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Bourne Board of Health
24 Perry Avenue
Bu zzards Bay, MA 02532

July 6, 2022

Re: Variance(s) Requested For 128 Emmons Road, Bourne, MA 02553
Jonathan Levitt and Marni Levitt, Owners

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 128 Emmons Road, Bourne, MA 02553. We respectfully request consideration of the following local upgrade approvals/variances to accommodate our project.

The Variances requested are:

A 40.2 foot variance from the Bourne Board of Health 150 Foot Setback Regulation for the placement of a leaching facility within 109.8 feet of the top of south eastern coastal bank;

A 49.9 foot variance from the Bourne Board of Health 150 Foot Setback Regulation for the placement of a leaching facility within 100.1 feet of the top of the north western coastal bank;

According to your request we have reviewed the nitrogen loading calculations and have submitted new calculations for 3 bedrooms and the proposed 7 bedrooms. Also enclosed is an updated site plan and updated architectural plans. 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: See Attached List:

Enclosures: Nitrogen Loading Calculation Sheets for 3 bedrooms
Nitrogen Loading Calculation Sheets for proposed 7 bedrooms
Architectural Plans for Existing House-Ground Floor EX-01
Architectural Plans for Existing House-1st Floor EX-02
Architectural Plans for Existing House-2nd Floor EX-03
Site Plan Prepared for Jonathan and Marni Levitt of 128 Emmons Road Bourne, MA 06/01/22, revised 06/28/22 Sheet 1 of 2 and Sheet 2 of 2

p://Ken B/128 Emmons Rd BOH Variance

# Town of Bourne

## CONSERVATION COMMISSION

128 Emmons Road - 3 Bedrooms

## 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 ($NO_3$-N). Use the information from your PLAN OF RECORD to provide the following:

Number of bedrooms (Title 5 definition) = 3 bedrooms
Lot size (in square feet) = 35,600 sq. ft.
Impervious surfaces; **Roof area = 2549 sq. ft. **Paved area = 2337 sq. ft.
Natural Area = lot area minus all impervious surfaces = 30,714 sq. ft.
Lawn area in sq. ft. = 10,034 sq. ft.

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

Nitrogen from Title 5 design = 14,572 mg $NO_3$-N / day / bedroom
Water from Title 5 design = 416..3 L $H_2O$ / day / bedroom

1a) Number of bedrooms = 3 X 14,572 = 43716 mg. $NO_3$-N / day
1b) Number of bedrooms = 3 X 416 = 1248 L $H_2O$ / day

Actual Nitrogen load = 6071.5 mg $NO_3$-N / day / bedroom
Actual Water load = 173.5 L $H_2O$ / day / bedroom
*Note: This assumes 2.5 people / unit average occupancy within the Town.

2a) Number of bedrooms = 3 X 6071.5 = 18215 mg. $NO_3$-N / day
2b) Number of bedrooms = 3 X 173.5 = 521 L $H_2O$ / day

IMPERVIOUS SURFACES (NITROGEN LOAD & WATER LOAD)

$NO_3$-N load number sq. ft. of roof surface X 0.19395 mg $NO_3$-N / sq. ft.
$H_2O$ load number sq. ft. of roof surface X 0.2586 L / sq. ft.

3a) Roof surface = 2549 sq. ft. X 0.19395 = 494 mg $NO_3$-N
3b) Roof surface = 2549 sq. ft. X 0.2586 = 659 L $H_2O$

$NO_3$-N load number sq. ft. of paved surface X 0.388 mg / sq. ft.
$H_2O$ load number sq. ft. of paved surface X 0.2586 L / sq. ft.

4a) $NO_3$-N = 2337 sq. ft. paved surface X 0.388 mg / sq. ft. = 907 mg $NO_3$-N
4b) $H_2O$ = 2337 sq. ft. paved surface X 0.2586 L / sq. ft. = 604 L $H_2O$

LAWN NITROGEN LOAD = 0.933 mg / sq. ft. lawn surface

5) sq. ft. of lawn = 10034 X 0.933 = 9362 mg

NATURAL AREA WATER LOADING

Natural area = lot size - impervious surface = 30,714 sq.ft.

6) Natural area = 30,714 X water recharge factor (0.1358 L / sq. ft. for Bourne)[1] = 4171 L

## SUMMARY OF NITROGEN LOADING

**Estimated Title 5 Nitrogen & Water Loading** 128 Emmons Road – 3 Bedrooms

7a) ADD the above $NO_3N$ load:

1a + 3a + 4a + 5

43,716 + 494 + 907 + 9362 = 54,479 mg $NO_3$-N / day

7b) ADD the above water ($H_2O$) load:

1b + 3b + 4b + 6

1246 + 659 + 604 + 4171 = 6682 L $H_2O$ / day

**7c) DIVIDE 7a by 7b = 8,153 ppm NO $_3$-N*****

Actual Nitrogen & Water Loading

8a) ADD the above NO $_3$N load:

2a + 3a + 4a + 5

14,215 + 494 + 907 + 9,362 = 28,978 mg $NO_3$-N / day

8b) ADD the above water (H $_2$O) load:

2b + 3b + 4b + 6

521 + 659 + 604 + 4171 = 5955 L $H_2O$ / day

**8c) DIVIDE 8a by 8b = 4.866 ppm $NO_3$-N*****

**FINAL CALCULATION ADD 7c & 8c (ppm) = 13.019 divide by 2 = 6.510 ppm $NO_3$-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.

# Town of Bourne

## CONSERVATION COMMISSION

128 Emmons Road 7 Bedrooms

# 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 ($NO_3$-N). Use the information from your PLAN OF RECORD to provide the following:

Number of bedrooms (Title 5 definition) = 7 bedrooms
Lot size (in square feet) = 35,600 sq. ft.
Impervious surfaces; **Roof area = 3739 sq. ft. **Paved area = _____ sq. ft.
Natural Area = lot area minus all impervious surfaces = 31,861 sq. ft.
Lawn area in sq. ft. = 8734 sq. ft.

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

Nitrogen from Title 5 design = 14,572 mg $NO_3$-N / day / bedroom
Water from Title 5 design = 416..3 L $H_2O$ / day / bedroom

1a) Number of bedrooms = 7 X 14,572 = 102,004 mg. $NO_3$-N / day
1b) Number of bedrooms = 7 X 416 = 2912 L $H_2O$ / day

Actual Nitrogen load = 6071.5 mg $NO_3$-N / day / bedroom
Actual Water load = 173.5 L $H_2O$ / day / bedroom
*Note: This assumes 2.5 people / unit average occupancy within the Town.

2a) Number of bedrooms = 7 X 6071.5 = 42501 mg. $NO_3$-N / day
2b) Number of bedrooms = 7 X 173.5 = 1215 L $H_2O$ / day

IMPERVIOUS SURFACES (NITROGEN LOAD & WATER LOAD)

$NO_3$-N load number sq. ft. of roof surface X 0.19395 mg $NO_3$-N / sq. ft.
$H_2O$ load number sq. ft. of roof surface X 0.2586 L / sq. ft.

3a) Roof surface = 3739 sq. ft. X 0.19395 = 725 mg $NO_3$-N
3b) Roof surface = 3739 sq. ft. X 0.2586 = 967 L $H_2O$

$NO_3$-N load number sq. ft. of paved surface X 0.388 mg / sq. ft.
$H_2O$ load number sq. ft. of paved surface X 0.2586 L / sq. ft.

4a) $NO_3$-N = 0 sq. ft. paved surface X 0.388 mg / sq. ft. = 0 mg $NO_3$-N
4b) $H_2O$ = 0 sq. ft. paved surface X 0.2586 L / sq. ft. = 0 L $H_2O$

LAWN NITROGEN LOAD = 0.933 mg / sq. ft. lawn surface

5) sq. ft. of lawn = 8734 X 0.933 = 8149 mg

NATURAL AREA WATER LOADING

Natural area = lot size - impervious surface = 31,861 sq.ft.

6) Natural area = 31,861 X water recharge factor (0.1358 L / sq. ft. for Bourne)[1] = 4,327 L

## SUMMARY OF NITROGEN LOADING

**Estimated Title 5 Nitrogen & Water Loading** 128 Emmons Road - 7 Bedrooms

7a) ADD the above $NO_3N$ load:

1a + 3a + 4a + 5

102,864 + 725 + 0 + 8149 = 110,878 mg $NO_3$-N / day

7b) ADD the above water ($H_2O$) load:

1b + 3b + 4b + 6

2912 + 967 + 0 + 4327 = 8206 L $H_2O$ / day

**7c) DIVIDE 7a by 7b = 13.512 ppm $NO_3$-N*****

Actual Nitrogen & Water Loading

8a) ADD the above $NO_3N$ load:

2a + 3a + 4a + 5

42,501 + 725 + 0 + 8149 = 51375 mg $NO_3$-N / day

8b) ADD the above water ($H_2O$) load:

2b + 3b + 4b + 6

1215 + 967 + 0 + 4327 = 6509 L $H_2O$ / day

**8c) DIVIDE 8a by 8b = 7.893 ppm $NO_3$-N*****

**FINAL CALCULATION ADD 7c & 8c (ppm) = 21.401 divide by 2 = 10.702 ppm $NO_3$-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.