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Bourne Health Department  
24 Perry Avenue  
Buzzards Bay, MA 02532

# Town of Bourne

## 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<sub>3</sub>-N) Use the information from your PLAN OF RECORD to provide the following:

**68 Elgin Road - Proposed Conditions**

Number of Bedrooms (Title 5 Definition)	=	<span style="border: 1px solid black; padding: 2px;">3</span>	Bedrooms
Lot Size (in square feet of upland areas)	=	<span style="border: 1px solid black; padding: 2px;">18,159</span>	sq. ft.
Impervious Surfaces; **roof area	=	<span style="border: 1px solid black; padding: 2px;">3,087</span> sq. ft.	**Paved Area = <span style="border: 1px solid black; padding: 2px;">2,057</span> sq. ft.
Natural Area = lot area minus all impervious surfaces	=	<span style="border: 1px solid black; padding: 2px;">13,015</span>	sq. ft.
Lawn Area in sq. ft.	=	<span style="border: 1px solid black; padding: 2px;">4,494</span>	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<sub>3</sub>-N / day / bedroom: or 7911 mg NO<sub>3</sub>-N / day/ bedroom with IA Treatment

Water from Title 5 design = 416.3 H<sub>2</sub>O / day / bedroom

1a) Number of bedrooms = 3 x 7911 = 23733.00 mg. NO<sub>3</sub>-N / day

1b) Number of bedrooms = 3 x 416 = 1248.00 L H<sub>2</sub>O / day

Actual Nitrogen load = 6071.5 mg NO<sub>3</sub>-N / day/ bedroom: 3296 mg NO<sub>3</sub>-N / day/ bedroom with IA Treatment

Actual Water load = 173.5 L H<sub>2</sub>O / day / bedroom

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

2a) Number of bedrooms = 3 x 3296 = 9888.00 mg. NO<sub>3</sub>-N / day

2b) Number of bedrooms = 3 x 173.5 = 520.50 L H<sub>2</sub>O / day

IMPERVIOUS SURFACES (NITROGEN LOAD & WATER LOAD)

NO<sub>3</sub>-N load number sq. ft. of roof surface X 0.19395 mg NO<sub>3</sub>-N / sq. ft.

H<sub>2</sub>O load number sq. ft. of roof surface X 0.2586 L / sq. ft.

3a) Roof surface = 3087 sq. ft. X 0.19395 = 598.72 mg NO<sub>3</sub>-N

3b) Roof surface = 3087 sq. ft. X 0.2586 = 798.30 L H<sub>2</sub>O / day

NO<sub>3</sub>-N load number sq. ft. of paved surface X 0.388 mg / sq. ft.

H<sub>2</sub>O load number sq. ft. of paved surface X 0.2586 L / sq. ft.

4a) NO<sub>3</sub>-N = 2,057 sq. ft. paved surface X 0.388 mg / sq. ft. = 798.12 mg NO<sub>3</sub>-N

4b) H<sub>2</sub>O = 2,057 sq. ft. paved surface X 0.2586 L / sq. ft. = 531.94 L H<sub>2</sub>O

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

$$5) \text{ sq. ft. of lawn} = 4494 \times 0.933 = 4192.90 \text{ mg}$$

NATURAL AREA WATER LOADING

$$\text{Natural area} = \text{lot size} - \text{impervious surfaces} = 13015 \text{ sq. ft.}$$

$$6) \text{ Natural area} = 13015 \times \text{water recharge factor} = 1767.44 \text{ L}$$

(0.1358 L / sq. ft. for Bourne)

### SUMMARY OF NITROGEN LOADING

#### Estimated Title 5 Nitrogen & Water Loading

7a) ADD the above NO<sub>3</sub>N load

1a	(+)	3a	(+)	4a	(+)	5	
23733		598.72		798.12		4192.90	29322.74 mg NO <sub>3</sub> -N / day

7b)

1b	(+)	3b	(+)	4b	(+)	6	
1248		798.30		531.94		1767.44	4345.68 L H <sub>2</sub> O / day

$$7c) \text{ DIVIDE 7a by 7b} = \underline{6.7} \text{ ppm NO}_3\text{-N}^{*****}$$

#### Actual Nitrogen & Water Loading

8a) ADD the above NO<sub>3</sub>N load:

2a	(+)	3a	(+)	4a	(+)	5	
9888		598.72		798.12		4192.90	<u>15477.74</u> mg NO <sub>3</sub> -N / day

8b) ADD the above water (H<sub>2</sub>O) load:

2b	(+)	3b	(+)	4b	(+)	6	
520.5		798.30		531.94		1767.44	<u>3618.18</u> L H <sub>2</sub> O / day

$$8c) \text{ DIVIDE 8a by 8b} = \underline{4.3} \text{ ppm NO}_3\text{-N}^{*****}$$

$$\text{FINAL CALCULATION ADD 7c \& 8c (ppm)} = \underline{11.0} \text{ divide by 2} = \underline{5.5} \text{ ppm NO}_3\text{-N}$$

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**\*\*\*