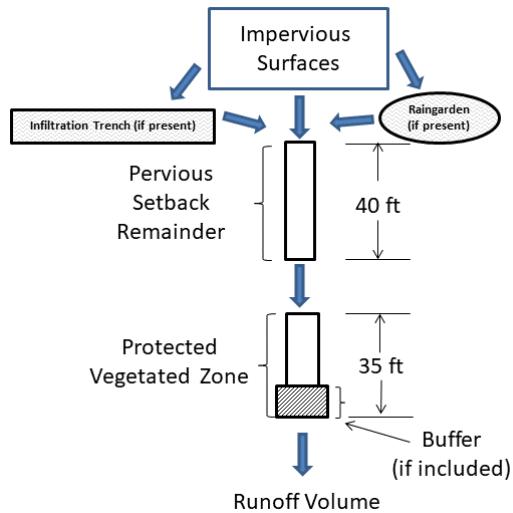


APPENDICES

- A. Model Solution Tables for Base Simulation**
- B. Model Parameters for Base Simulation**
- C. Model Files Available**
- D. Preliminary Regional Comparison**
- E. Quick-Start Guide to SWMM**
- F. Python Code for Repeated Simulations**
- G. Experimental Evaluation of SWMM Pervious Runon Simulation**

APPENDIX A. MODEL SOLUTION TABLES FOR BASE SIMULATION

The base simulation is shown the figure below and model inputs are shown in Appendix B:



Creating the tables required running the EPA SWMM model hundreds of times with different input parameters. This was done using a python program and connecting to SWMM using Markus Pichler's SWMM_api (https://gitlab.com/markuspichler/swmm_api/-/blob/main/README.md). The SWMM_api tools allow a user to edit SWMM input files, run the model and retrieve results. Tables were created directly from the python output using R with the flextable package (<https://cran.r-project.org/package=flextable>). The python-based solver of the SWMM model allowed more detail in the model output than the summary table in the SWMM GUI. The summary table in the SWMM GUI only presents runoff volume results to the nearest 0.01 million gallon and to obtain more significant figures requires calculations from an output table whereas the python approach allows those calculations to be automated and the runoff can be calculated to 0.001 million gallon or smaller. It is important to note that this does require the user to use a relatively small reporting step (10 minutes was used in the model). Results of the base simulation that follow are divided by simulation group, infiltration rate and absence or presence of buffer using groups as shown in Table A1.

Table A1. Results from Simulations using the Base Model

| Simulation Group | Modeled System | Corridor Soil Infiltration | Total Setback Distance | Buffer Distance |
|------------------|---------------------------------------|----------------------------|------------------------|--|
| R | Impervious Area & Raingarden | Low R.1 | 75' R.1.1 | 0' (R.1.1.1) 10'(R.1.1.2) 20'(R.1.1.3) 35' (R.1.1.4) |
| | | | 50' R.1.2 | 0' (R.1.2.1) 10'(R.1.2.2) 20'(R.1.2.3) 35' (R.1.2.4) |
| | | | 35' R.1.3 | 0' (R.1.3.1) 10'(R.1.3.2) 20'(R.1.3.3) 35' (R.1.3.4) |
| | | Medium R.2 | 75' R.2.1 | 0' (R.2.1.1) 10'(R.2.1.2) 20'(R.2.1.3) 35' (R.2.1.4) |
| | | | 50' R.2.2 | 0' (R.2.2.1) 10'(R.2.2.2) 20'(R.2.2.3) 35' (R.2.2.4) |
| | | | 35' R.2.3 | 0' (R.2.3.1) 10'(R.2.3.2) 20'(R.2.3.3) 35' (R.2.3.4) |
| | | High R.3 | 75' R.3.1 | 0' (R.3.1.1) 10'(R.3.1.2) 20'(R.3.1.3) 35' (R.3.1.4) |
| | | | 50' R.3.2 | 0' (R.3.2.1) 10'(R.3.2.2) 20'(R.3.2.3) 35' (R.3.2.4) |
| | | | 35' R.3.3 | 0' (R.3.3.1) 10'(R.3.3.2) 20'(R.3.3.3) 35' (R.3.3.4) |
| T | Impervious Area & Infiltration Trench | Low T.1 | 75' T.1.1 | 0' (T.1.1.1) 10'(T.1.1.2) 20'(T.1.1.3) 35' (T.1.1.4) |
| | | | 50' T.1.2 | 0' (T.1.2.1) 10'(T.1.2.2) 20'(T.1.2.3) 35' (T.1.2.4) |
| | | | 35' T.1.3 | 0' (T.1.3.1) 10'(T.1.3.2) 20'(T.1.3.3) 35' (T.1.3.4) |
| | | Medium T.2 | 75' T.2.1 | 0' (T.2.1.1) 10'(T.2.1.2) 20'(T.2.1.3) 35' (T.2.1.4) |
| | | | 50' T.2.2 | 0' (T.2.2.1) 10'(T.2.2.2) 20'(T.2.2.3) 35' (T.2.2.4) |
| | | | 35' T.2.3 | 0' (T.2.3.1) 10'(T.2.3.2) 20'(T.2.3.3) 35' (T.2.3.4) |
| | | High T.3 | 75' T.3.1 | 0' (T.3.1.1) 10'(T.3.1.2) 20'(T.3.1.3) 35' (T.3.1.4) |
| | | | 50' T.3.2 | 0' (T.3.2.1) 10'(T.3.2.2) 20'(T.3.2.3) 35' (T.3.2.4) |
| | | | 35' T.3.3 | 0' (T.3.3.1) 10'(T.3.3.2) 20'(T.3.3.3) 35' (T.3.3.4) |

Table R 1.1.1**RAINGARDEN**

| Soil Infiltration Rate: Low | | | Setback Distance: 75 feet | | | Buffer Depth: No Buffer | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 0 | 0.029 | 0.053 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 0 | 0.021 | 0.044 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 0 | 0.015 | 0.037 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 0 | 0.011 | 0.031 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 0 | 0.010 | 0.025 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.026 | 0.045 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.016 | 0.034 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.010 | 0.026 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.006 | 0.020 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.005 | 0.015 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 0 | 0.027 | 0.042 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 0 | 0.015 | 0.029 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 0 | 0.008 | 0.020 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 0 | 0.004 | 0.014 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 0 | 0.003 | 0.009 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 0 | 0.052 | 0.089 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 0 | 0.043 | 0.079 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 0 | 0.033 | 0.068 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 0 | 0.020 | 0.051 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 0 | 0.013 | 0.042 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.053 | 0.084 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.041 | 0.070 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.029 | 0.059 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.015 | 0.040 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.008 | 0.031 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 0 | 0.059 | 0.086 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 0 | 0.042 | 0.067 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 0 | 0.029 | 0.054 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 0 | 0.013 | 0.035 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 0 | 0.006 | 0.026 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 0 | 0.106 | 0.167 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 0 | 0.095 | 0.157 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 0 | 0.082 | 0.140 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 0 | 0.059 | 0.116 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 0 | 0.035 | 0.090 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.116 | 0.170 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.100 | 0.154 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.084 | 0.134 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.057 | 0.109 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.031 | 0.080 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 0 | 0.128 | 0.180 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 0 | 0.107 | 0.156 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 0 | 0.087 | 0.133 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 0 | 0.057 | 0.106 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 0 | 0.029 | 0.076 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.1.2**RAINGARDEN**

| Soil Infiltration Rate: Low | | | Setback Distance: 75 feet | | | Buffer Depth: 10 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 10 | 0.026 | 0.050 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 10 | 0.019 | 0.042 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 10 | 0.013 | 0.035 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 10 | 0.010 | 0.029 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 10 | 0.009 | 0.023 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.023 | 0.041 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.015 | 0.033 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.009 | 0.025 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.006 | 0.020 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.005 | 0.014 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 10 | 0.022 | 0.038 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 10 | 0.013 | 0.029 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 10 | 0.007 | 0.021 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 10 | 0.004 | 0.015 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 10 | 0.003 | 0.010 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 10 | 0.048 | 0.084 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 10 | 0.040 | 0.075 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 10 | 0.031 | 0.065 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 10 | 0.018 | 0.049 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 10 | 0.012 | 0.040 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.048 | 0.079 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.038 | 0.067 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.028 | 0.057 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.014 | 0.040 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.008 | 0.031 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 10 | 0.049 | 0.078 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 10 | 0.037 | 0.064 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 10 | 0.026 | 0.053 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 10 | 0.012 | 0.035 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 10 | 0.006 | 0.026 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 10 | 0.100 | 0.161 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 10 | 0.090 | 0.151 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 10 | 0.078 | 0.135 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 10 | 0.056 | 0.113 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 10 | 0.033 | 0.088 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.106 | 0.161 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.093 | 0.148 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.079 | 0.129 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.054 | 0.107 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.030 | 0.079 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 10 | 0.112 | 0.164 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 10 | 0.096 | 0.148 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 10 | 0.080 | 0.128 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 10 | 0.054 | 0.103 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 10 | 0.028 | 0.075 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.1.3

RAINGARDEN

| Soil Infiltration Rate: Low | | | Setback Distance: 75 feet | | | Buffer Depth: 20 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 20 | 0.024 | 0.047 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 20 | 0.017 | 0.040 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 20 | 0.012 | 0.033 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 20 | 0.009 | 0.027 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 20 | 0.008 | 0.022 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.021 | 0.039 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.014 | 0.032 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.009 | 0.025 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.005 | 0.019 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.004 | 0.014 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 20 | 0.019 | 0.035 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 20 | 0.013 | 0.028 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 20 | 0.007 | 0.021 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 20 | 0.004 | 0.015 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 20 | 0.003 | 0.010 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 20 | 0.045 | 0.080 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 20 | 0.037 | 0.071 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 20 | 0.029 | 0.063 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 20 | 0.017 | 0.048 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 20 | 0.011 | 0.038 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.043 | 0.074 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.035 | 0.064 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.026 | 0.055 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.014 | 0.040 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.007 | 0.031 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 20 | 0.043 | 0.073 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 20 | 0.034 | 0.061 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 20 | 0.024 | 0.052 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 20 | 0.012 | 0.036 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 20 | 0.006 | 0.027 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 20 | 0.095 | 0.154 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 20 | 0.086 | 0.146 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.131 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 20 | 0.054 | 0.110 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 20 | 0.032 | 0.085 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.098 | 0.154 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.086 | 0.142 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.125 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.052 | 0.104 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.029 | 0.078 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 20 | 0.101 | 0.154 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 20 | 0.088 | 0.141 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.123 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 20 | 0.051 | 0.101 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 20 | 0.027 | 0.074 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.1.4**RAINGARDEN**

| Soil Infiltration Rate: Low | | | Setback Distance: 75 feet | | | Buffer Depth: 35 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 35 | 0.020 | 0.042 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 35 | 0.015 | 0.037 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 35 | 0.010 | 0.030 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 35 | 0.007 | 0.024 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 35 | 0.006 | 0.019 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.018 | 0.036 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.013 | 0.032 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.008 | 0.025 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.005 | 0.019 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.004 | 0.014 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 35 | 0.017 | 0.034 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 35 | 0.012 | 0.029 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 35 | 0.007 | 0.022 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 35 | 0.004 | 0.016 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 35 | 0.003 | 0.011 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 35 | 0.040 | 0.073 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 35 | 0.034 | 0.066 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 35 | 0.026 | 0.059 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 35 | 0.015 | 0.045 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 35 | 0.009 | 0.036 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.038 | 0.069 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.032 | 0.061 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.024 | 0.054 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.013 | 0.039 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.007 | 0.030 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 35 | 0.037 | 0.068 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 35 | 0.031 | 0.058 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 35 | 0.023 | 0.051 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 35 | 0.012 | 0.037 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 35 | 0.006 | 0.028 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 35 | 0.087 | 0.146 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 35 | 0.078 | 0.138 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 35 | 0.069 | 0.125 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 35 | 0.050 | 0.106 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 35 | 0.029 | 0.082 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.088 | 0.144 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.078 | 0.135 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.068 | 0.120 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.048 | 0.101 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.028 | 0.077 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 35 | 0.089 | 0.144 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 35 | 0.078 | 0.133 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 35 | 0.068 | 0.118 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 35 | 0.048 | 0.099 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 35 | 0.026 | 0.074 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.2.1

RAINGARDEN

| Soil Infiltration Rate: Low | | | Setback Distance: 50 feet | | | Buffer Depth: No Buffer | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 0 | 0.027 | 0.048 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 0 | 0.018 | 0.038 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 0 | 0.012 | 0.030 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 0 | 0.008 | 0.024 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 0 | 0.007 | 0.018 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.026 | 0.043 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.015 | 0.031 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.008 | 0.022 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.005 | 0.016 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.004 | 0.011 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 0 | 0.028 | 0.042 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 0 | 0.015 | 0.028 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 0 | 0.007 | 0.019 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 0 | 0.003 | 0.012 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 0 | 0.002 | 0.007 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 0 | 0.052 | 0.086 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 0 | 0.042 | 0.073 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 0 | 0.030 | 0.061 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 0 | 0.017 | 0.044 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 0 | 0.010 | 0.035 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.056 | 0.084 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.042 | 0.068 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.029 | 0.056 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.014 | 0.037 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.007 | 0.028 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 0 | 0.062 | 0.088 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 0 | 0.043 | 0.067 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 0 | 0.028 | 0.054 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 0 | 0.012 | 0.034 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 0 | 0.005 | 0.024 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 0 | 0.112 | 0.168 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 0 | 0.098 | 0.155 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 0 | 0.083 | 0.136 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 0 | 0.058 | 0.112 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 0 | 0.032 | 0.084 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.123 | 0.175 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.104 | 0.155 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.086 | 0.133 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.057 | 0.107 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.030 | 0.077 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 0 | 0.134 | 0.185 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 0 | 0.110 | 0.158 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 0 | 0.088 | 0.134 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 0 | 0.057 | 0.105 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 0 | 0.029 | 0.074 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.2.2**RAINGARDEN**

| Soil Infiltration Rate: Low | | | Setback Distance: 50 feet | | | Buffer Depth: 10 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 10 | 0.024 | 0.043 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 10 | 0.016 | 0.035 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 10 | 0.010 | 0.028 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 10 | 0.007 | 0.022 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 10 | 0.006 | 0.016 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.022 | 0.039 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.014 | 0.030 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.008 | 0.022 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.004 | 0.016 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.003 | 0.011 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 10 | 0.022 | 0.038 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 10 | 0.013 | 0.027 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 10 | 0.006 | 0.019 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 10 | 0.003 | 0.013 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 10 | 0.002 | 0.008 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 10 | 0.048 | 0.080 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 10 | 0.038 | 0.069 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 10 | 0.028 | 0.059 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 10 | 0.015 | 0.042 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 10 | 0.009 | 0.033 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.048 | 0.078 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.037 | 0.064 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.026 | 0.054 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.013 | 0.036 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.006 | 0.027 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 10 | 0.050 | 0.077 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 10 | 0.037 | 0.063 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 10 | 0.026 | 0.051 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 10 | 0.012 | 0.034 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 10 | 0.005 | 0.025 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 10 | 0.104 | 0.161 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 10 | 0.092 | 0.148 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 10 | 0.078 | 0.131 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 10 | 0.055 | 0.108 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 10 | 0.031 | 0.081 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.110 | 0.163 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.095 | 0.147 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.080 | 0.128 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.054 | 0.104 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.029 | 0.076 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 10 | 0.116 | 0.166 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 10 | 0.098 | 0.148 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 10 | 0.081 | 0.128 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 10 | 0.053 | 0.102 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 10 | 0.028 | 0.073 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.2.3**RAINGARDEN**

| Soil Infiltration Rate: Low | | | Setback Distance: 50 feet | | | Buffer Depth: 20 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 20 | 0.021 | 0.040 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 20 | 0.014 | 0.033 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 20 | 0.009 | 0.026 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 20 | 0.006 | 0.020 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 20 | 0.005 | 0.015 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.019 | 0.036 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.013 | 0.029 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.007 | 0.022 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.004 | 0.016 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.003 | 0.010 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 20 | 0.012 | 0.027 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 20 | 0.006 | 0.020 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 20 | 0.003 | 0.014 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 20 | 0.002 | 0.008 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 20 | 0.043 | 0.075 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 20 | 0.035 | 0.065 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 20 | 0.026 | 0.056 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 20 | 0.014 | 0.040 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 20 | 0.008 | 0.031 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.043 | 0.073 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.034 | 0.061 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.025 | 0.052 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.012 | 0.036 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.006 | 0.027 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 20 | 0.043 | 0.072 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 20 | 0.034 | 0.060 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 20 | 0.024 | 0.050 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 20 | 0.011 | 0.034 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 20 | 0.005 | 0.025 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 20 | 0.097 | 0.154 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 20 | 0.086 | 0.142 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.126 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 20 | 0.052 | 0.105 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 20 | 0.029 | 0.079 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.100 | 0.154 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.088 | 0.141 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.123 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.051 | 0.101 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.028 | 0.075 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 20 | 0.103 | 0.154 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 20 | 0.088 | 0.141 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.123 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 20 | 0.051 | 0.100 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 20 | 0.027 | 0.073 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.2.4**RAINGARDEN**

| Soil Infiltration Rate: Low | | | Setback Distance: 50 feet | | | Buffer Depth: 35 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 35 | 0.017 | 0.035 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 35 | 0.012 | 0.030 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 35 | 0.007 | 0.023 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 35 | 0.004 | 0.018 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 35 | 0.004 | 0.012 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.016 | 0.033 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.011 | 0.028 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.007 | 0.021 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.004 | 0.016 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.003 | 0.010 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 35 | 0.016 | 0.032 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 35 | 0.011 | 0.027 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 35 | 0.006 | 0.020 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 35 | 0.003 | 0.015 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 35 | 0.002 | 0.009 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 35 | 0.037 | 0.068 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 35 | 0.031 | 0.059 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 35 | 0.023 | 0.053 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 35 | 0.012 | 0.038 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 35 | 0.006 | 0.029 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.037 | 0.067 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.030 | 0.057 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.022 | 0.051 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.011 | 0.036 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.006 | 0.027 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 35 | 0.037 | 0.066 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 35 | 0.030 | 0.057 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 35 | 0.022 | 0.050 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 35 | 0.011 | 0.035 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 35 | 0.005 | 0.026 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 35 | 0.087 | 0.143 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 35 | 0.078 | 0.133 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 35 | 0.068 | 0.119 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 35 | 0.048 | 0.100 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 35 | 0.027 | 0.075 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.089 | 0.144 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.078 | 0.132 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.067 | 0.118 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.047 | 0.098 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.026 | 0.073 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 35 | 0.090 | 0.144 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 35 | 0.079 | 0.132 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 35 | 0.067 | 0.117 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 35 | 0.047 | 0.097 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 35 | 0.026 | 0.072 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.3.1

RAINGARDEN

| Soil Infiltration Rate: Low | | | Setback Distance: 35 feet | | | Buffer Depth: No Buffer | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 0 | 0.026 | 0.045 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 0 | 0.016 | 0.033 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 0 | 0.010 | 0.025 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 0 | 0.006 | 0.019 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 0 | 0.005 | 0.014 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.027 | 0.043 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.015 | 0.029 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.007 | 0.020 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.004 | 0.014 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.003 | 0.009 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 0 | 0.029 | 0.043 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 0 | 0.014 | 0.027 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 0 | 0.006 | 0.018 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 0 | 0.002 | 0.011 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 0 | 0.002 | 0.006 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 0 | 0.054 | 0.085 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 0 | 0.041 | 0.070 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 0 | 0.029 | 0.058 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 0 | 0.015 | 0.040 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 0 | 0.008 | 0.031 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.059 | 0.085 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.042 | 0.067 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.028 | 0.054 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.013 | 0.035 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.006 | 0.026 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 0 | 0.065 | 0.090 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 0 | 0.044 | 0.067 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 0 | 0.028 | 0.053 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 0 | 0.012 | 0.033 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 0 | 0.005 | 0.023 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 0 | 0.117 | 0.170 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 0 | 0.101 | 0.154 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 0 | 0.084 | 0.134 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 0 | 0.057 | 0.108 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 0 | 0.031 | 0.080 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 0 | 0.129 | 0.180 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 0 | 0.107 | 0.156 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 0 | 0.087 | 0.133 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 0 | 0.057 | 0.106 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 0 | 0.029 | 0.075 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 0 | 0.138 | 0.189 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 0 | 0.111 | 0.158 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 0 | 0.089 | 0.134 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 0 | 0.057 | 0.105 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 0 | 0.028 | 0.073 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.3.2**RAINGARDEN**

| Soil Infiltration Rate: Low | | | Setback Distance: 35 feet | | | Buffer Depth: 10 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 10 | 0.022 | 0.040 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 10 | 0.014 | 0.031 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 10 | 0.008 | 0.023 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 10 | 0.005 | 0.017 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 10 | 0.004 | 0.012 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.022 | 0.038 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.013 | 0.028 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.007 | 0.020 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.003 | 0.014 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.002 | 0.008 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 10 | 0.021 | 0.036 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 10 | 0.012 | 0.026 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 10 | 0.006 | 0.018 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 10 | 0.002 | 0.012 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 10 | 0.002 | 0.007 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 10 | 0.048 | 0.079 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 10 | 0.037 | 0.065 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 10 | 0.027 | 0.055 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 10 | 0.013 | 0.038 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 10 | 0.007 | 0.029 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.049 | 0.077 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.037 | 0.063 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.026 | 0.052 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.012 | 0.034 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.005 | 0.025 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 10 | 0.051 | 0.077 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 10 | 0.037 | 0.062 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 10 | 0.025 | 0.051 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 10 | 0.011 | 0.033 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 10 | 0.004 | 0.024 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 10 | 0.108 | 0.161 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 10 | 0.094 | 0.147 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 10 | 0.079 | 0.128 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 10 | 0.054 | 0.105 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 10 | 0.029 | 0.077 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 10 | 0.114 | 0.165 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 10 | 0.097 | 0.147 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 10 | 0.080 | 0.127 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 10 | 0.053 | 0.103 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 10 | 0.028 | 0.074 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 10 | 0.118 | 0.168 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 10 | 0.099 | 0.148 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 10 | 0.081 | 0.127 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 10 | 0.053 | 0.101 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 10 | 0.027 | 0.072 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.3.3

RAINGARDEN

| Soil Infiltration Rate: Low | | | Setback Distance: 35 feet | | | Buffer Depth: 20 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 20 | 0.019 | 0.035 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 20 | 0.013 | 0.029 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 20 | 0.007 | 0.021 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 20 | 0.004 | 0.016 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 20 | 0.003 | 0.010 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.012 | 0.027 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.006 | 0.019 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.003 | 0.014 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.002 | 0.008 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 20 | 0.011 | 0.026 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 20 | 0.006 | 0.018 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 20 | 0.003 | 0.013 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 20 | 0.002 | 0.008 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 20 | 0.043 | 0.072 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 20 | 0.034 | 0.061 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 20 | 0.024 | 0.052 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 20 | 0.012 | 0.036 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 20 | 0.006 | 0.027 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.043 | 0.071 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.033 | 0.059 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.024 | 0.050 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.011 | 0.034 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.005 | 0.025 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 20 | 0.043 | 0.071 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 20 | 0.033 | 0.059 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 20 | 0.024 | 0.049 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 20 | 0.011 | 0.033 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 20 | 0.005 | 0.024 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 20 | 0.100 | 0.153 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 20 | 0.087 | 0.141 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.123 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 20 | 0.051 | 0.101 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 20 | 0.028 | 0.075 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 20 | 0.102 | 0.154 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 20 | 0.088 | 0.140 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.122 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 20 | 0.050 | 0.100 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 20 | 0.027 | 0.073 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 20 | 0.104 | 0.155 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 20 | 0.089 | 0.141 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 20 | 0.074 | 0.122 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 20 | 0.050 | 0.099 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 20 | 0.026 | 0.072 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 1.3.4**RAINGARDEN**

| Soil Infiltration Rate: Low | | | Setback Distance: 35 feet | | | Buffer Depth: 35 feet | | |
|-----------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0 | 8 | Low x 2 | 35 | 0.016 | 0.032 |
| Low | 500 | <5% | 50 | 8 | Low x 2 | 35 | 0.010 | 0.026 |
| Low | 500 | <5% | 100 | 8 | Low x 2 | 35 | 0.006 | 0.019 |
| Low | 500 | <5% | 200 | 8 | Low x 2 | 35 | 0.003 | 0.013 |
| Low | 500 | <5% | 350 | 8 | Low x 2 | 35 | 0.002 | 0.009 |
| Low | 500 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.016 | 0.032 |
| Low | 500 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.010 | 0.026 |
| Low | 500 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.006 | 0.019 |
| Low | 500 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.003 | 0.014 |
| Low | 500 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.002 | 0.009 |
| Low | 500 | >20% | 0 | 8 | Low x 2 | 35 | 0.016 | 0.032 |
| Low | 500 | >20% | 50 | 8 | Low x 2 | 35 | 0.011 | 0.026 |
| Low | 500 | >20% | 100 | 8 | Low x 2 | 35 | 0.006 | 0.019 |
| Low | 500 | >20% | 200 | 8 | Low x 2 | 35 | 0.003 | 0.014 |
| Low | 500 | >20% | 350 | 8 | Low x 2 | 35 | 0.002 | 0.009 |
| Low | 1,000 | <5% | 0 | 8 | Low x 2 | 35 | 0.037 | 0.066 |
| Low | 1,000 | <5% | 50 | 8 | Low x 2 | 35 | 0.029 | 0.055 |
| Low | 1,000 | <5% | 100 | 8 | Low x 2 | 35 | 0.021 | 0.048 |
| Low | 1,000 | <5% | 200 | 8 | Low x 2 | 35 | 0.011 | 0.034 |
| Low | 1,000 | <5% | 350 | 8 | Low x 2 | 35 | 0.005 | 0.025 |
| Low | 1,000 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.037 | 0.066 |
| Low | 1,000 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.029 | 0.055 |
| Low | 1,000 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.022 | 0.048 |
| Low | 1,000 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.011 | 0.034 |
| Low | 1,000 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.005 | 0.025 |
| Low | 1,000 | >20% | 0 | 8 | Low x 2 | 35 | 0.037 | 0.067 |
| Low | 1,000 | >20% | 50 | 8 | Low x 2 | 35 | 0.030 | 0.055 |
| Low | 1,000 | >20% | 100 | 8 | Low x 2 | 35 | 0.022 | 0.049 |
| Low | 1,000 | >20% | 200 | 8 | Low x 2 | 35 | 0.011 | 0.034 |
| Low | 1,000 | >20% | 350 | 8 | Low x 2 | 35 | 0.005 | 0.025 |
| Low | 2,000 | <5% | 0 | 8 | Low x 2 | 35 | 0.090 | 0.143 |
| Low | 2,000 | <5% | 50 | 8 | Low x 2 | 35 | 0.078 | 0.131 |
| Low | 2,000 | <5% | 100 | 8 | Low x 2 | 35 | 0.067 | 0.116 |
| Low | 2,000 | <5% | 200 | 8 | Low x 2 | 35 | 0.047 | 0.096 |
| Low | 2,000 | <5% | 350 | 8 | Low x 2 | 35 | 0.025 | 0.071 |
| Low | 2,000 | 5-20% | 0 | 8 | Low x 2 | 35 | 0.090 | 0.143 |
| Low | 2,000 | 5-20% | 50 | 8 | Low x 2 | 35 | 0.078 | 0.131 |
| Low | 2,000 | 5-20% | 100 | 8 | Low x 2 | 35 | 0.067 | 0.116 |
| Low | 2,000 | 5-20% | 200 | 8 | Low x 2 | 35 | 0.047 | 0.096 |
| Low | 2,000 | 5-20% | 350 | 8 | Low x 2 | 35 | 0.025 | 0.072 |
| Low | 2,000 | >20% | 0 | 8 | Low x 2 | 35 | 0.091 | 0.144 |
| Low | 2,000 | >20% | 50 | 8 | Low x 2 | 35 | 0.078 | 0.132 |
| Low | 2,000 | >20% | 100 | 8 | Low x 2 | 35 | 0.067 | 0.116 |
| Low | 2,000 | >20% | 200 | 8 | Low x 2 | 35 | 0.047 | 0.096 |
| Low | 2,000 | >20% | 350 | 8 | Low x 2 | 35 | 0.025 | 0.072 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.1.1**RAINGARDEN**

| Soil Infiltration Rate: Medium | | | Setback Distance: 75 feet | | | Buffer Depth: No Buffer | | |
|--------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 0 | 0.007 | 0.019 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 0 | 0.004 | 0.015 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.011 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 0 | 0.001 | 0.007 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.005 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.008 | 0.020 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.004 | 0.013 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.001 | 0.006 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.004 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 0 | 0.012 | 0.023 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 0 | 0.004 | 0.013 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.008 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 0 | 0.001 | 0.005 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 0 | 0.000 | 0.003 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 0 | 0.016 | 0.040 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 0 | 0.012 | 0.032 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 0 | 0.007 | 0.026 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 0 | 0.004 | 0.018 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 0 | 0.002 | 0.012 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.023 | 0.045 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.014 | 0.034 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.008 | 0.025 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.003 | 0.016 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.011 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 0 | 0.032 | 0.056 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 0 | 0.017 | 0.037 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 0 | 0.009 | 0.025 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 0 | 0.003 | 0.015 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.010 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 0 | 0.045 | 0.090 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 0 | 0.036 | 0.079 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 0 | 0.028 | 0.067 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 0 | 0.016 | 0.050 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.036 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.063 | 0.112 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.047 | 0.090 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.034 | 0.074 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.018 | 0.051 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.035 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 0 | 0.084 | 0.134 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 0 | 0.058 | 0.102 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 0 | 0.040 | 0.079 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 0 | 0.020 | 0.052 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.034 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.1.2

RAINGARDEN

| Soil Infiltration Rate: Medium | | Setback Distance: 75 feet | | | | Buffer Depth: 10 feet | | |
|--------------------------------|-------------------------------|---------------------------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 10 | 0.005 | 0.017 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.013 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 10 | 0.002 | 0.010 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 10 | 0.001 | 0.006 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.005 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.011 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.001 | 0.008 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.001 | 0.005 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.000 | 0.003 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 10 | 0.007 | 0.016 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.010 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 10 | 0.001 | 0.007 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 10 | 0.000 | 0.004 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 10 | 0.000 | 0.003 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 10 | 0.014 | 0.035 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 10 | 0.010 | 0.029 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 10 | 0.007 | 0.024 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.016 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 10 | 0.002 | 0.011 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.017 | 0.038 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.011 | 0.029 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.007 | 0.022 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.015 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.010 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 10 | 0.021 | 0.042 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 10 | 0.013 | 0.030 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 10 | 0.007 | 0.022 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.014 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.010 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 10 | 0.040 | 0.083 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 10 | 0.032 | 0.073 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 10 | 0.025 | 0.063 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 10 | 0.015 | 0.047 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.034 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.052 | 0.097 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.040 | 0.080 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.029 | 0.066 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.016 | 0.047 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.033 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 10 | 0.062 | 0.108 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 10 | 0.046 | 0.087 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 10 | 0.033 | 0.070 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 10 | 0.017 | 0.048 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.032 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.1.3

RAINGARDEN

| Soil Infiltration Rate: Medium | | | Setback Distance: 75 feet | | | Buffer Depth: 20 feet | | |
|--------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 20 | 0.004 | 0.015 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 20 | 0.003 | 0.011 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 20 | 0.002 | 0.008 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 20 | 0.001 | 0.005 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.004 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.002 | 0.010 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.001 | 0.007 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.000 | 0.004 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.000 | 0.003 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 20 | 0.001 | 0.006 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 20 | 0.000 | 0.004 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 20 | 0.000 | 0.002 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 20 | 0.012 | 0.031 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 20 | 0.009 | 0.026 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.021 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 20 | 0.003 | 0.015 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.011 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.014 | 0.033 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.009 | 0.026 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.020 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.002 | 0.014 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.010 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 20 | 0.015 | 0.034 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.020 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 20 | 0.002 | 0.013 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.009 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 20 | 0.036 | 0.078 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 20 | 0.029 | 0.068 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 20 | 0.023 | 0.059 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 20 | 0.014 | 0.044 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.033 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.043 | 0.084 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.034 | 0.072 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.025 | 0.061 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.015 | 0.044 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.032 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 20 | 0.049 | 0.092 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 20 | 0.037 | 0.076 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 20 | 0.028 | 0.063 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 20 | 0.015 | 0.044 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.031 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.1.4

RAINGARDEN

| Soil Infiltration Rate: Medium | | | Setback Distance: 75 feet | | | Buffer Depth: 35 feet | | |
|--------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.011 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.009 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.007 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.004 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.003 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.008 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.006 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.004 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.002 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.003 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.002 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 35 | 0.009 | 0.026 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.019 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.013 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.009 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.010 | 0.026 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.017 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.012 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.009 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 35 | 0.010 | 0.027 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.017 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.012 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.008 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 35 | 0.030 | 0.069 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 35 | 0.024 | 0.060 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 35 | 0.019 | 0.053 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 35 | 0.012 | 0.040 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.030 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.033 | 0.072 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.027 | 0.062 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.021 | 0.054 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.012 | 0.040 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.030 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 35 | 0.036 | 0.074 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 35 | 0.028 | 0.065 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 35 | 0.022 | 0.054 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 35 | 0.013 | 0.040 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.030 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.2.1

RAINGARDEN

| Soil Infiltration Rate: Medium | | | Setback Distance: 50 feet | | | Buffer Depth: No Buffer | | |
|--------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 0 | 0.007 | 0.020 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 0 | 0.004 | 0.014 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.010 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 0 | 0.001 | 0.006 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.004 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.010 | 0.021 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.004 | 0.013 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.008 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.001 | 0.005 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.000 | 0.003 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 0 | 0.014 | 0.026 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 0 | 0.004 | 0.013 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.008 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 0 | 0.000 | 0.005 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 0 | 0.000 | 0.003 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 0 | 0.019 | 0.042 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 0 | 0.013 | 0.033 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 0 | 0.008 | 0.025 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 0 | 0.003 | 0.017 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 0 | 0.002 | 0.012 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.028 | 0.051 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.016 | 0.036 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.009 | 0.025 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.003 | 0.015 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.011 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 0 | 0.038 | 0.063 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 0 | 0.019 | 0.039 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 0 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 0 | 0.003 | 0.015 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.010 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 0 | 0.055 | 0.103 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 0 | 0.042 | 0.085 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 0 | 0.032 | 0.071 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 0 | 0.017 | 0.050 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.035 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.075 | 0.125 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.054 | 0.098 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.038 | 0.077 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.019 | 0.051 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.034 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 0 | 0.096 | 0.145 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 0 | 0.064 | 0.108 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 0 | 0.043 | 0.083 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 0 | 0.020 | 0.052 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.034 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.2.2

RAINGARDEN

| Soil Infiltration Rate: Medium | | Setback Distance: 50 feet | | | | Buffer Depth: 10 feet | | |
|--------------------------------|-------------------------------|---------------------------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.012 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 10 | 0.002 | 0.008 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 10 | 0.001 | 0.005 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.004 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.011 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.001 | 0.007 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.000 | 0.005 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.000 | 0.003 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 10 | 0.007 | 0.017 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.010 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 10 | 0.001 | 0.007 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 10 | 0.000 | 0.004 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 10 | 0.000 | 0.002 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 10 | 0.016 | 0.037 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 10 | 0.011 | 0.029 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 10 | 0.007 | 0.023 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.015 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.011 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.020 | 0.041 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.012 | 0.030 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.007 | 0.022 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.014 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.010 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 10 | 0.023 | 0.045 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 10 | 0.014 | 0.031 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 10 | 0.007 | 0.022 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.014 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.010 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 10 | 0.048 | 0.092 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 10 | 0.038 | 0.079 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 10 | 0.028 | 0.065 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 10 | 0.016 | 0.047 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.034 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.059 | 0.106 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.044 | 0.085 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.032 | 0.069 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.017 | 0.048 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.033 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 10 | 0.068 | 0.115 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 10 | 0.049 | 0.091 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 10 | 0.034 | 0.072 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 10 | 0.018 | 0.048 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.032 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.2.3

RAINGARDEN

| Soil Infiltration Rate: Medium | | Setback Distance: 50 feet | | | | Buffer Depth: 20 feet | | |
|--------------------------------|-------------------------------|---------------------------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 20 | 0.002 | 0.010 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 20 | 0.001 | 0.007 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 20 | 0.000 | 0.005 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 20 | 0.000 | 0.003 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.001 | 0.006 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.000 | 0.004 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.000 | 0.002 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 20 | 0.005 | 0.013 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 20 | 0.001 | 0.006 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 20 | 0.000 | 0.004 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 20 | 0.000 | 0.002 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 20 | 0.013 | 0.032 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 20 | 0.009 | 0.026 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.020 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 20 | 0.002 | 0.014 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.010 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.015 | 0.034 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.020 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.002 | 0.013 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.009 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 20 | 0.016 | 0.035 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.020 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 20 | 0.002 | 0.013 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.009 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 20 | 0.042 | 0.083 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 20 | 0.033 | 0.072 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 20 | 0.025 | 0.060 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 20 | 0.014 | 0.044 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.032 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.048 | 0.091 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.037 | 0.076 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.027 | 0.063 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.015 | 0.044 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.031 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 20 | 0.052 | 0.096 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 20 | 0.039 | 0.079 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 20 | 0.029 | 0.064 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 20 | 0.016 | 0.045 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.031 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.2.4

RAINGARDEN

| Soil Infiltration Rate: Medium | | | Setback Distance: 50 feet | | | Buffer Depth: 35 feet | | |
|--------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.003 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.002 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.003 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.002 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.011 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.003 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.002 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 35 | 0.010 | 0.027 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.017 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.012 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.008 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.010 | 0.027 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.017 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.011 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.008 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 35 | 0.011 | 0.027 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.017 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.011 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.008 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 35 | 0.034 | 0.073 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 35 | 0.027 | 0.063 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 35 | 0.021 | 0.054 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 35 | 0.012 | 0.040 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.029 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.037 | 0.075 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.029 | 0.065 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.022 | 0.054 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.013 | 0.040 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.029 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 35 | 0.039 | 0.078 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 35 | 0.030 | 0.067 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 35 | 0.022 | 0.055 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 35 | 0.013 | 0.040 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.029 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.3.1

RAINGARDEN

| Soil Infiltration Rate: Medium | | | Setback Distance: 35 feet | | | Buffer Depth: No Buffer | | |
|--------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 0 | 0.009 | 0.020 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 0 | 0.004 | 0.013 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.009 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 0 | 0.001 | 0.006 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.004 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.012 | 0.024 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.004 | 0.013 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.008 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.001 | 0.005 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.000 | 0.003 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 0 | 0.017 | 0.029 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 0 | 0.005 | 0.013 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 0 | 0.002 | 0.008 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 0 | 0.000 | 0.005 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 0 | 0.000 | 0.003 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 0 | 0.024 | 0.049 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 0 | 0.014 | 0.034 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 0 | 0.008 | 0.025 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 0 | 0.003 | 0.016 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.011 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.033 | 0.059 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.018 | 0.037 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.009 | 0.025 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.003 | 0.015 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.010 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 0 | 0.043 | 0.069 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 0 | 0.020 | 0.040 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 0 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 0 | 0.003 | 0.015 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 0 | 0.001 | 0.010 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 0 | 0.066 | 0.117 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 0 | 0.048 | 0.091 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 0 | 0.035 | 0.074 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 0 | 0.018 | 0.051 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.035 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 0 | 0.086 | 0.137 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 0 | 0.059 | 0.103 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 0 | 0.040 | 0.080 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 0 | 0.020 | 0.052 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.034 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 0 | 0.107 | 0.156 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 0 | 0.068 | 0.112 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 0 | 0.044 | 0.085 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 0 | 0.020 | 0.052 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 0 | 0.008 | 0.034 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.3.2

RAINGARDEN

| Soil Infiltration Rate: Medium | | Setback Distance: 35 feet | | | | Buffer Depth: 10 feet | | |
|--------------------------------|-------------------------------|---------------------------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.011 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 10 | 0.001 | 0.007 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 10 | 0.000 | 0.005 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 10 | 0.000 | 0.003 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.007 | 0.017 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.001 | 0.007 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.000 | 0.004 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.000 | 0.003 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 10 | 0.008 | 0.017 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 10 | 0.003 | 0.010 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 10 | 0.001 | 0.006 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 10 | 0.000 | 0.004 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 10 | 0.000 | 0.002 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 10 | 0.019 | 0.040 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 10 | 0.012 | 0.029 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 10 | 0.007 | 0.022 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.014 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.010 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.022 | 0.044 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.013 | 0.030 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.007 | 0.022 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.014 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.010 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 10 | 0.025 | 0.047 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 10 | 0.014 | 0.032 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 10 | 0.008 | 0.022 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 10 | 0.003 | 0.013 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 10 | 0.001 | 0.009 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 10 | 0.056 | 0.103 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 10 | 0.042 | 0.083 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 10 | 0.031 | 0.068 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 10 | 0.016 | 0.047 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.033 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 10 | 0.065 | 0.112 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 10 | 0.048 | 0.089 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 10 | 0.034 | 0.071 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 10 | 0.017 | 0.048 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.032 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 10 | 0.072 | 0.120 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 10 | 0.051 | 0.093 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 10 | 0.035 | 0.073 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 10 | 0.018 | 0.048 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 10 | 0.007 | 0.032 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.3.3

RAINGARDEN

| Soil Infiltration Rate: Medium | | Setback Distance: 35 feet | | | | Buffer Depth: 20 feet | | |
|--------------------------------|-------------------------------|---------------------------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 20 | 0.001 | 0.006 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 20 | 0.000 | 0.004 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 20 | 0.000 | 0.002 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.005 | 0.013 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.001 | 0.006 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.000 | 0.004 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.000 | 0.002 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 20 | 0.005 | 0.013 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 20 | 0.002 | 0.008 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 20 | 0.001 | 0.006 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 20 | 0.000 | 0.004 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 20 | 0.000 | 0.002 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 20 | 0.015 | 0.034 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.020 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 20 | 0.002 | 0.013 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.009 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.016 | 0.035 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.020 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.002 | 0.013 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.009 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 20 | 0.017 | 0.036 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 20 | 0.006 | 0.020 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 20 | 0.002 | 0.012 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 20 | 0.001 | 0.009 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 20 | 0.048 | 0.091 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 20 | 0.037 | 0.075 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 20 | 0.027 | 0.062 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 20 | 0.015 | 0.044 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.031 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 20 | 0.052 | 0.096 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 20 | 0.039 | 0.078 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 20 | 0.028 | 0.064 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 20 | 0.015 | 0.044 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.031 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 20 | 0.055 | 0.100 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 20 | 0.040 | 0.080 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 20 | 0.029 | 0.065 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 20 | 0.016 | 0.045 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 20 | 0.007 | 0.031 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 2.3.4

RAINGARDEN

| Soil Infiltration Rate: Medium | | Setback Distance: 35 feet | | | | Buffer Depth: 35 feet | | |
|--------------------------------|-------------------------------|---------------------------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | <5% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.006 |
| Medium | 500 | <5% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.004 |
| Medium | 500 | <5% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.003 |
| Medium | 500 | <5% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.002 |
| Medium | 500 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.006 |
| Medium | 500 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 500 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.003 |
| Medium | 500 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.002 |
| Medium | 500 | >20% | 0 | 8 | Medium x 2 | 35 | 0.003 | 0.011 |
| Medium | 500 | >20% | 50 | 8 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | >20% | 100 | 8 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 500 | >20% | 200 | 8 | Medium x 2 | 35 | 0.000 | 0.003 |
| Medium | 500 | >20% | 350 | 8 | Medium x 2 | 35 | 0.000 | 0.002 |
| Medium | 1,000 | <5% | 0 | 8 | Medium x 2 | 35 | 0.011 | 0.027 |
| Medium | 1,000 | <5% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.021 |
| Medium | 1,000 | <5% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.016 |
| Medium | 1,000 | <5% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.011 |
| Medium | 1,000 | <5% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.008 |
| Medium | 1,000 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.011 | 0.027 |
| Medium | 1,000 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.021 |
| Medium | 1,000 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.016 |
| Medium | 1,000 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.011 |
| Medium | 1,000 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.008 |
| Medium | 1,000 | >20% | 0 | 8 | Medium x 2 | 35 | 0.012 | 0.027 |
| Medium | 1,000 | >20% | 50 | 8 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | >20% | 100 | 8 | Medium x 2 | 35 | 0.005 | 0.017 |
| Medium | 1,000 | >20% | 200 | 8 | Medium x 2 | 35 | 0.002 | 0.011 |
| Medium | 1,000 | >20% | 350 | 8 | Medium x 2 | 35 | 0.001 | 0.008 |
| Medium | 2,000 | <5% | 0 | 8 | Medium x 2 | 35 | 0.040 | 0.079 |
| Medium | 2,000 | <5% | 50 | 8 | Medium x 2 | 35 | 0.030 | 0.066 |
| Medium | 2,000 | <5% | 100 | 8 | Medium x 2 | 35 | 0.022 | 0.055 |
| Medium | 2,000 | <5% | 200 | 8 | Medium x 2 | 35 | 0.013 | 0.040 |
| Medium | 2,000 | <5% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.029 |
| Medium | 2,000 | 5-20% | 0 | 8 | Medium x 2 | 35 | 0.040 | 0.080 |
| Medium | 2,000 | 5-20% | 50 | 8 | Medium x 2 | 35 | 0.030 | 0.067 |
| Medium | 2,000 | 5-20% | 100 | 8 | Medium x 2 | 35 | 0.022 | 0.055 |
| Medium | 2,000 | 5-20% | 200 | 8 | Medium x 2 | 35 | 0.013 | 0.040 |
| Medium | 2,000 | 5-20% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.029 |
| Medium | 2,000 | >20% | 0 | 8 | Medium x 2 | 35 | 0.040 | 0.081 |
| Medium | 2,000 | >20% | 50 | 8 | Medium x 2 | 35 | 0.030 | 0.067 |
| Medium | 2,000 | >20% | 100 | 8 | Medium x 2 | 35 | 0.023 | 0.055 |
| Medium | 2,000 | >20% | 200 | 8 | Medium x 2 | 35 | 0.013 | 0.040 |
| Medium | 2,000 | >20% | 350 | 8 | Medium x 2 | 35 | 0.006 | 0.029 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.1.1

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 75 feet | | | Buffer Depth: No Buffer | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 50 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 100 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 0 | 0.001 | 0.003 |
| High | 500 | >20% | 50 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | >20% | 100 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | >20% | 200 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | >20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 0 | 0.002 | 0.006 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 0 | 0.001 | 0.005 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 0 | 0.005 | 0.016 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 0 | 0.003 | 0.012 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 0 | 0.002 | 0.008 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 0 | 0.001 | 0.005 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.003 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 0 | 0.003 | 0.013 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 0 | 0.003 | 0.012 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 0 | 0.002 | 0.010 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 0 | 0.002 | 0.008 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 0 | 0.001 | 0.006 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 0 | 0.010 | 0.030 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 0 | 0.008 | 0.027 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 0 | 0.006 | 0.023 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 0 | 0.004 | 0.016 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 0 | 0.002 | 0.012 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 0 | 0.025 | 0.054 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 0 | 0.018 | 0.045 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 0 | 0.013 | 0.036 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 0 | 0.006 | 0.024 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 0 | 0.002 | 0.016 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.1.2

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 75 feet | | | Buffer Depth: 10 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 50 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 100 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 50 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 100 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 10 | 0.002 | 0.006 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 10 | 0.002 | 0.010 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 10 | 0.002 | 0.009 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 10 | 0.002 | 0.008 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 10 | 0.001 | 0.007 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 10 | 0.001 | 0.005 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 10 | 0.006 | 0.020 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 10 | 0.005 | 0.018 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 10 | 0.004 | 0.016 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 10 | 0.002 | 0.012 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 10 | 0.001 | 0.008 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 10 | 0.011 | 0.031 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 10 | 0.009 | 0.027 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 10 | 0.007 | 0.023 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 10 | 0.004 | 0.016 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 10 | 0.002 | 0.011 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.1.3

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 75 feet | | | Buffer Depth: 20 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 50 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 20 | 0.002 | 0.008 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 20 | 0.002 | 0.007 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 20 | 0.001 | 0.007 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 20 | 0.001 | 0.006 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 20 | 0.000 | 0.005 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 20 | 0.003 | 0.013 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 20 | 0.003 | 0.012 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 20 | 0.002 | 0.011 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 20 | 0.002 | 0.008 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 20 | 0.001 | 0.006 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 20 | 0.005 | 0.019 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 20 | 0.004 | 0.017 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 20 | 0.004 | 0.015 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 20 | 0.002 | 0.011 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 20 | 0.001 | 0.008 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.1.4

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 75 feet | | | Buffer Depth: 35 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 35 | 0.001 | 0.005 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 35 | 0.000 | 0.004 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.004 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 35 | 0.001 | 0.007 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 35 | 0.001 | 0.005 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.2.1

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 50 feet | | | Buffer Depth: No Buffer | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 50 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 100 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 200 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 0 | 0.002 | 0.006 |
| High | 500 | >20% | 50 | 8 | High x 2 | 0 | 0.001 | 0.003 |
| High | 500 | >20% | 100 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | >20% | 200 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | >20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 0 | 0.000 | 0.004 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 0 | 0.003 | 0.011 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 0 | 0.002 | 0.009 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 0 | 0.001 | 0.007 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 0 | 0.000 | 0.004 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 0 | 0.009 | 0.023 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 0 | 0.005 | 0.016 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 0 | 0.003 | 0.011 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 0 | 0.001 | 0.006 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.004 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 0 | 0.007 | 0.022 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 0 | 0.005 | 0.020 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 0 | 0.004 | 0.018 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 0 | 0.003 | 0.013 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 0 | 0.001 | 0.009 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 0 | 0.018 | 0.045 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 0 | 0.014 | 0.038 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 0 | 0.010 | 0.031 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 0 | 0.005 | 0.021 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 0 | 0.002 | 0.014 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 0 | 0.036 | 0.070 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 0 | 0.026 | 0.056 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 0 | 0.017 | 0.042 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 0 | 0.008 | 0.028 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 0 | 0.003 | 0.018 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.2.2

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 50 feet | | | Buffer Depth: 10 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 50 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 100 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 50 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 100 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 10 | 0.001 | 0.003 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 10 | 0.002 | 0.008 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 10 | 0.002 | 0.006 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 10 | 0.005 | 0.017 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 10 | 0.004 | 0.015 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 10 | 0.003 | 0.014 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 10 | 0.002 | 0.010 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 10 | 0.001 | 0.007 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 10 | 0.009 | 0.028 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 10 | 0.007 | 0.024 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 10 | 0.006 | 0.021 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 10 | 0.003 | 0.015 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 10 | 0.001 | 0.011 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 10 | 0.014 | 0.038 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 10 | 0.011 | 0.032 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 10 | 0.008 | 0.027 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 10 | 0.004 | 0.018 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 10 | 0.002 | 0.012 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.2.3

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 50 feet | | | Buffer Depth: 20 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 50 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 20 | 0.003 | 0.012 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 20 | 0.003 | 0.011 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 20 | 0.002 | 0.010 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 20 | 0.002 | 0.008 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 20 | 0.001 | 0.005 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 20 | 0.005 | 0.018 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 20 | 0.004 | 0.016 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 20 | 0.004 | 0.014 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 20 | 0.002 | 0.010 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 20 | 0.001 | 0.007 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 20 | 0.007 | 0.022 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 20 | 0.006 | 0.020 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 20 | 0.004 | 0.017 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 20 | 0.003 | 0.012 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 20 | 0.001 | 0.009 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.2.4

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 50 feet | | | Buffer Depth: 35 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 35 | 0.001 | 0.007 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 35 | 0.000 | 0.005 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 35 | 0.001 | 0.007 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 35 | 0.001 | 0.005 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 35 | 0.003 | 0.010 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 35 | 0.001 | 0.007 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 35 | 0.001 | 0.005 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.3.1

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 35 feet | | | Buffer Depth: No Buffer | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | <5% | 50 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | <5% | 100 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 200 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 0 | 0.001 | 0.004 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 0 | 0.003 | 0.009 |
| High | 500 | >20% | 50 | 8 | High x 2 | 0 | 0.001 | 0.004 |
| High | 500 | >20% | 100 | 8 | High x 2 | 0 | 0.000 | 0.003 |
| High | 500 | >20% | 200 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | >20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 0 | 0.002 | 0.007 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 0 | 0.001 | 0.006 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 0 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 0 | 0.006 | 0.017 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 0 | 0.004 | 0.012 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 0 | 0.002 | 0.009 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 0 | 0.001 | 0.005 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.004 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 0 | 0.014 | 0.029 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 0 | 0.007 | 0.018 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 0 | 0.003 | 0.012 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 0 | 0.001 | 0.007 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 0 | 0.000 | 0.005 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 0 | 0.012 | 0.034 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 0 | 0.009 | 0.029 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 0 | 0.007 | 0.024 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 0 | 0.004 | 0.017 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 0 | 0.002 | 0.012 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 0 | 0.027 | 0.056 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 0 | 0.020 | 0.047 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 0 | 0.014 | 0.036 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 0 | 0.007 | 0.024 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 0 | 0.002 | 0.016 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 0 | 0.049 | 0.088 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 0 | 0.033 | 0.067 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 0 | 0.021 | 0.049 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 0 | 0.009 | 0.030 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 0 | 0.003 | 0.019 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.3.2

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 35 feet | | | Buffer Depth: 10 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 50 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 100 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 50 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 100 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 10 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 10 | 0.002 | 0.007 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 10 | 0.001 | 0.006 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 10 | 0.003 | 0.010 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 10 | 0.002 | 0.008 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 10 | 0.001 | 0.006 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 10 | 0.000 | 0.002 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 10 | 0.008 | 0.024 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 10 | 0.006 | 0.022 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 10 | 0.005 | 0.019 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 10 | 0.003 | 0.013 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 10 | 0.001 | 0.010 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 10 | 0.013 | 0.034 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 10 | 0.010 | 0.030 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 10 | 0.008 | 0.024 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 10 | 0.004 | 0.017 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 10 | 0.002 | 0.012 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 10 | 0.017 | 0.042 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 10 | 0.013 | 0.036 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 10 | 0.010 | 0.029 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 10 | 0.005 | 0.020 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 10 | 0.002 | 0.013 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.3.3

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 35 feet | | | Buffer Depth: 20 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 50 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 50 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 20 | 0.001 | 0.004 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 20 | 0.000 | 0.001 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 20 | 0.005 | 0.018 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 20 | 0.004 | 0.016 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 20 | 0.003 | 0.014 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 20 | 0.002 | 0.010 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 20 | 0.001 | 0.007 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 20 | 0.007 | 0.022 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 20 | 0.005 | 0.019 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 20 | 0.004 | 0.017 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 20 | 0.003 | 0.012 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 20 | 0.001 | 0.009 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 20 | 0.008 | 0.024 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 20 | 0.006 | 0.021 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 20 | 0.005 | 0.018 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 20 | 0.003 | 0.013 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 20 | 0.001 | 0.009 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table R 3.3.4

RAINGARDEN

| Soil Infiltration Rate: High | | | Setback Distance: 35 feet | | | Buffer Depth: 35 feet | | |
|------------------------------|-------------------------------|-------|-------------------------------|---------------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Raingarden Area (square feet) | Raingarden Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 200 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | 5-20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | >20% | 0 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 50 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 100 | 8 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 200 | 8 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | >20% | 350 | 8 | High x 2 | 35 | 0.000 | 0.000 |
| High | 2,000 | <5% | 0 | 8 | High x 2 | 35 | 0.003 | 0.011 |
| High | 2,000 | <5% | 50 | 8 | High x 2 | 35 | 0.002 | 0.010 |
| High | 2,000 | <5% | 100 | 8 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | <5% | 200 | 8 | High x 2 | 35 | 0.001 | 0.007 |
| High | 2,000 | <5% | 350 | 8 | High x 2 | 35 | 0.001 | 0.005 |
| High | 2,000 | 5-20% | 0 | 8 | High x 2 | 35 | 0.003 | 0.011 |
| High | 2,000 | 5-20% | 50 | 8 | High x 2 | 35 | 0.002 | 0.010 |
| High | 2,000 | 5-20% | 100 | 8 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | 5-20% | 200 | 8 | High x 2 | 35 | 0.001 | 0.007 |
| High | 2,000 | 5-20% | 350 | 8 | High x 2 | 35 | 0.001 | 0.005 |
| High | 2,000 | >20% | 0 | 8 | High x 2 | 35 | 0.003 | 0.011 |
| High | 2,000 | >20% | 50 | 8 | High x 2 | 35 | 0.002 | 0.010 |
| High | 2,000 | >20% | 100 | 8 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | >20% | 200 | 8 | High x 2 | 35 | 0.001 | 0.007 |
| High | 2,000 | >20% | 350 | 8 | High x 2 | 35 | 0.001 | 0.005 |

Note: Same soil in raingarden and setback, Duluth 1960-1995

Table T 1.1.1

INFILTRATION TRENCH

| Soil Infiltration Rate: Low | | | Setback Distance: 75 feet | | | Buffer Depth: No Buffer | | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.029 | 0.053 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.027 | 0.052 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.025 | 0.050 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.021 | 0.045 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.015 | 0.038 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.026 | 0.045 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.024 | 0.043 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.022 | 0.040 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.017 | 0.034 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.011 | 0.027 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.027 | 0.042 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.024 | 0.040 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.021 | 0.036 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.016 | 0.030 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.008 | 0.022 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.052 | 0.089 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.050 | 0.088 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.048 | 0.086 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.043 | 0.080 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.034 | 0.068 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.053 | 0.084 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.051 | 0.082 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.048 | 0.080 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.042 | 0.071 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.031 | 0.059 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.059 | 0.086 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.055 | 0.082 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.051 | 0.078 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.043 | 0.068 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.030 | 0.056 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.106 | 0.167 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.104 | 0.165 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.101 | 0.163 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.096 | 0.157 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.084 | 0.142 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.116 | 0.170 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.113 | 0.167 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.109 | 0.163 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.101 | 0.155 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.086 | 0.136 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.128 | 0.180 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.123 | 0.173 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.118 | 0.167 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.108 | 0.157 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.089 | 0.135 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.1.2

INFILTRATION TRENCH

| Soil Infiltration Rate: Low | | | Setback Distance: 75 feet | | | | Buffer Depth: 10 feet | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.026 | 0.050 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.025 | 0.049 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.023 | 0.046 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.020 | 0.043 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.014 | 0.036 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.023 | 0.041 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.021 | 0.040 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.020 | 0.038 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.016 | 0.034 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.010 | 0.026 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.022 | 0.038 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.020 | 0.036 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.018 | 0.033 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.014 | 0.029 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.008 | 0.022 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.048 | 0.084 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.046 | 0.083 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.045 | 0.081 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.040 | 0.076 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.032 | 0.066 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.048 | 0.079 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.046 | 0.077 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.043 | 0.075 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.038 | 0.068 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.029 | 0.058 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.049 | 0.078 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.046 | 0.076 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.044 | 0.073 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.038 | 0.065 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.028 | 0.054 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.100 | 0.161 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.098 | 0.159 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.096 | 0.156 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.091 | 0.152 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.080 | 0.138 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.106 | 0.161 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.103 | 0.159 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.100 | 0.156 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.094 | 0.148 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.080 | 0.132 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.112 | 0.164 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.108 | 0.160 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.105 | 0.157 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.097 | 0.148 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.082 | 0.129 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.1.3

INFILTRATION TRENCH

| Soil Infiltration Rate: Low | | | Setback Distance: 75 feet | | | Buffer Depth: 20 feet | | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.024 | 0.047 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.023 | 0.046 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.021 | 0.044 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.018 | 0.040 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.013 | 0.034 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.021 | 0.039 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.020 | 0.038 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.018 | 0.036 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.015 | 0.033 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.009 | 0.026 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.019 | 0.035 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.016 | 0.032 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.013 | 0.029 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.008 | 0.022 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.045 | 0.080 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.043 | 0.079 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.042 | 0.077 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.038 | 0.072 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.030 | 0.064 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.043 | 0.074 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.041 | 0.072 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.040 | 0.071 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.035 | 0.065 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.027 | 0.056 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.043 | 0.073 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.041 | 0.071 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.039 | 0.068 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.034 | 0.062 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.026 | 0.053 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.095 | 0.154 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.092 | 0.153 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.090 | 0.150 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.086 | 0.146 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.076 | 0.133 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.098 | 0.154 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.095 | 0.152 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.092 | 0.149 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.087 | 0.143 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.075 | 0.128 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.101 | 0.154 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.098 | 0.152 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.095 | 0.149 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.088 | 0.142 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.076 | 0.125 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.1.4**INFILTRATION TRENCH**

| Soil Infiltration Rate: Low | | | Setback Distance: 75 feet | | | | Buffer Depth: 35 feet | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.020 | 0.042 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.020 | 0.042 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.018 | 0.040 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.016 | 0.037 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.011 | 0.031 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.018 | 0.036 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.017 | 0.035 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.016 | 0.035 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.013 | 0.032 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.009 | 0.026 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.017 | 0.034 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.016 | 0.033 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.015 | 0.031 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.012 | 0.029 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.008 | 0.023 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.040 | 0.073 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.038 | 0.073 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.037 | 0.072 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.034 | 0.067 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.027 | 0.060 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.038 | 0.069 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.036 | 0.068 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.035 | 0.066 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.032 | 0.062 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.025 | 0.055 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.037 | 0.068 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.036 | 0.066 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.034 | 0.064 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.031 | 0.060 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.024 | 0.052 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.087 | 0.146 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.084 | 0.144 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.083 | 0.142 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.079 | 0.139 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.070 | 0.127 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.088 | 0.144 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.085 | 0.143 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.083 | 0.141 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.079 | 0.135 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.069 | 0.122 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.089 | 0.144 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.086 | 0.142 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.084 | 0.140 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.079 | 0.134 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.069 | 0.120 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.2.1

INFILTRATION TRENCH

| Soil Infiltration Rate: Low | | | Setback Distance: 50 feet | | | Buffer Depth: No Buffer | | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.027 | 0.048 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.025 | 0.046 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.023 | 0.043 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.019 | 0.038 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.012 | 0.031 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.026 | 0.043 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.024 | 0.041 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.021 | 0.037 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.016 | 0.031 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.009 | 0.023 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.028 | 0.042 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.025 | 0.039 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.021 | 0.035 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.015 | 0.028 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.008 | 0.020 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.052 | 0.086 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.050 | 0.084 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.048 | 0.082 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.042 | 0.074 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.032 | 0.062 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.056 | 0.084 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.053 | 0.082 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.050 | 0.078 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.043 | 0.069 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.030 | 0.057 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.062 | 0.088 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.057 | 0.083 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.053 | 0.078 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.044 | 0.068 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.030 | 0.055 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.112 | 0.168 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.109 | 0.165 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.106 | 0.163 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.099 | 0.156 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.085 | 0.138 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.123 | 0.175 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.119 | 0.170 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.114 | 0.165 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.105 | 0.156 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.088 | 0.135 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.134 | 0.185 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.128 | 0.178 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.122 | 0.170 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.111 | 0.159 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.091 | 0.136 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.2.2

INFILTRATION TRENCH

| Soil Infiltration Rate: Low | | | Setback Distance: 50 feet | | | | Buffer Depth: 10 feet | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.024 | 0.043 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.022 | 0.042 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.020 | 0.040 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.017 | 0.036 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.011 | 0.029 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.022 | 0.039 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.020 | 0.037 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.018 | 0.034 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.014 | 0.030 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.008 | 0.023 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.022 | 0.038 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.020 | 0.035 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.018 | 0.032 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.013 | 0.027 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.007 | 0.020 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.048 | 0.080 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.046 | 0.078 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.044 | 0.076 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.039 | 0.070 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.029 | 0.060 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.048 | 0.078 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.046 | 0.076 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.044 | 0.073 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.038 | 0.065 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.028 | 0.055 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.050 | 0.077 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.047 | 0.075 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.044 | 0.072 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.038 | 0.064 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.027 | 0.052 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.104 | 0.161 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.102 | 0.159 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.099 | 0.156 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.093 | 0.149 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.080 | 0.133 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.110 | 0.163 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.107 | 0.160 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.103 | 0.156 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.096 | 0.148 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.081 | 0.130 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.116 | 0.166 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.111 | 0.161 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.107 | 0.157 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.099 | 0.149 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.082 | 0.129 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.2.3

INFILTRATION TRENCH

| Soil Infiltration Rate: Low | | | Setback Distance: 50 feet | | | | Buffer Depth: 20 feet | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.021 | 0.040 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.020 | 0.039 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.018 | 0.037 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.015 | 0.034 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.010 | 0.027 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.019 | 0.036 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.016 | 0.032 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.013 | 0.029 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.008 | 0.022 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.017 | 0.033 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.016 | 0.030 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.012 | 0.027 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.007 | 0.020 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.043 | 0.075 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.042 | 0.073 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.040 | 0.071 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.036 | 0.066 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.027 | 0.057 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.043 | 0.073 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.041 | 0.071 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.039 | 0.069 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.034 | 0.062 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.026 | 0.053 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.043 | 0.072 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.041 | 0.070 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.039 | 0.067 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.034 | 0.061 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.025 | 0.051 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.097 | 0.154 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.095 | 0.152 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.092 | 0.149 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.087 | 0.143 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.075 | 0.128 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.100 | 0.154 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.097 | 0.151 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.094 | 0.149 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.088 | 0.141 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.076 | 0.126 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.103 | 0.154 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.099 | 0.151 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.096 | 0.148 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.089 | 0.141 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.076 | 0.125 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.2.4**INFILTRATION TRENCH**

| Soil Infiltration Rate: Low | | | Setback Distance: 50 feet | | | Buffer Depth: 35 feet | | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.017 | 0.035 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.016 | 0.034 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.015 | 0.033 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.013 | 0.030 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.008 | 0.024 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.016 | 0.033 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.015 | 0.032 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.014 | 0.030 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.012 | 0.028 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.007 | 0.022 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.016 | 0.032 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.015 | 0.031 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.014 | 0.030 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.011 | 0.027 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.007 | 0.021 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.037 | 0.068 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.036 | 0.066 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.035 | 0.065 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.031 | 0.060 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.024 | 0.053 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.037 | 0.067 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.035 | 0.065 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.034 | 0.063 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.031 | 0.058 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.024 | 0.051 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.037 | 0.066 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.035 | 0.065 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.034 | 0.062 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.030 | 0.058 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.023 | 0.050 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.087 | 0.143 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.086 | 0.143 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.083 | 0.140 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.078 | 0.134 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.069 | 0.122 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.089 | 0.144 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.086 | 0.141 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.084 | 0.139 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.079 | 0.133 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.069 | 0.120 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.090 | 0.144 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.087 | 0.141 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.084 | 0.139 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.079 | 0.133 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.069 | 0.119 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.3.1

INFILTRATION TRENCH

| Soil Infiltration Rate: Low | | | Setback Distance: 35 feet | | | Buffer Depth: No Buffer | | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.026 | 0.045 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.024 | 0.043 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.021 | 0.039 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.017 | 0.034 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.010 | 0.026 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.027 | 0.043 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.024 | 0.040 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.021 | 0.035 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.015 | 0.030 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.008 | 0.021 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.029 | 0.043 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.026 | 0.039 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.022 | 0.034 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.015 | 0.028 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.007 | 0.019 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.054 | 0.085 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.051 | 0.082 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.048 | 0.080 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.042 | 0.071 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.031 | 0.059 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.059 | 0.085 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.055 | 0.081 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.051 | 0.078 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.043 | 0.068 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.030 | 0.056 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.065 | 0.090 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.059 | 0.084 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.054 | 0.079 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.045 | 0.068 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.030 | 0.054 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 0 | 0.117 | 0.170 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 0 | 0.113 | 0.167 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 0 | 0.109 | 0.163 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 0 | 0.102 | 0.155 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 0 | 0.086 | 0.136 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 0 | 0.129 | 0.180 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 0 | 0.123 | 0.174 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 0 | 0.118 | 0.167 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 0 | 0.108 | 0.157 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 0 | 0.089 | 0.135 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 0 | 0.138 | 0.189 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 0 | 0.131 | 0.182 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 0 | 0.124 | 0.173 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 0 | 0.112 | 0.160 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 0 | 0.092 | 0.136 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.3.2**INFILTRATION TRENCH**

| Soil Infiltration Rate: Low | | | Setback Distance: 35 feet | | | Buffer Depth: 10 feet | | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.022 | 0.040 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.021 | 0.038 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.019 | 0.036 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.015 | 0.031 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.009 | 0.024 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.022 | 0.038 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.020 | 0.036 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.018 | 0.033 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.014 | 0.028 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.007 | 0.021 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.021 | 0.036 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.020 | 0.034 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.017 | 0.031 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.013 | 0.026 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.007 | 0.019 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.048 | 0.079 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.046 | 0.076 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.043 | 0.073 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.038 | 0.066 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.028 | 0.056 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.049 | 0.077 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.047 | 0.075 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.044 | 0.072 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.038 | 0.064 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.027 | 0.053 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.051 | 0.078 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.048 | 0.075 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.044 | 0.071 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.038 | 0.063 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.027 | 0.052 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 10 | 0.108 | 0.161 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 10 | 0.105 | 0.158 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 10 | 0.102 | 0.155 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 10 | 0.095 | 0.148 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 10 | 0.081 | 0.130 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 10 | 0.114 | 0.165 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 10 | 0.110 | 0.160 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 10 | 0.106 | 0.157 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 10 | 0.098 | 0.148 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 10 | 0.082 | 0.129 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 10 | 0.118 | 0.168 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 10 | 0.113 | 0.162 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 10 | 0.108 | 0.157 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 10 | 0.100 | 0.149 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 10 | 0.083 | 0.129 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.3.3

INFILTRATION TRENCH

| Soil Infiltration Rate: Low | | | Setback Distance: 35 feet | | | Buffer Depth: 20 feet | | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.019 | 0.035 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.016 | 0.032 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.013 | 0.029 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.008 | 0.022 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.017 | 0.032 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.016 | 0.030 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.012 | 0.027 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.007 | 0.020 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.018 | 0.034 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.017 | 0.032 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.015 | 0.029 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.012 | 0.026 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.006 | 0.019 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.043 | 0.072 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.041 | 0.070 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.039 | 0.068 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.034 | 0.062 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.026 | 0.053 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.043 | 0.071 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.041 | 0.070 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.038 | 0.067 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.034 | 0.060 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.025 | 0.051 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.043 | 0.071 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.041 | 0.070 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.039 | 0.066 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.034 | 0.060 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.025 | 0.050 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 20 | 0.100 | 0.153 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 20 | 0.097 | 0.151 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 20 | 0.094 | 0.148 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 20 | 0.088 | 0.141 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 20 | 0.075 | 0.126 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 20 | 0.102 | 0.154 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 20 | 0.099 | 0.150 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 20 | 0.096 | 0.148 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 20 | 0.089 | 0.141 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 20 | 0.076 | 0.124 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 20 | 0.104 | 0.155 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 20 | 0.100 | 0.152 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 20 | 0.097 | 0.148 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 20 | 0.090 | 0.142 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 20 | 0.076 | 0.124 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 1.3.4**INFILTRATION TRENCH**

| Soil Infiltration Rate: Low | | | Setback Distance: 35 feet | | | Buffer Depth: 35 feet | | |
|-----------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Low | 500 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.016 | 0.032 |
| Low | 500 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.014 | 0.029 |
| Low | 500 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.013 | 0.028 |
| Low | 500 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.011 | 0.026 |
| Low | 500 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.006 | 0.020 |
| Low | 500 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.016 | 0.032 |
| Low | 500 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.014 | 0.029 |
| Low | 500 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.013 | 0.028 |
| Low | 500 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.011 | 0.026 |
| Low | 500 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.006 | 0.020 |
| Low | 500 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.016 | 0.032 |
| Low | 500 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.015 | 0.029 |
| Low | 500 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.014 | 0.028 |
| Low | 500 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.011 | 0.026 |
| Low | 500 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.006 | 0.020 |
| Low | 1,000 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.037 | 0.066 |
| Low | 1,000 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.035 | 0.064 |
| Low | 1,000 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.033 | 0.061 |
| Low | 1,000 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.030 | 0.056 |
| Low | 1,000 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.023 | 0.049 |
| Low | 1,000 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.037 | 0.066 |
| Low | 1,000 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.035 | 0.064 |
| Low | 1,000 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.033 | 0.061 |
| Low | 1,000 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.030 | 0.056 |
| Low | 1,000 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.023 | 0.049 |
| Low | 1,000 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.037 | 0.067 |
| Low | 1,000 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.035 | 0.065 |
| Low | 1,000 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.033 | 0.061 |
| Low | 1,000 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.030 | 0.056 |
| Low | 1,000 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.023 | 0.049 |
| Low | 2,000 | <5% | 0.0 | 24 | Low x 2 | 35 | 0.090 | 0.143 |
| Low | 2,000 | <5% | 12.5 | 24 | Low x 2 | 35 | 0.087 | 0.140 |
| Low | 2,000 | <5% | 25.0 | 24 | Low x 2 | 35 | 0.084 | 0.137 |
| Low | 2,000 | <5% | 50.0 | 24 | Low x 2 | 35 | 0.079 | 0.131 |
| Low | 2,000 | <5% | 100.0 | 24 | Low x 2 | 35 | 0.068 | 0.118 |
| Low | 2,000 | 5-20% | 0.0 | 24 | Low x 2 | 35 | 0.090 | 0.143 |
| Low | 2,000 | 5-20% | 12.5 | 24 | Low x 2 | 35 | 0.087 | 0.140 |
| Low | 2,000 | 5-20% | 25.0 | 24 | Low x 2 | 35 | 0.084 | 0.138 |
| Low | 2,000 | 5-20% | 50.0 | 24 | Low x 2 | 35 | 0.079 | 0.132 |
| Low | 2,000 | 5-20% | 100.0 | 24 | Low x 2 | 35 | 0.068 | 0.118 |
| Low | 2,000 | >20% | 0.0 | 24 | Low x 2 | 35 | 0.091 | 0.144 |
| Low | 2,000 | >20% | 12.5 | 24 | Low x 2 | 35 | 0.087 | 0.141 |
| Low | 2,000 | >20% | 25.0 | 24 | Low x 2 | 35 | 0.084 | 0.138 |
| Low | 2,000 | >20% | 50.0 | 24 | Low x 2 | 35 | 0.079 | 0.132 |
| Low | 2,000 | >20% | 100.0 | 24 | Low x 2 | 35 | 0.068 | 0.118 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.1.1

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 75 feet | | | Buffer Depth: No Buffer | | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.007 | 0.019 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.006 | 0.018 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.005 | 0.018 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.004 | 0.015 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.003 | 0.012 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.008 | 0.020 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.007 | 0.018 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.006 | 0.017 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.004 | 0.014 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.002 | 0.010 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.012 | 0.023 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.009 | 0.020 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.007 | 0.018 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.005 | 0.013 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.002 | 0.009 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.016 | 0.040 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.015 | 0.037 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.014 | 0.036 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.012 | 0.033 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.008 | 0.027 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.023 | 0.045 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.020 | 0.042 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.018 | 0.040 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.015 | 0.035 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.009 | 0.026 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.032 | 0.056 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.028 | 0.051 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.024 | 0.046 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.018 | 0.039 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.010 | 0.027 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.045 | 0.090 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.042 | 0.086 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.040 | 0.083 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.036 | 0.080 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.029 | 0.069 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.063 | 0.112 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.059 | 0.107 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.056 | 0.101 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.048 | 0.092 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.036 | 0.076 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.084 | 0.134 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.077 | 0.127 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.071 | 0.118 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.060 | 0.105 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.043 | 0.083 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.1.2

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 75 feet | | | | Buffer Depth: 10 feet | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.005 | 0.017 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.005 | 0.016 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.004 | 0.016 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.004 | 0.013 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.011 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.005 | 0.014 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.004 | 0.014 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.003 | 0.012 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.009 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.007 | 0.016 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.006 | 0.015 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.005 | 0.014 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.003 | 0.012 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.008 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.014 | 0.035 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.013 | 0.033 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.012 | 0.032 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.010 | 0.030 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.007 | 0.025 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.017 | 0.038 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.016 | 0.035 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.014 | 0.034 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.012 | 0.030 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.008 | 0.024 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.021 | 0.042 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.019 | 0.039 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.017 | 0.037 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.013 | 0.031 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.008 | 0.023 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.040 | 0.083 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.038 | 0.080 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.036 | 0.077 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.033 | 0.074 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.026 | 0.065 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.052 | 0.097 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.049 | 0.092 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.046 | 0.088 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.041 | 0.081 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.031 | 0.069 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.062 | 0.108 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.058 | 0.104 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.054 | 0.098 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.047 | 0.089 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.035 | 0.073 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.1.3

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 75 feet | | | | Buffer Depth: 20 feet | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.004 | 0.015 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.014 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.004 | 0.014 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.003 | 0.012 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.001 | 0.008 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.004 | 0.011 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.003 | 0.009 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.001 | 0.007 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.012 | 0.031 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.011 | 0.029 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.010 | 0.028 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.009 | 0.027 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.006 | 0.022 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.014 | 0.033 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.012 | 0.030 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.011 | 0.029 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.010 | 0.027 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.006 | 0.021 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.015 | 0.034 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.014 | 0.032 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.013 | 0.031 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.007 | 0.021 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.036 | 0.078 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.034 | 0.074 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.032 | 0.072 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.029 | 0.068 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.024 | 0.061 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.043 | 0.084 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.040 | 0.081 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.038 | 0.078 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.034 | 0.074 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.027 | 0.062 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.049 | 0.092 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.046 | 0.088 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.043 | 0.083 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.038 | 0.077 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.029 | 0.065 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.1.4

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 75 feet | | | | Buffer Depth: 35 feet | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.011 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.003 | 0.011 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.003 | 0.011 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.010 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.007 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.008 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.006 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.003 | 0.009 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.002 | 0.009 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.008 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.006 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.009 | 0.026 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.008 | 0.024 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.008 | 0.024 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.007 | 0.023 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.020 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.010 | 0.026 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.009 | 0.025 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.008 | 0.024 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.007 | 0.023 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.018 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.010 | 0.027 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.010 | 0.025 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.009 | 0.024 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.018 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.030 | 0.069 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.028 | 0.067 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.027 | 0.064 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.025 | 0.060 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.020 | 0.054 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.033 | 0.072 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.032 | 0.070 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.030 | 0.067 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.027 | 0.063 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.022 | 0.055 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.036 | 0.074 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.034 | 0.072 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.032 | 0.070 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.029 | 0.066 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.023 | 0.056 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.2.1

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 50 feet | | | Buffer Depth: No Buffer | | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.007 | 0.020 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.006 | 0.018 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.006 | 0.017 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.004 | 0.014 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.002 | 0.011 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.010 | 0.021 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.008 | 0.019 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.007 | 0.017 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.004 | 0.013 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.002 | 0.010 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.014 | 0.026 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.011 | 0.022 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.009 | 0.019 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.005 | 0.013 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.002 | 0.009 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.019 | 0.042 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.018 | 0.040 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.016 | 0.038 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.014 | 0.034 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.009 | 0.026 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.028 | 0.051 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.025 | 0.047 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.022 | 0.043 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.017 | 0.037 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.038 | 0.063 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.033 | 0.056 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.028 | 0.050 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.020 | 0.040 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.011 | 0.027 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.055 | 0.103 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.052 | 0.098 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.049 | 0.093 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.043 | 0.086 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.033 | 0.074 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.075 | 0.125 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.070 | 0.119 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.065 | 0.111 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.056 | 0.100 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.040 | 0.080 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.096 | 0.145 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.088 | 0.137 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.080 | 0.128 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.066 | 0.111 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.046 | 0.087 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.2.2

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 50 feet | | | Buffer Depth: 10 feet | | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.005 | 0.015 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.004 | 0.014 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.003 | 0.012 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.005 | 0.015 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.005 | 0.014 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.003 | 0.011 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.008 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.007 | 0.017 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.006 | 0.015 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.005 | 0.013 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.003 | 0.011 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.008 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.016 | 0.037 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.015 | 0.035 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.014 | 0.034 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.011 | 0.030 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.008 | 0.024 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.020 | 0.041 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.018 | 0.038 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.016 | 0.036 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.013 | 0.031 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.008 | 0.023 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.023 | 0.045 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.021 | 0.041 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.018 | 0.038 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.014 | 0.032 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.009 | 0.024 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.048 | 0.092 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.046 | 0.088 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.043 | 0.085 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.038 | 0.080 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.030 | 0.067 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.059 | 0.106 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.056 | 0.101 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.052 | 0.095 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.046 | 0.087 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.034 | 0.072 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.068 | 0.115 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.063 | 0.110 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.059 | 0.103 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.051 | 0.092 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.037 | 0.075 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.2.3

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 50 feet | | | Buffer Depth: 20 feet | | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.003 | 0.010 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.002 | 0.008 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.003 | 0.011 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.001 | 0.007 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.005 | 0.013 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.004 | 0.011 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.001 | 0.007 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.013 | 0.032 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.012 | 0.030 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.011 | 0.029 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.010 | 0.027 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.006 | 0.021 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.015 | 0.034 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.014 | 0.032 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.012 | 0.030 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.007 | 0.021 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.016 | 0.035 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.015 | 0.033 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.013 | 0.031 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.011 | 0.027 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.007 | 0.021 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.042 | 0.083 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.040 | 0.080 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.038 | 0.077 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.034 | 0.073 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.027 | 0.062 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.048 | 0.091 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.045 | 0.087 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.043 | 0.083 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.038 | 0.077 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.029 | 0.065 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.052 | 0.096 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.049 | 0.092 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.046 | 0.087 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.040 | 0.080 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.030 | 0.067 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.2.4**INFILTRATION TRENCH**

| Soil Infiltration Rate: Medium | | | Setback Distance: 50 feet | | | | Buffer Depth: 35 feet | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.003 | 0.009 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.002 | 0.009 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.008 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.006 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.003 | 0.009 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.006 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.011 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.003 | 0.009 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.002 | 0.009 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.006 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.010 | 0.027 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.009 | 0.025 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.008 | 0.024 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.018 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.010 | 0.027 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.010 | 0.026 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.009 | 0.024 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.018 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.011 | 0.027 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.009 | 0.024 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.008 | 0.022 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.018 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.034 | 0.073 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.033 | 0.071 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.031 | 0.068 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.028 | 0.064 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.022 | 0.055 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.037 | 0.075 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.035 | 0.072 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.033 | 0.070 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.029 | 0.066 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.023 | 0.056 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.039 | 0.078 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.036 | 0.074 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.034 | 0.071 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.030 | 0.067 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.024 | 0.056 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.3.1

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 35 feet | | | Buffer Depth: No Buffer | | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.009 | 0.020 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.007 | 0.018 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.006 | 0.017 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.004 | 0.014 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.002 | 0.010 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.012 | 0.024 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.010 | 0.020 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.008 | 0.018 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.005 | 0.013 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.002 | 0.009 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.017 | 0.029 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.013 | 0.023 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.009 | 0.020 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.005 | 0.013 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.002 | 0.009 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.024 | 0.049 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.021 | 0.043 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.019 | 0.041 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.015 | 0.035 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.009 | 0.026 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.033 | 0.059 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.029 | 0.052 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.025 | 0.047 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.019 | 0.039 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.010 | 0.027 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.043 | 0.069 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.036 | 0.061 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.031 | 0.053 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.022 | 0.042 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.011 | 0.027 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 0 | 0.066 | 0.117 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 0 | 0.061 | 0.110 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 0 | 0.057 | 0.103 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 0 | 0.050 | 0.093 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 0 | 0.037 | 0.077 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 0 | 0.086 | 0.137 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 0 | 0.079 | 0.129 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 0 | 0.072 | 0.120 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 0 | 0.061 | 0.106 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 0 | 0.043 | 0.084 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 0 | 0.107 | 0.156 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 0 | 0.096 | 0.144 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 0 | 0.086 | 0.134 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 0 | 0.070 | 0.115 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 0 | 0.048 | 0.089 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.3.2

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | Setback Distance: 35 feet | | | | Buffer Depth: 10 feet | | |
|--------------------------------|-------------------------------|---------------------------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.005 | 0.015 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.005 | 0.014 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.003 | 0.011 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.007 | 0.017 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.006 | 0.015 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.005 | 0.013 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.003 | 0.011 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.008 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.008 | 0.017 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.006 | 0.016 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.005 | 0.013 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.003 | 0.011 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.002 | 0.008 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.019 | 0.040 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.017 | 0.036 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.015 | 0.035 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.012 | 0.030 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.008 | 0.023 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.022 | 0.044 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.020 | 0.040 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.018 | 0.037 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.014 | 0.032 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.008 | 0.023 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.025 | 0.047 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.022 | 0.042 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.020 | 0.039 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.015 | 0.033 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.009 | 0.024 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 10 | 0.056 | 0.103 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 10 | 0.053 | 0.097 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 10 | 0.049 | 0.092 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 10 | 0.043 | 0.084 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 10 | 0.033 | 0.070 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 10 | 0.065 | 0.112 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 10 | 0.061 | 0.107 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 10 | 0.057 | 0.100 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 10 | 0.049 | 0.091 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 10 | 0.036 | 0.074 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 10 | 0.072 | 0.120 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 10 | 0.066 | 0.114 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 10 | 0.062 | 0.107 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 10 | 0.053 | 0.095 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 10 | 0.038 | 0.077 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.3.3

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 35 feet | | | Buffer Depth: 20 feet | | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.004 | 0.013 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.003 | 0.011 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.001 | 0.007 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.005 | 0.013 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.003 | 0.011 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.001 | 0.007 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.005 | 0.013 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.004 | 0.012 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.004 | 0.011 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.002 | 0.009 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.001 | 0.007 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.015 | 0.034 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.014 | 0.032 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.012 | 0.030 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.010 | 0.026 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.007 | 0.021 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.016 | 0.035 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.015 | 0.033 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.013 | 0.031 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.011 | 0.026 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.007 | 0.021 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.017 | 0.036 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.015 | 0.034 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.014 | 0.032 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.011 | 0.027 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.007 | 0.021 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 20 | 0.048 | 0.091 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 20 | 0.045 | 0.086 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 20 | 0.043 | 0.083 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 20 | 0.038 | 0.076 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 20 | 0.029 | 0.064 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 20 | 0.052 | 0.096 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 20 | 0.049 | 0.091 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 20 | 0.046 | 0.087 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 20 | 0.040 | 0.079 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 20 | 0.030 | 0.066 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 20 | 0.055 | 0.100 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 20 | 0.051 | 0.095 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 20 | 0.048 | 0.089 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 20 | 0.042 | 0.081 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 20 | 0.031 | 0.067 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 2.3.4

INFILTRATION TRENCH

| Soil Infiltration Rate: Medium | | | Setback Distance: 35 feet | | | Buffer Depth: 35 feet | | |
|--------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| Medium | 500 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.002 | 0.009 |
| Medium | 500 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.002 | 0.008 |
| Medium | 500 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 500 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.010 |
| Medium | 500 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.003 | 0.009 |
| Medium | 500 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.002 | 0.008 |
| Medium | 500 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 500 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.003 | 0.011 |
| Medium | 500 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.003 | 0.009 |
| Medium | 500 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.002 | 0.008 |
| Medium | 500 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.002 | 0.007 |
| Medium | 500 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.001 | 0.005 |
| Medium | 1,000 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.011 | 0.027 |
| Medium | 1,000 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.010 | 0.025 |
| Medium | 1,000 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.009 | 0.024 |
| Medium | 1,000 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.007 | 0.021 |
| Medium | 1,000 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.017 |
| Medium | 1,000 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.011 | 0.027 |
| Medium | 1,000 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.010 | 0.026 |
| Medium | 1,000 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.009 | 0.024 |
| Medium | 1,000 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.007 | 0.022 |
| Medium | 1,000 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.018 |
| Medium | 1,000 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.012 | 0.027 |
| Medium | 1,000 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.010 | 0.026 |
| Medium | 1,000 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.009 | 0.025 |
| Medium | 1,000 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.008 | 0.022 |
| Medium | 1,000 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.005 | 0.018 |
| Medium | 2,000 | <5% | 0.0 | 24 | Medium x 2 | 35 | 0.040 | 0.079 |
| Medium | 2,000 | <5% | 12.5 | 24 | Medium x 2 | 35 | 0.037 | 0.075 |
| Medium | 2,000 | <5% | 25.0 | 24 | Medium x 2 | 35 | 0.034 | 0.072 |
| Medium | 2,000 | <5% | 50.0 | 24 | Medium x 2 | 35 | 0.031 | 0.067 |
| Medium | 2,000 | <5% | 100.0 | 24 | Medium x 2 | 35 | 0.024 | 0.056 |
| Medium | 2,000 | 5-20% | 0.0 | 24 | Medium x 2 | 35 | 0.040 | 0.080 |
| Medium | 2,000 | 5-20% | 12.5 | 24 | Medium x 2 | 35 | 0.037 | 0.076 |
| Medium | 2,000 | 5-20% | 25.0 | 24 | Medium x 2 | 35 | 0.035 | 0.072 |
| Medium | 2,000 | 5-20% | 50.0 | 24 | Medium x 2 | 35 | 0.031 | 0.067 |
| Medium | 2,000 | 5-20% | 100.0 | 24 | Medium x 2 | 35 | 0.024 | 0.056 |
| Medium | 2,000 | >20% | 0.0 | 24 | Medium x 2 | 35 | 0.040 | 0.081 |
| Medium | 2,000 | >20% | 12.5 | 24 | Medium x 2 | 35 | 0.038 | 0.076 |
| Medium | 2,000 | >20% | 25.0 | 24 | Medium x 2 | 35 | 0.035 | 0.072 |
| Medium | 2,000 | >20% | 50.0 | 24 | Medium x 2 | 35 | 0.031 | 0.068 |
| Medium | 2,000 | >20% | 100.0 | 24 | Medium x 2 | 35 | 0.024 | 0.057 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.1.1

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 75 feet | | | Buffer Depth: No Buffer | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 0 | 0.001 | 0.003 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 0 | 0.001 | 0.003 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.002 | 0.006 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.002 | 0.006 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.001 | 0.005 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.001 | 0.003 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 0 | 0.005 | 0.016 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 0 | 0.004 | 0.014 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 0 | 0.004 | 0.012 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 0 | 0.003 | 0.009 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 0 | 0.001 | 0.005 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 0 | 0.003 | 0.013 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 0 | 0.003 | 0.012 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 0 | 0.003 | 0.012 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 0 | 0.002 | 0.010 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 0 | 0.002 | 0.008 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.010 | 0.030 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.009 | 0.029 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.009 | 0.027 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.007 | 0.024 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.005 | 0.018 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 0 | 0.025 | 0.054 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 0 | 0.022 | 0.050 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 0 | 0.019 | 0.046 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 0 | 0.015 | 0.039 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 0 | 0.009 | 0.027 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.1.2

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 75 feet | | | | Buffer Depth: 10 feet | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 10 | 0.002 | 0.006 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.003 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 10 | 0.002 | 0.010 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 10 | 0.002 | 0.010 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 10 | 0.002 | 0.009 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 10 | 0.002 | 0.009 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 10 | 0.002 | 0.007 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.006 | 0.020 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.005 | 0.019 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.005 | 0.018 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.004 | 0.016 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.003 | 0.013 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 10 | 0.011 | 0.031 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 10 | 0.010 | 0.029 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 10 | 0.009 | 0.028 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 10 | 0.008 | 0.024 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 10 | 0.005 | 0.018 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.1.3

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 75 feet | | | Buffer Depth: 20 feet | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 20 | 0.002 | 0.008 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 20 | 0.002 | 0.008 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 20 | 0.002 | 0.007 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 20 | 0.001 | 0.007 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 20 | 0.001 | 0.006 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.003 | 0.013 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.003 | 0.012 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.003 | 0.012 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.003 | 0.010 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.002 | 0.008 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 20 | 0.005 | 0.019 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 20 | 0.005 | 0.018 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 20 | 0.005 | 0.017 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 20 | 0.004 | 0.015 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 20 | 0.003 | 0.011 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.1.4

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 75 feet | | | | Buffer Depth: 35 feet | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 35 | 0.001 | 0.005 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 35 | 0.001 | 0.005 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 35 | 0.001 | 0.006 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.2.1

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 50 feet | | | Buffer Depth: No Buffer | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 0 | 0.002 | 0.006 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 0 | 0.001 | 0.005 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 0 | 0.001 | 0.004 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.003 | 0.011 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.003 | 0.010 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.002 | 0.009 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.002 | 0.007 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.001 | 0.004 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 0 | 0.009 | 0.023 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 0 | 0.007 | 0.020 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 0 | 0.006 | 0.017 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 0 | 0.004 | 0.012 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 0 | 0.002 | 0.006 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 0 | 0.007 | 0.022 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 0 | 0.006 | 0.021 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 0 | 0.006 | 0.020 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 0 | 0.005 | 0.018 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 0 | 0.004 | 0.014 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.018 | 0.045 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.016 | 0.042 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.014 | 0.038 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.012 | 0.033 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.007 | 0.024 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 0 | 0.036 | 0.070 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 0 | 0.032 | 0.063 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 0 | 0.027 | 0.057 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 0 | 0.021 | 0.046 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 0 | 0.012 | 0.032 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.2.2

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 50 feet | | | Buffer Depth: 10 feet | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 10 | 0.001 | 0.003 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 10 | 0.002 | 0.008 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 10 | 0.002 | 0.007 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 10 | 0.002 | 0.006 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 10 | 0.001 | 0.003 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 10 | 0.005 | 0.017 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 10 | 0.004 | 0.016 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 10 | 0.004 | 0.015 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 10 | 0.004 | 0.013 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 10 | 0.003 | 0.011 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.009 | 0.028 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.008 | 0.026 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.008 | 0.025 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.007 | 0.022 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.005 | 0.017 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 10 | 0.014 | 0.038 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 10 | 0.013 | 0.035 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 10 | 0.012 | 0.033 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 10 | 0.010 | 0.028 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 10 | 0.006 | 0.020 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.2.3

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 50 feet | | | Buffer Depth: 20 feet | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 20 | 0.003 | 0.012 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 20 | 0.003 | 0.011 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 20 | 0.003 | 0.011 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 20 | 0.002 | 0.010 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 20 | 0.002 | 0.008 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.005 | 0.018 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.005 | 0.017 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.004 | 0.016 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.004 | 0.014 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.003 | 0.011 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 20 | 0.007 | 0.022 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 20 | 0.006 | 0.021 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 20 | 0.006 | 0.020 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 20 | 0.005 | 0.017 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 20 | 0.004 | 0.013 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.2.4

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 50 feet | | | | Buffer Depth: 35 feet | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|---------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.001 | 0.006 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 35 | 0.003 | 0.010 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 35 | 0.002 | 0.010 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 35 | 0.002 | 0.008 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 35 | 0.002 | 0.007 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.3.1

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 35 feet | | | Buffer Depth: No Buffer | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-------------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.001 | 0.004 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.001 | 0.003 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.001 | 0.002 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.000 | 0.002 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 0 | 0.003 | 0.009 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 0 | 0.002 | 0.006 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 0 | 0.001 | 0.005 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 0 | 0.001 | 0.003 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 0 | 0.000 | 0.001 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 0 | 0.002 | 0.007 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 0 | 0.002 | 0.007 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 0 | 0.001 | 0.006 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 0 | 0.001 | 0.005 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 0 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.006 | 0.017 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.005 | 0.015 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.004 | 0.013 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.003 | 0.010 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.001 | 0.005 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 0 | 0.014 | 0.029 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 0 | 0.011 | 0.024 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 0 | 0.008 | 0.020 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 0 | 0.005 | 0.014 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 0 | 0.002 | 0.007 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 0 | 0.012 | 0.034 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 0 | 0.011 | 0.032 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 0 | 0.010 | 0.030 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 0 | 0.008 | 0.025 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 0 | 0.005 | 0.019 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 0 | 0.027 | 0.056 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 0 | 0.024 | 0.052 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 0 | 0.021 | 0.048 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 0 | 0.016 | 0.040 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 0 | 0.010 | 0.028 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 0 | 0.049 | 0.088 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 0 | 0.041 | 0.077 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 0 | 0.035 | 0.068 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 0 | 0.025 | 0.054 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 0 | 0.013 | 0.035 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.3.2

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 35 feet | | | Buffer Depth: 10 feet | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 10 | 0.000 | 0.002 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.001 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 10 | 0.001 | 0.004 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 10 | 0.001 | 0.003 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 10 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.002 | 0.007 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.002 | 0.006 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.002 | 0.006 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.001 | 0.005 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.001 | 0.003 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 10 | 0.003 | 0.010 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 10 | 0.002 | 0.009 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 10 | 0.002 | 0.008 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 10 | 0.002 | 0.006 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 10 | 0.001 | 0.004 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 10 | 0.008 | 0.024 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 10 | 0.007 | 0.023 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 10 | 0.006 | 0.022 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 10 | 0.005 | 0.019 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 10 | 0.004 | 0.015 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 10 | 0.013 | 0.034 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 10 | 0.011 | 0.032 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 10 | 0.010 | 0.030 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 10 | 0.009 | 0.026 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 10 | 0.006 | 0.019 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 10 | 0.017 | 0.042 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 10 | 0.015 | 0.039 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 10 | 0.014 | 0.037 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 10 | 0.011 | 0.031 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 10 | 0.007 | 0.022 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.3.3

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 35 feet | | | Buffer Depth: 20 feet | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.001 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.000 | 0.003 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 20 | 0.001 | 0.004 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 20 | 0.001 | 0.004 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 20 | 0.001 | 0.003 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 20 | 0.000 | 0.002 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 20 | 0.005 | 0.018 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 20 | 0.005 | 0.017 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 20 | 0.004 | 0.016 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 20 | 0.004 | 0.014 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 20 | 0.003 | 0.011 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 20 | 0.007 | 0.022 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 20 | 0.006 | 0.020 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 20 | 0.006 | 0.019 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 20 | 0.005 | 0.017 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 20 | 0.003 | 0.013 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 20 | 0.008 | 0.024 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 20 | 0.007 | 0.023 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 20 | 0.007 | 0.022 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 20 | 0.006 | 0.019 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 20 | 0.004 | 0.015 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

Table T 3.3.4

INFILTRATION TRENCH

| Soil Infiltration Rate: High | | | Setback Distance: 35 feet | | | Buffer Depth: 35 feet | | |
|------------------------------|-------------------------------|-------|--|-----------------------|--------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Infiltration Rate | Impervious Area (square feet) | Slope | Infiltration Trench Area (square feet) | Trench Depth (inches) | Buffer Infiltration Rate | Buffer Depth (feet) | Average Annual Phosphorus (pound/yr) | Maximum Annual Phosphorus (pound/yr) |
| High | 500 | <5% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | <5% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 500 | >20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.000 |
| High | 1,000 | <5% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | <5% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.001 |
| High | 1,000 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 0.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 12.5 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 25.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 50.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 1,000 | >20% | 100.0 | 24 | High x 2 | 35 | 0.000 | 0.002 |
| High | 2,000 | <5% | 0.0 | 24 | High x 2 | 35 | 0.003 | 0.011 |
| High | 2,000 | <5% | 12.5 | 24 | High x 2 | 35 | 0.003 | 0.010 |
| High | 2,000 | <5% | 25.0 | 24 | High x 2 | 35 | 0.002 | 0.010 |
| High | 2,000 | <5% | 50.0 | 24 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | <5% | 100.0 | 24 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | 5-20% | 0.0 | 24 | High x 2 | 35 | 0.003 | 0.011 |
| High | 2,000 | 5-20% | 12.5 | 24 | High x 2 | 35 | 0.003 | 0.010 |
| High | 2,000 | 5-20% | 25.0 | 24 | High x 2 | 35 | 0.002 | 0.010 |
| High | 2,000 | 5-20% | 50.0 | 24 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | 5-20% | 100.0 | 24 | High x 2 | 35 | 0.002 | 0.007 |
| High | 2,000 | >20% | 0.0 | 24 | High x 2 | 35 | 0.003 | 0.011 |
| High | 2,000 | >20% | 12.5 | 24 | High x 2 | 35 | 0.003 | 0.011 |
| High | 2,000 | >20% | 25.0 | 24 | High x 2 | 35 | 0.003 | 0.010 |
| High | 2,000 | >20% | 50.0 | 24 | High x 2 | 35 | 0.002 | 0.009 |
| High | 2,000 | >20% | 100.0 | 24 | High x 2 | 35 | 0.002 | 0.007 |

Note: Same soil in infiltration trench and setback, Duluth 1960-1995

APPENDIX B. MODEL INPUTS FOR BASE SIMULATION

The parameter values used in the base simulation described in Appendix A are shown in Table B1.

Table B1. Parameter Values used in the Base Simulation

| Model Object | Parameter | Value | Notes |
|---|--------------------|--|---|
| Impervious Surface | | | |
| | % Slope | 10% | Assumed, results not sensitive to this value |
| | Width | 50 ft | Assumed, results not sensitive to this value |
| | % Imperv | 100 | Modeling only an impervious surface |
| | Dstore-Imperv | 0.00 | Conservative assumption |
| | %Zero-Imperv | 100 | Another way to implement no depression storage |
| | N-Imperv | 0.01 | SWMM suggested value for little resistance to flow on surface |
| | Snow Pack | 32 degree base temperature | Default values |
| Setback Remainder & Protected Vegetation Area in Setback | | | |
| | Width | 2.5 to 10 feet | Value based on slope: >20%: 2.5 ft 5-20%: 5 ft <5%: 10 ft |
| | Slope | 5%, 10% or 30% | <5%: 5 5-20%: 10 >20%: 30 |
| | % Imperv | 0 | |
| | N-Perv | 0.15 | Suggested for short, prairie grass (EPA SWMM reference) |
| | Dstore-Perv | 0.1 | Suggested for lawns (EPA SWMM reference) |
| | Infiltration Model | Modified Green-Ampt | |
| | Conductivity | High: 1.8 in/hr Medium: 0.25 in/hr Low: 0.05 in/hr | Based on other Wisconsin stormwater management tools (see text) |
| | Suction head | 1.8 in/hr: 3 in 0.25 in/hr: 6 in 0.05 in/hr: 8 in | Approximated based on SWMM Soil Characteristics Table |
| | Initial deficit | 1.8 in/hr: 0.3 0.25 in/hr: 0.2 0.05 in/hr: 0.15 | Approximated based on SWMM Soil Characteristics Table |
| | Snow Pack | Same as impervious surface | |
| Buffer | | | |
| | Width | 10 feet | Assuming no channelized flow through buffer |
| | Slope | 5%, 10% or 30% | Use same slope as the remainder of the setback |
| | N-Perv | 0.3 | Assuming increased resistance in the buffer, using value for light underbrush |
| | Dstore-Perv | 0.2 | Assuming increased storage, using value suggested in SWMM for pasture |
| | Infiltration Model | Modified Green-Ampt | |
| | Conductivity | Double the value used in the setback | Assuming some improvement of conductivity in the buffer and limited future compaction |
| | Suction Head | Same as setback | |
| | Initial Deficit | Same as setback | |
| | Snow Pack | Same as impervious surface | |

Table B1 continued. Parameter Values used in the Base Simulation

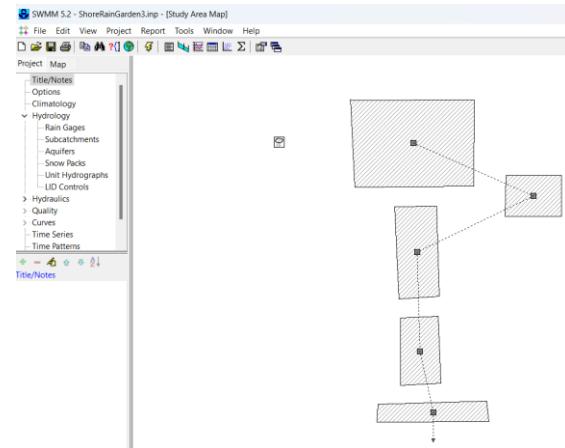
| Model Object | Parameter | Value | Notes |
|----------------------------|----------------------------|--|--|
| Raingarden | | | |
| | Area | 0 to 350 ft ² in tabled solutions | In example models, the raingarden occupies the entire subcatchment "Practice" so area of the unit is the area of that subcatchment. |
| | Berm Height | 8 inches | The depth of water in the raingarden when full |
| | Vegetation Volume Fraction | 0 | Assumes the vegetation volume will not significantly affect the water volume |
| | Surface Roughness | 0 | SWMM Guidance |
| | Surface Slope | 0 | SWMM Guidance |
| | Soil Thickness | 6 in | Relatively small amount of water storage assumed below berm depth |
| | Porosity | 0.4 | Assumed as value for all soil types |
| | Field Capacity | 0.2 | Assumed as value for all soil types |
| | Wilting Point | 0.1 | Assumed as value for all soil types |
| | Conductivity | High: 1.8 in/hr Medium: 0.25 in/hr Low: 0.05 in/hr | Same values as setback soil used in raingarden for the tabled solutions |
| | Conductivity Slope | 30, 40, 50 for High, Medium, Low infiltration | Based on SWMM User Guide |
| | Suction Head | 3 in, 6 in, 8 in for High, Medium, Low | Based on SWMM User Guide |
| Infiltration Trench | | | |
| | Area | 0-100 ft ² in tabled solutions | In the example SWMM file, the trench occupies the entire "Practice" subcatchment and area of the subcatchment is the area of the trench. |
| | Berm Height | 0 | |
| | Vegetation Volume | 0 | |
| | Surface Roughness | 0 | |
| | Surface Slope | 0 | |
| | Storage Thickness | 24 inches | |
| | Void Ratio | 0.4 | |
| | Seepage Rate | High: 1.8 in/hr Medium: 0.25 in/hr Low: 0.05 in/hr | Same values as setback soil used in table solutions |
| | Clogging Factor | 0 | |

APPENDIX C. MODEL FILES AVAILABLE

Shoreland Development Runoff Phosphorus Model Files

Input File. SWMM uses an input file with a suffix “.inp” that contains the information about impervious surfaces, runoff pathway, rainfall and temperature files.

The SWMM input file “ShoreRG3.inp” is printed below and the view from the SWMM GUI is shown on the right. This input file describes an impervious area directed to raingarden followed by runoff corridor pathway with a buffer adjacent to the lake. The model layout was used for the raingarden tables in the report. Users can also read this into SWMM and adjust the sizes of the areas and soil properties. Note that the file version shown below uses Green Bay precipitation and temperature files but those can be changed by the user to other locations.



Rainfall Files. The shoreland impact and mitigation model was developed using hourly rainfall. A set of rainfall files was created from previously developed precipitation files provided by the Wisconsin DNR for stormwater runoff modeling (<https://dnr.wisconsin.gov/topic/Stormwater/standards/slamm.html>).

The rainfall files provide hourly rainfall from January 1, 1960 to December 31, 1995. They were converted to the SWMM file format from the format supplied in the WDNR download (P8 format).

The files are:

DuluthP8PCP.txt (Duluth)
GBP8PCP.txt (Green Bay)
MSPP8PCP.txt (Minneapolis)
MDSNP8PCP.txt (Madison)

Temperature Files. The SWMM model uses the minimum and maximum air temperature and then fits a curve to simulate temperature throughout the day. Daily air temperature files were developed by downloading air temperature as “Daily Summaries” as GHCN-Daily Text from the NOAA National Centers for Environmental Information. The EPA SWMM model reads these files directly.

The files are:

DuluthMinMax19602019.txt
GBMinMax19602019.txt
MSPMinMax19502019.txt
MDSNMinMax19602019.txt

Coming Soon—I can get these files on an internet site where these files are available for download.

Appendix C Continued.

SWMM File used for Base Simulation

```

[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option      Value
FLOW_UNITS      CFS
INFILTRATION    MODIFIED_GREEN_AMPT
FLOW_ROUTING    KINWAVE
LINK_OFFSETS    DEPTH
MIN_SLOPE       0
ALLOW_PONDING   NO
SKIP_STEADY_STATE NO

START_DATE      01/01/1960
START_TIME       00:00:00
REPORT_START_DATE 01/01/1960
REPORT_START_TIME 00:00:00
END_DATE        12/31/1995
END_TIME         00:00:00
SWEEP_START     01/01
SWEEP_END       12/31
DRY_DAYS         0
REPORT_STEP      00:10:00
WET_STEP         00:01:00
DRY_STEP         01:00:00
ROUTING_STEP    0:01:00
RULE_STEP        00:00:00

INERTIAL_DAMPING PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP     0.75
LENGTHENING_STEP 0
MIN_SURFAREA     12.566
MAX_TRIALS       8
HEAD_TOLERANCE   0.005
SYS_FLOW_TOL     5
LAT_FLOW_TOL     5
MINIMUM_STEP     0.5
THREADS          1

[EVAPORATION]
;;Data Source Parameters
;-----
TEMPERATURE
DRY_ONLY        YES

[TEMPERATURE]
;;Data Element Values
FILE           "GBMinMax19602019.txt" *      F
WINDSPEED FILE
SNOWMELT        34 0.5 0.6 1000 45 0.0
ADC IMPERVIOUS  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
ADC PERVIOUS   1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

[RAINGAGES]
;;Name      Format Interval SCF      Source
;-----
1          INTENSITY 1:00    1      FILE      "P8Files\GBP8PCP.txt" GB6095      IN

[SUBCATCHMENTS]
;;Name      Rain Gage      Outlet      Area      %Imperv      Width      %Slope      CurbLen      SnowPack
;-----
Impervious  1            Practice    0.0459136822773186 100      50          10          0          Snow_1
Practice    1            Setback_Remainder 0.00803489439853076 0      10          0          0
Setback_Remainder 1          Protected_Veg 0.00229568411386593 0      2.5          10          0          Snow_1
Protected_Veg 1            Buffer      0.00200814967860422 0      2.5          10          0          Snow_1
Buffer      1            2            1.14784205693297e-06 0      5            20          0          Snow_1

[SUBAREAS]
;;Subcatchment N-Imperv  N-Perv      S-Imperv      S-Perv      PctZero      RouteTo      PctRouted
;-----
Impervious  0.01        0.1        0.00        0.05        100          OUTLET
Practice    0.01        0.1        0.00        0.1        100          OUTLET
Setback_Remainder 0.01    0.15       0.00        0.1        100          OUTLET
Protected_Veg 0.01        0.15       0.00        0.1        100          OUTLET
Buffer      0.01        0.3        0.00        0.2        25           OUTLET

[INFILTRATION]
;;Subcatchment Param1    Param2      Param3      Param4      Param5
;-----
Impervious  3.5         0.5        0.25        7          0
Practice    3.5         0.05       0.25        7          0
Setback_Remainder 8          0.05       0.26        7          0
Protected_Veg 8          0.05       0.26        7          0
Buffer      8          0.1        0.26        7          0

[LID_CONTROLS]
;;Name      Type/Layer Parameters
;-----
raingrd    RG
raingrd    SURFACE    8          0.1        0.1        1          5
raingrd    SOIL        4          0.5        0.2        0.1        0.05      10          3.5
raingrd    STORAGE     0          0.75       0.5        0          NO

```

```

Trench          IT
Trench        SURFACE   0       0       0       0       5
Trench        STORAGE    24      0.4     0.5     0      NO
Trench        DRAIN      0       0.5     6       6      0       0

[LID_USAGE]
;;Subcatchment LID Process      Number  Area       Width     InitSat  FromImp  ToPerv   RptFile           DrainTo
FromPerv
;-----
Practice      rainngrd        1      350.00   0       0       100     0       *           *
100

[SNOWPACKS]
;;Name      Surface  Parameters
;;
Snow_1        PLOWABLE  0.001    0.001    32.0     0.10    0.00    0.00    0.0
Snow_1        IMPERVIOUS 0.001    0.001    32.0     0.10    0.00    0.00    0.00
Snow_1        PERVIOUS   0.001    0.001    32.0     0.10    0.00    0.00    0.00
Snow_1        REMOVAL    1.0      0.0      0.0      0.0     0.00    0.00    0.00

[OUTFALLS]
;;Name      Elevation Type      Stage Data      Gated   Route To
;;
2            0         FREE             NO

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -2101.264 -176.140 10000.000 10000.000
Units      None

[COORDINATES]
;;Node      X-Coord      Y-Coord
;;
2          2124.811    369.346

[VERTICES]
;;Link      X-Coord      Y-Coord
;;
;-----

[Polygons]
;;Subcatchment X-Coord      Y-Coord
;;
Impervious   62.837     8886.894
Impervious   62.837     8886.894
Impervious   3150.808   8904.847
Impervious   3132.855   6732.496
Impervious   152.603    6714.542
Impervious   44.883     8922.801
Practice     3949.368   7009.231
Practice     5341.299   7009.231
Practice     5349.127   5985.037
Practice     3927.681   5985.037
Setback_Remainder 2200.050 6238.026
Setback_Remainder 2275.290 3980.841
Setback_Remainder 1259.557 3905.602
Setback_Remainder 1146.697 6219.216
Protected_Veg 2237.670 3472.975
Protected_Veg 2312.909 1798.896
Protected_Veg 1297.176 1742.467
Protected_Veg 1297.176 3435.355
Buffer       3460.311 1347.460
Buffer       3516.741 839.593
Buffer       695.260 820.783
Buffer       732.880 1272.220

[SYMBOLS]
;;Gage      X-Coord      Y-Coord
;;
1          -1732.496  7827.648

```

APPENDIX D. PRELIMINARY REGIONAL MODEL COMPARISON

Appendix E User's Guide to EPA SWMM for this Shoreland Impact Evaluation Approach

This section provides a step-by-step demonstration of using the EPA SWMM model for the simulations in this report. The SWMM model can be downloaded from the USEPA SWMM page and installed on a computer. When you open the model, you will get the graphical user interface shown in Figure A1. This interface allows you to develop a model by dragging objects onto the model window and then connecting them by editing the details for each object.

Coming Soon... how to set up a model in SWMM and run it

Appendix F Python Code used for the Repeated Simulations in the Baseline Model Tables

A program to cycle through a series of SWMM simulations with changes to input parameters was developed in python.

The files shown here will be available on the project web page soon!

A portion of the “InputSheet” spreadsheet is shown here. Each line provides the parameter values for a simulation.

| Index | Sim | impft2 | impacre | rgft2 | rgacre | rgdepth | rginfil | slope | setremwide | setremlong | setremacre | setremslope | setreminfil | setremsuh | setremdef | pi |
|-------|-----------------|--------|----------|-------|----------|---------|-----------|-------|------------|-------------|------------|-------------|-------------|-----------|-----------|----|
| 0 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 1.8 low | 10 | 40 | 0.009182736 | 5 | 1.8 | 3 | 0.3 | | |
| 1 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 1.8 med | 5 | 40 | 0.004591368 | 10 | 1.8 | 3 | 0.3 | | |
| 2 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 1.8 high | 2.5 | 40 | 0.002295684 | 30 | 1.8 | 3 | 0.3 | | |
| 3 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 0.25 low | 10 | 40 | 0.009182736 | 5 | 0.25 | 6 | 0.2 | | |
| 4 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 0.25 med | 5 | 40 | 0.004591368 | 10 | 0.25 | 6 | 0.2 | | |
| 5 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 0.25 high | 2.5 | 40 | 0.002295684 | 30 | 0.25 | 6 | 0.2 | | |
| 6 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 0.05 low | 10 | 40 | 0.009182736 | 5 | 0.05 | 8 | 0.15 | | |
| 7 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 0.05 med | 5 | 40 | 0.004591368 | 10 | 0.05 | 8 | 0.15 | | |
| 8 | 1000_Raingarden | 1000 | 0.022957 | 0.01 | 2.3E-07 | 8 | 0.05 high | 2.5 | 40 | 0.002295684 | 30 | 0.05 | 8 | 0.15 | | |
| 9 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 1.8 low | 10 | 40 | 0.009182736 | 5 | 1.8 | 3 | 0.3 | | |
| 10 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 1.8 med | 5 | 40 | 0.004591368 | 10 | 1.8 | 3 | 0.3 | | |
| 11 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 1.8 high | 2.5 | 40 | 0.002295684 | 30 | 1.8 | 3 | 0.3 | | |
| 12 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 0.25 low | 10 | 40 | 0.009182736 | 5 | 0.25 | 6 | 0.2 | | |
| 13 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 0.25 med | 5 | 40 | 0.004591368 | 10 | 0.25 | 6 | 0.2 | | |
| 14 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 0.25 high | 2.5 | 40 | 0.002295684 | 30 | 0.25 | 6 | 0.2 | | |
| 15 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 0.05 low | 10 | 40 | 0.009182736 | 5 | 0.05 | 8 | 0.15 | | |
| 16 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 0.05 med | 5 | 40 | 0.004591368 | 10 | 0.05 | 8 | 0.15 | | |
| 17 | 1000_Raingarden | 1000 | 0.022957 | 50 | 0.001148 | 8 | 0.05 high | 2.5 | 40 | 0.002295684 | 30 | 0.05 | 8 | 0.15 | | |
| 18 | 1000_Raingarden | 1000 | 0.022957 | 100 | 0.002296 | 8 | 1.8 low | 10 | 40 | 0.009182736 | 5 | 1.8 | 3 | 0.3 | | |
| 19 | 1000_Raingarden | 1000 | 0.022957 | 100 | 0.002296 | 8 | 1.8 med | 5 | 40 | 0.004591368 | 10 | 1.8 | 3 | 0.3 | | |
| 20 | 1000_Raingarden | 1000 | 0.022957 | 100 | 0.002296 | 8 | 1.8 high | 2.5 | 40 | 0.002295684 | 30 | 1.8 | 3 | 0.3 | | |
| 21 | 1000_Raingarden | 1000 | 0.022957 | 100 | 0.002296 | 8 | 0.25 low | 10 | 40 | 0.009182736 | 5 | 0.25 | 6 | 0.2 | | |
| 22 | 1000_Raingarden | 1000 | 0.022957 | 100 | 0.002296 | 8 | 0.25 med | 5 | 40 | 0.004591368 | 10 | 0.25 | 6 | 0.2 | | |
| 23 | 1000_Raingarden | 1000 | 0.022957 | 100 | 0.002296 | 8 | 0.25 high | 2.5 | 40 | 0.002295684 | 30 | 0.25 | 6 | 0.2 | | |

The program uses functions that rewrite the SWMM run file using values obtained from the spreadsheet. For example, for the rain garden simulations:

```

def write_RainGarden (inputfile,indexer):
    inputfile.SUBCATCHMENTS['Impervious'].area = simpar['impacre'].loc[indexer]
    inputfile.SUBCATCHMENTS['Practice'].area = simpar['rgacre'].loc[indexer]
    inputfile.SUBCATCHMENTS['Setback_Remainder'].area = simpar['setremacre'].loc[indexer]
    inputfile.SUBCATCHMENTS['Protected_Veg'].area = simpar['protvegacre'].loc[indexer]
    inputfile.SUBCATCHMENTS['Buffer'].area = simpar['buffacre'].loc[indexer]

    inputfile.SUBCATCHMENTS['Setback_Remainder'].width = simpar['setremwide'].loc[indexer]
    inputfile.SUBCATCHMENTS['Protected_Veg'].width = simpar['protvegwde'].loc[indexer]
    inputfile.SUBCATCHMENTS['Buffer'].width = simpar['buffwde'].loc[indexer]

    inputfile.SUBCATCHMENTS['Setback_Remainder'].slope = simpar['setremslope'].loc[indexer]
    inputfile.SUBCATCHMENTS['Protected_Veg'].slope = simpar['protvegslope'].loc[indexer]
    inputfile.SUBCATCHMENTS['Buffer'].slope = simpar['buffslope'].loc[indexer]

    inputfile.INFILTRATION['Setback_Remainder'].suction_head = simpar['setremsuh'].loc[indexer]
    inputfile.INFILTRATION['Setback_Remainder'].hydraulic_conductivity = simpar['setreminfil'].loc[indexer]
    inputfile.INFILTRATION['Setback_Remainder'].moisture_deficit_initial = simpar['setremdef'].loc[indexer]

    inputfile.INFILTRATION['Protected_Veg'].suction_head = simpar['protvegsuh'].loc[indexer]
    inputfile.INFILTRATION['Protected_Veg'].hydraulic_conductivity = simpar['protveginfil'].loc[indexer]
    inputfile.INFILTRATION['Protected_Veg'].moisture_deficit_initial = simpar['protvegdef'].loc[indexer]

    inputfile.INFILTRATION['Buffer'].suction_head = simpar['buffsuh'].loc[indexer]
    inputfile.INFILTRATION['Buffer'].hydraulic_conductivity = simpar['buffinfil'].loc[indexer]
    inputfile.INFILTRATION['Buffer'].moisture_deficit_initial = simpar['buffdef'].loc[indexer]

    inputfile.LID_CONTROLS['raingrd'].layer_dict['SURFACE'].StorHt = simpar['rgdepth'].loc[indexer]
    inputfile.LID_CONTROLS['raingrd'].layer_dict['SOIL'].Ksat = simpar['rginfil'].loc[indexer]

    inputfile.LID_USAGE['Practice','raingrd'].area = simpar['rgacre'].loc[indexer]*43560

return inputfile

```

The program makes the changes to the SWMM run file, runs SWMM and then performs calculations on the output file to obtain the annual average runoff volume. The results are summarized in an output ".csv" file.

The program:

```
import os
from swmm_api import read_inp_file, swmm5_run
from swmm_api import read_out_file
#from pyswmm import Subcatchments, Simulation, Output
from datetime import datetime
from dateutil import relativedelta
from math import fsum
import pandas as pd
#from swmm_api.input_file import section_labels
from swmm_api import read_rpt_file, SwmmReport
os.chdir("C:/SWMM/")

#Read in the starting SWMM input file
#Two input files were developed: a raingarden file and an infiltration trench file
inp = read_inp_file("C:\SWMM\ShoreRG3.inp")
#used ShoreTrench3 for all except the Raingarden
#inp = read_inp_file("C:\SWMM\ShoreTrench3.inp")

#determine the time period in the file for calculations of average year
firstday = inp.OPTIONS.get_start()
lastday = inp.OPTIONS.get_end()
runlength = (lastday-firstday).days/365.25
print("start time ",firstday)
print("end time ",lastday)
print("run length ",runlength, " in years")

#determine reporting period to properly decipher the output file
rptmin = inp.OPTIONS['REPORT_STEP'].minute
rpthour = inp.OPTIONS['REPORT_STEP'].hour
rptsec = inp.OPTIONS['REPORT_STEP'].second
rptstep = rptmin + rpthour*60 + rptsec/60
print('report step ', rptstep, ' in minutes')

#some printouts just to verify the correct starting input file read
print("Buffer Slope is! ", inp.SUBCATCHMENTS['Buffer'].slope)
print("sub attributes ", inp.SUBCATCHMENTS['Buffer'].attributes)
print("sub values ", inp.SUBCATCHMENTS['Buffer'].values)

#Rewrite input file and run it as a check
inp.write_file("c:/SWMM/newinput3.inp")
# now run
# suggest you set the drive with os.chdir (see above)
# and not include c:/SWMM in the swmm5_run inp path as it seems to confuse the climate file read!
# progress bar in this call otherwise can track in command prompt window
swmm5_run("newinput3.inp", swmm_lib_path="C:/Program Files/EPA SWMM 5.2.4 (64-bit)/runswmm.exe", progress_size=100)
#read the output file
out = read_out_file('newinput3.out') # type: swmm_api.SwmmOut
#convert to dataframe
df = out.to_frame() # type: pandas.DataFrame
# our model uses node 2 as outfall node so sum output there
Total = df[['node', '2', 'total_inflow']].sum()
print("Starting Input File pre-run Total Runoff in Mill Gal ",Total*rptstep*60*7.481/1000000)
# compare results to the summary report... they should be very close when using small reporting steps (10 minutes for example)
rpt = read_rpt_file('newinput3.rpt') # type: swmm_api.SwmmReport
subcatch_rpt = rpt.subcatchment_runoff_summary
ro = subcatch_rpt['Total_Runoff_10^6 gal']
print('Total Runoff at Buffer from the Summary Report ', ro.loc['Buffer'])

#get the input for multiple runs
#we are using an excel spreadsheet with different worksheets for the different simulation types
#simpar = pd.read_excel('C:\SWMM\InputSheet.xlsx',sheet_name="DistPervious")
simpar = pd.read_excel('C:\SWMM\InputSheet.xlsx',sheet_name="Raingarden")
#simpar = pd.read_excel('C:\SWMM\InputSheet.xlsx',sheet_name="Trench")
#simpar = pd.read_excel('C:\SWMM\InputSheet.xlsx',sheet_name="Buffer")
```

```

#helper rows here are useful if you want to see all the column names in the output
#my_list = list(simpar) #get column names
#print (my_list) #print column names
#to select column and then row and can use this as a check
#print(simpar['buffacre'].loc[0])
#print('trench stuff')
#print(inp.LID_CONTROLS['Trench'].layer_dict['STORAGE'])

#add columns that will be used to capture results
simpar['FlowMG'] = pd.Series(dtype='float') #output from summary file
simpar['MGsum'] = pd.Series(dtype='float') #calculated sum should match FlowMG
simpar['AvgMG'] = pd.Series(dtype='float') #annualized average by year in MG
simpar['MaxYearMG'] = pd.Series(dtype='float') #max year in the series in MG

#note python flags assigning the result back to the simpar dataframe
#this prevents the warning from printing as the method seems to work fine
pd.set_option('mode.chained_assignment',None)

#loop through the input file worksheet with a SWMM run for each row defined in the range
#note the python upper in the range is not run so add that extra row
for x in range (0, 1):
    #NEED to pick the correct function for rewriting the file (for now, may be able to generalize this)
    # write_Buffer(inp,x)
    # write_DisturbedPervious(inp,x)
    write_RainGarden(inp,x)
    # write_Trench(inp,x)
    #do a few check printouts
    print("Buffer Slope is ", inp.SUBCATCHMENTS['Buffer'].slope)
    print("other stuff ", inp.SUBCATCHMENTS['Buffer'].attributes)
    #after making the changes, rewrite the input file
    inp.write_file("c:/SWMM/newinput3.inp")
    #then run it
    #do not include c:/SWMM in the inp path or it messes up the climate file read!
    swmm5_run("newinput3.inp", swmm_lib_path="C:/Program Files/EPA SWMM 5.2.4 (64-bit)/runswmm.exe", progress_size=100)
    out = read_out_file('newinput3.out') # type: swmm_api.SwmmOut
    df = out.to_frame() # type: pandas.DataFrame
    Total = df[['node', '2', 'total_inflow']].sum()
    #use reporting step in the multiplier here!
    print("Index Number ",x,"Total Runoff in Mill Gal ",Total*rptstep*60*7.48/1000000)
    simpar['MGsum'].loc[x]=Total*rptstep*60*7.48/1000000
    #need to put years of simulation in denominator
    simpar['AvgMG'].loc[x]=Total*rptstep*60*7.48/(1000000*runlength)
    dfout = out.get_part('node', '2', 'total_inflow').to_frame()
    yearsum = dfout.groupby([dfout.index.year]).sum()*rptstep*60*7.48/1000000
    maxyear = yearsum['node/2/total_inflow'].max()
    simpar['MaxYearMG'].loc[x]=maxyear

    rpt = read_rpt_file('newinput3.rpt') # type: swmm_api.SwmmReport
    subcatch_rpt = rpt.subcatchment_runoff_summary
    ro = subcatch_rpt['Total_Runoff_10^6 gal']
    print('Total Runoff at Buffer from Summary Report ', ro.loc['Buffer'])
    simpar['FlowMG'].loc[x]=ro.loc['Buffer']
    #repeating AvgMG calc for printout here
    print('Average MG per year calculated ', Total*rptstep*60*7.48/(1000000*runlength))

#after the loop, print out the whole table as a csv
#note this will fail if you have that csv file open in excel
simpar.to_csv('C:\\SWMM\\SWMOut.csv')

```

Results from the SWMMout.csv file are used with the R package “flextable” to generate the tables in the report.

APPENDIX G. EXPERIMENTAL EXAMINATION OF THE SWMM APPROACH TO PERVIOUS AREA DISCONNECTION MODELING

The EPA SWMM model can be used to simulate the infiltration of impervious surface runoff by directing it to a pervious area. This approach can be simulated using two SWMM “subcatchments” in series described in the EPA SWMM Hydrology Manual (EPA, 2016, page 59). The EPA SWMM model simulates runoff from a subcatchment by accounting for water entering (runoff from an upstream subcatchment, rainfall and snowmelt) and water leaving (infiltration, evaporation and runoff) to track the depth of water on the subcatchment. If that depth is greater than the depression storage for that subcatchment, runoff is calculated using Manning’s equation across the width of the subcatchment for that portion of the water depth above the depression storage depth. This modeling approach is described as a “nonlinear reservoir” as it does not track the movement of water as it moves through the pervious area but simulates it as a depth across the entire pervious area that changes with time. More details are provided in the EPA SWMM Hydrology Manual (EPA, 2016).

To experimentally evaluate how the SWMM model simulates the direction of impervious surface runoff to a pervious area, the model was used to simulate the field experiments of Foster (2008). Those experiments directed water from a downspout to a channel established with metal sheeting on lawns near a lake as shown in Figure 1. A constant runoff rate was directed into the downspout during the experiment and the rate that water exited the channel was measured over time. More details are available in Foster (2008).

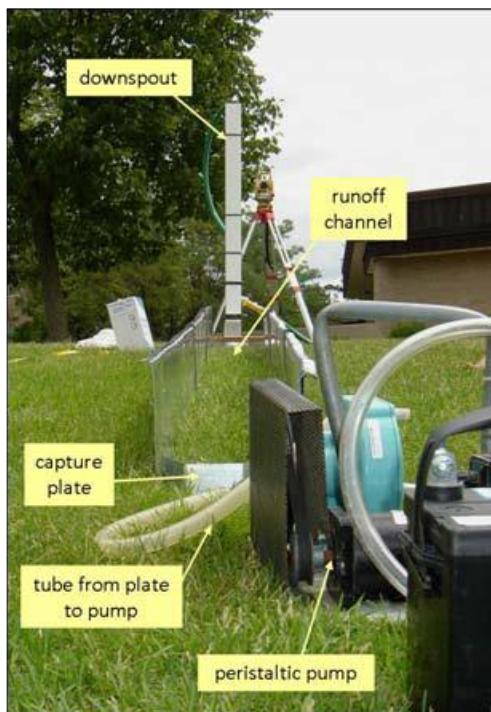


Figure 1. Experimental approach used by Foster (2007) to measure the movement of runoff across pervious shoreland areas (photograph adapted from Foster, 2008).

A SWMM model to model the Foster (2008) experiments was configured as two subcatchments in series. Uniform flow onto the pervious second subcatchment was simulated with a constant rainfall rate onto an impervious first

subcatchment that was wide and short. Runoff depth and impervious area size was calculated to match the runoff to the second subcatchment that matched the flow rate used in the experiments.

Experimental measurements and SWMM modeled outflow are compared in Figures 2 and 3 for several simulations described in Foster (2008). The model reasonably simulated the delay in the appearance of runoff arising from infiltration and depression storage. The results show that the infiltration rate is an important control and varied in the two sites shown here.

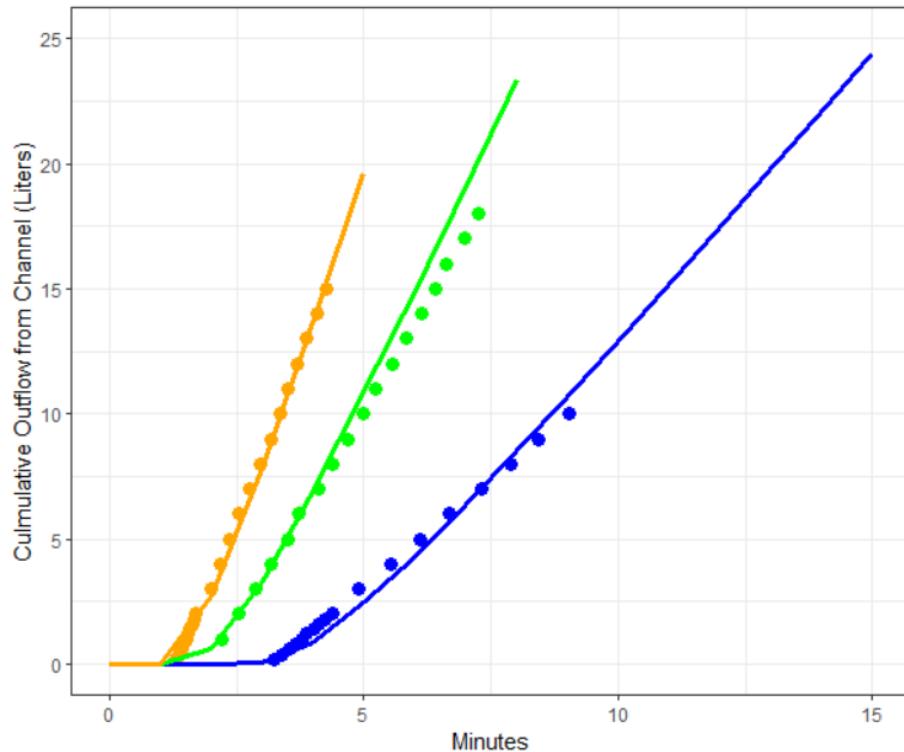


Figure 2. Results from Foster (2008) Site 3C (9% slope) showing the measured outflow volume (circles) with modeled outflow volume (lines) for three different flow rates (3 liter/min: orange; 5 liter/min: green and 7 liter/min: blue). Trial and error fit to the data using $K_{sat} = 1.5 \text{ in/hr}$, Manning's $n=0.35$; depression storage depth = 0.2 inches.

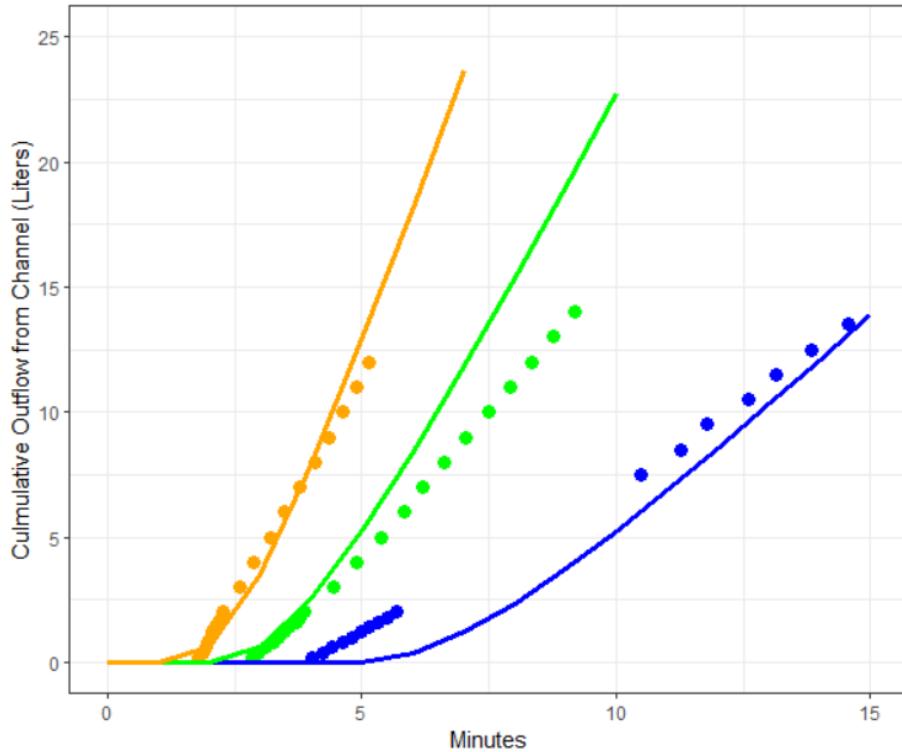


Figure 3. Results from Foster (2008) Site 5C (3% slope) showing the measured outflow volume (circles) with modeled outflow volume (lines) for three different flow rates (3 liter/min: orange; 5 liter/min: green and 7 liter/min: blue). Trial and error fit to the data using $K_{sat} = 3 \text{ in/hr}$, Manning's $n=0.35$; depression storage depth = 0.2 inches.

Reference

Foster, K.M. 2008. The role of the residential shoreland lawn as a hydrologic connection between the downspout and lake. M.S. Thesis, College of Natural Resource, University of Wisconsin-Stevens Point.
 (available on 9/13/2023 at <https://minds.wisconsin.edu/bitstream/handle/1793/81198/Foster.pdf>)