

C.G. Johnson Engineering, Inc.

203 Willow Street

South Hamilton, MA 01982

Phone (978) 468-2957

Fax (978) 468-3862

Charles G. Johnson, P.E.

Transmittal

To: Gregory P. Bernard, Wenham Health Agent
From: Charles G. Johnson, P.E. (Civil) *CET*
Date: April 22, 2015
Re: Proposed On-Site Wastewater Treatment & Dispersal System Plan

Site: Proposed "Maple Woods" at 62 Maple Street (Tax Map 23, Lot 16)

Applicant: Maple Woods Housing, LLC
c/o Andrew DeFranza
238 Elliott Street
P.O. Box 507
Beverly, MA 01915
Office: (978) 922-1305, extension 207

Enclosures:

1. Proposed On-Site Wastewater Treatment & Dispersal System Plan revised April 21, 2015 (3 sets)
2. Wenham Board of Health Plan Review Letter dated April 8, 2015
3. Response to Wenham Board of Health Plan Review Letter dated April 21, 2015
4. Horsley Witten Group Peer Review Letter dated April 8, 2015
5. Response to Horsley Witten Group Peer Review Letter dated April 21, 2015
6. Tetra Tech Septic System Design Review Letter dated April 15, 2015
7. Response to Tetra Tech Septic System Design Review Letter dated April 21, 2015
8. H. Criss Stephens, Jr. e-mail to Gregory Bernard dated April 16, 2015
9. Groundwater Mounding Calculations dated April 16, 2015
10. Clear Water Industries Waterloo Biofilter System Design Review & Designer Certification dated April 21, 2015
11. Maple Woods Housing LLC Certification Letter dated April 21, 2015
12. C.G. Johnson Engineering, Inc. Certification Letter dated April 21, 2015

Comments: Please let me know if you have any questions during your review.

Thank you.

Cc: Andrew DeFranza, Maple Woods Housing, LLC
Theodore C. Regnante, Esq. & Paul J. Haverty, Esq., Regnante, Sterio & Osborne LLP
Charles E. Wear, III, P.E., and April Ferraro, P.E., Meridian Associates
John Harden, AIA, Siemasko & Verbridge
Daniel J. Mills, P.E., MDM Transportation Consultants, Inc.
Matthew Ulrich, Ulrich Bachand Landscape Architecture, LLC
Emilie Cademartori, Wenham Zoning Board of Appeals Coordinator (4 sets)
C.G. Johnson Engineering, Inc.



Town of Wenham

Town Hall
138 Main Street
Wenham, MA 01984

BOARD OF HEALTH

TEL 978-468-5520 Ext. 4 FAX 978-468-8014

April 8, 2015
Maple Woods 1

C.G. Johnson Engineering, Inc.
203 Willow Street
South Hamilton, MA 01982

Mr. Johnson,

The Proposed On-Site Wastewater Treatment and Dispersal System Plan for Proposed Residences at "Maple Woods" (62 Maple Street), dated March 12, 2015, and received by the Wenham Board of Health on March 18, 2015, cannot be approved at this time. Please address the following comments:

SHEET 1:

1. Please add a note that a benchmark will be set within 75 feet of the proposed system after clearing and before installation.
2. The Waterloo Unit labelled S3 on the plan view should be labelled S7.
3. S6 shown in the Key is not labelled on the plan view.
4. Add a note that the final Control Panel location will also be approved by the Wenham Electrical Inspector.

SHEET 2:

1. 310 CMR 15.221(7) specifies, "The top of all system components, including the septic tank, distribution box, pump chamber, dosing chamber and soil absorption system, shall be installed no more than 36" below finish grade". The system profile shows greater than 36" of cover over the pump chamber.

SHEET 3:

1. Provide the Soil Evaluator Certification statement as shown in 310 CMR 15.018(2) and include approval date per 310 CMR 15.220 (4)(j).
2. Title 5 Pressure Distribution Guidance suggests drilling a perforation vent hole at the distal end of the elbow of the lateral sweep, below the stone aggregate. Please show on Flushing Valve Detail.
3. Orifice shields are required for any perforations located at the 6:00 o'clock position of the 1.5" diameter laterals.
4. Though not required, I suggest a Plan View Detail of the lateral layout showing staggered perforations between adjacent laterals (Pressure Distribution Design Guidance Figure 1).

SHEETS 4, 5, AND 6:

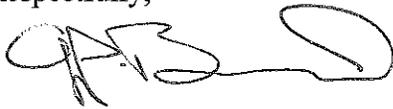
1. Please specify and locate weep holes in each of the force mains in the pump chamber and Waterloo unit.

ALSO:

1. Please submit all required documentation required under Standard Conditions for Secondary Treatment Units Certified for General Use Section II 16.

Please feel free to contact me at this office with any questions.

Respectfully,



Gregory P. Bernard
Wenham Health Agent

C.G. Johnson Engineering, Inc.

203 Willow Street

South Hamilton, MA 01982

Phone (978) 468-2957

Fax (978) 468-3862

Charles G. Johnson, P.E.

April 21, 2015

Mr. Gregory P. Bernard, Wenham Health Agent

Wenham Board of Health

Town Hall

138 Main Street

Wenham, MA 01984

**Re: On-Site Wastewater Treatment and Dispersal System for "Maple Woods"
Response to Wenham Board of Health Plan Review Letter**

Dear **Mr. Bernard,**

Pursuant to your dated April 8, 2015, we offer the following responses:

SHEET 1:

Comment #1: Please add a note that a benchmark will be set within 75 feet of the proposed system after clearing and before installation.

Response #1: *A note has been added as requested.*

Comment #2: The Waterloo Unit labelled S3 on the plan view should be labelled S7.

Response #2: *The Waterloo Unit labelling has been changed from S3 to S7.*

Comment #3: S6 shown in the Key is not labelled on the plan view.

Response #3: *S6 (Proposed 2" SCH. 40 PVC forcemain sewer pipe) is now labelled on the plan view.*

Comment #4: Add a note that the final Control Panel location will also be approved by the Wenham Electrical Inspector.

Response #4: *A note has been added to the Control Panel (S23 in the Key) as requested.*

SHEET 2:

Comment #1: 310 CMR 15.221(7) specifies, "The top of all system components, including the septic tank, distribution box, pump chamber, dosing chamber and soil absorption system, shall be installed no more than 36" below finish grade". The system profile shows greater than 36" of cover over the pump chamber.

Response #1: *The building sewer pipe (S1), septic tank (S3), pipe from the septic tank to the pump chamber (S4) and pump chamber (S5) have all been adjusted so that the pump chamber (S5) is no more than 36" below finish grade.*

Page 2 of 2

Mr. Gregory P. Bernard, Wenham Health Agent

April 21, 2015

SHEET 3:

Comment #1: Provide the Soil Evaluator Certification statement as shown in 310 CMR 15.018(2) and include approval date per 310 CMR 15.220(4)(j).

Response #1: The Soil Evaluator Certification statement and approval date have been added as requested.

Comment #2: Title 5 Pressure Distribution Guidance suggests drilling a perforation vent hole at the distal end of the elbow of the lateral sweep, below the stone aggregate. Please show on Flushing Valve detail.

Response #2: Since the laterals are designed with perforations in both the top and bottom, the suggested perforation vent hole at the distal end of the elbow of the lateral sweep is not needed.

Comment #3: Orifice shields are required for any perforation located at the 6:00 o'clock position of the 1.5" diameter laterals.

Response #3: A note for Orifice shields at the 6:00 o'clock position has been added to the Pressure-Distribution Leach Field Zone Detail.

Comment #4: Though not required, I suggest a Plan View Detail of the lateral layout showing staggered perforations between adjacent laterals (Pressure Distribution Guidance Figure 1).

Response #4: A Plan View Detail has been added as requested, which shows a total of 140 perforations per zone. Since the staggered perforations set-up would provide 130 perforations per zone and therefore not as uniform distribution, this set-up was not implemented.

SHEETS 4, 5, AND 6:

Comment #1: Please specify and locate weep holes in each of the force mains in the pump chamber and Waterloo unit.

Response #1: The weep holes specification has been added as requested.

ALSO:

Comment #1: Please submit all required documentation required under Standard Conditions for Secondary Treatment Units Certified for General Use Section II 16.

Response #1: The required documentation will be provided as requested.

Please contact us if you have any questions with these responses.

Sincerely,

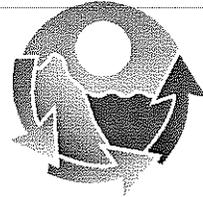
C.G. Johnson Engineering, Inc.


Charles G. Johnson, P.E. (Civil)
President

Horsley Witten Group

Sustainable Environmental Solutions

294 Washington Street • Suite 801 • Boston, MA • 02108
Phone - 857-263-8193 • www.horsleywitten.com



April 8, 2015

Emilie Cademartori
Town of Wenham
Zoning Board of Appeals
Wenham Town Hall
2nd Floor
138 Main Street
Wenham, Massachusetts 01938

RE: Peer Review for Maple Woods Wastewater Treatment System
Comprehensive Permit Application

Dear Ms. Cademartori and Board Members:

The Horsley Witten Group, Inc. (HW) is pleased to provide the Wenham Zoning Board of Appeals (ZBA) with this peer review of the Maple Woods subsurface wastewater disposal system in conjunction with the Comprehensive Site Plan submission located at 62 Maple Street in Wenham, Massachusetts. The proposed Chapter 40B residential development is located on approximately 3.5 acres of undeveloped woodlands. The Applicant proposes a new age-restricted residential community with 60 one-bedroom homes located within one three-story building.

The following documents and plans were reviewed by HW:

- Application for Disposal System Construction Permit, prepared by C.G. Johnson Engineering, Inc.;
- Soil Suitability Assessment for Onsite Sewage Disposal, prepared by C.G. Johnson Engineering, Inc., dated May 28, 2014, June 4, 2014 and July 23, 2014;
- MA DEP Renewal of Approval for General Use: Waterloo Biofilter™; dated November 1, 2012;
- MA DEP Standard Conditions for Secondary Treatment Units Certified for General Use dated February 19, 2013;
- Proposed Onsite Wastewater Treatment and Disposal System Plans, prepared by C.G. Johnson Engineering, Inc., dated March 12, 2015 including;
 - Site Plan, Sheet 1 of 6
 - System Profile, Sheet 2 of 6
 - Details & Notes, Sheet 3 of 6
 - Pump Chamber to Waterloo Biofilter™ Design, Sheet 4 of 6
 - Waterloo Biofilter™ & Recirculation Design, Sheet 5 of 6
 - Waterloo Biofilter™ & Pressure Distribution Design, Sheet 6 of 6

Based on the materials submitted and reviewed to date, HW provides the following comments and recommendations on the proposed wastewater system.

Wastewater Treatment System Review

The treatment system consists of a two compartment 20,000 gallon septic tank, 10,000 gallon pump chamber, Waterloo Biofilter™ model UG6600 gpd secondary treatment unit and a pressure dosed leaching field with a four-zone distribution valve.

1. The Waterloo Biofilter™ secondary technology is approved by the Massachusetts Department of Environmental Protection (DEP) and is allowed for use under a General Use certification.
2. HW recommends the applicant provide a note on the plan referencing the Waterloo Biofilter™ General Use Approval and the Standard Conditions for Secondary Treatment Units, to ensure that all of the requirements and conditions of the approval are met.
3. The fire access road shown on Sheet 1 is located close to the eastern edge of the Waterloo Biofilter™ tank, and it is not clear if this tank has been designed to handle the load from emergency vehicles. HW recommends that for additional protection, a set of bollards are placed next to the tank to avoid vehicles driving over it or the tank should be specified to handle H-20 loads.
4. On Sheet 1 of the Site Plan, the Waterloo tank is labeled as S-3; however, it appears it should be labeled as S-7 per the Key. HW recommends that the Applicant clarify the labeling.
5. Test pit T-9 shows standing water at 52-inches below grade and soil mottling observed at elevation 63.3. The observed mottling is 8.7 feet higher than the assumed Estimated Seasonal High Groundwater (ESHGW) elevation used for the design. After discussing these findings with Gregory Bernard, the Wenham Health Agent, it was determined that the water table observed in TP-9 is not representative of seasonal high groundwater.

6. In the groundwater mounding calculations on sheet 2, the Applicant uses a Specific Yield (Sy) of 0.25 and duration of infiltration period (time) of 90 days, which meets MassDEP requirements. However, in our opinion a longer time period and lower specific yield would better represent a steady state condition. Additionally, the Applicant assumes a saturated thickness depth equal to elevation 40.8, (a total aquifer thickness of 13.8 feet), which is described as elevations in the wetlands. The test pit data does not show the loamy fine sand or loamy medium sand material extending beyond elevation 46.7. HW recommends conducting a soil boring in the location of the leaching field to verify the saturated thickness of the loamy fine sand and loamy medium sand material.
7. The redundant off/low alarm and timer on float elevations shown in the 10,000 gallon pump chamber detail on Sheet 4 are set 2-inchs apart. With the floats set this close, the turbulence in the tank may cause float chatter. We recommend that the inlet tee to the 10,000 gallon pump chamber is extended below the redundant/off float elevation to minimize turbulence.

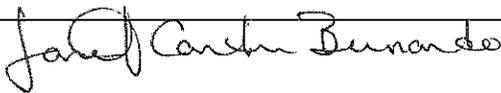
8. The effluent dosing pumps are shown in the Waterloo Biofilter™ tank with access from a 24-inch diameter manhole cover. HW recommends that these pumps are provided with slide rails for easy removal, as the Myer's ME150 pumps weigh 70 – 80 lbs each. Additionally, the applicant should confirm that the 24-inch diameter manhole provides adequate access to remove the pumps.
9. HW recommends providing check valves and gate valves on the discharge piping from the 10,000 gallon pump chamber shown on Sheet 4. All valves should be accessible from the access manhole cover.
10. HW recommends that the Applicant verify the manifold sizing calculations for the pressure dosed leaching field shown on Sheet 6. The length of the manifold segments (L) is shown as 1-foot in the calculations; however, the spacing appears to be 5-feet as shown on the site plan and leaching field zone detail.

Conclusion

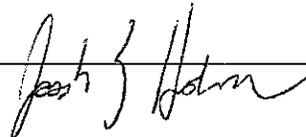
HW recommends that the Wenham ZBA and/or the Wenham Board of Health require the Applicant to provide a written response to these comments to be considered during your decision process. The Applicant is advised that provision of these comments does not relieve him/her of the responsibility to comply with all Commonwealth of Massachusetts laws, and federal regulations as applicable to this project. Please contact Janet Carter Bernardo at 857-263-8193 (jbernardo@horsleywitten.com) if you have any questions regarding this review.

Sincerely,

HORSLEY WITTEN GROUP, INC.



Janet Carter Bernardo, P.E., LEED AP
Senior Project Manager



Joe Henderson, P.E.
Project Engineer

Cc: Meridian Associates

C.G. Johnson Engineering, Inc.

203 Willow Street
South Hamilton, MA 01982
Phone (978) 468-2957
Fax (978) 468-3862

Charles G. Johnson, P.E.

April 21, 2015

Mr. Gregory P. Bernard, Wenham Health Agent

Wenham Board of Health
Town Hall
138 Main Street
Wenham, MA 01984

**Re: On-Site Wastewater Treatment and Dispersal System for "Maple Woods"
Response to Horsley Witten Group Peer Review Letter**

Dear **Mr. Bernard**,

Pursuant to the Horsley Witten Group Peer Review Letter (HW) dated April 8, 2015, we offer the following responses:

Comment #1: The Waterloo Biofilter™ secondary technology is approved by the Massachusetts Department of Environmental Protection (DEP) and is allowed for use under a General Use certification.

Response #1: No response required.

Comment #2: HW recommends the applicant provide a note on the plan referencing the Waterloo Biofilter™ General Use Approval and the Standard Conditions for Secondary Treatment Units, to ensure that all of the requirements and conditions of the approval are met.

Response #2: Specific Note 4 has been added to Sheet 2 as recommended.

Comment #3: The fire access road shown on Sheet 1 is located close to the eastern edge of the Waterloo Biofilter™ tank, and it is not clear if this tank has been designed to handle the load from emergency vehicles. HW recommends that for additional protection, a set of bollards are placed next to the tank to avoid vehicles driving over it or the tank should be specified to handle H-20 loads.

Response #3: A note has been added to the Waterloo Biofilter™ tank detail on Sheets 5 and 6 to clearly state that the tank is specified to handle H-20 loads. Since the covers are designed to handle H-20 loads also, a set of bollards will not be necessary.

Comment #4: On Sheet 1 of the Site Plan, the Waterloo tank is labeled as S-3; however, it appears it should be labeled as S-7 per the Key. HW recommends that the Applicant clarify the labeling.

Response #4: The label for the Waterloo Biofilter™ tank on Sheet 1 has been corrected as S-7 per the Key.

Mr. Gregory P. Bernard, Wenham Health Agent

April 21, 2015

Comment #5: Test pit T-9 shows standing water at 52-inches below grade and soil mottling observed at elevation 63.3. The observed mottling is 8.7 feet higher than the assumed Estimated Seasonal High Groundwater (ESHGW) elevation used for the design. After discussing these findings with Gregory Bernard, the Wenham Health Agent, it was determined that the water table observed in TP-9 is not representative of seasonal high groundwater.

Response #5: On Sheet 3, Test pit T-9 did not have standing water at 52-inches below grade. The 52-inch depth has been corrected to show "moist" (or "damp") soil and not standing water or weeping water. Since T-9 was significantly different than all other tests, both the Primary and Reserve Leach Areas were purposely not proposed at T-9.

Comment #6: In the groundwater mounding calculations on Sheet 2, the Applicant uses a Specific Yield (Sy) of 0.25 and duration of infiltration period (time) of 90 days, which meets MassDEP requirements. However, in our opinion a longer time period and lower specific yield would better represent a steady state condition. Additionally, the Applicant assumes a saturated thickness depth equal to elevation 40.8, (a total aquifer thickness of 13.8 feet), which is described as elevations in the wetlands. The test pit data does not show the loamy fine sand or loamy medium sand material extending beyond elevation 46.7. HW recommends conducting a soil boring in the location of the leaching field to verify the saturated thickness of the loamy fine sand and loamy medium sand material.

Response #6: The groundwater mounding calculations were reviewed with Mr. H. Criss Stephens, Jr. (Hydrogeologist at the Northeast Regional Office of Mass DEP in Wilmington, MA), and he prepared the attached e-mail dated April 16, 2015. The initial saturated thickness (hi) value on Sheet 2 was changed from 13.8 feet to 7.9 feet (54.6 – 46.7). The groundwater mounding adjustment changed from 1.1 feet to 1.6 feet and is included as an attachment. Since Mr. Stephens agreed with the methodology presented on the design plans, using a longer time period and lower specific yield will not be necessary. Also, conducting a soil boring in the location of the leaching field will not be necessary.

Comment #7: The redundant off/low alarm and timer on float elevations shown in the 10,000 gallon pump chamber detail on Sheet 4 are set 2-inches apart. With the floats set this close, the turbulence in the tank may cause float chatter. We recommend that the inlet tee to the 10,000 gallon pump chamber is extended below the redundant/off float elevation to minimize turbulence.

Response #7: This issue was reviewed with Mr. Mark Cottrell of Clear Water Industries who will be supplying the Biotube Filter and Pumps in the 10,000 gallon pump chamber. Since the pumps and floats are housed within a Biotube Filter, the effluent entering the Biotube Filter is limited by the holes in the pipe and therefore no float chatter will be expected. In addition, extending the inlet tee to below the redundant/off float elevation will not be necessary.

Page 3 of 3

Mr. Gregory P. Bernard, Wenham Health Agent

April 21, 2015

Comment #8: The effluent dosing pumps are shown in the Waterloo Biofilter™ tank with access from a 24-inch diameter manhole cover. HW recommends that these pumps are provided with slide rails for easy removal, as the Myer's ME150 pumps weigh 70 – 80 lbs each. Additionally, the applicant should confirm that the 24-inch diameter manhole provides adequate access to remove the pumps.

Response #8: This issue was reviewed with Mr. Mark Cottrell of Clear Water Industries who will be constructing the Waterloo Biofilter tank. Since Mr. Cottrell has the proper equipment to service and maintain the pumps, slides rails will not be necessary. However, the manhole size has been revised from 24-inches to 36-inches. Mr. Cottrell appreciated the comments.

Comment #9: HW recommends providing check valves and gate valves on the discharge piping from the 10,000 gallon pump chamber shown on Sheet 4. All valves should be accessible from the access manhole cover.

Response #9: This issue was reviewed with Mr. Mark Cottrell of Clear Water Industries who will be installing the pumps in the 10,000 gallon pump chamber. A note has been added to the 10,000 gallon pump chamber detail on Sheet 4 regarding the fact that there will be check valve on each pump and a gate valve on the 2" discharge pipe. Mr. Cottrell assured me that all valves will be accessible from the access manhole cover.

Comment #10: HW recommends that the Applicant verify the manifold sizing calculations for the pressure dosed leaching field shown on Sheet 6. The length of the manifold segments (L) is shown as 1-foot in the calculations; however, the spacing appears to be 5-feet as shown on the site plan and leaching field zone detail.

Response #10: The length of the manifold segments (L) on Sheet 6 has been revised from 1-foot to 5-feet. The manifold diameter remained at 2-inches.

Please contact us if you have any questions regarding these responses.

Sincerely,

C.G. Johnson Engineering, Inc.



Charles G. Johnson, P.E. (Civil)
President



TETRA TECH

April 15, 2015

Wenham Zoning Board of Appeals
Wenham Town Hall
138 Main Street
Wenham, MA 01938

Wenham Conservation Commission
Wenham Town Hall
138 Main Street
Wenham, MA 01938

**Re: Maple Woods - 62 Maple Street
Engineering Review – Septic System Design
Wenham, Massachusetts**

Dear Members of the Zoning Board and Conservation Commission:

Tetra Tech (TT) has been retained by Hill Law on behalf of several abutters to the above-referenced residential project, and is pleased to submit our review of plans of the Proposed On-Site Wastewater Treatment & Disposal System for Proposed Residences at “Maple Woods” Sheets 1 through 6 dated March 12, 2015. The objective of our services was to review the documentation provided and provide initial comments on the completeness and general suitability of the design.

The following are our comments:

Sheet 1 of 6:

- a) The plan shows the subsurface soil absorption system (SAS) beneath a proposed traffic island where trees are proposed (see Landscape Plan). Trees cannot be planted above the SAS.

Sheet 2 of 6:

- a) The plan identifies seasonal high groundwater as determined at Test Pit DT-1. Test Pit DT-1 is located off the subject property and more than 100 feet to the west of the proposed SAS. Deep Observation Hole Tests are required to be within the limits of the disposal area (310 CMR 15.102). Existing grade at DT-1 is approximately 10 feet below existing grade at the disposal area and cannot be considered a reliable reference point for determining groundwater elevation at the disposal area.
- b) Seasonal High Groundwater within the primary and reserve disposal areas have not been determined by methods required under 310 CMR 15.103. See discussion under “Sheet 3” below.
- c) The “Groundwater Mounding Calculations” provided do not follow methods required under 310 CMR 15.212(2) and 15.240(12). The method cited, “Simulation of Groundwater Mounding Beneath Hypothetical Stormwater Basins” is a method used for stormwater



TETRA TECH

applications which are fundamentally different than wastewater applications and may not present an accurate forecast.

- d) Groundwater mounding calculations do not consider potential mounding that will likely result from stormwater recharge area located just 50 feet to the east of the SAS.
- e) In summary, seasonal high groundwater has not been determined by an approved method in either the primary or reserve disposal, potential groundwater mounding from the wastewater disposal area has not been evaluated using methods approved under 310 CMR 15.00, and potential groundwater mounding effect on, and from, the adjacent stormwater recharge area has not been considered.

Sheet 3 of 6:

- a) The plan indicates the system has not been designed for garbage grinders. We suggest any and all approvals be clearly conditioned to preclude the use of garbage disposals.
- b) The Soil Test Data table does not provide values for estimated seasonal high groundwater in any of the test pits conducted within the footprint of either the primary or reserve disposal areas as required by 310 CMR 15.00. The regulations clearly indicate approved methods for determining seasonal high groundwater when no redoximorphic features are present (310 CMR 15.103). The plans do not include any material indicating high groundwater has been determined via an approved method.

Sheet 4 of 6:

- a) No comments

Sheet 5 of 6:

- a) No Comments

Sheet 6 of 6:

- a) No Comments

We appreciate the opportunity to provide these services and look forward to continuing to work with you. Please contact us if you have any questions or require additional information.

Very truly yours,

Sean P. Reardon, P.E.
Vice President

C.G. Johnson Engineering, Inc.

203 Willow Street

South Hamilton, MA 01982

Phone (978) 468-2957

Fax (978) 468-3862

Charles G. Johnson, P.E.

April 21, 2015

Mr. Gregory P. Bernard, Wenham Health Agent

Wenham Board of Health

Town Hall

138 Main Street

Wenham, MA 01984

**Re: On-Site Wastewater Treatment and Dispersal System for "Maple Woods"
Response to Tetra Tech Septic System Design Review Letter**

Dear **Mr. Bernard,**

Pursuant to the Tetra Tech Septic System Design Review Letter dated April 15, 2015, we offer the following responses:

Sheet 1 of 6:

Comment a): The plan shows the subsurface soil absorption system (SAS) beneath a proposed traffic island where trees are proposed (see Landscape Plan). Trees cannot be planted above the SAS.

Response a): *Mr. Matthew Ulrich (Landscape Architect with Ulrich Bachand Landscape Architecture, LLC) will be contacted to make sure no trees are planted above the SAS as shown on his final design plans.*

Sheet 2 of 6:

Comment a): The plan identifies seasonal high groundwater as determined at Test Pit DT-1. Test Pit DT-1 is located off the subject property and more than 100 feet to the west of the proposed SAS. Deep Observation Hole Tests are required to be within the disposal area (310 CMR 15.102). Existing grade at DT-1 is approximately 10 feet below existing grade at the disposal area and cannot be considered a reliable reference point for determining groundwater elevation at the disposal area.

Response a): *The use of Test Pit DT-1 was a helpful and reliable reference point for determining seasonal high groundwater for this project.*

Comment b): Seasonal High Groundwater within the primary and reserve disposal areas have not been determined by methods required under 310 CMR 15.103. See discussion under "Sheet 3" below.

Response b): *The groundwater mounding calculations were reviewed with Mr. H. Criss Stephens, Jr. (Hydrogeologist at the Northeast Regional Office of Mass DEP in Wilmington, MA), and he prepared the attached e-mail dated April 16, 2015. Mr. Stephens agreed with the methodology utilized for this project.*

Page 2 of 2

Mr. Gregory P. Bernard, Wenham Health Agent
April 21, 2015

Comment c): The "Groundwater Mounding Calculations" provided do not follow methods required under 310 CMR 15.212(2) and 15.240(12). The method cited, "Simulation of Groundwater Mounding Beneath Hypothetical Stormwater Basins" is a method used for stormwater applications which are fundamentally different than wastewater applications and may not present an accurate forecast.

Response c): Same response as for Response b) previously stated.

Comment d): Groundwater mounding calculations do not consider potential mounding that will likely result from stormwater recharge area located just 50 feet to the east of the SAS.

Response d): Same response as for Response b) previously stated.

Comment e): In summary, seasonal high groundwater has not been determined by an approved method in either the primary or reserve disposal, potential groundwater mounding from the wastewater disposal area has not been evaluated using methods approved under 310 CMR 15.00, and potential groundwater mounding effect on, and from, the adjacent stormwater recharge area has not been considered.

Response e): Same response as for Response b) previously stated.

Sheet 3 of 6:

Comment a): The plan indicates the system has not been designed for garbage grinders. We suggest any all approvals be clearly conditioned to preclude the use of garbage disposals.

Response a): I agree with the suggestion.

~~Comment b): The Soil Test Data table does not provide values for estimated seasonal high groundwater in any of the test pits conducted within the footprint of either the primary or reserve disposal areas as required by 310 CMR 15.00. The regulations clearly indicate approved methods for determining seasonal high groundwater when no redoximorphic features are present (310 CMR 15.103). The plans do not include any material indicating high groundwater has been determined via an approved method.~~

~~*Response b): Same response as for Response b) for Sheet 2 of 6 previously stated.*~~

Please contact us if you have any questions regarding these responses.

Sincerely,
C.G. Johnson Engineering, Inc.



Charles G. Johnson, P.E. (Civil)
President

Chuck Johnson

From: Stephens, Harold (DEP) <harold.stephens@state.ma.us>
Sent: Thursday, April 16, 2015 2:16 PM
To: mcrowley@wenhamma.gov
Cc: Chuck Johnson (cgjohnsoncivil@verizon.net)
Subject: Wenham/Maple Woods/Groundwater Mounding Calculations

Dear Mr. Bernard;

I have reviewed a set of plans entitled "Proposed On-Site Wastewater Treatment & Dispersal System Design" prepared by Charles G. Johnson, P.E. of C.G. Johnson Engineering, Inc. The plans support a proposed residential development to be located at 62 Maple Street in Wenham, Massachusetts. The plans are dated March 12, 2015. Mr. Johnson had contacted me in mid-February to discuss the groundwater mounding analysis required by 314 CMR 15 (Title 5); specifically, his proposed values for the input parameters needed to conduct said analysis.

I met with Mr. Johnson this morning to discuss the results of his mounding calculations. After reviewing the data provided, I find that the input parameters used by Mr. Johnson appear reasonable and that the methodology used to by Mr. Johnson meets MassDEP's requirements for calculating groundwater mounding beneath Title 5 on-site systems.

The input parameters used include;

- Recharge rate (R) = 0.098 feet/day,
- Specific yield (S_y) = 0.25,
- Horizontal hydraulic conductivity (K_h) = 25 feet/day,
- SAS length = 100 feet,
- SAS width = 90 feet,
- Duration of infiltration(t) = 90 days,
- Initial saturated thickness (h_i) =7.9 feet.

The resultant output yields a groundwater mound of 1.6 feet.

If you have questions, please feel free to contact me via e-mail or at the listed below.

Sincerely,

Criss Stephens

H. Criss Stephens, Jr.
Hydrogeologist
MassDEP/NERO/BWR/Wastewater
978-694-3241

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

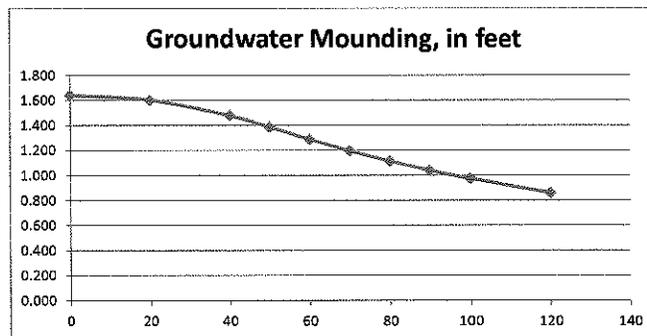
The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values		use consistent units (e.g. feet & days or inches & hours)	Conversion Table	
			inch/hour	feet/day
0.0980	R	Recharge (infiltration) rate (feet/day)	0.67	1.33
0.250	Sy	Specific yield, Sy (dimensionless, between 0 and 1)		
25.00	K	Horizontal hydraulic conductivity, Kh (feet/day)*	2.00	4.00
50.000	x	1/2 length of basin (x direction, in feet)		
45.000	y	1/2 width of basin (y direction, in feet)	hours	days
90.000	t	duration of infiltration period (days)	36	1.50
7.900	hi(0)	initial thickness of saturated zone (feet)		
	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)		
	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)		

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
	0
	20
	40
	50
	60
	70
	80
	90
	100
	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.



Waterloo Biofilter™ System Design Review & Designer Certification

Project: "Maple Woods", 62 Maple Street, Wenham, MA

Applicant: Maple Woods Housing, LLC

Designer: C.G. Johnson Engineering, Inc.

Plan Date: April 21, 2015

Project No.: 1300

Waterloo Biofilter™ unit: 6,600 gpd

The above referenced drawing has been reviewed for conformance with the installation requirements for the Waterloo Biofilter™ unit proposed and the design has been found to meet the installation requirements for the Waterloo Biofilter™ unit.

In addition, Charles G Johnson, P.E., has satisfactorily completed any required training by Clear Water Industries for the design and installation of the Waterloo Biofilter unit.

A handwritten signature in black ink, appearing to read "Charles G. Johnson", is written over a horizontal line.

Clear Water Industries

4-21-15
Date

Maple Woods Housing LLC

238 Elliott Street

Post Office Box 507

Beverly, Massachusetts 01915

April 21, 2015

Mr. Gregory P. Bernard

Wenham Board of Health

Town Hall

138 Main Street

Wenham, MA 01984

**Re: Proposed On-Site Wastewater Treatment and Dispersal System for "Maple Woods"
62 Maple Street, Wenham, MA**

Dear Mr. Bernard,

Pursuant to Section II 16. of the MA DEP Standard Conditions for Secondary Treatment Units Certified for General Use last revised March 20, 2015, I hereby certify the following as the future Owner of record for the subject property:

- i) I have been provided a copy of the MA DEP Renewal of Approval for General Use: Waterloo Biofilter dated November 1, 2012, the Owner's Manual, the Operation and Maintenance Manual, and all attachments and I (as future Owner) agree to comply with all terms and conditions;
- ii) I have been informed of all the Owner's estimated costs associated with the operation including, when applicable: power consumption, maintenance, sampling, recordkeeping, reporting, and equipment replacement;
- iii) I understand the requirement for a service contract;
- iv) I agree to fulfill my responsibilities to provide a Deed Notice as required by 310 CMR 15.287(10) and the Approval;
- v) I agree to fulfill my responsibilities to provide written notification of the Approval conditions to any new Owner, as required by 310 CMR 15.287(5);
- vi) I understand and accept that the restriction that the design does not provide for the use of garbage grinders, the restriction is understood and accepted; and
- vii) I understand, whether or not covered by a warranty, the requirement to repair, replace, modify or take any other action as required by the Department or the local Approving Authority, if the Department or the local Approving Authority determines the System to be failing to protect public health and safety and the environment, as defined in 310 CMR 15.303.

Sincerely,



Andrew DeFranza

C.G. Johnson Engineering, Inc.

203 Willow Street
South Hamilton, MA 01982
Phone (978) 468-2957
Fax (978) 468-3862

Charles G. Johnson, P.E.

April 21, 2015

Mr. Gregory P. Bernard
Wenham Board of Health
Town Hall
138 Main Street
Wenham, MA 01938

**Re: On-Site Wastewater Treatment and Dispersal System for "Maple Woods"
62 Maple Street, Wenham, MA**

Dear **Mr. Bernard**,

In accordance with Section II.16. of MA DEP's Standard Conditions for Secondary Treatment Units Certified for General Use dated March 20, 2015, as the Designer I certify that the design conforms to MA DEP Renewal of Approval for General Use: Waterloo Biofilter dated November 1, 2012, Clear Water Industries Design Guidance for Waterloo Biofilters, and Title 5 (310 CMR 15.000).

Please contact us if you have any questions regarding this matter.

Sincerely,

C.G. Johnson Engineering, Inc.


Charles G. Johnson, P.E. (Civil)
Project Engineer

