

Brush Hill Homes responses (in green):

Stantec Review of 34 Brush Hill Road Septic System

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

1. Explain the Special Note on Sheet BOH-1 that reads: "Leaching catch basins or drywalls are located near components of the proposed sewage disposal system". If any such drainage structures are proposed they should be shown along with required setback from septic components.

- This note is in error (from previous design) and has been removed from the plan.

2. Explain the statement that "Foundation Drains are proposed for the subject building." Show the locations of proposed foundation drains including depth, elevations, outlets, and design details for such under drain(s), including setback from septic components. This is supported by BOH Regulation 3.4.1.B which requires...*The location of all drains.*

- Foundation drains have been added to the plan for units 3 and 4. Units 1 and 2 are slab on grade (no basement).

3. Benchmarks are not noted on the septic plan. Per BOH Regulations 3.4.1 E. *Two benchmarks and datum plane notation. One of the benchmarks shall be within fifty (50) feet of the proposed leaching area.*

- Benchmarks will be added prior to construction.

4. The Locus Map is incomplete in the latest submittal. Per BOH Regulations 3.4.1.F. *A locus map including the distance to the nearest intersecting street.*

- Locus Map has been corrected.

5. Per BOH Regulations 3.4.1.G. *The results of the soil logs, as provided by the soil evaluator, soil classification and maximum water table elevations encountered for all test holes, and the name of the individual who witnessed the tests for the Board of Health.* (underline emphasis added). Test pit locations are shown on the plans; however, the following test pit logs are missing: 24-04, 24-05, 24-07, 24-08, 24-09. Also, the field notes in Submittal H above "soil test log-book November 4, 2024" are not clear and it was not possible to relate the field notes to the logs shown on Soils Information Sheet BOH-5.

- All witnessed testing was observed by Sherborn BOH Agent Mark Oram. Data is provided on all test holes used in the design or within 50' of the system. Many test holes in other areas of the site were for stormwater consideration and were not witnessed. Additional soil test data is available in MA DEP Form 11 which is on file at Sherborn BOH.

6. The Applicant should include any recorded elevations of groundwater weeping on the test pit logs on Sheet BOH-5, and within the cross-section of trenches on Sheet BOH-2.

- All elevations of groundwater weeping are now shown on the plans.

7. Per BOH Regulations 4.B.5. *An “Environmental Health Impact Report” and “Environmental Health Permit” are required under Regulation III – PUBLIC AND ENVIRONMENTAL HEALTH REVIEW REGULATIONS AND STANDARDS FOR SELECTED SITE DEVELOPMENT ACTIVITIES OR OTHER SPECIAL CONDITIONS, OR FOR OTHER THAN A SINGLE-FAMILY DWELLING ON A SINGLE LOT.* The proposed project will require an “Environmental Health Impact Report” and “Environmental Health Permit.” However, we understand that the Applicant is seeking a waiver of this local requirement¹⁴.

14 BOH Regulations III.3.1g.under the heading *ENVIRONMENTAL HEALTH IMPACT REPORT (“EHIR”)* states that an EHIR is required for applications for approval of a Comprehensive Permit under M.G.L. c. 40B, s. 20-23

- Agreed. The applicant is seeking a waiver from this Sherborn BOH regulation which specifically targets affordable housing.

8. Per BOH Regulations 8.1. *The bottom of any leaching area shall be a minimum of five (5) feet above the maximum high ground water table.* The proposed plans do not comply with this local requirement. We understand that the Applicant is seeking a waiver of this requirement and proposes compliance with Title 5 only.

- Agreed. The applicant is seeking a waiver from this Sherborn BOH regulation.

9. Per BOH Regulations 8.2. *Subsurface sewage disposal systems shall not be constructed in fill that is to be placed directly on or near ledge, hardpan or other impervious materials or in any area where peat is present or when the maximum groundwater level is five (5) feet or less below natural surface grade. A depth of at least five (5) feet of pervious material (determined by percolation test) in natural soil shall be maintained below the bottom of the leaching area.* (underline emphasis added). The proposed system is not compliant with this requirement as only 2' to 3' of natural soil is present from existing Site grade to the Estimated Seasonal High Groundwater (ESHGW). The SAS design (with removal of A & B horizons, replaced by Title 5 sand) will provide 4-ft minimum separation between the leaching trenches and ESHGW per Title 5. Also, natural soil will be present to more than 5-ft below the proposed system's remove & replace zone, and bedrock has not been found. We understand that the Applicant is seeking a waiver of this local requirement and proposes compliance with Title 5 only.

- Agreed. The applicant is seeking a waiver from this Sherborn BOH regulation.

10. Provide a detail for the 2-inch force main (FM) connection to the distribution box (Dbox); and include a baffle and/or “T” fitting at the end of the FM to protect D-box contents from disruption and/or short-circuiting of flow. [Per 310 CMR 15.232(3) - (a) *when the soil absorption system is to be dosed or the slope of the inlet pipe exceeds 0.08 feet per foot, an inlet tee, baffle or splash plate extending to one inch above the outlet invert elevation shall be provided to dissipate the velocity of the influent]*

- Detail has been updated on the plan.

11. Call out the remove and replace (R&R) limits on the plan view of the leaching area, and the limits should extend 5-feet (min) past the limits of the trenches (active or reserve).

- Limits are now shown on the plan.

12. The SAS is proposed as a mounded system with construction in fill per 310 CMR 15.255 and proper breakout separation between the top of the leaching trenches and a 3:1 surface slope is provided, and a 4-ft high retaining wall is proposed on the downslope portion of the system and the wall extends to a 3:1 slope area at its base also complying with the 15-ft setback requirements of 310 CMR 15.255(2). Our review of mounding at the system indicates that trench effluent added to ESHGW should not intersect the proposed retaining wall (see comments under 15 below). Nevertheless, we recommend that an impervious barrier should be added to the SAS side of the wall as a precaution. The wall plan view and detail should be modified to include an appropriate durable membrane to direct any infiltration (e.g., rain or effluent, vertically and prevent lateral movement (through wall) from the adjacent SAS. Such membrane should be extended to the base of the retaining wall. The retaining wall is proposed to be 4-feet in height. We recommend that it be approved by the Building Department and be designed by a Massachusetts registered Structural Engineer and include calculations for factor of safety against overturning, sliding, and bearing capacity; and conditions of high groundwater, if any, should be factored into the design. If structural plans are provided by a wall manufacturer, then the Board should require that such plans be based on site specific geotechnical information, and the Board should not accept plans that are qualified by requiring further determination of geotechnical conditions after issuance of the signed and sealed structural drawings.

- Agree that the retaining wall will require engineered drawings which will be provided to the Building Inspector prior to permitting.

13. The septic system is proposed as a “shared system” per 310 CMR 15.290, which is approvable by the Board subject to the requirements established in 310 CMR 15.292. In addition to the plans provided, the Applicant must also submit the following information, per 310 CMR 15.290 (2), which reads as follows:

(b) a proposed operation and maintenance plan for the shared system;
(c) a description of the form of ownership which each component of the system serving more than one Facility will take, together with relevant legal documentation describing or establishing that ownership including, without limitation, easements, condominium master deed, or homeowners' association documents. All forms of private ownership of system components serving more than one Facility shall establish that each user of the system has the legal ability to accomplish any necessary maintenance, repair, or upgrade of the component;
(d) a description of the financial assurance mechanism proposed to ensure effective long-term operation and maintenance of the system. Acceptable financial

assurance mechanisms may include, but are not limited to, an escrow account, letter of credit, performance bond, or insurance policy, which names the Approving Authority as beneficiary, and which provides for upgrade of the shared system in the event the shared system fails to protect public health, safety, welfare or environment pursuant to the criteria established in 310 CMR 15.303. A copy of the final financial assurance mechanism shall be provided to the Approving Authority prior to construction of the system; and

(e) a copy of a proposed Grant of Title 5 Covenant and Easement essentially identical to that contained in 310 CMR 15.000: Appendix 1 shall be recorded and/or registered with the appropriate Registry of Deeds and/or Land Registration Office within 30 days of the Approving Authority's approval of the Covenant and Easement. The applicant shall file a certified Registry copy of this Covenant and Easement with the Approving Authority within 30 days of its date of recordation and/or registration, and prior to construction of the system.

We do not agree with Stantec that this is a "Shared System" under Title 5. 310 CMR 15.002 provides a definition for "Shared System" which states "***A system serving a condominium located on the same facility is not a shared system***". Brush Hill Homes is proposed as a condominium.

14. The 2-inch force main should be insulated in any area where less than 4-ft of cover is provided.

- Required insulation has been added to the plan.

15. Mounding analysis is not required by either Title 5 or BOH Regulations for systems with flow less than 2,000 gpd. Nevertheless, an abutter's consultant (Horsley) has raised the question of mounding. To check this issue, Stantec ran Hantush mounding analyses for both original design conditions (Submittal E above) and latest design conditions (Submittal A above). Our comparative findings from these mounding analyses are presented in the table below (and supporting Hantush spreadsheets are attached) and discussed further below. The Horsley mounding analysis of the former (9.23.24) SAS design is flawed because of the following input errors:

- Basin Length and Width Input Error: The 9.23.24 design has 14 trenches which are 84-ft long, and total field length (including a 10-ft wide non-leaching area between the two sets of trenches) is 178-ft, and the Hantush method requires input of $\frac{1}{2}$ the area length and $\frac{1}{2}$ the area width, therefore these inputs should have been $x=89'$ ($1/2$ of 178') and $y=25'$ ($1/2$ of 50'). Mr. Horsley used a full field size of 180' x 50' and failed to use the required $\frac{1}{2}$ value inputs. We ran one Hantush analysis using Mr. Horsley's inputs just to check his results for the larger field (see version 1 in Table 1 below) and then ran another using corrected and revised inputs (see version 2 in Table 1 below) as a comparison for the larger leaching field mounding estimate.

- Recharge (Infiltration) Rate Error: Recharge rate for a 90-day mounding analysis is calculated as 80% of the Title 5 flow distributed over the leaching system footprint. Mr. Horsley used 100% of the design flow. MassDEP guidance on mounding¹⁵ states the following:

- *An analysis of the ability of site to accept and disperse flow at the proposed discharge rate. (Maximum Monthly Flow)¹⁶*
- *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 Recharge Rate for the original and revised SAS designs is calculated as 80% of the Title 5 flow distributed over the leaching system footprint, as follows:

- Original design flow is 1,760 gpd, and leaching area is 50' wide and 178' long
(89' + 10' + 89') = 8,900 sf
- Original design application rate = $(0.8 \times 1,760) / 7.48 / 8,900 = 0.0212 \text{ ft/day}$
- Revised design flow is 1,320 gpd, and leaching area is 42' wide and 157' long
(73.5' + 10' + 73.5') = 6,594 sf
- Revised design application rate = $(0.8 \times 1,320) / 7.48 / 6,594 = 0.0214 \text{ ft/day}$

- Hydraulic Conductivity Value (K): MassMapper¹⁷ data on hydraulic conductivity (K) at the Site is reported as a max value of 10 ft/day and average value of 3 ft/day, but more relevant on-site testing by the Applicant found values of 4 ft/day and 6 ft/day, therefore we believe the min. on-site K value of 4-ft/day is appropriate, (Horsley used K= 3).

- Initial saturated thickness (h): This is the most significant variable in the Hantush calculation. Mr. Horsley used a value for h of 7.9-ft based on the depths of most on-site test pits. However, if the mounding issue is to be pursued further, then we believe that the saturated depth should be verified (see comment 16 below) before finalizing any conclusions on mounding. In the interim, we can look to the MassMapper GIS data on surficial geology which reports the Site area as "thick till", and nearby measurements of depth to bedrock (dtb) based on well driller logs are reported as 22.25-ft at 44 Brush Hill Rd, 27.13-ft and 25.3-ft at two wells at 60 Brush Hill Road, and 18.6-ft at 32 Brush Hill Rd. Also, we found that none of the Applicant's test pits encountered bedrock, and the lowest test pit (#23-01) at the Site did not encounter bedrock at elevation 180. Therefore, given the above note d data, we used a value of h=16-ft¹⁸ as a more representative value in Hantush. As noted, we recommend further site testing on this issue, see comment 16 below.

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

Ver #	Review By:	Septic Plan Date:	Recha Rate (R)	Specific Yield (Sy)	Hydraul Conductivity (K)	$\frac{1}{2}$ Basin Length (x)	$\frac{1}{2}$ Basin width (y)	Time (days)	Aquifer Saturated thickness $h(0)$	Mound under basin center, ft (max)
0	Horsley	9.23.24	0.025	0.18	3	180	50	90	7.9	4.303
1	Stantec confirmatory re-run of #0	9.23.24	0.025	0.18	3	180	50	90	7.9	4.303
2	Stantec Original Design with revised inputs	9.23.24	0.0212	0.18	4	89	27	90	16	0.877
3	Stantec Revised Design with revised inputs	12.23.24	0.0214	0.18	4	78.5	23	90	16	0.704

We believe that the results for analysis version #3 (last row) in the table above provides the best current estimate of a mound height of (0.704-feet) that could form under the middle of the revised design leaching trench system. 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 3). The mound would be seasonal and would not significantly reduce the effective treatment area below the SAS; however, the Board could ask that the elevation and grading at the SAS be raised to provide a consistent 4-ft separation¹⁹. The mound height decreases to 0.285-ft at 120-ft from the center of the SAS, and the water table gradient clearly drops also with distance from the SAS, therefore break out should not occur at any point on the Site. The mound elevation, when added to the ESHGW elevation below the system would not intersect with or come close to the side slopes or the downgradient retaining wall (19-ft from active trench, 15-ft from reserve trench). See Attachment 4 which is a sketch of the mound above ESHGW as shown on the Applicant's trenches cross-section.

- **Agreed. Mounding analysis is not required by Title 5 or Sherborn BOH regulations.**

16. We have discussed that there is uncertainty on depth to bedrock under the septic system SAS (which is critical to an accurate evaluation of mounding). Also, we have seen that the Sherborn Groundwater Protection Committee and some abutters have expressed concern about the possibility of fractured bedrock transport of SAS effluent. If the Board wishes to pursue these questions further, they should ask the Applicant to conduct and provide geologist logs for several (3 minimum) borings within the septic system SAS area to determine the value h (saturated aquifer thickness). All borings should be drilled to bedrock refusal; and at least one of the borings should be advanced as a bedrock coring to determine if the bedrock is competent or fractured, and then provide an opinion from a qualified hydrogeologist regarding the risk of SAS effluent entering the bedrock, and if so, opinion on the risk of effluent transport in the bedrock.

- **Not required by Title 5 or Sherborn BOH regulations.**

