



ENGINEERING SUCCESS TOGETHER

August 19, 2015

Town of Sherborn
19 Washington Street
Sherborn, Massachusetts 01770

Attn: Mr. Alan Rubenstein, Chairman Ms. Daryl Beardsley, Chairman
Board of Appeals Board of Health

Re: The Fields at Sherborn - Comprehensive Permit Application
Sewer and Water Systems Review

Dear Mr. Rubenstein and Ms. Beardsley:

BETA reviewed the Comprehensive Permit Application for The Fields at Sherborn relative to the onsite sewer and water systems. This letter is provided to outline BETA's findings, comments and recommendations.

BASIS OF REVIEW

The following documents have been provided and will form the basis of the review.

- Board of Health Application Cover letter to Mark Oram, Health Agent, dated July 28, 2015 from Bruce Saluk & Assoc. Inc., Marlborough, MA
- Board of Health Application Cover letter to Phil Paradis, BETA Group, dated July 28, 2015 from Bruce Saluk & Assoc. Inc., Marlborough, MA
- Plans (9 Sheets) entitled *The Fields at Sherborn Washington Street Sherborn* dated, December 8, 2014, revised through July 28, 2015 by Bruce Saluk & Assoc. Inc., Marlborough, MA
- Septic System Plans (3 Sheets) entitled *The Fields at Sherborn Washington Street Sherborn* dated, July 13, 2015 and July 28, 2015 by Bruce Saluk & Assoc. Inc., Marlborough, MA
- *BioMicrobotics Fast Treatment Systems Performance Evaluation Plan* prepared by Bio-Microbics Inc. Shawnee, KS

Project Overview

The existing 17.55± acre wooded lot containing wetland resource areas is located on the south side of Washington Street opposite Knollcrest Farm Lane in Sherborn, Massachusetts. The project documents indicate the proposed development includes 36 new residential units in 10 buildings with associated access drives, parking, private water wells, on-site septic, stormwater management systems and private utilities.

Supplemental documents indicate that the proposed units are two stories with an average of 2500 sq. ft. of floor area. The site plan and architectural elevations depict some units with walk out basements.

WATER SERVICE

The project is proposing to install a well for each of the 10 buildings. The Applicant is indicating that this configuration qualifies as a private water system. In reviewing 310 CMR 22.02 a public water system is defined as:

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Public Water System means a system for the provision to the public of water for human consumption, through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year. Such term includes any collection, treatment, storage, and distribution facilities under control of the operator of such a system and used primarily in connection with such system, and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. The Department may presume that a system is a public water system as defined herein based on the average number of persons using a facility served by the system or on the number of bedrooms in a residential home or facility. The Department reserves the right to evaluate and determine whether two or more wells located on commonly owned property, that individually may serve less than 25 people, but collectively serve more than 25 people for more than 60 days of the year should not be regulated as a public water system, taking into account the risk to public health.

BETA was provided with an email and guidance from MassDEP relative to this issue. It is unclear from the correspondence when the project was discussed and how much detail of the project, beyond the original email, was provided.

- W1. BETA recommends the Applicant provide an official letter from MassDEP that they have reviewed the entire project as it relates to both water supply and sewer treatment issues and the question of whether this should be considered a Public Water System.
- W2. Provide well quality and quantity testing data including short and extended time well pump testing to confirm that there is sufficient supply and whether treatment is required.
- W3. Provide information on proposed irrigation well.

SEWER SYSTEM

The project includes a shared sewer septic system for the 36 units. The collection system routes flows to a septic tank through 2 Fast tanks to a pump chamber system then to one of three soil absorption fields.

Title 5 Compliance

Design flows: BETA completed an analysis of preliminary floor plans in their Site Plan Peer Review letter to ZBA dated August 10, 2015 (excerpt attached) and based on that analysis the sewer system for this proposed project should be based on the potential of 129 bedrooms or units will need to be deed restricted. The following review is based on the Applicant's assertion that the project will provide 84 bedrooms or 9,240 gal/ day.

- T5-1. Include a condition that units will be deed restricted based on the final floor plans with the total number of bedrooms not to exceed 84 (15.002 Bedroom).

System components meet the minimum setbacks (15.211) for property lines, BVW, private water supply well, leaching catch basins and drywells.

- T5-2. Provide retaining wall designed by a Massachusetts Registered Professional Engineer (310CMR 15.211(1)[4]). Confirm that the property line setback(s) of the proposed retaining walls complies with applicable zoning, building, planning board requirements. It is depicted as being installed 6-inches away from the property line.

Based on 15.214, with proposed on-site wells, the project must comply with nitrogen loading limitations. With the use of an approved system with enhanced nitrogen removal the loading can be increased up to 9,652 gals/day – the design flow is 9,240 gal/ day which is below the maximum amount allowed.

Facility Aggregation Plan

T5-3. Provide the aggregation plan report, and mass balance analysis required per the guidelines for 310 CMR 15.216, to assure that groundwater quality standards (10 mg/l total nitrogen and 10 mg/l nitrate nitrogen) are met at down gradient sensitive receptors, and at both the private wells to be located on the proposed development, as well as at the private well(s) on adjacent lots. Down gradient groundwater monitoring will also be required according to the nutrient loading guidelines.

Plans and Specifications

T5-4. Provide legal boundaries of the facility (property) to be served (15.220(4)(a))

Septic Tank: The project includes a required two compartment 28,230 gal septic tank with the first compartment sized (18,762 gal.) to provide 48 hour detention time and the second (9,468 gal) for 24 hours. The 5,000 PSI precast concrete watertight (HS-20 loading) tank includes required baffles, tees and access.

T5-5. Confirm that septic tank is 25 feet or more from wetlands.

T5-6. Provide buoyancy calculations for all tanks installed below seasonal high groundwater elevations.

Pump Chamber: The project includes a pump chamber and a secondary pump chamber tank to provide supplemental 24 hour emergency storage.

Innovative/Alternative (I/A) Treatment Technology Comments:

T5-7. The MassDEP provisional use approval letter for the Biomicrobics FAST system for flows between 2,000 gpd to 10,000 gpd requires effluent monitoring requirements. Flow metering provisions were missing on the plans, and are required in the provisional approval letter. Wastewater flow meter is to be provided to measure the flow to each of the leaching fields. Water metering of the domestic, non-irrigation or fire suppression system well flows is also not specified.

T5-8. The proposed I/A septic system design must also be reviewed and approval obtained by MassDEP, per 310 CMR 15.003 (2) (a) and (e). This is stipulated in the provisional approval for the proposed system, Item III, C. 1.

Soil Absorption System (SAS):

The project proposes three SAS fields of trenches that will alternate dosing three times a day for each field.

GROUNDWATER MODELING

The aquifer testing was done in the unsaturated zone of the aquifer above the water table, and the results of the testing were used to simulate saturated groundwater mounding for both septic and storm water.

GW1. Provide results of saturated aquifer testing.

GW2. As an alternative to the aquifer testing, conduct additional groundwater mounding calculations using the lowest hydraulic conductivity (29 feet per day) for both the storm water BMPs and the septic leach fields.

GW3. Determine a saturated thickness for the aquifer based on knowledge of local bedrock elevations obtained from well logs.

GW4. In converting HydroCAD storm water volumes to groundwater mounding model inputs, use the method developed by William Domey.

GW5. In determining if the storm water BMP meets requirements, compare the 3-day residual

groundwater mound elevation, as determined by groundwater modeling, with the design elevation of the bottom of the BMP.

GW6. Provide the groundwater flow direction and slope of the water table beneath the property.

SHERBORN BOARD OF HEALTH REGULATIONS

Understanding that Comprehensive Applications are not bound to local regulations however 310 CMR 15.003 Coordination with Local Approving Authorities states:

(1) In general, full compliance with the provisions of 310 CMR 15.000 is presumed by the Department to be protective of the public health, safety, welfare and the environment. Specific site or design conditions, however, may require that additional criteria be met in order to achieve the purpose or intent of 310 CMR 15.000.

Based on the fact that Sherborn provides no public water supply or sewerage treatment and relies on on-site systems, it is recommended that the additional criteria (as outlined in the Sherborn Board of Health Regulations) be considered for this project due to the fact that maximum build out is proposed on a parcel that:

- Will provide private wells on the same lot
- 40 % of the project parcel is mapped as wetland resource areas
- Varies in elevation by 45± feet
- A portion of the parcel is located within an approved wellhead protection area (Zone II)
- A portion of which is located within a FEMA mapped 100 year flood plain.
- The soil absorption system for the entire project is located within 150 feet of two adjacent private wells.
- The entire site is located within a NHESP mapped estimated habitat area for rare wildlife.

Also the attached correspondence from MassDEP emphasizes the fact that they do not have jurisdiction over private wells and they are under the jurisdiction of the local board of health regulations.

The following are additional requirements indicated in the Sherborn Board of Health Regulations.

I Sewerage Disposal

- BOH1. All single family dwellings shall be designed for a minimum of three (3) bedrooms (7.1). Documentation indicates that the project is proposing 24 two bedroom units and 12 three bedroom units. Flows should be revised to reflect this requirement.
- BOH2. Each (septic) tank in series shall be 200% of the design flow (7.2.2). Increase the second compartment to meet this requirement. Deed restriction on garbage grinders will be required, if system not designed for garbage grinder.
- BOH3. Due to rapid infiltration rate of 2 minutes per inch, the minimum distance from private wells is 150 if it is upgradient of the SAS or 175 feet if down gradient (10.1). This will require the relocation of the SAS.
- BOH4. All subsurface disposal areas shall be 20 feet from any property line. This will require the relocation of the SAS.

BOH5. Maximum cover allowed over leaching facilities is 2-ft (Section 8.3). 3-ft of cover is called out on the plans. This will require grades to be revised. Field Primary 2 is depicted with finish grade of 194.0, with top of lateral at elevation 191.2, depicting 2.8-ft of cover.

II Domestic Water Supply

The project does not meet the regulations in respect to the following:

BOH6. Semi-Public Water Supply (§2.4): the project would be defined "Any water system serving or intended to serve water for human consumption for domestic uses or purposes including, but not limited to, multiple dwellings, ..."

BOH7. Number of wells (§7.0): No well shall be used to supply more than one dwelling.

III Public and Environmental Health Review Regulations and Standards for Other than Single Family Dwelling on a Single Lot

BOH8. Environmental Health Impact Report (§3.1): The project proposes more than 10 dwelling units and sewage design flow of more than 4,400 gallons per day, provide report.

BOH9. Water Supply (§7.0): "in the case of sites to be served by on-site wells, hydrogeological evaluation showing groundwater flow directions and the proposed placement of wells and septic systems. Zones of contribution to wells shall be delineated

BOH10. Sewage Disposal (§8.0.2): "or any subdivision having ten (10) or more dwelling lots or any project having a minimum design wastewater flow of 4400 gallons per day, a hydrogeological evaluation shall be performed by a qualified engineer or geologist, at the expense of the applicant, to be reviewed by the Board of Health for this determination. Hydrogeological evaluations shall include determination of geologic stratigraphy, determination of ground water flow directions, determination of minimum groundwater elevation when relevant, evaluation of water table mounding, and prediction of down-gradient water quality impacts...", provide evaluation.

If we can be of any further assistance regarding this matter, please contact the undersigned.

Very truly yours,
BETA Group, Inc.



Philip F Paradis, Jr., PE
Project Manager

BETA Group, Inc.



Robert Baglini, PE
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GeoHydroCycle, Inc.



Stephen Smith, PE, P.HGW Senior
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CC: Jeanne Guthrie
Ellen Hartnett
Jean Greco

Ben Stevens
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Desheng Wang



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Excerpt from BETA’s August 10, 2015 letter to the Zoning Board of Appeals

Supplemental documents indicate that the proposed units are two stories with an average of 2500 sq. ft. of floor area. The site plan and architectural elevations depict some units with walk out basements. Analysis of the preliminary architectural plans, provided with the application, indicate that units have the potential to have more bedrooms than listed. 310 CMR 15.002 Defines a Bedroom as follows:

Bedroom - A room providing privacy, intended primarily for sleeping and consisting of all of the following:

- (a) floor space of no less than 70 square feet;*
- (b) for new construction, a ceiling height of no less than seven feet three inches; for existing houses and for mobile homes, a ceiling height of no less than seven feet zero inches;*
- (c) an electrical service and ventilation; and*
- (d) at least one window.*

Living rooms, dining rooms, kitchens, halls, bathrooms, unfinished cellars and unheated storage areas over garages are not considered bedrooms. Single family dwellings shall be presumed to have at least three bedrooms. Where the total number of rooms for single family dwellings exceeds eight, not including bathrooms, hallways, unfinished cellars and unheated storage areas, the number of bedrooms presumed shall be calculated by dividing the total number of rooms by two then rounding down to the next lowest whole number. The applicant may design a system using design flows for a smaller number of bedrooms than are presumed in this definition by granting to the Approving Authority a deed restriction limiting the number of bedrooms to the smaller number.

Based on floor plans and the definition above the number of bedrooms is calculated as follows -:

<u>Unit Name</u>	<u>Bedrooms</u>	<u>Studies</u>	<u>Total Rooms^a</u>	<u>Effective Bedrooms</u>	<u>Project Units^b</u>	<u>Total Bedrooms</u>
Adams 2 (in)	2	2	8	4	10	40
Adams 3 (in)	3	1	8	4	5	20
Kirkland 2 (ex) 1 st Fl. M.	2	1	7	3	6	18
Kirkland 2 (ex)	2	1	6	3	6	18
Kirkland 3 (ex)	3	1	7	4	6	24
Leverett 2 (ex)	2	1	6	3	2	6
Leverett 3 (in & ex)	3	0	6	3	1	3
Total					36	129

Notes:

- a. Architectural drawings did not include basements therefore any potential basement rooms were not considered.
- b. Floor plan options of 2 and 3 bedroom units were maintained at a ratio of 2:1 (24 to 12) respectively.

Since the number of bedrooms are used to calculation water usage and sewer treatment facility sizing, the Board should evaluate the project on the potential construction of 129 bedrooms.



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The following is the Applicants email correspondence with DEP regarding private or public wells

Tom Mahin forwarded your e-mail to me. I am one of his staff in the MassDEP Drinking Water Program in the Northeast Regional Office.

For the wells at your development to be private wells instead of a public water system, the wells must be **completely independent** of the condominium trust. The maintenance must be done by the well owners and not by the condominium trust. If the wells are a common responsibility of the entire development, then they are not private wells. MassDEP does not have a template to provide you on writing up the documents.

MassDEP has jurisdiction over public water supply wells, but not over private wells. If the wells are determined to be private wells, then they will be under the jurisdiction of the Sherborn Board of Health. They will be subject to the requirements that the Town of Sherborn has for private wells, including testing.

The following is information that we have sent to other developers – Tom may already have sent you this:

For wells that are on commonly owned property to be considered individual private wells rather than parts of a single public water system, the owner(s) of an individual well need to be able to do any needed maintenance, upgrade, or replacement of the well without any veto control by a larger entity such as a condo association, realty holding company, etc. This control of the well needs to be stated clearly in both the unit deed and on the master deed. The ownership documents have to give the well owners (which may be an entity such as a well trust) total control of the well.

If what is proposed is a residential development, please be aware that there is a MassDEP policy that says there will be a presumption of two people per bedroom. So to be less than the 25 people threshold for a public water supply, there can be no more than 12 bedrooms served by one well. If these are 2-bedroom units, that would mean 6 units on a well. If they are 4-bedroom units, there could only be 3 units on a well.

There haven't been enough of these projects yet for MassDEP to have a formal standardized process for the review. In the process of development, the wells are likely to be under common ownership early on, and then must be moved from the common ownership to ownership by the sub-unit (the well trust, well owners, etc.). For a couple of projects done in western Mass., MassDEP addressed this by requiring the developers to enter into Administrative Consent Orders that required the wells to be moved from the common deed to the sub-unit ownership before the units were sold. The only one done so far in the MassDEP Northeast Region was the Whitney Farm project in Sherborn. That project did not come before MassDEP until late in the development process, when the design was changed from individual lots to condominiums, so in that case there were already unit deeds that the well ownership language could be put into.

If the well ownership is set up so that there is no public water system, then the wells are legally considered to be private wells. Private wells are under the jurisdiction of the local Board of Health and are subject to the private well requirements for that Town. In that case, there is no requirement for a Zone I protective radius, and each well just has to meet the setback requirements that the Town requires for private wells.

James Persky
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----- Original Message -----

Subject: drinking water well condition

From: Desheng Wang <deshengw@yahoo.com>

To: "Mahin, Thomas (DEP)" <Thomas.Mahin@MassMail.State.MA.US>

CC:

Hi Tom,

Hope this find you well.

I spoke with you a couple of months ago regarding the drinking water condition for a project in Sherborn.

We have a 40B subdivision development requires onsite water supply. We have 36 units 2-brm clustered in 11 buildings (it may have some minor changes later). In order to make nonpublic water supply wells, we will have 7 to 11 wells to supply water to the 36 units so that each well will have less than 24 services (12 bedrooms). If I recall it right, you told me that we also need to put the wells to well easements to be used by the buildings exclusively.

As the whole setting is in a condominium trust, the entire land will be held by the trust and the trust will carry out the public land O/M. We like to include the wells in the common maintenance. Given the non-public water supply requirement, can we do that?

Would you provide me a template for the water well easement and any advice on how can we set up the O/M and trust in order to make the wells non-public water supply? Any other requirement for water quality testing and reporting under our nonpublic water supply well setting in the future?

See the attached site plan for project setting.

Looking forward to your response.

Thank you.

Desheng Wang, Ph.D. P.E., CWS, CSE