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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)

176 Scraggy Neck Road - Proposed Conditions

Number of Bedrooms (Title 5 Definition)			=	4	Bedrooms
Lot Size (in square feet of upland areas)			=	87,006	sq.ft.
Impervious Surfaces;**roof area=	4,317	sq.ft.	**Paved Area =	-	sq.ft.
Natural Area = lot area minus all impervious surfaces			=	82,689	sq.ft.
Lawn Area in sq. ft.			=	6,583	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	=	4	x 7911 =	31644.00	mg. NO_3-N / day	
1b) Number of bedrooms	=	4	x 416 =	1664.00	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	=	4317	sq. ft.	X	0.19395 =	837.28	mg NO_3-N
3b) Roof surface	=	4317	sq. ft.	X	0.2586 =	1116.38	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	=	-	sq. ft. paved surface X	0.388	mg / sq. ft.	0.00 mg NO_3-N
4b) H_2O	=	-	sq. ft. paved surface X	0.2586	L / sq. ft.	0.00 L H_2O

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

5) sq. ft. of lawn = 6583 X 0.933 = 6141.94 mg

NATURAL AREA WATER LOADING

Natural area = lot size - impervious surfaces = 82689 sq. ft.

6) Natural area = 82689 X water recharge factor = 11229.17 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		
31644		837.28		0.00		6141.94	38623.22	mg NO_3-N / day

7b)

1b	(+)	3b	(+)	4b	(+)	6		
1664		1116.38		0.00		11229.17	14009.54	L H_2O / day

7c) DIVIDE 7a by 7b = 2.8 ppm NO_3-N***

Actual Nitrogen & Water Loading

8a) ADD the above NO_3N load:

2a	(+)	3a	(+)	4a	(+)	5		
12585		837.28		0.00		6141.94	19564.22	mg NO_3-N / day

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

2b	(+)	3b	(+)	4b	(+)	6		
662.375		1116.38		0.00		11229.2	13007.92	L H_2O / day

8c) DIVIDE 8a by 8b = 1.5 ppm NO_3-N***

FINAL CALCULATION ADD 7c & 8c (ppm) = 4.3 divide by 2 = *2.1* 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*****