

To: Daryl Beardsley, Chair  
Julie Dreyfus, Vice Chair  
Sherborn Board of Health, Town Hall,  
Sherborn, MA

From: Mark S. Bartlett, P.E.  
Stantec, Hingham, MA

Project/File: Sherborn, Project Review

Date: May 21, 2025

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**Reference: Review of Lot 3, 121-129 Washington St. Shared Septic System for Residences (40B)  
3<sup>rd</sup> Review Memo, response to Applicant's Supplemental Test Pit Submittal of 5/19/25**

### **Introduction**

On behalf of the Sherborn Board of Health (the Board), Stantec Consulting Services, Inc. (Stantec) reviewed submittals to the Board in support of a proposed subsurface sewage disposal (septic) system at Lot 3, 121-129 Washington Street (the Site) and issued a project review memo on April 9, 2025.

On April 29, 2025, we received an email reply from the Applicant that responds to our comments as well as a revised plan set for the Title 5 application revised April 29, 2025 (3 sheets). Prior to our receiving this revised plan, we participated in two remote Teams Call meetings with the Applicant and his engineer to discuss proposed revisions, one call on April 14th, and a second call the morning of April 29th. Then on May 1<sup>st</sup>, Stantec issued a second project review memorandum which included Stantec's original April 9th comments, the Applicant's responses, and Stantec's evaluation of the Applicant's responses.

The project was discussed at the Board Meeting on May 7, 2025. At the meeting the Board requested that the Applicant provide two (2) additional deep hole test pits to be located at the northeast and southwest corners of the proposed SAS (at trench #5). These test pits were excavated by the Applicant on May 16, 2025, and the results were reported to the Board on May 19, 2025. **This third memo only addresses this follow-up issue of test pits as raised at the Board meeting during discussion of Comment 4 below (see pages 3 & 4).** All other comments below are unchanged from our second memorandum of May 1, 2025.

### **REVISED SUBMITTALS CONSIDERED**

- A. Letter dated May 19, 2025, from DGT Associates to Bob Murchison, re: Washington Street Soil Testing including attachments: (1) Deep Test Hole and Percolation Test Logs, and (2) Soil Test Hole Location Plan.

**Reference:** 3<sup>rd</sup> Review of Lot 3, 121-129 Washington Street Shared Septic System for Residences (40B)

## **REFERENCES**

- A. Massachusetts Department of Environmental Protection regulations 310 CMR 15.000: The State Environmental Code, Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-Site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage. (last revised 8/4/23)
- B. Sherborn “Regulations of the Board of Health, Section I Sewage Disposal” dated January 2020; and Sherborn “Board of Health Regulatory Changes Approved at 10/4/2023 Public Hearing (effective 11/9/2023)”, (collectively referenced herein as BOH Regulations).

## **Comments on the Proposed Septic System Plans Dated December 23, 2024:**

- 1. Proposed Benchmarks are noted on the septic plan, and this is acceptable for now. The Board shall require as a condition (if approved) that these benchmarks shall be set with elevations by the surveyor of record with witness stakes prior to the start of construction and visible to the Board at a pre-construction inspection and shall remain through the end of construction.

*Applicant Response: Agreed.*

**Stantec: The response is acceptable. The Board’s condition (if approved) as noted above will be a requirement.**

- 2. The vernal pool location needs to be located on the design plan so that the required setback of 100-ft (min) can be confirmed per Title 5 310 CMR 15.211 (1).

*Applicant Response: Vernal Pool is noted on plan as requested.*

**Stantec: The response is acceptable.**

- 3. An undefined pathway or easement, about 10-ft wide, is shown on the plan starting at Washington Street and crossing on the west side of the Site from north to south. This pathway needs to be called out on the plan and defined as to purpose (i.e., legal rights of passage and/or utilities, etc.). Also, because the path passes over a corner of the SAS, the Applicant should discuss what provisions, if any, are proposed to ensure that there will be no adverse impact to the SAS because of the path location.

*Applicant Response: The ten-foot-wide easement shown on the plan is designated for walking and horses. We have shown the path to be relocated (allowable by MA law) along the western property line and away from the SAS.*

Reference: 3<sup>rd</sup> Review of Lot 3, 121-129 Washington Street Shared Septic System for Residences (40B)

**Stantec: The response is acceptable. We recommend that the beginning and the end and the two angle points along the relocated 10-ft wide easement be permanently marked on site with concrete bounds.**

4. Test pit logs and locations are shown on the SAS plan and in the Soil Report, and Soil evaluation reports for all test pits (including those not used for SAS design) are noted in the Soil Report with locations noted on the Site plan, and these are useful. However, as quoted from the Applicant's Soil Report (page 3 above): ***Refusal was observed in test holes TH 24-02, 24-06, and 24-08 with depths that varied between 33 –57". However, at the time of testing it could not be determined if the observed refusal was ledge/bedrock or if it was due to the presence of large boulders that were present throughout the soil profile in all of the test holes on the site. Additional testing with a larger excavator may be required to confirm depth to refusal.*** The refusal (on either boulders or bedrock) encountered at TP-24-02 within the SAS area is of particular concern; and may be related to refusals found at TP-24-06 and TP-24-08 which are 54.5± ft and 174.5± ft respectively north of the SAS area.

**Title 5: 15.240: Soil Absorption Systems**, requires "(1) On-site subsurface sewage disposal systems shall be located in an area where there is at least a four-foot depth of naturally occurring pervious soil below the entire area of the soil absorption area and reserve area unless a variance is issued in accordance with the provisions of 310 CMR 15.415(2). The four-foot stratum must be free of impervious and unsuitable materials." (underlined emphasis added).

To ensure that there will be 4-ft of naturally occurring pervious material free of rock, and for better understanding of the hydrogeology (e.g., depth of saturated thickness) at the SAS given proximity to downgradient wetlands, further SAS area subsurface testing is recommended (e.g., with a grid of "Geoprobes") conducted across the SAS area, to definitively establish the presence of soils vs. ledge and the depth to bedrock below the proposed SAS. Any ground water or ledge encountered should be noted along with the types of soils encountered in the coring.

*Applicant Response: As we agreed, we have moved the entire system about 8' to the southeast (downhill) to avoid the large boulders found further uphill in TH 24-02, TH24-06 and Th 24-08. We are no longer relying on TH 24-02 for design as it is now not within the system. The system is designed using TH 24-01, TH 24-04, and TH 24-05. Furthermore, we have additional confirmation of comfortably compliant pervious material depth from the results of unwitnessed testing at TH 23-05.*

**Reference:** 3<sup>rd</sup> Review of Lot 3, 121-129 Washington Street Shared Septic System for Residences (40B)

*As we agreed in our call this morning, at the time of construction we will do six additional holes from the bottom of excavation down to an elevation of 103' to ensure that the entire system meets the Title 5 requirement of 4' of natural pervious material (as you suggested we are going down an additional foot to be conservative). This condition is documented in Regulatory Note #8*

**Stantec: This response and plan revision at Regulatory Note #8 are acceptable. [Note: the depth of excavation for bottom soils inspection during construction has been correctly stated on the plan at Regulatory Note #8 as to elevation 203 (not to 103 as noted in the response above).]**

Board requests at Meeting May 7, 2025: To definitively establish that there will be at least 4-ft of naturally occurring pervious material free of rock below the proposed SAS, the Board requested two (2) additional deep test pits to be located at the ends of SAS trench #5 (northeast and southwest corners). The Board also agreed that the revision at Regulatory Note #8 should be kept on the plan to require inspection of subsurface conditions during SAS construction.

*Applicant Response: See the letter from DGT Associates dated May 19, 2025, that provides the requested Deep Test Hole and Percolation Test Logs along with a Soil Test Hole Location Plan.*

**Stantec: David Glenn, a Stantec MA DEP registered Soil Evaluator witnessed the on-site soil testing conducted by DGT Associates on May 16, 2025, at the Site. His field logs of the test pits are attached, and these confirm the findings reported in the DGT Associates letter. The recent test pits demonstrate that depth of pervious material (including B Horizon soils) is 6.5-ft to 7.1-ft at test holes 25-01 and 25-02 respectively. Although some boulders (2' to 4' size) were found (and removed) at these test pits, it is apparent that ledge (a.k.a. bedrock) was not found within the required depth of pervious material. In addition, the depth to ESHGW<sup>1</sup> was 61-inches at test hole 25-02 (northeast corner test) which translates to elevation 204.1 in that location. The SAS design is based on a conservative ESHGW elevation of 206.5 (which is 2.4' higher).**

5. The highest ESHGW elevation is noted in Test Pit 24-01 as **206.5**. Therefore, the SAS design should be adjusted up by **0.3-ft** so that the proposed bottom of the SAS will be set at **210.5**, or 4-ft minimum from the 206.5 ESHGW level.

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<sup>1</sup> ESHGW stands for "Estimated Seasonal High Ground Water." Actual groundwater was observed on the day of testing at elevations 202.3 and 202.7 at test holes 25-01 and 25-02 respectively.

**Reference:** 3<sup>rd</sup> Review of Lot 3, 121-129 Washington Street Shared Septic System for Residences (40B)

*Applicant Response: You are correct. This was a clerical error. We have made the proper adjustment.*

**Stantec: The response and plan revision are acceptable.**

6. Enhance the Limit of Excavation (LOE) description noted on the plan to specifically call for the LOE to include replacement (R&R) of unsuitable soils with Title 5 sand and note that this is to a minimum of 5-ft past the limits of the trenches (active or reserve).

*Applicant Response: The limit of excavation has been enhanced, and a callout has been added on the plan to refer to Regulatory Note #8 for more information.*

**Stantec: The response and plan revision are acceptable.**

7. The SAS is proposed as a mounded system with construction in fill per 310 CMR 15.255 and proper breakout separation (15-ft minimum) between the top of the leaching trenches and a 3:1 surface slope is provided, (per 310 CMR 15.255(2)). Our estimate of potential groundwater mounding at the system indicates that trench effluent added to ESHGW should not breakout at the 3:1 surface slope that is proposed as grading around the SAS (however, see Comment 9 below).

*Applicant Response: Agreed.*

**Stantec: The response is acceptable and the revised plan location for the SAS (including the limited proposed retaining wall for grading control) are acceptable.**

8. The Applicant has indicated that the proposed subsurface disposal system will be serving a Condominium and therefore all legal documentation for ownership and for operation and maintenance responsibility should be provided to the Board including a "condominium master deed." If there are any questions on details, we recommend that the Board consult with Town Counsel and MassDEP as necessary for clarification on this issue and for assurances that the Condominium will adequately operate and maintain the septic system and provide reserve funding for replacement of the system field and components in the future.

*Applicant Response: Agreed.*

**Stantec: The response is acceptable; and should the Board have any questions on legal issues we recommend that they consult with Town Counsel and MassDEP as necessary for clarification and for assurances that the Condominium will adequately operate and**

Reference: 3<sup>rd</sup> Review of Lot 3, 121-129 Washington Street Shared Septic System for Residences (40B)

**maintain the septic system and provide reserve funding for replacement of the system field and components in the future.**

9. Mounding analysis is not required by either Title 5 or BOH Regulations for systems with less than 2,000 gpd. Nevertheless, from our prior work with the Board in review of a “Title 5 only design”, we know that the Board seeks a prudent SAS design that respects local concerns on protecting groundwater and wetland resources. Therefore, for the Board’s benefit, Stantec ran Hantush mounding analyses for the proposed design conditions. Our findings from these mounding analyses are presented in Table 1 below (and supporting Hantush spreadsheets are attached) and discussed further below.

- Basin Length and Width Input: the Hantush method requires input of ½ the area length and ½ the area width.
- Recharge (Infiltration) Rate: Recharge rate for a 90-day mounding analysis is calculated as 80% of the Title 5 flow distributed over the leaching system footprint per MassDEP guidance on mounding<sup>2</sup> which states the following:

☐ *An analysis of the ability of site to accept and disperse flow at the proposed discharge rate. (Maximum Monthly Flow)<sup>3</sup>*

☐ *Evaluation of the mounding potential, presence of confining layers, thickness and estimated aerial extent of unsaturated receiving formation. Mounding calculations or modeling to be evaluated for maximum monthly flow (defined as 80% of the design flow based on Title 5 calculations. However, it should be noted that the disposal field design is based on 100% of the design flow) for a duration of 90 days. Maximum daily flow may be higher, but the sum of the daily flows for the months over the 90 days shall not exceed the maximum monthly flow for the 90-day period evaluation of the site.*

The Hantush Method Recharge Rate for the SAS design is calculated below:

Design flow is 1,320 gpd. Leaching area is 34’ wide and 84’ long = 2,856 sf.

- Recharge Rate (R) =  $(0.8 \times 1,320 \text{ g}) / (7.48 \text{ gpd per sf}) / 2,856 \text{ sf} = 0.0494 \text{ ft/day}$

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<sup>2</sup> Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal, Commonwealth of Massachusetts Department of Environmental Protection, Division of Watershed Permitting, Revised July 2018.

<sup>3</sup> Maximum monthly flow is 80% of maximum daily flow, which is used for sizing the leaching area.

**Reference:** 3<sup>rd</sup> Review of Lot 3, 121-129 Washington Street Shared Septic System for Residences (40B)

- Hydraulic Conductivity Value (K): MassMapper<sup>4</sup> data on hydraulic conductivity (K) at the Site is reported as 10 ft/day. On-site testing is not reported.
- Initial saturated thickness (h): Saturated thickness is the most significant variable in the Hantush calculation. As noted earlier and in Comment 4 above, depth to bedrock below the SAS is not well defined by the Applicant's Soil Report test pits. Therefore, to develop initial estimates of (h) we have checked MassMapper GIS data for two locations nearest to the Site, which indicate depth to bedrock (dtb) (based on well driller logs) of 13-ft and 46-feet respectively<sup>5</sup>. We have used this dtb data to obtain the Hantush evaluation results presented in Table 1 below. [If the Board wishes to pursue better understanding of groundwater mounding at the proposed SAS, then the saturated depth should be verified (see Comment 4 above) before finalizing any conclusions on mounding.]

**Table 1: Hantush Mounding Analysis Results for the proposed septic system**

Ver #	Mass- Mapper GIS Data source	Recharge Rate (R)	Specific Yield (Sy)	Hydraulic Conductivity (K)	½ Basin Length (x)	½ Basin width (y)	Time (days)	Aquifer Saturated thickness hi(0)	Calculated Mound under basin center
1	Min. Sat. Thickness	0.0494	0.18	10	42	17	90	10.5	0.59-ft
2	Max. Sat. Thickness	0.0494	0.18	10	42	17	90	43.5	0.18-ft
3	Avg. Sat. Thickness	0.0494	0.18	10	42	17	90	27	0.27-ft

<sup>4</sup> MassMapper is an interactive map tool that provides access to geological information about Massachusetts. The Bureau of Geographic Information (MassGIS) developed it.

<sup>5</sup> Depth to bedrock (dtb) can be used to estimate the initial thickness of the saturated zone (aquifer) below the SAS (in feet). The nearest site (lot 157) has the same elevation (210), setting, and distance from Washington St. with a dtb of **46-ft**. The next proximate site (lot 56) has 4 times greater distance from Washington St., higher elevation (223) and dissimilar setting southeast of the BVW with dtb of **13-ft**. In this case, deducting a typical depth to ESHGW of **2.5-ft** at the Site, provides the following estimates of saturated aquifer thickness h(i) used in our Hantush model): Minimum estimate of **10.5-ft** (13 - 2.5), Maximum estimate of **43.5-ft** (46 - 2.5), and Average estimate of **27'ft**.

**Reference:** 3<sup>rd</sup> Review of Lot 3, 121-129 Washington Street Shared Septic System for Residences (40B)

These Table 1 results illustrate the influence of increased saturated thickness on reducing ground water mounding. Without in-situ measurements, the estimated results for analysis version #1 (first row) in the table above provides the more conservative estimate to consider as a mound height (0.59-feet) that could form under the middle of the proposed leaching trench system. The mound elevation, when added to the ESHGW elevation below the system would not intersect with or come close to the proposed 3:1 side slope around the field. Also, the mound height under the SAS area decreases with distance from the center of the field as shown in the Hantush output table and graph (Attachment 1): The mound height decreases to 0.24-ft at 120-ft from the center of the SAS, and because the water table gradient would also drop with distance from the SAS, break-out should not occur at the adjacent wetlands on either side of the SAS. Also, the mound would be seasonal and would not significantly reduce the effective treatment area below the SAS. Nevertheless, the Board could ask that the elevation and grading at the SAS be raised to provide a consistent 4-ft separation.

*Applicant Response: Mounding analysis is not required by either Title 5 or BOH Regulations for systems with flow less than 2,000 gpd.*

**Stantec: The response is acceptable. As already stated, Stantec ran Hantush mounding analyses of the design purely for the Board's benefit to better understand groundwater impact from the proposed design. Our findings using conservative assumptions inform us that break-out should not occur at the adjacent wetlands on either side of the SAS, and such minor mounding would be seasonal and would not significantly reduce the effective treatment area below the SAS.**

10. Plans show five 84-ft long trenches that encroach on the two 100-ft wetland buffer zones. The Applicant could consider that it may be possible to keep the SAS area out of these buffer zones if eight 53-ft trenches (e.g., two sets of 4 trenches with central distribution) are proposed instead. Overall length of SAS could be about 120-ft (2 x 55' + 10' for central distribution box) and the width of the primary leaching area would be 26-ft.

*Applicant Response: We have considered this option and have decided to remain with the current design configuration.*

**Stantec: The response is acceptable.**



**Reference:** 3<sup>rd</sup> Review of Lot 3, 121-129 Washington Street Shared Septic System for Residences (40B)

Please contact us should you have any questions concerning the responses and comments above.

Sincerely yours,

**Stantec Consulting Services Inc.**



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Attachment: "Form 11 Lot 3 TP 25-1 TP 25-2\_Washington Street.pdf" field logs provided by David Glenn of Stantec.



**Commonwealth of Massachusetts  
City/Town of**

# **Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal**

## **C. On-Site Review** *(minimum of two holes required at every proposed primary and reserve disposal area)*

**Deep Observation Hole Number:** TP-25-1  
Hole #

05-16-25  
Date

9:15 am  
Time

60's CloudyTP  
Weather

Latitude

Longitude

1. Land Use Woodland  
(e.g., woodland, agricultural field, vacant lot, etc.)

Grass  
Vegetation

Stones/Boulders  
Surface Stones (e.g., cobbles, stones, boulders, etc.)

3  
Slope (%)

Description of Location: Refer to Plan

2. Soil Parent Material: \_\_\_\_\_

Landform

Top of Ridge/Hill

Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body NA feet

Drainage Way NA feet

Wetlands 90' +/- feet

Property Line 60' +/- feet

Drinking Water Well NA feet

Other \_\_\_\_\_ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No

If yes: \_\_\_\_\_ Depth to Weeping in Hole

98" Depth to Standing Water in Hole

### **Soil Log**

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A	FSL	10 YR 2/2		Cnc : Dpl:					Friable	
4-15	Bw	FSL	10YR 5/8		Cnc : Dpl:					Friable	
15-30	Bc	SL	10YR 5/4		Cnc : Dpl:					Friable	
30-108	C	SL	2.5 Y 5/2		Cnc : Dpl:					Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Boulders (2'-4' diameter) Surface to Bottom TP



Commonwealth of Massachusetts  
City/Town of

## Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

### C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-25-2

Hole #

05-16-25

Date

10: am

Time

60's Cloudy

Weather

Latitude

Longitude

1. Land Use: Woodland

(e.g., woodland, agricultural field, vacant lot, etc.)

Grass

Vegetation

Stones/Boulders

Surface Stones (e.g., cobbles, stones, boulders, etc.)

3

Slope (%)

Description of Location:

Refer to Plan

2. Soil Parent Material:

Landform

Top of Ridge/Hill

Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from:

Open Water Body NA feet

Drainage Way NA feet

Wetlands 90' +/- feet

Property Line 110" +/- feet

Drinking Water Well NA feet

Other        feet

4. Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil/Fill Material

☐ Weathered/Fractured Rock

☒ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No

If yes: 78" Depth to Weeping in Hole

       Depth Standing Water in Hole

#### Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A	FSL	10YR 2/2		Cnc : Dpl:					Friable	
4-10	Bw	FSL	10YR 5/8		Cnc : Dpl:					Friable	
10-24	Bc	SL	10YR 5/4		Cnc : Dpl:					Friable	
24-82	C	SL	2.5 Y 5/2	61"	Cnc :5Y 6/1 Dpl:					Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Refusal/Bedrock 82"-100"....Boulders (2'-4' diameter) Surface to Bottom TP