Town of Bourne

CONSERVATION COMMISSION

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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) = 2 bedrooms
Lot size (in square feet) = 8,179 sq. ft.
Impervious surfaces; **Roof area = 1201 sq. ft. **Paved area = 832 sq. ft.
Natural Area = lot area minus all impervious surfaces = 6146 sq. ft.
Lawn area in sq. ft. = 0 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 x (19/35) = 7,911 mgNO3-N/day/bedroom with I/A
Water from Title 5 design = 416..3 L H_2O / day / bedroom
1a) Number of bedrooms = 2 X 14,572 = 15,281 W/ I/A mg. NO_3-N / day
1b) Number of bedrooms = 2 X 416 = 832 L H_2O / day
Actual Nitrogen load = 6071.5 mg NO_3-N / day / bedroom x (19/35) = 3,296 mgNO3-N/day/bedroom with I/A
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 = 2 X 6071.5 = 6591.9 W/ I/A mg. NO_3-N / day
2b) Number of bedrooms = 2 X 173.5 = 347 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 = 1201 sq. ft. X 0.19395 = 232.9 mg NO_3-N
3b) Roof surface = 1201 sq. ft. X 0.2586 = 310.6 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 = 832 sq. ft. paved surface X 0.388 mg / sq. ft. = 322.8 mg NO_3-N
4b) H_2O = 832 sq. ft. paved surface X 0.2586 L / sq. ft. = 215.2 L H_2O

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

5) sq. ft. of lawn = 0 X 0.933 = 0 mg

NATURAL AREA WATER LOADING

Natural area = lot size - impervious surface = 6146 sq.ft.

6) Natural area = 6146 X water recharge factor = 834.6 L
(0.1358 L / sq. ft. for Bourne)[1]

SUMMARY OF NITROGEN LOADING

Estimated Title 5 Nitrogen & Water Loading

7a) ADD the above NO_3N load:

1a	+	3a	+	4a	+	5		
15,281	+	232.9	+	322.8	+	0	=	15,836.7 mg NO_3-N / day

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

1b	+	3b	+	4b	+	6		
832	+	310.6	+	215.2	+	834.6	=	2,192.4 L H_2O / day

7c) DIVIDE 7a by 7b = 7.2 ppm NO_3-N***

Actual Nitrogen & Water Loading

8a) ADD the above NO_3N load:

2a	+	3a	+	4a	+	5		
6,591.9	+	232.9	+	322.8	+	0	=	7,147.6 mg NO_3-N / day

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

2b	+	3b	+	4b	+	6		
347	+	310.6	+	215.2	+	834.6	=	1,707.4 L H_2O / day

8c) DIVIDE 8a by 8b = 4.2 ppm NO_3-N***

FINAL CALCULATION ADD 7c & 8c (ppm) = 11.4 divide by 2 = 5.7 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.