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Bourne Board of Health
24 Perry Avenue
Bourne, MA 02532

- July 6, 2022

Re: Variance Requested For 17 Scotch House Cove Road, Bourne, MA
Lawrence R. Coen, Jr., Applicant/Owner

Dear Members:

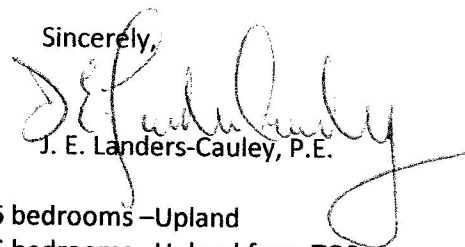
In accordance with the State Environmental Code, Title 5: 310 CMR 15.410, please accept this letter of request to be heard before the Board of Health at their next meeting to discuss relief from Title 5 and/or Board of Health Regulations for the installation of an upgraded septic system at 17 Scotch House Cove Road, Bourne, MA. We respectfully request consideration of the following local upgrade approvals/variances to accommodate our project.

The Variance(s) requested are:

A 47.8 foot variance from the Bourne Board of Health 150 Foot Setback Regulation for the placement of a leaching facility (S.A.S.) within 102.2 feet of the top of a coastal bank

In accordance with your request we are providing new nitrogen loading calculations and an updated pdf file of the site plan, together with seven (7) copies of each document. We have notified all abutters as required and previously provided proof of mailing. Thank you in advance for your consideration of this request.

Sincerely,



J. E. Landers-Cauley, P.E.

Enclosures: Nitrogen Loading Calculation Sheet for 6 bedrooms –Upland
Nitrogen Loading Calculation Sheet for 6 bedrooms –Upland from TOB
Plan of Land Prepared for Lawrence R. Coen of 17 Scotch House Cove Road Bourne, MA
dated 05/12/21, revised 05/16/22, revised 06/28/22 Sheet 1 of 2 and Sheet 2 of 2

17 Scotch House Cove Road - Upland from Top of Bank

Town of Bourne

CONSERVATION COMMISSION

Nitrogen Loading Calculation Sheet for Residential Housing

The following calculation sheet is based upon Technical Bulletin 91-001 issued by the Cape Cod Commission and deals with nitrate nitrogen (NO₃-N). Use the information from your PLAN OF RECORD to provide the following:

Number of bedrooms (Title 5 definition) = 6 bedrooms

Lot size (in square feet) = 52,311 sq. ft.

Impervious surfaces; **Roof area = 3716 sq. ft. **Paved area = _____ sq. ft.

Natural Area = lot area minus all impervious surfaces = 48,595 sq. ft.

Lawn area in sq. ft. = 23,675 sq. ft.

TITLE 5 FLOW = 110 GAL. / DAY PER BEDROOM
WASTEWATER FLOWS (NITROGEN LOAD & WATER LOAD)

Nitrogen from Title 5 design = 14,572 mg NO₃-N / day / bedroom

Water from Title 5 design = 416.3 L H₂O / day / bedroom

1a) Number of bedrooms = 6 X 14,572 = 87,432 mg. NO₃-N / day

1b) Number of bedrooms = 6 X 416 = 2,496 L H₂O / day

Actual Nitrogen load = 6071.5 mg NO₃-N / day / bedroom

Actual Water load = 173.5 L H₂O / day / bedroom

*Note: This assumes 2.5 people / unit average occupancy within the Town.

2a) Number of bedrooms = 6 X 6071.5 = 36,429 mg. NO₃-N / day

2b) Number of bedrooms = 6 X 173.5 = 1,041 L H₂O / day

IMPERVIOUS SURFACES (NITROGEN LOAD & WATER LOAD)

NO₃-N load number sq. ft. of roof surface X 0.19395 mg NO₃-N / sq. ft.

H₂O load number sq. ft. of roof surface X 0.2586 L / sq. ft.

3a) Roof surface = 3716 sq. ft. X 0.19395 = 721 mg NO₃-N

3b) Roof surface = 3716 sq. ft. X 0.2586 = 961 L H₂O

NO₃-N load number sq. ft. of paved surface X 0.388 mg / sq. ft.

H₂O load number sq. ft. of paved surface X 0.2586 L / sq. ft.

4a) NO₃-N = 0 sq. ft. paved surface X 0.388 mg / sq. ft. = 0 mg NO₃-N

4b) H₂O = 0 sq. ft. paved surface X 0.2586 L / sq. ft. = 0 L H₂O

17 South Horse Cove Road - Upland from Top of Bank
LAWN NITROGEN LOAD = 0.933 mg / sq. ft. lawn surface

$$5) \text{ sq. ft. of lawn} = \underline{23,675} \times 0.933 = \underline{22,089} \text{ mg}$$

NATURAL AREA WATER LOADING

$$\text{Natural area} = \text{lot size} - \text{impervious surface} \quad 52,311 - 3716 = \underline{48,595} \text{ sq. ft.}$$

$$6) \text{ Natural area} = \underline{48,595} \times \text{water recharge factor} = \underline{6599} \text{ L}$$

(0.1358 L / sq. ft. for Bourne)¹

SUMMARY OF NITROGEN LOADING

Estimated Title 5 Nitrogen & Water Loading

7a) ADD the above NO₃N load:

$$\begin{array}{r} 1a \\ 87432 \end{array} + \begin{array}{r} 3a \\ 721 \end{array} + \begin{array}{r} 4a \\ \emptyset \end{array} + \begin{array}{r} 5 \\ 22,089 \end{array} = \underline{110,242} \text{ mg NO}_3\text{-N / day}$$

7b) ADD the above water (H₂O) load:

$$\begin{array}{r} 1b \\ 2496 \end{array} + \begin{array}{r} 3b \\ 961 \end{array} + \begin{array}{r} 4b \\ \emptyset \end{array} + \begin{array}{r} 6 \\ 6599 \end{array} = \underline{10,056} \text{ L H}_2\text{O / day}$$

$$7c) \text{ DIVIDE } 7a \text{ by } 7b = \underline{10,962} \text{ ppm NO}_3\text{-N*****}$$

Actual Nitrogen & Water Loading

8a) ADD the above NO₃N load:

$$\begin{array}{r} 2a \\ 36,429 \end{array} + \begin{array}{r} 3a \\ 721 \end{array} + \begin{array}{r} 4a \\ \emptyset \end{array} + \begin{array}{r} 5 \\ 22,089 \end{array} = \underline{59,239} \text{ mg NO}_3\text{-N / day}$$

8b) ADD the above water (H₂O) load:

$$\begin{array}{r} 2b \\ 1041 \end{array} + \begin{array}{r} 3b \\ 961 \end{array} + \begin{array}{r} 4b \\ \emptyset \end{array} + \begin{array}{r} 6 \\ 6599 \end{array} = \underline{8601} \text{ L H}_2\text{O / day}$$

$$8c) \text{ DIVIDE } 8a \text{ by } 8b = \underline{6,887} \text{ ppm NO}_3\text{-N*****}$$

$$\text{FINAL CALCULATION ADD } 7c \text{ \& } 8c \text{ (ppm)} = \underline{17,849} \text{ divide by } 2 = \underline{8,925} \text{ ppm NO}_3\text{-N}$$

This is the actual nitrate nitrogen load for the project as designed. The target for coastal areas is 5 ppm nitrate nitrogen. Certain critical embayments may require a LOWER figure to prevent degradation.

*****If your nitrate nitrogen load exceeds the target limit USE A SECOND CALCULATION SHEET TO SHOW ALTERNATIVES IN TRYING TO ACHIEVE THE 5 PPM NITRATE NITROGEN LEVEL*****

¹ Water recharge factors for data line 6: @21' / yr. use 0.1358 in Bourne and Falmouth; @ 19" / yr. use 0.1228 for Mashpee & Sandwich; @ 18" / yr. 0.1164 for Barnstable, Dennis & Yarmouth; @ 17" / yr. use 0.1101 for Brewster &

17 Scotch House Cove Road - Upland

Town of Bourne CONSERVATION COMMISSION

Nitrogen Loading Calculation Sheet for Residential Housing

The following calculation sheet is based upon Technical Bulletin 91-001 issued by the Cape Cod Commission and deals with nitrate nitrogen (NO₃-N). Use the information from your PLAN OF RECORD to provide the following:

Number of bedrooms (Title 5 definition) = 6 bedrooms
 Lot size (in square feet) = 111,674 sq. ft.
 Impervious surfaces; **Roof area = 3716 sq. ft. **Paved area = _____ sq. ft.
 Natural Area = lot area minus all impervious surfaces = 107,960 sq. ft.
 Lawn area in sq. ft. = 23,675 sq. ft.

TITLE 5 FLOW = 110 GAL. / DAY PER BEDROOM
WASTEWATER FLOWS (NITROGEN LOAD & WATER LOAD)

Nitrogen from Title 5 design = 14,572 mg NO₃-N / day / bedroom

Water from Title 5 design = 416.3 L H₂O / day / bedroom

1a) Number of bedrooms = 6 X 14,572 = 87,432 mg. NO₃-N / day

1b) Number of bedrooms = 6 X 416 = 2,496 L H₂O / day

Actual Nitrogen load = 6071.5 mg NO₃-N / day / bedroom

Actual Water load = 173.5 L H₂O / day / bedroom

*Note: This assumes 2.5 people / unit average occupancy within the Town.

2a) Number of bedrooms = 6 X 6071.5 = 36,429 mg. NO₃-N / day

2b) Number of bedrooms = 6 X 173.5 = 1,041 L H₂O / day

IMPERVIOUS SURFACES (NITROGEN LOAD & WATER LOAD)

NO₃-N load number sq. ft. of roof surface X 0.19395 mg NO₃-N / sq. ft.

H₂O load number sq. ft. of roof surface X 0.2586 L / sq. ft.

3a) Roof surface = 3716 sq. ft. X 0.19395 = 721 mg NO₃-N

3b) Roof surface = 3716 sq. ft. X 0.2586 = 961 L H₂O

NO₃-N load number sq. ft. of paved surface X 0.388 mg / sq. ft.

H₂O load number sq. ft. of paved surface X 0.2586 L / sq. ft.

4a) NO₃-N = 0 sq. ft. paved surface X 0.388 mg / sq. ft. = 0 mg NO₃-N

4b) H₂O = 0 sq. ft. paved surface X 0.2586 L / sq. ft. = 0 L H₂O

SCOTT HOUSE LOW ROAD - UPLAND
LAWN NITROGEN LOAD = 0.933 mg / sq. ft. lawn surface

5) sq. ft. of lawn = 23,675 X 0.933 = 22,089 mg

NATURAL AREA WATER LOADING

Natural area = lot size - impervious surface 114,676 - 3716 = 107,960 sq.ft.

6) Natural area = 107,960 X water recharge factor = 13,581 L
(0.1358 L / sq. ft. for Bourne)¹

SUMMARY OF NITROGEN LOADING

Estimated Title 5 Nitrogen & Water Loading

7a) ADD the above NO₃N load:

1a + 3a + 4a + 5 = 110,242 mg NO₃-N / day
87,432 + 721 + 0 + 22,089

7b) ADD the above water (H₂O) load:

1b + 3b + 4b + 6 = 17,038 L H₂O / day
2,496 + 961 + 0 + 13,581

7c) DIVIDE 7a by 7b = 6.470 ppm NO₃-N*****

Actual Nitrogen & Water Loading

8a) ADD the above NO₃N load:

2a + 3a + 4a + 5 = 59,239 mg NO₃-N / day
36,429 + 721 + 0 + 22,089

8b) ADD the above water (H₂O) load:

2b + 3b + 4b + 6 = 15,583 L H₂O / day
1,071 + 961 + 0 + 13,581

8c) DIVIDE 8a by 8b = 3.802 ppm NO₃-N*****

FINAL CALCULATION ADD 7c & 8c (ppm) = 10.272 divide by 2 = 5.135 ppm NO₃-N

This is the actual nitrate nitrogen load for the project as designed. The target for coastal areas is 5 ppm nitrate nitrogen. Certain critical embayments may require a LOWER figure to prevent degradation.

*****If your nitrate nitrogen load exceeds the target limit USE A SECOND CALCULATION SHEET TO SHOW ALTERNATIVES IN TRYING TO ACHIEVE THE 5 PPM NITRATE NITROGEN LEVEL*****

¹ Water recharge factors for data line 6: @21' / yr. use 0.1358 in Bourne and Falmouth; @ 19" / yr. use 0.1228 for Mashpee & Sandwich; @ 18" / yr. 0.1164 for Barnstable, Dennis & Yarmouth; @ 17" / yr. use 0.1101 for Brewster & Harwich; @ 16" / yr. use 0.1031 for Chatham, Eastham, Orleans, Provincetown, Truro & Wellfleet.