RECEIVED
By Bourne Health Department at 9:10 am, Feb 01, 2023

Town of Bourne

CONSERVATION COMMISSION

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:

Project Address: 3 Sunny Lane Bourne Date Prepared: 12/20/2022

Title and date of plan: Plan of Proposed sewage disposal system - 8-8-22

Proposed Conditions

Number of Bedrooms (Title 5 definition)	=	3	BEDROOMS
Lot size (in square feet)	=	6,365	sq.ft.
IMPERVIOUS SURFACES **ROOF AREA	=	1,143	sq.ft.
**DRIVEWAY, TERRACE & PATIO	=	844	sq.ft.
Total Imperivous area		1,987	
Natural Area = Lot area minus all impervious surfaces	=	4,378	sq.ft.
Lawn area in Sq. ft	=	4,378	sq.ft.

TITLE 5 FLOW = 110 GAL./DAY PER BEDROOM

WASTEWATER FLOWS (NITROGEN LOADS & WATER LOADS)

Nitrogen from Title 5 design = 7,911 mg NO3-N/day/bedroom 19 mg/l

Water fromTitle 5 Design = 416.3 L H2O/day/bedroom

1a)	Number of bedrooms =	3	x	7910.514	=	23,732	mg NO3-N/DAY
1b)	Number of bedrooms =	3	x	416	=	1,248	L H2O/DAY

Actual Nitrogen Load = 3296 mg NO3-N/DAY/BEDROOM

Actual Water Load = 173.5 H20/DAY/BEDROOM FOR 2.5 PEOPLE PER DWELLING

*Note: this assumes 2.5 people /unit average occupancy withing the town.

2a)	Number of bedrooms =	3	x	3,296.0	=	9,888	mg NO3-N/DAY
2b)	Number of bedrooms =	3	x	173.5	=	521	L H2O/DAY

IMPERVIOUS SURFACE (NITROGEN LOAD & WATER LOAD)

NO3-N load numbersq.ft. of roof surface	x	0.1940	mg NO3-N
H2O load number sq.ft of roof surface	X	0.2586	L/sq.ft

3a)	Roof surface =	1,143	x	0.1940	=	221.7	mg NO3-N/DAY
3b)	Roof surface =	1,143	x	0.2586	=	295.6	L H2O

NO3-Nload number sq.ft. of paved surface	x	0.3880	mg/sq.ft.
H2O load number sq.ft of paved surface	x	0.2586	L/sq.ft

4a)	NO3-n sq.ft paved surfaces =	844	X	0.3880	mg/sq.ft. =	327.5	mg NO3-N/DAY
4b)	H20 sq.ft paved surfaces =	844	X	0.2586	L/sq.ft =	218.3	L H2O

Prepared by: Holmes and McGrath

Project Address: 3 Sunny Lane Bourne Date Prepared: 12/20/2022

Existing Conditions

LAWN NITROGEN LOAD = 0.933 mg / sq.sf. Lawn surface

5) SF LAWN AREA = 4,378 X 0.933 = 4,084.1 mg

NATURAL AREA WATER LOADING

Natural area = lot size - impervious surface = 1,987.0 sq.ft.

6) Natural area = 4,378 X water recharge factor = 594.5 L PER DAY

(0.1358 L/sq. ft. for Bourne)1

SUMMARY OF NITROGEN LOADING

ESTIMATED TITLE 5 NITROGEN AND WATER LOADING

7a) ADD THE NO3-N LOADING

1a	+	3a	+	4a	+	5		
23,732	+	222	+	327	+	4084	=	28,365 mg NO2-N / day

7b) ADD THE ABOVE WATER LOAD

1b	+	3b	+	4b	+	6		
1,248	+	296	+	218	+	595	=	2,356 L H2O/day

7c) DIVIDE 7a BY 7b = 12.04 ppm NO3-N ***

ACTUAL NITROGEN AND WATER LOADING

8a) ADD THE ABOVE NO3-N LOADING:

2a	+	3a	+	4a	+	5		
9,888	+	222	+	327	+	4084	=	14,521 mg NO2-N / day

8b) ADD THE ABOVE WATER (H2)) LOAD:

2b	+	3b	+	4b	+	6		
521	+	296	+	218	+	595	=	1,629 L H2O/day

8c) DIVIDE 7a BY 7b = 8.91 ppm NO3-N ***

FINAL CALCULATION ADD 7C & 8C (ppm) = 20.95 divided by 2 = 10.48 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*****

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.

Prepared by: Holmes and McGrath