

# Trask

TRASK INCORPORATED

30 Turnpike Road • Suite 8  
Southborough, MA 01772  
PH: (508) 485-0077  
FX: (508) 485-4879

Massachusetts Department of Environmental Protection  
Northeast Region  
Drinking Water Program  
205B Lowell Street  
Wilmington, MA 01887

24 June 2016

RE: The Fields at Sherborn [TFS]

Dear Mr. Persky;

This letter has been drafted in reference to a letter, dated June 06, 2016, written by Alan Rubenstein, Chairman of the Town of Sherborn's Zoning Boards of Appeals [ZBA] regarding the Fields at Sherborn [TFS].

As you may recall, officials from Sherborn and members of my team (Dr. Wang) have reached out to you over the past several months regarding the well configuration proposal for our project, The Fields at Sherborn. Although the references submitted contained little detail, you directed us at that time to similar opinions given regarding successful well configurations/classifications. The two projects you recommended were The Whitney Farms project, Sherborn, MA and Abbey Road, Sherborn, MA. You indicated these were good examples of how well configurations could be constructed to keep the system as a private water system.

The town letter drafted by Mr. Rubenstein, which the Board initially represented as a collaborative effort, was to provide a clear representation of the system. Mr. Rubenstein's letter however; was drafted and sent without my teams knowledge and is deliberately short on detail and applicable data.

I understand that the MassDEP does have final approval over private water systems. We also understand that the overall control and ownership of these proposed wells must be in a format that allows the individual well owners the ability to maintain, repair and replace their wells as needed. These documents are being prepared and will be submitted for final review at the appropriate time.

The discussion of nitrogen influence from the projects proposed septic system to on and off-site wells has also been greatly underreported or oversimplified by the ZBA. If these reports are relevant to the DEP's determination of a public or private well system, we are prepared to expand on the results and provide you a more accurate picture of the system that has been planned.

There were 4 different hydrogeologists who reviewed this project:

- Dr. Desheng Wang, Creative Land & Water Engineering; applicant's hydrogeologist and wetland scientist.

- Mr. Horsley, Horsley and Whitten; represented an abutters group.
- Steven Smith, GeoHydrocycle Inc; 3<sup>rd</sup> party review hired by the Town of Sherborn and paid for by the applicant.
- Dr. Vernon, Nobis Engineering, hired by the Town directly for the Conservation Commission and the Board of Health.

Dr. Wang provided an extensive study of the overburden down gradient from the septic field and he made multiple Area of Influence (AOI) models that proved that all of the newly located wells would not be in the AOI field of the septic areas. His models also indicated the AOI would be substantially contained by a large wetland system located downgradient from the proposed septic field. Dr. Wang's calculations showed little to no potential impact from the proposed septic field. In addition, most of the wells are not downgradient, but side gradient leaving the wells over 500' away from the proposed septic area.

Steven Smith reviewed Dr. Wang's report and he substantially agreed with Dr. Wang. He did however, have concerns that, during low ground water times, the septic AOI could slip under the wetlands and pose threats to one or two on-site wells. Dr. Wang then performed groundwater studies within the wetlands area to confirm the hydraulic connection between the overburden and the wetland areas. He was able to confirm the link. Mr. Smith felt that due to this remaining underlying potential, a well monitoring program should be established so this condition could be confirmed over time; the applicant agreed. Mr. Smith also agreed that the impact to direct abutter's wells was not a problem based upon AOI flow. Mr. Smith then informed the board that if this low ground water condition was true, a well conditioning system could be installed to remedy the problem for the on-site wells.

Mr. Horsley, hired by the abutters, made multiple, opposing claims. First he claimed the septic areas would affect the abutter at 257 Washington Street. Then, after the system was reduced in size, he claimed that the abutter at 247 would be affected. At this point, Mr. Smith, Dr. Vernon, and Dr. Wang all agreed that neither 247 nor 257 Washington Street were in jeopardy from the AOI in the overburden area. Mr. Horsley then tried to claim that the storm water management system proposed for the project represented a more damaging problem. Mr. Horsley made various assumptions that were not shared by the other 3 hydrogeologists.

Dr. Vernon substantially agreed with Dr. Wang and Mr. Smith on the AOI flows. However, he also had concerns that since these wells were bedrock wells, little would be known about what could happen in bedrock fracture movements. Dr. Vernon did openly claim at a meeting (as referenced in the ZBA letter) that the probability that the nitrogen concentration in at least one of the project wells would exceed the drinking water standards [10 mg/liter] was greater than 50% during low groundwater conditions. When asked to clarify, Dr. Vernon did agree he was referencing **the overburden** and not necessarily the significant portion of the overburden, but potentially **just a portion of the overburden** would be affected. He also stated that just because it might be in the overburden was no indication that it would be in the well itself. This statement was made prior to the groundwater elevation done by Dr. Wang which proved a probable link between the wetlands and the groundwater, 365 days a year. This 50% prediction was not part of Dr. Vernon's final report (March 4, 2016, updated March 21, 2016), as he updated his report after our GW findings.

Dr. Vernon also stated that some plausible groundwater contour flow maps indicated that nitrate concentrations based upon **Title 5 Guidelines** methods could be greater than 20 mg/liter in the

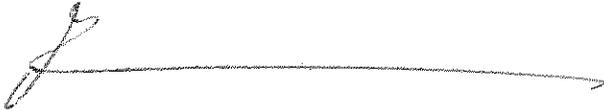
overburden groundwater at Wells F and G. However, this determination was made using only the **Title 5 Mass-Balance analysis** which, as conceded by Dr. Vernon, was not required in this project due to its size. He also said that it was of limited value in accurately determining nitrate values at a specific location and even less accurate in determining potential well-specific nitrate levels.

Dr. Vernon also completed an extensive Nitrate Dispersion Analysis (Domenico 1987) which he, along with Dr. Wang, recognized as a more accurate analysis for determining nitrate loading. Dr. Vernon's first table of values contained a calculation error and his table H, contained in his March 4 report, was flawed. Dr. Vernon did admit to this flaw and his firm recalculated the nitrate values. Enclosed please find his corrected table dated 3/21/16 (Table H1). Upon review you will see the relevant potential concentrations at nearby wells (247 Washington Street; and on-site well J) were between 1.7 and 6.2 (mg/L) depending upon different groundwater conditions/assumptions.

In closing, Dr. Vernon recommend a testing and monitoring protocol to be implemented during the well drilling, testing, and monitoring. The applicant agreed 100% to his suggestions for this protocol and is part of our final approval.

Enclosed please find the table H1 from Dr. Vernon' report, along with the AOI plan submitted by Dr. Wang. We are prepared to provide any and all support documentation the MassDEP may require.

Regards,



Ben Stevens  
Manager, The Fields at Sherborn

CC: Alan Rubenstein, Chairman Zoning Board of Appeals, Town of Sherborn  
Paul J. Haverty, Blatman, Bobrowski, Mead & Talerman, LLC

Revised Table H1 Nitrate Dispersion Analysis  
 247A Washington Street  
 Sherborn, Massachusetts

Line No.	Start	End	K (m/yr)	X (m)	Y (m)	Z (m)	AH	V <sub>x</sub> (m/yr)	α <sub>x</sub> (m)	α <sub>y</sub> (m)	α <sub>z</sub> (m)	z <sub>0</sub> (mg/L)	T (yr)	C (mg/L)	Adjusted C	Target (mg/L)
A-1	Septic 1	247 Washington Street*	3226	31.35	29	6.1	0.038	472.077	2.1957	0.2196	0.22	35	30	20.609904	1.710622	10
A-2a	Septic 1&2	Well J	3226	156.8	29	6.1	0.0141	175.843	5.6286	0.5539	0.554	35	30	4.6687126		10
A-2b	Septic 1&2	Well J*	3226	122.7	29	6.1	0.0163	189.58	4.9126	0.4913	0.491	35	30	6.2296715		10
A-3	Septic 1&2	Downgradient property line	3226	249.3	29	6.1	0.0141	175.54	7.9009	0.7901	0.79	35	30	1.6723588		10
A-4	Septic 1&2	103 Whitney Street	3226	524.8	29	6.1	0.0094	116.837	9.2926	0.9293	0.929	35	30	0.9735564		10
A-5	Septic 1&2	Small Wetland	3226	64.41	29	6.1	0.0767	952.004	3.4715	0.3471	0.347	35	30	11.937603		10
A-6	Septic 1&2	Dirty Meadow Wetland	3226	231.7	29	6.1	0.0184	228.104	6.6299	0.663	0.663	35	30	2.8610063		10
B-1	Septic 1	247 Washington Street*	3226	31.35	29	6.1	0.0435	639.516	2.1957	0.2196	0.22	35	30	20.609904	1.710622	10
B-2a	Septic 1&2	Well J	3226	150.9	29	6.1	0.0127	157.74	5.6073	0.5607	0.561	35	30	4.5249259		10
B-2b	Septic 1&2	Well J*	3226	126.8	29	6.1	0.0134	166.796	4.9938	0.4994	0.499	35	30	6.0004671		10
B-3	Septic 1&2	Downgradient property line	3226	360	29	6.1	0.0068	84.5785	7.9072	0.7907	0.791	35	30	1.6690484		10
B-4	Septic 1&2	103 Whitney Street	3226	644.3	29	6.1	0.0044	84.3908	9.4233	0.9423	0.942	35	30	0.9274465		10
B-5	Septic 1&2	Small Wetland	3226	66.8	29	6.1	0.0153	189.982	3.5451	0.3545	0.355	35	30	11.56228		10
B-6	Septic 1&2	Dirty Meadow Wetland	3226	215	29	6.1	0.0111	197.658	6.4123	0.6412	0.641	35	30	3.1489141		10

source	H (ft)	end H (ft)	length (ft)	ΔH
A-1	177.5	174	92	0.03804
A-2a	172.5	166	460	0.01413
A-2b	172.5	167	360	0.01528
A-3	172.5	158	1025	0.01415
A-4	172.5	158	1540	0.00842
A-5	172.5	158	189	0.07672
A-6	172.5	160	699	0.01839
B-1	174	170	92	0.04648
B-2a	170	164	472	0.01271
B-2b	170	165	372	0.01344
B-3	170	163	1027	0.00682
B-4	170	163	1597	0.00438
B-5	170	167	196	0.01531
B-6	170	163	631	0.01109

K (ft/day)	K (m/yr)	from applicant	29	3226
App assumes	A-1	App assumes	A-1	
App assumes	A-2a	App assumes	A-2a	
App assumes	A-2b	App assumes	A-2b	
App assumes	A-3	App assumes	A-3	
App assumes	A-4	App assumes	A-4	
App assumes	A-5	App assumes	A-5	
App assumes	A-6	App assumes	A-6	
We assume	B-1	We assume	B-1	
We assume	B-2a	We assume	B-2a	
We assume	B-2b	We assume	B-2b	
We assume	B-3	We assume	B-3	
We assume	B-4	We assume	B-4	
We assume	B-5	We assume	B-5	
We assume	B-6	We assume	B-6	

Notes:  
 Kd = solute-specific distribution coefficient, T = arrival time  
 C<sub>0</sub> = source concentration, C = predicted concentration  
 V<sub>0</sub> substituted for V<sub>x</sub> in equation below to incorporate retardation  
 V<sub>0</sub> = V<sub>x</sub> / (1 + (ρ<sub>s</sub> / n) \* K<sub>d</sub> / K)  
 V<sub>x</sub> = AH \* K / n<sub>s</sub>

\*Flow line assumed to reach edge of area of impact, Final C is multiplied by 30/860 or 0.033  
 \*\*Flow line assumed to reach edge of area of impact directly, with no off-set dilution

Aquifer Properties  
 n = 0.3  
 n<sub>s</sub> = 0.26  
 ρ<sub>s</sub> (g/cm<sup>3</sup>) = 1.7