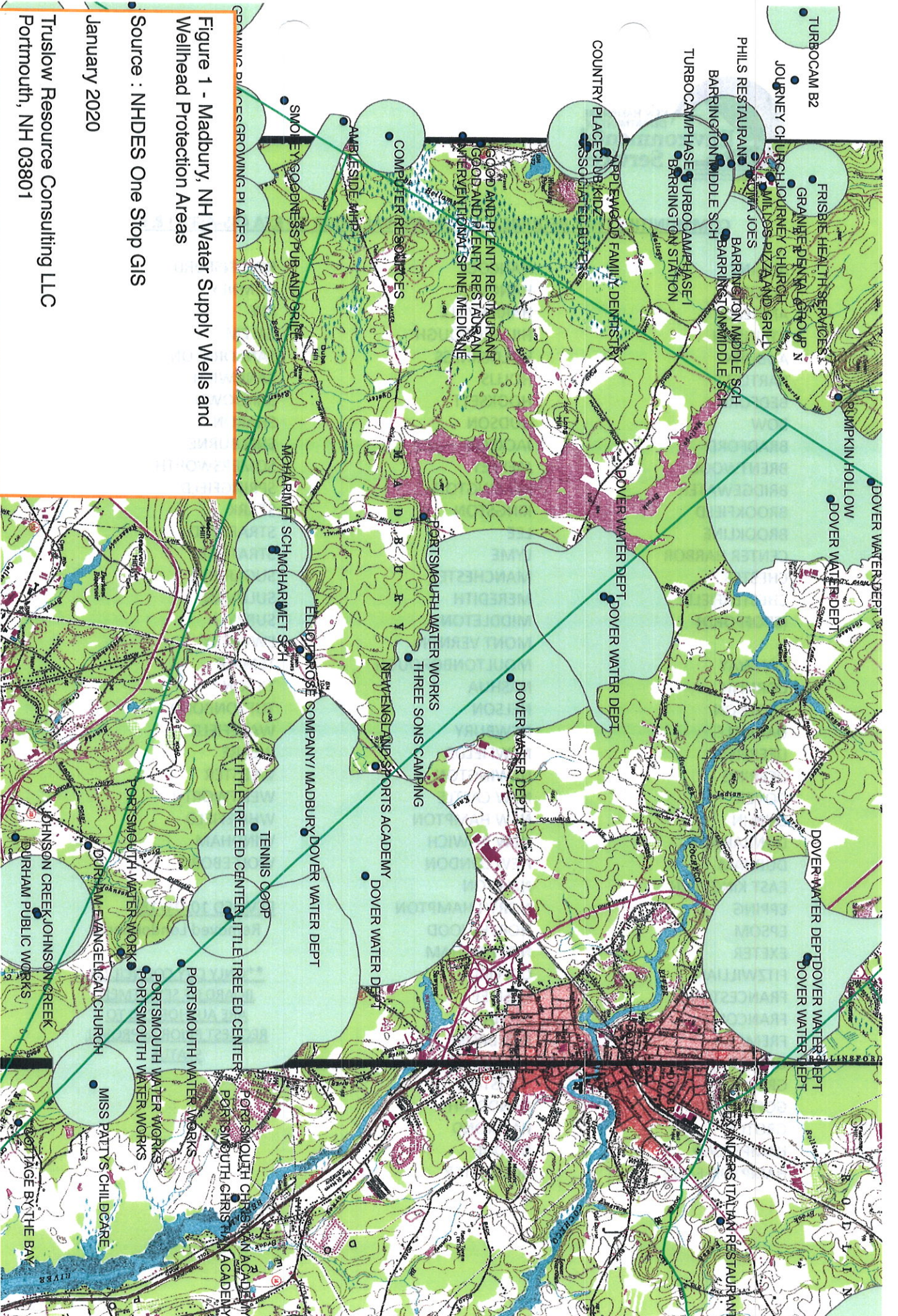


Figure 1 - Madbury, NH Water Supply Wells and Wellhead Protection Areas

Source : NHDES One Stop GIS

January 2020

Truslow Resource Consulting LLC
Portsmouth, NH 03801



COMMUNITIES THAT REQUIRE LOCAL APPROVAL PRIOR TO RSA 485-A;32, I & II

ALBANY
ALTON
AMHERST
ATKINSON
AUBURN
BARTLETT
BEDFORD
BOW
BRADFORD
BRENTWOOD
BRIDGEWATER
BROOKFIELD
BROOKLINE
CENTER HARBOR
CHESTER
CHESTERFIELD
(SPOFFORD)

CONWAY
CORNISH
CROYDON
DANVILLE
DEERFIELD
DEERING
DOVER
DUBLIN
DUNBARTON
DURHAM
EAST KINGSTON
EPPING
EPSOM
EXETER
FITZWILLIAM
FRANCESTOWN
FRANCONIA
FREMONT
GREENFIELD
GREENLAND
GOFFSTOWN
GROTON
HAMPSTEAD
HAMPTON FALLS

HANCOCK
HANOVER
HARRISVILLE
HILLSBOROUGH
HOLDERNESS
HOLLIS
HOOKSETT
HUDSON
JACKSON
JAFFREY
KENSINGTON
KINGSTON
LEE
LYME
MANCHESTER
MEREDITH
MIDDLETON
MONT VERNON
MOULTONBOROUGH
NASHUA
NELSON
NEWBURY
NEWFIELDS
NEWINGTON
NEW CASTLE
NEW HAMPTON
NEW IPSWICH
NEW LONDON
NEWTON
NORTH HAMPTON
NORTHWOOD
NOTTINGHAM
ORFORD
OSS�PEE
PELHAM
PEMBROKE
PLAINFIELD
PLAISTOW
RANDOLPH
RAYMOND
RINDGE
ROCHESTER

ROLLINSFORD
RUMNEY
RYE
SALEM
SANBORNTON
SANDWICH
SANDOWN
SHARON
SHELBURNE
SOMERSWORTH
SPRINGFIELD
STARK
STRAFFORD
STRATHAM
SUGAR HILL
SULLIVAN
SURRY
SWANZEY
TEMPLE
TILTON
TUFTONBORO
WAKEFIELD
WEARE
WEBSTER
WENTWORTH
WHITEFIELD
WINDHAM
WOLFEBORO

REVISED 10/04/18;

Removed Londonderry

****ONLY CITY COUNCIL OR
BOARD OF SELECTMEN
ARE AUTHORIZED TO
REQUEST PRIOR APPROVAL
STATUS**

TITLE L

WATER MANAGEMENT AND PROTECTION

CHAPTER 485-A

WATER POLLUTION AND WASTE DISPOSAL

Sewage Disposal Systems

Section 485-A:32

485-A:32 Prior Approval; Permits. –

I. No person shall construct any building from which sewage or other wastes will discharge or construct a sewage or waste disposal system without prior approval of the plans and specifications of the sewage or waste disposal system by the department. Nothing herein shall be construed to modify or lessen the powers conferred upon local authorities by other statutes; provided, however, that in all instances the requirements contained in this chapter shall be considered as minimum.

II. Any person submitting an application and plans for construction approval shall also certify in writing that he has complied with all local government requirements as relate to water supply and sewage disposal which must be complied with prior to application to the department of environmental services in those municipalities where regulations require prior local approval; and, at the same time, a copy of the certification shall be sent to the board of selectmen of the town or the city council of the city.

II-a. Any person submitting an application and plans for construction approval to replace a subsurface sewage disposal system in failure as defined in RSA 485-A:2, IV shall be exempt from presenting a certification of compliance with local government requirements as required by paragraph II.

III. No person required to submit subdivision plans pursuant to paragraph I shall commence the construction of roads within the lot, tract, or parcel proposed to be subdivided, by clearing the land thereof of natural vegetation, placing any artificial fill thereon, or otherwise altering the land, nor shall he do any other act or acts which will alter the natural state of the land or environment, unless the subdivision plan relating thereto has been submitted and approved in accordance with the requirements of this chapter. Nothing in this paragraph shall be construed to prevent the taking of test borings, the digging of test pits, or any other preliminary testing and inspection necessary to comply with the requirements of the department of environmental services relative to information necessary for review and approval of the subdivision plans.

Source. 1989, 339:1. 1996, 228:106, 108, eff. July 1, 1996. 2017, 238:2, eff. Sept. 16, 2017.

ENVIRONMENTAL Fact Sheet



29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-DWGB-12-10

2019

Wellhead Protection Tips for Small Public Water Systems

Small public water systems such as residential subdivisions, apartment buildings, schools, or workplaces should take steps to protect their wells from contamination. Wellhead protection begins with the owner and operator of a well. To achieve protection, follow the six steps listed below. Each step is explained in detail in this fact sheet:

1. Review the Source Assessment Report prepared by NHDES.
2. Familiarize yourself with the established protection areas around the well.
3. Examine activities in your protection areas.
4. Practice good management procedures.
5. Talk with municipal officials.
6. Educate staff and water users about the importance of clean water.

1. Source Assessment Report

NHDES prepared a Source Assessment Report for each system. The report, which was sent to the system owner, includes a map of the wellhead protection area(s), an inventory of potential sources of contamination, and a rating of each well's vulnerability to contamination. The report also includes a description of suggested protection measures.

2. Protection Areas

Sanitary Protective Radius – This area should receive the greatest attention. The sanitary protective radius is a 75' to 400' radius around the well that under current law must be controlled by the water supplier through ownership or easements. The extent of the sanitary protective radius depends on the maximum daily amount of water withdrawn from the well. Know the extent of your sanitary protective radius, and be sure only activities that are both directly related to your water system and non-threatening to the water quality occur within the radius.

Sanitary Protective Radius	
Volume (gal)	Radius (feet)
0-750	75
751-1,440	100
1,441 – 4,320	125
4,321 – 14,400	150*
14,401 – 28,800	175
28,801 – 57,600	200
57,601 – 86,400	250
86,401 – 115,200	300
115,201 – 144,000	350
> 144,000	400

*minimum SPR for new community wells under Env-Dw 305.10 (a) and Env-Dw 302.10(b).

Wellhead Protection Area – The area under which groundwater flows to a producing well is known as the wellhead protection area (WHPA). For bedrock wells producing less than 57,600 gallons in any 24-hour period, the WHPA is a circle whose radius depends on the maximum daily amount of water withdrawn from the well. For small overburden wells within unconfined aquifers, the WHPA is typically calculated based on existing hydrogeological information.

Wellhead Protection Area	
Volume (gal)	Radius* (feet)
0 – 7,200	1,300
7,201 – 14,400	1,500
14,401 – 28,800	2,050
28,801 – 43,200	2,850
43,201 – 57,599	3,600
* for bedrock and small overburden production wells only Env-Dw 305.11 (b)	

3. Examine Activities

Look carefully at activities and businesses within the wellhead protection area. Identify any threats to water quality and develop strategies to address them. Be sure to include:

Underground and Above-Ground Storage Tanks (USTs & ASTs) – Leaking oil and gasoline USTs contaminate soil and groundwater. If a UST or AST is located within the sanitary protective radius of a well, remove it to a location outside the sanitary protective radius and check for signs of previous spills or leaks. (Call NHDES' Waste Division regarding UST closure rules.) All new USTs must be located at least 400 to 500 feet (depending upon UST contents) from a public water supply well. If you need to store fuel to power an emergency generator, use natural gas or propane. Any heating oil tanks in the larger WHPA should be above ground or in basements on an impermeable surface and contained in an area large enough to hold the complete liquid volume should a spill occur.

Herbicides, Pesticides and Fertilizers – Herbicides and pesticides must not be used or stored within your sanitary protective radius. Commercial pesticide applicators may not apply pesticides within 400 feet of gravel packed wells used as a public water supply or within 250 feet of any other wells without prior state approval. If you use them outside of but near the sanitary protective radius, be careful to follow label directions and any specific restrictions, registration requirements and storage guidelines, which vary depending upon the quantity and types of products you choose to apply. Fertilizers are potential sources of nitrates and bacteria; don't use them within the sanitary protective radius. Contact the NHDES Drinking Water and Groundwater Bureau for more information on best management practices and additional fact sheets regarding these topics.

Effluent Disposal System – Septic tanks, leach fields, etc., should be removed and placed outside the sanitary protective radius of a well. Septic systems outside of but near the sanitary protective radius should be well-maintained. Inspect septic tanks every year and pump when needed. Never dump hazardous household chemicals down the drains. Do not use septic system cleaners.

Storage Areas – Do not store, either indoors or outdoors, hazardous substances (e.g., gasoline, garden chemicals, paints, deicers/salt, motor oil, or antifreeze) within a sanitary protective radius. Outside the sanitary protective radius, store them in a secure building equipped with an impermeable floor and with adequate spill containment equipment.

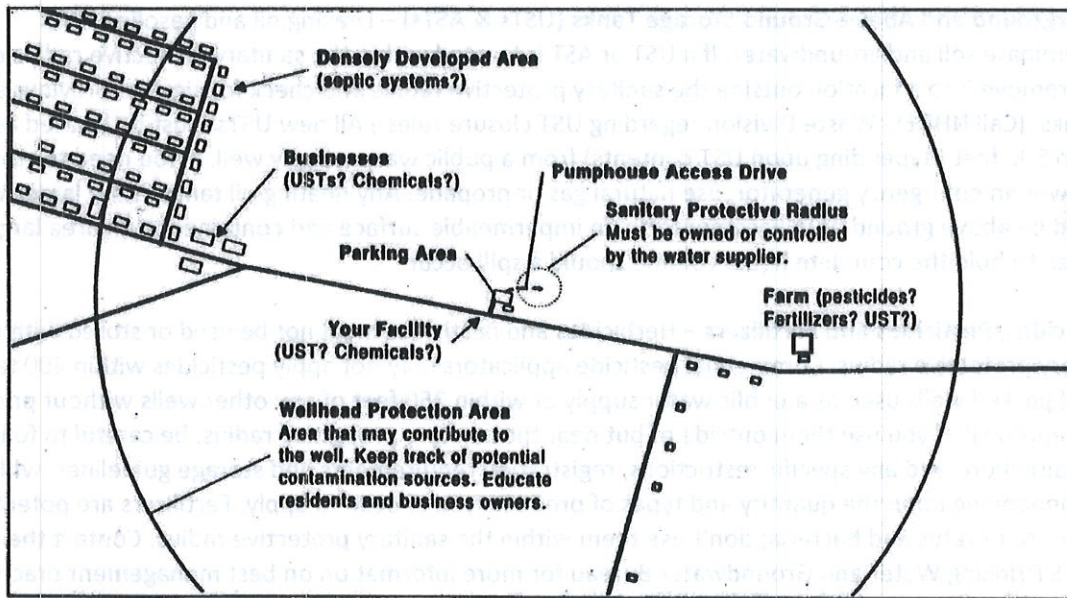
Parking and Vehicle Use – Do not establish a parking area within the sanitary protective radius. Perform maintenance and washing of vehicles outside the sanitary protective radius. Commercial vehicle washing that results in any discharges to the ground may require a NHDES groundwater discharge

permit or registration. Keep any vehicles that must operate within the sanitary protective radius in good repair to prevent leaks and spills. Thoroughly clean up any leaks or spills immediately.

Municipal/Institutional Systems – These facilities may be conducting some of the potentially harmful activities listed above. In addition, they may use regulated substances or produce hazardous waste. Inspect these facilities, record what is being used, and be sure all potentially harmful materials are stored and disposed of properly.

For example, at a school, be sure that:

- Art supplies are properly stored and hazardous wastes produced by the art studio are managed in accordance with state and federal rules and are not discharged down the sink.
- Laboratory chemicals are properly labeled, stored and disposed.
- Waste oils and antifreeze from the automotive shop are properly labeled, stored and disposed.



4. Good Management

A well must be secure and protected. To ensure the safety and purity of the well, follow the do's and don'ts listed below:

DO:

- Regularly inspect activities in the sanitary protective radius.
- Restrict access to the well.
- Clearly label any **hazardous materials** essential to your treatment system located near the well.
- Cap and/or screen all vents, access ports, and other openings of the well or nearby monitoring wells.
- Check the condition of sanitary seals and replace those that are not intact.
- **Slope parking areas and concrete pads under storage areas away from the well;** periodically check their condition, and repair any permeable areas.

- Safeguard chemical feeders from inadvertent physical disturbances or tampering.
- Use a properly constructed sample tap and take other measures to avoid cross-connections.
- Inspect backflow prevention valves and replace as needed.

DON'T:

- Allow the installation of floor drains that discharge to a drywell or any surface leaching system (except for water system backflush) within the sanitary protective radius.
- Store any non-essential chemicals in or near the well house.
- Risk cross-connections by using a hose bib as your sample tap or allowing hoses to be submerged in swimming pools or slop sinks.

5. Municipal Officials

Be sure that officials know you operate a public water system. Explain the exact location of your well, your sanitary protective radius, and your WHPA. Discuss the results of your Source Assessment Report. You may be able to work with municipal officials to educate residents and businesses within your WHPA and to reduce threats from community-wide activities such as road salting. Ask that your WHPA be included in any groundwater protection planning efforts. If you are concerned about a particular activity near your well, ask the health officer or code enforcement officer for help in informing the property owner about Env-Wq-401 Best Management Practices for Groundwater Protection. For more information, contact DWGB at (603) 271-0688.

6. Educate

It is critical to water supply protection that the public be aware of a protection area. Post signs at access routes entering the WHPA to inform visitors that they are entering a sensitive area. Use periodic mailings to educate residents and businesses in your WHPA about the importance of protecting groundwater. Inform your staff and your water users about potential threats; they may help you locate and resolve a problem. Community systems are required to include a summary of their source assessment report in their annual consumer confidence report (often called a water quality report). NHDES can provide you with sample notices to post within your facility to remind your staff that they are within the protected area of a water supply.

Benefits

Wells with an approved wellhead protection plan are eligible for money-saving chemical monitoring waivers. Also, protecting your source saves you the added expense of water treatment associated with contamination. Ultimately, the protective measures you take help protect your investment, ensure healthy drinking water and improve consumer confidence!

For More Information

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at www.des.nh.gov.

Note: This fact sheet is accurate as of September 2019. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.



December 19, 2018

Ms. Sarah Greenshields, Owner
Little Tree Education Center and Coldstream Properties LLC
314 Route 108
Madbury, NH 03823

Re: Johnson Creek Septic System Placement

Dear Ms. Greenshields,

Thank you for contacting me to perform an initial hydrogeologic evaluation of the proposed septic system for the Real McCoy Property LLC proposed Johnson Creek assisted living facility. The following is a summary of that review and conclusions and recommendations based on this review.

Background

Little Tree Education Center is located at 314 Route 108 in Madbury, NH. The education center is a preschool with children aged 6 weeks to 12 years with an average enrollment of 75 children per day. There are 25-35 employed staff members at the facility on a rotating basis. Many of these children are formula fed as their sole food source. Drinking water for the school is provided from an on-site public water supply (PWS) well which is permitted by New Hampshire Department of Environmental Services permit # 1458010.

The well draws water from bedrock and the pump is currently set at 500 feet below land surface according to Epping Well and Pump who installed a new pump in 2016. The pump has a maximum capacity of 10 gallons per minute. A treatment system installed and maintained by Aqua Specialties of Northwood treats for soluble arsenic at the point of withdrawal. Regular testing of water quality is required to maintain the PWS permit. The well is located beneath a porch at the school on the southeast side of the school building and is furnished with a concrete protective cover.

Little Tree is concerned about the impact of a septic leachfield proposed on a parcel in Madbury – Map 9 Lot 23. This leachfield is part of a larger septic system on an adjacent parcel in Dover (Map H, Lot 1) where the Johnson Creek assisted living facility is proposed. The project was approved for a 12-bed facility in 2015 and was substantially built in 2016. The project was then revised and a request to increase the capacity to a 24-bed facility was requested in November 2018.



The septic system for the facility was already installed and was sized for 12 beds so an additional leachfield was proposed on an adjacent lot in Madbury where septic system leachate would be distributed to accommodate the load of the additional 12 beds at the facility. The septic systems are each designed for a 1500-gallon per day discharge rate.

The well location shown on the map included in Madbury Planning Board minutes is incorrect. The actual location is approximately 35 feet southwest of the mapped location so this will impact the final leachfield location. We understand that this oversight was corrected by the applicant's engineer.

Area Water Resources

This area of Dover and Madbury, which includes the land for the Johnson Creek facility in Dover, the proposed satellite septic field in Madbury, and Little Tree property, are near the southern boundary of an extensive sand and gravel deposit and aquifer that covers much of this area of Madbury and Dover (Mack and Lawlor, 1990).

This land is within Oyster River watershed and USGS mapping shows that groundwater flows to the south and southeast in this area. Less than 20 feet of saturated sand and gravel material lies beneath this area but has moderate transmissivity. Transmissivity is a measure of the capacity of the geologic material to transmit and store groundwater. These sand and gravel materials provide recharge to the large aquifer area and to nearby surface water bodies. This recharge also flows to underlying bedrock, and to nearby wells depending on the pumping rate and connectivity of the bedrock to the overburden sand and gravel.

The location of the existing or proposed septic fields (red boxes) and the Little Tree facility (blue box) are shown on the attached USGS maps. The red arrows show the approximate flow direction based on the USGS mapping. The flow from both septic leachfield areas is towards the Little Tree property. As required by the Madbury aquifer protection ordinance, the proposed septic field is just outside a 400 foot protective radius from the Little Tree water supply well.

Prescription Medication and Personal Care Products in Groundwater

One of the concerns voiced by Little Tree was that septic system discharge from the Johnson Creek facility may contain chemicals included in prescription medication, personal care products and cleaning products. Recent studies have shown that some of these organic wastewater compounds (OWCs) completed in hydrogeologic settings similar to that in Madbury are present in groundwater that receive discharge from domestic septic systems and/or land application of treated municipal wastewater

(Schaider, et. al, 2014, Schaider, et. al, 2017, McEachran et al, 2016). This research reported that compounds that are most likely to be found in leachfield drain water or groundwater wells located downgradient are antibiotics, perfluorinated compounds and flame retardants (PFAS), non-antibiotic prescription medication and the pesticide DEET. An assisted living facility can be expected to have a higher than normal use and discharge of prescription and non-prescription drugs which may either be excreted in human waste or mistakenly disposed to drains and toilets. Additionally a substantial use of cleaning products/disinfectants is also likely for sanitation at these facilities.

Conclusions and Recommendations

The septic leachfields as proposed will discharge approximately 1500 gallons per day each. If the septic system capacity was increased at the existing location 3000 gallons per day would be discharged from one leachfield area.

The concerns about water quality impacts to your well are valid especially since there are babies and young children that may be more sensitive to these chemicals during development. Some degradation of compounds occurs in the subsurface during infiltration and groundwater transport but antibiotics appear to be in large enough abundance in the areas studied to still have significant concentrations in downgradient water. Additionally, PFAS compounds do not break down and can only be diluted to decrease overall concentrations. Toxicological studies are on the increase with the recent attention on PFAS compounds, but there is limited information on human impacts from OWSs.

The Little Tree well is deep and is somewhat isolated from the subsurface, but recharge from the septic fields will likely migrate to the upper bedrock based on local hydrologic conditions and groundwater flow directions.

Additional well installation and pump testing could definitively determine the source of water to your well and other water supply wells in the vicinity. Bedrock wells tap fractures in bedrock that are connected in sometimes non-uniform ways. It seems that the discharge from an assisted living facility may be more appropriately routed to the nearby City of Dover city sewer than to an onsite septic system since this infrastructure is close to the project site.

Additional information gathering on local well depths and locations could provide information on impacts to other nearby landowners in addition to Little Tree. Well testing may also be appropriate to evaluate water supply well impacts.



The facility should have a policy for product and drug usage and disposal to assure that best management practices are being followed and to avoid impacts to subsurface water quality. Cleaning and maintenance products should also be chosen to have the least environmental impact while being effective in keeping the facility sanitary.

I hope this information is useful to the evaluation of your water supply well impacts. Please feel free to call with additional questions.

Sincerely,

A handwritten signature in black ink, appearing to be "Danna B. Truslow", written over a light blue grid background.

Danna B. Truslow, PG, CG
Principal Hydrogeologist

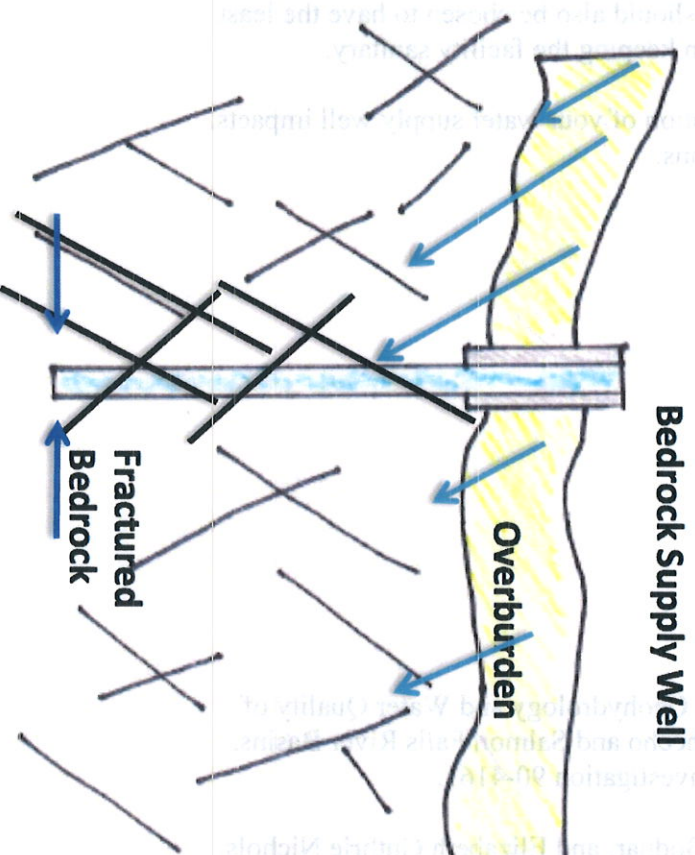
References:

- Mack, Thomas J. and Sean M. Lawlor, 1990, Geohydrology and Water Quality of Stratified Drift Aquifers in the Bellamy, Cochecho and Salmon Falls River Basins, Southeastern NH. USGS Water Resources Investigation 90-4161.
- McEachran, Andrew, Damlan Shea, Wanda Bodnar, and Elizabeth Guthrie Nichols, 2016, Pharmaceutical Occurrence in Groundwater and Surface Waters in Forests Land Applied with Municipal Wastewater, Environmental Toxicological Chemistry, 35, pp. 898-905.
- Schaider, Laurel A., Ruthann Rudel, Janet M. Ackerman, Sarah Dunagan and Julia Green Brody, 2014, Pharmaceutical, perfluorosurfactants, and other organic wastewater compounds in public drinking water wells in a shallow sand and gravel aquifer, Science of the Total Environment, Issue 468-469 pp. 384-393.
- Schaider, Laurel A, Kathryn M. Rogers, Ruthann A. Rudel, 2017, Review of Organic Wastewater Compounds Concentrations and Removal in Onsite Wastewater Treatment Systems, Environmental Science and Technology, Issue 51, pp. 7304 – 7317.

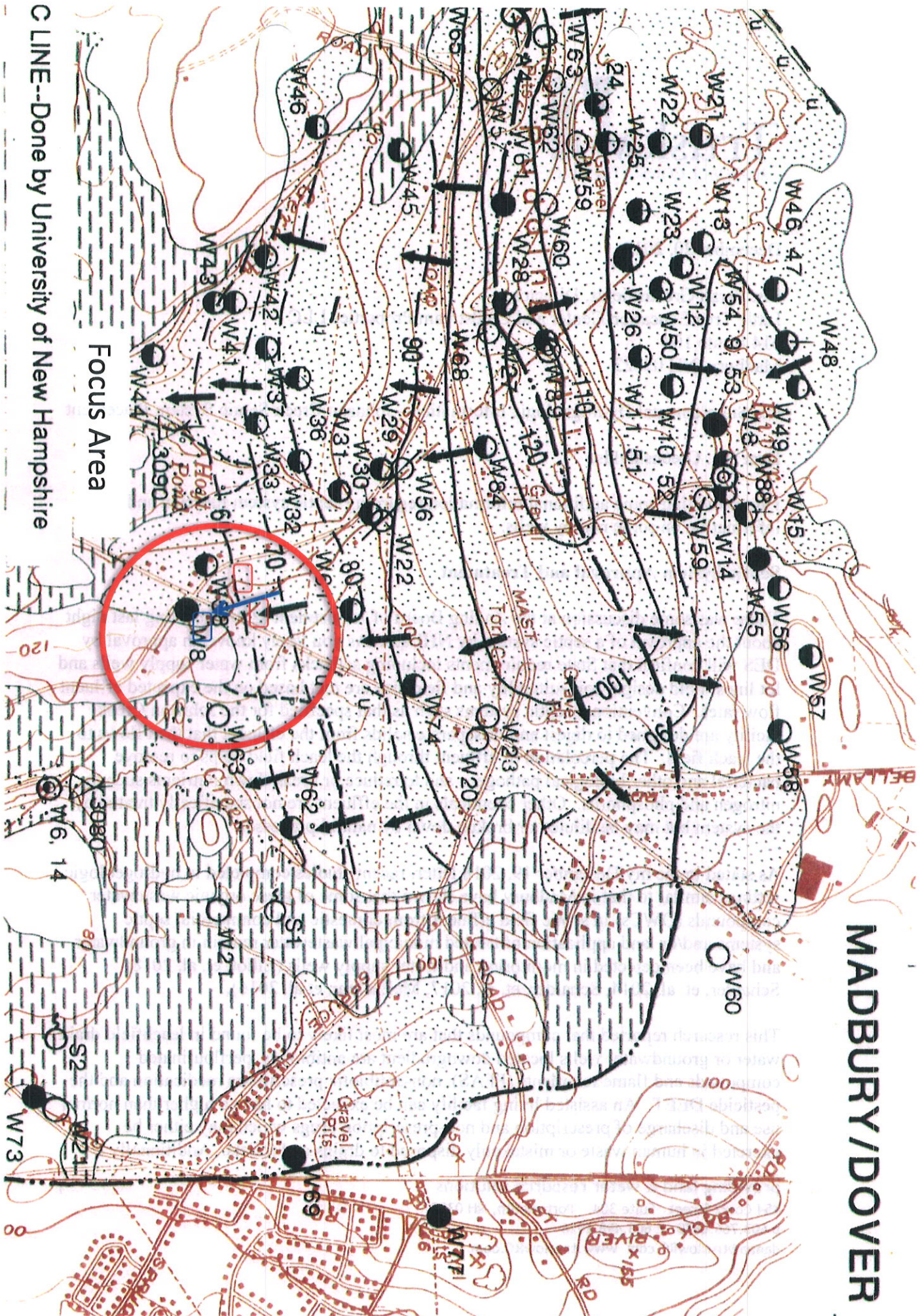
Bedrock Well Groundwater Flow

Groundwater flows to bedrock wells via fracture zones

- Casing driven to bedrock— open borehole in bedrock
- Yield based on needs of community/ business
- Overburden (unconsolidated material over bedrock) recharge to bedrock



MADBURY/DOVER



Focus Area

C LINE--Done by University of New Hampshire

Source: Mack and Lawlor, 1991



December 20, 2018

Ms. Sarah Greenshields, Director
Little Tree Education Center and Coldstream Properties LLC
314 Route 108
Madbury, NH 03823

Re: Supplemental Hydrogeologic Information - Johnson Creek Septic System Placement

Dear Ms. Greenshields,

I am providing some additional information regarding septic system function and information on some nearby wells.

Septic System Approval and Treatment

There was some discussion at the Zoning Board of Adjustment (ZBA) meeting last night about the approval of a septic system by NHDES. As you likely know, an approval by DES will confirm that State requirements including setbacks from water supply wells and lot lines, field design, soil suitability and field size are met based on the expected effluent flow rates. Conventional septic systems such as that specified for the Johnson Creek facility are designed to digest and/or separate solids from the effluent that then flows to the leach field. The percolation of effluent through the leach field helps to remove bacterial and other biological pathogens and to reduce or break down nutrients such as nitrogen and phosphorus. Other chemicals in the effluent are not specifically treated by the system but may be diluted or broken down by natural processes.

As stated in the my December 19, 2018 letter, recent studies completed in hydrogeologic settings similar to that in Madbury have shown that some of these organic wastewater compounds (OWCs) in septic field effluent from domestic and commercial septic systems and/or land application of treated municipal wastewater remain in groundwater and have been detected in monitoring and water supply wells (Elliot, et. al, 2018; Schaider, et. al, 2014, Schaider, et. al, 2017, McEachran et al, 2016).

This research reported that compounds that are most likely to be found in leachfield drain water or groundwater wells located downgradient are antibiotics, perfluorinated compounds and flame retardants (PFAS), non-antibiotic prescription medication and the pesticide DEET. An assisted living facility can be expected to have a higher than normal use and discharge of prescription and non-prescription drugs which may either be excreted in human waste or mistakenly disposed to drains and toilets. Additionally a

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substantial use of cleaning products/disinfectants is also likely for sanitation at these facilities. A conventional septic system is not designed to treat or remove these chemical compounds from the septic system leachate.

Nearby Wells

I have compiled information on nearby domestic and public water supply wells based on information available in the NHDES One Stop database. This includes well completion reports that have been submitted to the state since 1984. There are likely other water supply wells installed prior to 1984 that are nearby, but are not listed in the DES database. Some of the nearby homes are older and do not appear to have wells listed in this database (24, 31, 34, 35 Freshet Road and 317 Route 108). Addresses, tax map and lot numbers are listed in the attached table along with depth and well yield/pumping rate provided by the well driller.

Finally, I had a brief conversation with Al Pratt of the City of Portsmouth Water Department and they will be evaluating the potential water quality impacts of the proposed septic system on the public water supply wells located at 60 Freshet Road in Madbury.

Sincerely,

A handwritten signature in black ink, appearing to read "Danna B. Truslow", with a long horizontal flourish extending to the right.

Danna B. Truslow, PG, CG
Principal Hydrogeologist

cc: Elena Piekut, Planning Department, City of Dover, NH
Steve Haight, Civilworks

References:

Elliot, Sarah M., M. Erickson, A.L, Krall and B. Adams, 2018, Concentrations of pharmaceuticals and other micropollutants in groundwater downgradient from large on-site wastewater discharges, PLOS One (13) 11.

McEachran, Andrew, Damlan Shea, Wanda Bodnar, and Elizabeth Guthrie Nichols, 2016, Pharmaceutical Occurrence in Groundwater and Surface Waters in Forests Land Applied with Municipal Wastewater, Environmental Toxicological Chemistry, 35, pp. 898-905.

Schaider, Laurel A., Ruthann Rudel, Janet M. Ackerman, Sarah Dunagan and Julia Green Brody, 2014, Pharmaceutical, perflourosurfactants, ad other organic wastewater compounds in public drinking water wells in a shallow sand and gravel aquifer, Science of the Total Environment, Issue 468-469 pp. 384-393.

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Water wells in NHDES OneStop database near Proposed Johnson Creek Septic System
Madbury, NH

Well ID	Address	Tax Map	Lot	Total Depth (feet)	Depth to Bedrock below land surface (feet)	Tested Pumping Rate (gallons per minute)
67.0759	304 Durham Road, Dover	1	123	400	28	6
148.0044	23 Freshet Rd, Madbury	9	21A	362	11	7
148.0156	316 Rt 108 (Little Tree)	10	7	720	100	20
148.0202	49 Freshet Rd, Madbury	10	001C	623	7	18
148.0242	Hoyt Pond Rd (Sub Lot #4), Madbury	9	68	600	87	4
148.0243	" (Subdivision (Sub) Lot #6)	9	68	180	97	20
148.0251	" (Sub Lot #9) Madbury	9	68	600	47	1
148.0253	" (Sub Lot #3) Madbury	9	68	140	60	20
148.0254	" (Sub Lot #8) Madbury	9	68	440	63	8
148.0255	" (Sub Lot #2) Madbury	9	68	340	45	20
148.0256	" (Sub Lot #5) Madbury	9	68	640	92	15
148.0257	" (Sub Lot #10) Madbury	9	68	620	53	1
148.0324	60 Freshet Road, Madbury (City of Portsmouth)	9	12	93	NA	373
148.0326	11 Freshet Road, Madbury	9	20	420	135	15

