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Bourne Health Department
24 Perry Avenue
Brazzards 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 (NO₃-N) Use the information from your PLAN OF RECORD to provide the following:
(Actual water load based on 2.5 people @ 55 gpd/person or 137.5 gpd/unit)

68 Elgin Road - Proposed Conditions

Number of Bedrooms (Title 5 Definition)	=	3	Bedrooms
Lot Size (in square feet of upland areas)	=	18,159	sq. ft.
Impervious Surfaces; **roof area = 3,087 sq. ft.	**Paved Area =	2,057	sq. ft.
Natural Area = lot area minus all impervious surfaces	=	13,015	sq. ft.
Lawn Area in sq. ft.	=	4,494	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; or
 With IA Treatment = 7,911 mg NO₃-N day/bedroom
 Water from Title 5 design = 416.3 H₂O / day / bedroom

1a) Number of bedrooms	=	3	x 7911 =	23733.00 mg. NO ₃ -N / day
1b) Number of bedrooms	=	3	x 416 =	1248.00 L H ₂ O / day

Actual Nitrogen load = 6071.5 mg NO₃-N / day/ person (@ 35 ppm); or
 With IA Treatment = 3,296 mg NO₃-N / day/person (@ 19 ppm)
 Actual Water load = 173.5 L H₂O / day / bedroom
 *Note: This assumes 2.5 people / unit average occupancy within the Town

2a) Number of People	=	2.5	x 3296 =	8240.00 mg. NO ₃ -N / day
2b) Number of People	=	2.5	x 208.2 =	520.50 L H ₂ O / 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 ₂ 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 ₃ -N
3b) Roof surface = 3087 sq. ft.	X	0.2586 =	798.30 L H ₂ O / day

NO ₃ -N load number sq. ft. of paved surface	X	0.388 mg / sq. ft.
H ₂ O load number sq. ft. of paved surface	X	0.2586 L / sq. ft.

4a) NO ₃ -N	=	2,057	sq. ft. paved surface X 0.388 mg / sq. ft.	798.12 mg NO ₃ -N
4b) H ₂ O	=	2,057	sq. ft. paved surface X 0.2586 L / sq. ft.	531.94 L H ₂ O

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

5) sq. ft. of lawn = 4494 X 0.933 = 4192.90 mg

NATURAL AREA WATER LOADING

Natural area = lot size - impervious surfaces = 13015 sq. ft.

6) Natural area = 13015 X water recharge factor = 1767.44 L
(0.1358 L / sq. ft. for Bourne)

SUMMARY OF NITROGEN LOADING

Estimated Title 5 Nitrogen & Water Loading

7a) ADD the above NO3N load

1a	(+)	3a	(+)	4a	(+)	5	
23733		598.72		798.12		4192.90	29322.74 mg NO3-N / day

7b)

1b	(+)	3b	(+)	4b	(+)	6	
1248		798.30		531.94		1767.44	4345.68 L H2O / day

7c) DIVIDE 7a by 7b = 6.7 ppm NO3-N*****

Actual Nitrogen & Water Loading

8a) ADD the above NO3N load:

2a	(+)	3a	(+)	4a	(+)	5	
8240		598.72		798.12		4192.90	<u>13829.74</u> mg NO3-N / day

8b) ADD the above water (H2O) load:

2b	(+)	3b	(+)	4b	(+)	6	
520.5		798.30		531.94		1767.44	<u>3618.18</u> L H2O / day

8c) DIVIDE 8a by 8b = 3.8 ppm NO3-N*****

FINAL CALCULATION ADD 7c & 8c (ppm) = 10.6 divide by 2 = 5.3 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*****