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 Commision 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/unit @ 70 gpd/person or 175 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 NO_3-N / day / bedroom; or
With IA Treatment = 7,911 mg NO3-N / day/bedroom
Water from Title 5 design = 416.3 H_2O / 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_2O / day

Actual Nitrogen load = 9273.25 mg NO_3-N / day/ person: 5034.05mg NO3-N / day/person
with IA Treatment = 5034.05mg NO3-N /day/person (@ 19 ppm with IA)
Actual Water load = 175 gpd/unit or 70 gpd/person @ 2.5 people/unit = 265 L H_2O / day / person
*Note: This assumes 2.5 people / unit average occupancy within the Town

2a) Number of People =	2.5	x 5034=	12585.00	mg. NO_3-N / day
2b) Number of People =	2.5	x 265.0 =	662.38	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 =	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_2O / day

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 =	2,057	sq. ft. paved surface X	0.388 mg / sq. ft.	798.12	mg NO_3-N
4b) H_2O =	2,057	sq. ft. paved surface X	0.2586 L / sq. ft.	531.94	L H_2O

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 NO_3N load

1a	(+)	3a	(+)	4a	(+)	5	
23733		598.72		798.12		4192.90	29322.74 mg NO_3-N / day

7b)

1b	(+)	3b	(+)	4b	(+)	6	
1248		798.30		531.94		1767.44	4345.68 L H_2O / day

7c) DIVIDE 7a by 7b = 6.7 ppm NO_3-N***

Actual Nitrogen & Water Loading

8a) ADD the above NO_3N load:

2a	(+)	3a	(+)	4a	(+)	5	
12585		598.72		798.12		4192.90	18174.74 mg NO_3-N / day

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

2b	(+)	3b	(+)	4b	(+)	6	
662.375		798.30		531.94		1767.44	3760.05 L H_2O / day

8c) DIVIDE 8a by 8b = 4.8 ppm NO_3-N***

FINAL CALCULATION ADD 7c & 8c (ppm) = 11.6 divide by 2 = *5.8* 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*****