



Town of Bourne - Water Resources Nitrogen Loading and Mitigation Worksheet

See Cape Cod Commission Technical Bulletin 91-001 for further details: https://capecodcommission.org/resource-library/file/?url=/dept/commission/team/Website_Resources/regulatory/NitrogenLoadTechbulletin.pdf

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By Bourne Health Department at 4:20 pm, Dec 04, 2023

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Preparer's Name: Cape & Island Eng.

Date: 9/7/2023, Rev.: 10/21/2023

Watershed: Phinneys Harbor

Project Nitrogen Load	Proposed Wastewater	New Construction/ Raze & Rebuild, Increases in Flow, or Repairs/ Upgrades	Existing Conditions																	
1.	Project Title-5 wastewater flows: <input type="text" value="770.0"/> gpd Actual wastewater flows: <input type="text" value="175.0"/> * Average wastewater flows: <input type="text"/> gpd	<input type="text" value="770.0"/> (a) <input type="text" value="175.0"/> (b) <input type="text"/> (A) = (a)+(b) ÷ 2 * Title-5 flows prescribed by TB91-001 for commercial uses	Calculate (A') through (P') as w/ (A) through (P): Title-5 wastewater flows: <input type="text" value="770.0"/> gpd Actual wastewater flows: <input type="text" value="175.0"/> * Avg. wastewater flows: <input type="text" value="472.5"/> gpd (A')																	
<p>Place <input checked="" type="checkbox"/> in applicable box:</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Will the project be connected to sewer ?</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is project Title-5 wastewater flow 10,000 gpd or greater ?</p>		<p>Place <input checked="" type="checkbox"/> in applicable box:</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is existing development on sewer ? (If 'Yes', then go to line 2.)</p> <p><input checked="" type="checkbox"/> Sub-Standard Title-5 System (Cesspool) <input type="checkbox"/> DEP-approved I/A System (commercial) <input type="checkbox"/> DEP-approved I/A System (residential) <input type="checkbox"/> DEP-approved enhanced I/A</p>																		
<p>Place <input checked="" type="checkbox"/> in applicable box and multiply unsewered wastewater flow by applicable conversion factor:</p> <table border="0"> <tr><td><input type="checkbox"/></td><td>Standard Title-5 System (35-ppm-N)</td><td>x</td><td>0.048359</td><td rowspan="4">} Type of system: <input type="text" value="Fast 0.75 model"/></td></tr> <tr><td><input type="checkbox"/></td><td>DEP-approved I/A System (25-ppm-N)</td><td>x</td><td>0.034542</td></tr> <tr><td><input checked="" type="checkbox"/></td><td>DEP-approved I/A System (19-ppm-N)</td><td>x</td><td>0.026252</td></tr> <tr><td><input type="checkbox"/></td><td>DEP-approved Enhanced I/A (12-ppm-N)</td><td>x</td><td>0.016580</td></tr> </table>		<input type="checkbox"/>	Standard Title-5 System (35-ppm-N)	x	0.048359	} Type of system: <input type="text" value="Fast 0.75 model"/>	<input type="checkbox"/>	DEP-approved I/A System (25-ppm-N)	x	0.034542	<input checked="" type="checkbox"/>	DEP-approved I/A System (19-ppm-N)	x	0.026252	<input type="checkbox"/>	DEP-approved Enhanced I/A (12-ppm-N)	x	0.016580	<p>Wastewater nitrogen load (Title-5 flows) = <input type="text" value="20.21"/> kg-N/yr (B)</p> <p>Wastewater nitrogen load (Actual flows) = <input type="text" value="4.59"/> kg-N/yr (C)</p>	
<input type="checkbox"/>	Standard Title-5 System (35-ppm-N)	x	0.048359	} Type of system: <input type="text" value="Fast 0.75 model"/>																
<input type="checkbox"/>	DEP-approved I/A System (25-ppm-N)	x	0.034542																	
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<input type="checkbox"/>	DEP-approved Enhanced I/A (12-ppm-N)	x	0.016580																	
<p>Stormwater Runoff</p> <p>Town of Bourne Recharge rate for Bourne (inches; for natural areas from Technical Bulletin 91-001): <input type="text" value="21"/> (RECH)</p>		<p>Project site area: <input type="text" value="0.944"/> acres (D)</p> <p>Project site wetland area: <input type="text" value="0.000"/> acres (E)</p> <p>Project site upland area: <input type="text" value="0.944"/> acres (F)</p> <p>Pervious unpaved upland: <input type="text" value="0.799"/> acres (G)</p> <p><input type="text" value="0"/> % using LID Paved area: <input type="text" value="3,798"/> s.f. (H) Factor may be adjusted for employment of LID → LID = low impact development x 1.4158E-04 = <input type="text" value="0.53766524"/> kg-N/yr (I)</p> <p>Roof area: <input type="text" value="2,519"/> s.f. (J) x 7.0792E-05 = <input type="text" value="0.1783"/> kg-N/yr (K)</p>																		
<p>Fertilizer</p> <p>Previous unpaved upland - roof area = Managed turf/ lawn area: <input type="text" value="5,300"/> s.f. x 3.4019E-04 = <input type="text" value="1.803"/> kg-N/yr (L)</p>		<p>Managed Turf/ lawn area: <input type="text" value="5,300"/> s.f. Fertilizer offset: <input type="text" value="1.803"/> kg-N/yr (L')</p>																		
<p>Total Nitrogen Load</p> <p>Total project nitrogen load (Title-5 flows): <input type="text" value="22.73"/> kg-N/yr (M) = (B)+(I)+(K)+(L)</p> <p>Total project nitrogen load (Actual flows): <input type="text" value="7.11"/> kg-N/yr (N) = (C)+(I)+(K)+(L)</p> <p>Nitrogen load per acre (Average): <input type="text" value="15.80"/> kg-N/yr/acre (O) = (M)+(N) ÷ 2 ÷ (F)</p>		<p>Existing nitrogen load (Title-5 flows): <input type="text" value="39.76"/> kg-N/yr (M')</p> <p>Existing nitrogen load (Actual flows): <input type="text" value="10.98"/> kg-N/yr (N')</p> <p>Nitrogen offset per acre: <input type="text" value="26.86"/> kg-N/yr/acre (O')</p>																		
<p>Proposed Nitrogen Loading Concentration</p> <p>Project nitrogen loading concentration (Title-5 flows): <input type="text" value="6.71"/> ppm-N (P) = $\frac{(M)}{(a) \div 723.76 + (G) \times (RECH) \div 9.7286 + (H) \div 10,594 + (K) \div 0.75}$</p> <p>Project nitrogen loading concentration (Actual flows): <input type="text" value="2.77"/> ppm-N (Q) = $\frac{(N)}{(b) \div 723.76 + (G) \times (RECH) \div 9.7286 + (H) \div 10,594 + (K) \div 0.75}$</p> <p>Project nitrogen loading concentration (Average): <input type="text" value="4.74"/> ppm-N (R) = (P)+(Q) ÷ 2</p>		<p>Existing nitrogen loading concentrations:</p> <p>Title-5 flows: <input type="text" value="11.74"/> ppm-N (P')</p> <p>Actual flows: <input type="text" value="4.28"/> ppm-N (Q')</p> <p>Average: <input type="text" value="8.01"/> ppm-N (R')</p>																		

Resource/ Impact Based Criteria

Marine Water Recharge Areas / Coastal Embayments

2.

<input checked="" type="checkbox"/>	<input type="checkbox"/>
Yes	No

 Is the project located in any of the following watersheds: **Buttermilk Bay Basins, Phinneys Harbor / Back River / Eel Pond, Pocasset River Basin, Pocasset Harbor / Hen Cove / Red Brook Harbor, Megansett / Squeteague Harbors**** ?
(If 'No', then go to line 3.)

Name of Watershed
(from Regional Policy Plan Data Viewer): **Back River / Phinneys Harbor**

Critical Nitrogen-loading limit** : kg-N/year/acre (S)

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Does project's nitrogen load (O) exceed the existing load (O') AND the critical nitrogen load (S) ?
(If 'No', then go to line 3.)

Excess project nitrogen load to be mitigated: kg-N/yr (T)= LESSER OF (O)-(S) x(F) AND (O)-(O') x(F)

** When a nitrogen-loading limit has been determined through either a Total Maximum Daily Load (TMDL), a Massachusetts Estuaries Project-accepted technical report, or specified by a Commission-approved comprehensive wastewater management plan pursuant to Objective WR3, or if impaired water quality has been documented for the receiving coastal waters, the nitrogen loading limit shall be 0 kg-N/yr per acre pursuant to Objective WR3.

Groundwater Quality

3.

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Does the project's nitrogen loading concentration in groundwater (R) exceed the greater of 5 ppm or the existing concentration (R') ?
(If 'Yes', the project will need to provide an alternative strategy for meeting these thresholds by using another worksheet)

Potential Public Water Supply Areas

4.

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Is project in a Potential Public Water Supply Area (PPWSA) ?
(If 'No', then go to line 5.)

<input type="checkbox"/>	<input type="checkbox"/>
Yes	No

 Does the project's nitrogen loading concentration (R) exceed the greater of 1 ppm or the existing concentration (R') ?
(If 'Yes', the project must provide an alternative strategy for meeting Objective WR1)

<input type="checkbox"/>	<input type="checkbox"/>
Yes	No

 Does the project use, treat, generate, store or dispose of hazardous materials in excess of the greater of a) household quantities or b) existing quantities ?
(If 'Yes', the project must provide an alternative strategy for meeting Objective WR1)

Wellhead Protection Areas

5.

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Is project in a Wellhead Protection Area (WHPA) ?

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Does the project's nitrogen loading concentration (R) exceed the greater of 5 ppm or the existing concentration (R') ?
(If 'Yes', the project must provide an alternative strategy for meeting Objective WR1)

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Does the project use, treat, generate, store or dispose of hazardous materials in excess of the greater of a) household quantities or b) existing quantities ?
(If 'Yes', the project must provide an alternative strategy for meeting Objective WR1)

Fresh Water Recharge Areas

6.

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Is project wastewater disposed of within 300 feet of a stream or fresh surface water body?
(If 'No', then go to line 7.)

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Is the project located in a freshwater recharge area (FWRA) hydraulically upgradient of a stream or fresh surface water body?
(If 'Yes', the project must provide an alternative strategy for meeting Objective WR2)

Other Potential Impacts

7.

<input type="checkbox"/>	<input checked="" type="checkbox"/>
Yes	No

 Will the project withdraw more than 20,000 gallons of water per day ?
(If 'Yes', then the project must provide documentation demonstrating that there will not be significant impacts to water levels, surface waters and wetlands)

8. The project must demonstrate compliance with Objective WR4, including use of Low Impact Development to mitigate impacts of stormwater runoff and O & M plans for maintaining stormwater infrastructure and landscaping.