

INTERIM TURF NUTRIENT MANAGEMENT (1100)

Wisconsin Department of Natural Resources Technical Standard

I. Definition

Managing the amount, method, timing, and source of nutrient applications on turf.

II. Purpose

This standard establishes the criteria and documentation requirements for a nutrient management plan that addresses the application of nutrients to establish, maintain and renovate turf areas. These criteria are intended to minimize nutrient entry into surface and groundwater resources through proper application of nutrient inputs while maintaining turf density of 70% or greater.

Note: See Section VIII.H for methods to measure density.

III. Conditions Where Practice Applies

This standard applies to parcels that have *five or more total acres*¹ of turf that receive nutrients. This includes municipally owned parcels within an incorporated municipality and non-municipally owned parcels regardless of location.

This standard does not apply to agricultural operations, sod farms, or community gardens. This standard may be beneficial for turf management on any sized parcel.

IV. Federal, State and Local Laws

Users of this standard shall be aware of potentially applicable federal, state and local laws, rules, regulations or permit requirements governing the placement of nutrients. This standard does not contain the text of federal, state, or local laws.

V. Criteria

This section establishes requirements for soils and data collection, application, and management requirements for nutrient management plan

development and implementation related to the establishment, maintenance and renovation of turf. Nutrient management plans shall be prepared according to all of the Criteria, Plans and Specifications, and Operation and Maintenance sections.

A. Turf Establishment – When establishing turf, the steps listed below shall be followed.

Note: Further guidance is located in UWEX Publication A3434 Lawn Establishment and Renovation.

1. Soil Test – Soil samples shall be obtained, and the test results made available prior to seeding or sodding. Allow two to three months to obtain results from the lab.
 - a. Identify variations in *representative areas* across the site. To provide a representative sample of the soil in each representative area, collect a minimum of ten uniformly distributed sub-samples.
 - b. Collect sub-samples of soil (0.5 to 1 inch in diameter) in a uniform manner to a minimum depth of five inches and maximum depth of seven inches. Remove any turf or plant matter prior to compiling and mixing the sub-samples.
 - c. Compile the sub-samples collected from each representative sampling area, mix thoroughly, and place approximately 0.5 quart of soil in a clearly labeled bag.
 - d. Submit the sample to a soil testing lab for analysis to determine pH, available phosphorus (P) using Bray P1 analysis or Mehlich III for golf turf, and available potassium (K) levels in the soil. Test results shall be in parts per

¹ Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

million (ppm) or pounds per acre (lbs/ac).

- e. In the event that soil testing is not practical prior to establishment, apply no more than one lb N/1000 ft² using a *starter fertilizer*. In accordance with Section VII.A, document reasons why test results were not obtained and rates applied.

Note: For further guidance, see UWEX Publication A2166 Sampling Lawn and Garden Soils for Soil Testing.

- 2. The amount of P from all sources shall not exceed the soil test recommendations contained in Table 1.
 - a. If a soil amendment contains P as a fertilizer, the P shall be tilled into the root zone prior to establishment.
 - b. Starter Fertilizer – If starter fertilizer is used, the amount of Nitrogen (N) cannot be more than one lb N/1000 ft². Apply starter fertilizer to the surface of the soil prior to or immediately following seeding to ensure it will be in close proximity to the seed.

Note: There are different interpretations in Table 1 for turf establishment, whether establishment is by seeding or sodding.

- 3. N Fertilizer – A maximum of six lbs N/1000 ft² may be applied during the first 12 months of establishment. Apply no more than one lb N/1000 ft² per application. After establishment, N applications according to Section V.B can begin.
- 4. Specific criteria for establishment of turf on sand-based root zones, putting greens, and athletic fields.
 - a. Nitrogen fertilization – A maximum of 10 lbs N/1000 ft² may be applied during the first 12 months of establishment. Apply no more than one lb N/1000 ft² per application.

b. Phosphorus fertilization

- i. Non-calcareous and acidic root zones – The amounts shall not exceed the soil test recommendations contained in Table 1.
- ii. *Calcareous* sand based root zones – Apply a P fertilizer monthly until soil test P levels stabilize in the range of 38-50 ppm (i.e. three soil test P levels in this range over at least a three month period indicate stabilization).

- 5. Erosion Control – Appropriate erosion control methods shall be installed in accordance with Wisconsin Department of Natural Resources (WDNR) construction site erosion and sediment control technical standards to minimize transport of sediment offsite.

Note: WDNR technical standards are available at: <http://dnr.wi.gov/org/water/wm/nps/stormwater>

B. Turf Maintenance – Fertilizer Recommendations for *Established Turf*.

- 1. Soil Test – Soil samples shall be obtained once every five years for areas receiving P. For sites requiring multiple P applications, the five year period shall start after the final P application. Follow directions for collecting samples based on the type of area being fertilized as described below.

Note: More frequent testing may be beneficial. Guidance is located in UWEX Bulletin A2166 Sampling Lawn and Garden Soils for Soil Testing.

a. General Turf Areas

- i. Identify variations in representative areas across the site. To provide a representative sample of the soil in each representative area, collect a minimum of ten uniformly distributed sub-samples.
- ii. Collect sub-samples of soil (up to one inch in diameter) in a uniform

manner to whichever is less, a minimum depth of five inches and a maximum depth of seven inches, or to the depth of the root system. Remove any turf or plant matter prior to compiling and mixing the sub-samples.

- iii. Follow steps in Sections V.A.1.c and V.A.1.d for compiling and submitting the samples.

b. Golf course putting greens and tees

- i. Identify variations in representative areas across the site. To provide a representative sample of the soil in each representative area, collect a minimum of ten uniformly distributed sub-samples.
- ii. Collect sub-samples of soil (up to one inch in diameter) in a uniform manner to whichever is less, a minimum depth of the root system or a minimum of two inches, and a maximum depth of seven inches. Remove any turf or plant matter prior to compiling and mixing the sub-samples.
- iii. Follow the steps described in Section V.A.1.c and V.A.1.d for compiling and submitting the samples.

2. Fertilizer Recommendations for *low-traffic turf areas*.

- a. P Recommendations – The recommendations for P in Table 1 shall be used.
- b. N Recommendations – Do not apply more than one lb N /1000 ft² per application unless the fertilizer is entirely natural organic material (i.e. plant or animal derived substances) in which case N may be applied at rates up to two lbs N/1000 ft² but not to exceed four lbs N/1000 ft² annually.

Specific annual N recommendations are as follows:

- i. General Areas – Do not exceed a maximum of four lbs N/1000 ft² annually.
- ii. Areas where clippings are returned – Do not exceed a maximum of three lbs N/1000 ft² annually beginning the third year after establishment.

Note: Clippings left on the lawn typically release about one lb N/1000 ft² annually.

- iii. Areas with *high permeability soils* – Use a fertilizer containing at least 50% slow release N if greater than ¼ lb N/1000 ft² is applied at one time.

3. Fertilizer recommendations for *high traffic areas* (e.g., athletic fields, golf courses, some parks areas).

- a. P Recommendations – The recommendations for P in Table 1 shall be used.
- b. N Recommendations – The values listed below shall be used only when other cultural practices such as regular mowing and irrigation are in place. Otherwise, the N fertility program should be the same as for low traffic turf areas.

Do not apply more than one lb N/1000 ft² per application unless the fertilizer is entirely natural organic material (i.e. plant or animal derived substances) in which case it may be applied at rates up to two lbs N/1000 ft² not to exceed the maximums listed below.

- i. Athletic fields and tee boxes with native soil root zones – A maximum of eight lbs N/1000 ft² may be applied.
- ii. Athletic fields and tee boxes with sand-based root zones (≥ 70% sand) – A maximum of ten lbs N/1000 ft² may be applied.

- iii. Fairways or putting greens with native soil root zones – A maximum of five lbs N/1000 ft² may be applied.
- iv. Fairways or putting greens (root zone \geq 70% sand) – A maximum of eight lbs N/1000 ft² may be applied.

C. Turf Renovation – One of the following methods shall be used:

- 1. Tilling – When renovation involves tilling, follow the turf establishment criteria located in Section V.A. The balance of fertilizer remaining from the current soil test recommendations from Table 1 shall not be exceeded.
- 2. *Interseeding / overseeding* – A maximum of six lbs N/1000 ft² may be applied during the first 12 months of establishment unless otherwise allowed under Section V.B.3. Apply no more than one lb N/1000 ft² per application unless a natural organic fertilizer is used, in which case N may be applied at rates up to two lbs N/1000 ft² but not to exceed four lbs N/1000 ft² annually. The balance of fertilizer remaining from the current soil test recommendations from Table 1 shall not be exceeded. After establishment, N applications according to Section V.B can begin.

D. Criteria to Minimize Entry of Nutrients to Groundwater

- 1. Do not apply fertilizer on *saturated soils*.
- 2. Do not apply nutrients to frozen soils unless the fertilizers are used to melt snow or ice on high traffic turf areas (i.e. greens and athletic fields).
- 3. To minimize N leaching to groundwater on high permeability soils, or soils with less than 20 inches to bedrock, or soils with less than 12 inches to *apparent water table* use the following practices:
 - a. Do not use fertilizer with greater than 50% water soluble N unless applying

less than or equal to a ¼ lb N/1000 ft² at one time.

- b. Do not apply nutrients within 100 feet upslope of a direct conduit to groundwater such as fractured bedrock at the surface.
- c. Tile inlets, drain tiles, and similar stormwater infrastructure must be covered prior to fertilizer application, unless these devices outflow to on-site irrigation ponds disconnected from surface and groundwater.

E. Criteria to minimize the Entry of Nutrients to Surface Water

- 1. Do not apply fertilizer on saturated soils, wetlands, surface water, or impervious surfaces (i.e. pavement, sidewalks). Do not apply nutrients to frozen soils unless the fertilizers are used to melt snow or ice on high traffic turf areas (i.e. greens and athletic fields).
- 2. Take action to avoid drift of fertilizer into waterbodies.
- 3. To minimize entry of nutrients to surface water in *surface water quality management areas* the following apply.
 - a. Use products with at least 50% water soluble N on slopes steeper than 10%.
 - b. Do not apply water soluble fertilizers when a runoff event is expected within 24 hours, such as an intense short duration rainfall event, unless irrigation is used shortly after the fertilizer is applied.
 - c. Areas adjacent to a waterbody or waterway – Within 20 feet of a waterbody or waterway’s *ordinary high watermark* only *foliar* applications of N and P are allowed. On golf course greens and surrounds within the 20 foot area drop spreaders may be used. Do not exceed two lbs N/1000 ft² per year.

Table 1. Phosphorus Soil Test Interpretations and Recommendations

	Nutrient Concentrations			Phosphorus Recommendations ^{Note 1}			
	Soil Test P		Concentration Interpretation	lb P ₂ O ₅ /1000 ft ²		lb P ₂ O ₅ /acre	
	ppm P	lbs/acre					
Bray P1 Soil Test	Turf Establishment	0-15	0-30	Very Low	3	131	
	From Seed	16-30	31-60	Low	2	87	
		31-45	61-90	Medium	1	44	
		46-50	91-100	Optimal	0	0	
		> 50	> 100	Very High	0	0	
		Turf Establishment	0-10	0-20	Very Low	3	131
	From Sod	11-20	21-40	Low	2	87	
		21-30	41-60	Medium	1	44	
		31-40	61-80	Optimal	0	0	
		> 40	> 80	Very High	0	0	
Established		0-5	0-10	Very Low	3	131	
Turf, Low Traffic Areas	6-10	11-20	Low	2	87		
	11-15	21-30	Medium	1	44		
	16-20	31-40	Optimal	0	0		
	> 20	> 40	Very High	0	0		
	Established				High Traffic Areas ^{Note 4}	Fairway	Tees and Greens
Turf, High Traffic Areas ^{Note 2}				lb P ₂ O ₅ /1000 ft ²	lb P ₂ O ₅ /acre	Sand ^{Note 5}	Push-up ^{Note 6}
	0-12	0-24	Very Low	5	200	3	5
	13-25	25-50	Low	3.5	150	2	3.5
	26-37	51-74	Medium	2	100	1	2
	38-50	75-100	Optimal ^{Note 3}	1	50	0.5	1
	> 50	> 100	Very High	0	0	0	0

Mehlich III Soil Test	Nutrient Concentrations			Phosphorus Recommendations ^{Note 1}				
	Established	Soil Test P		Concentration Interpretation	Sand ^{Note 5}		Push-up ^{Note 6}	
	Golf Turf ^{Note 2}	ppm P	lbs/acre		lb P ₂ O ₅ /1000 ft ²	lb P ₂ O ₅ /acre	lb P ₂ O ₅ /1000 ft ²	lb P ₂ O ₅ /acre
	Fairways				lb P ₂ O ₅ /1000 ft ²		lb P ₂ O ₅ /1000 ft ²	lb P ₂ O ₅ /acre
		0-12	0-25	Very Low	NA		6	260
		13-24	26-49	Low	NA		4	175
		25-37	50-75	Medium	NA		2.5	100
		38-50	76-100	Optimal ^{Note 3}	NA		1.5	50
		> 50	> 100	Very High	NA		0	0
	Established				Sand ^{Note 5}		Push-up ^{Note 6}	
Golf Turf ^{Note 2}				lb P ₂ O ₅ /1000 ft ²	lb P ₂ O ₅ /acre	lb P ₂ O ₅ /1000 ft ²	lb P ₂ O ₅ /acre	
Tees and Greens	0-5	0-11	Very Low	3	130	5	220	
	6-10	12-21	Low	2	90	3.5	150	
	11-19	22-39	Medium	1	45	2	90	
	20-30	40-60	Optimal ^{Note 3}	0.5	20	1	45	
	> 30	> 60	Very High	0	0	0	0	

^{Note 1} Recommendations provide the maximum amount of fertilizer that can be applied between soil tests. When soils require phosphorus, one of two approaches may be taken. Option one is to make what is known as a corrective application. This is a one-time application of the amount of phosphorus recommended. The second option is that of gradual buildup, and then re-testing of the soil to check if the desired level of phosphorus was achieved. Gradual buildup of phosphorus is accomplished by selecting the proper type or grade of fertilizer to apply at different times during the year. Use either the ppm or lbs/acre column for the soil test, and either the lbs/1000 ft² or lbs/acre column for the recommendation.

^{Note 2} Low maintenance turf and roughs shall follow recommendations for established turf, low traffic areas.

^{Note 3} The application recommendation is to maintain the level at the ppm which is considered the optimal range for turf that receives high traffic.

^{Note 4} Areas including but not limited to athletic fields, intensively used paths in low traffic areas, and high use park areas

^{Note 5} 50% or more of the root zone by depth is sand.

^{Note 6} More P needs to be applied to pushup greens in order to increase the soil test P. This is because native soils have a greater capacity to bind P, thus making it less available than in sand based greens.

VI. Plans and Specifications

The requirements for a nutrient management plan are specified in the previous sections of this standard. The nutrient management planner shall review the plan with the landowner or designee to assure an understanding of the requirements. Include the following:

- A. Narrative description (site description, land use, etc.).
- B. A site map showing topography, designated uses, soil test locations, *sensitive areas* and surface water.
- C. Application restrictions (Section V.D, & E).
- D. Soil sample/test location and results, and type of soil test (Bray P1 or Mehlich III).
- E. Recommended nutrient application rates.
- F. The nutrient management planner shall be a certified sports turf manager, certified golf course superintendent, an individual with a bachelor's degree in turf and grounds management, or having equivalent experience or training in turf management.
- G. Turf species and soil types present.
- H. Response plan for dealing with fertilizer spills.

VII. Operation and Maintenance

- A. Document the actual nutrient application including the rate, fertilizer grade, timing, and method of application. Revise the plan a minimum of every five years or as needed to reflect changes in vegetation and/or management objectives.
- B. The applicator shall wear protective clothing appropriate to the material being handled.
- C. The application equipment shall be calibrated to achieve the desired application rate.
- D. Protect fertilizer from the weather, and from accidental leakage or spillage. See Wisconsin administrative rules and county

or local ordinances concerning regulations on handling fertilizers.

- E. If a spill occurs, take appropriate cleanup actions. Spills involving over 250 lbs of dry or 25 gallons of liquid fertilizer must be immediately reported to the WDNR (24-Hour Spills Hotline 1-800-943-0003). Spills of lesser amounts are exempt from the reporting requirement unless the spill has adversely impacted or threatens to adversely impact the air, lands, or waters of the state either as a single discharge or when accumulated with past discharges.
- F. Take the appropriate environmental precautions when cleaning equipment after applications. If the application equipment system is flushed, use the rinse water in the following batch of nutrient mixture where possible or dispose of according to state and federal regulations. Always avoid cleaning equipment near high runoff areas, ponds, lakes, streams, and other waterbodies. Extreme care must be exercised to avoid contaminating water wells.

VIII. Considerations

Additional recommendations relating to nutrient management planning that may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation functions are as follows:

- A. Consult UW Publication A2303 for additional fertilization recommendations to maintain turf quality (>70% turf density).
- B. Potassium (K) Recommendations – K plays an important role in the plant's ability to manage stress but is not a known environmental contaminant. The K values presented in Tables 2 and 3 are recommendations to help maintain turf density.

Table 2. Bray P1 Potassium Soil Test Interpretations and Recommendations for Golf Turf

Nutrient Concentrations			K Recommendation		
Soil Test Interpretation			Established Tees and Greens		Fairway
ppm	lbs / acre	Concentration Interpretation	Sand	Pushup	
ppm	lbs / acre	Concentration Interpretation	lb K ₂ O/1000 ft ²		lb K ₂ O/acre
0-50	0-100	Very Low	4.0	5.0	200
51-100	101-200	Low	3.0	4.0	150
101-150	201-300	Medium	2.0	3.0	100
151-175	301-350	Optimal	1.0	2.0	50
>175	> 350	Very High	0	0	0

Table 3. Bray P1 Potassium Soil Test Interpretations and Recommendations for General Turf Areas

Nutrient Concentrations			K Recommendation	
Soil Test Interpretation			Established Turf	
ppm	lbs / acre	Concentration Interpretation	lb K ₂ O/1000 ft ²	lb K ₂ O/acre
0-20	0-40	Very Low	4.0	174
21-40	41-80	Low	3.0	131
41-60	81-120	Medium	2.0	87
61-80	121-160	Optimal	1.0	44
>80	> 160	Very High	0	0

C. Cultural Practices

1. Soil – A productive soil has good texture, structure (aerate if compacted), sufficient nutrients (N, P, K) and the right pH for the grass type. Loam type soils are often the preferable soil type for turf. Most soil textures may benefit from the addition of organic matter like compost or grass clippings.
2. Grass Choice – Select a grass that is best suited to the area’s climate, temperature, moisture and the intended function of the area where it is planted. Also consider whether the location is sunny or shady. Grass that is well adapted to its location will be able to resist pests and diseases better. For further guidance see UWEX Publication A3434.
3. Mowing Height – The ideal height may vary somewhat with the type of grass. Frequent mowing will result in short

clippings that can easily be left on the lawn. Ideally, cut no more than one-third of the height of the grass blades. Mowing blades should be kept sharp to prevent tearing. Immediately after mowing, sweep clippings off impervious surfaces.

4. Irrigation – Deep watering similar to a soaking rain is best. When irrigating, stagger the application schedule to meet the intended use of the area, and to prevent runoff.
5. Thatch Build-Up – If thatch buildup occurs that interferes with the intended use of the turf it may be necessary to remediate with core aeration. Excessive thatch build-up may be a sign of overuse of fertilizer, compaction of the soil or poor root development.

- D. Utilization of Emerging Technologies – Consider maintaining flexibility in fertilizer

programs to take advantage of new products and grass types.

- E. Application Timing – Many methods exist to properly apply N throughout the year. The following methods are examples.
- Method A – possible application times are April 1-15, May 15-30, July 1-5, August 1-15, September 1-15, and late October/early November.
 - Method B – 1.5 lbs N/1000 ft² (no more than one lb can be water soluble N) applications a couple of weeks prior to spring and fall periods of play, and three 1.0 lb N/1000 ft² applications every 6 weeks between spring and fall.
 - Method C – 1.0 lb N/1000 ft² applications per growing month.
 - Method D, Rapid recovery areas – Light and frequent water-soluble N applications of 0.1 to 0.25 lb N/1000 ft² at 10 to 14 day intervals may be used as well as a strictly granular fertility program.
- F. Fertilizer Products Containing Pesticides – The application rate cannot exceed the allowable amount of nutrients noted in the criteria of this standard or pesticide application restrictions established by DATCP.
- G. It may be necessary for planners to take precautions beyond the minimums contained within the criteria to account for such concerns as site hydrology, turf quality, and the potential for nutrients to enter waterbodies.
- H. Turf Density – Density is commonly evaluated by visual estimation, grids lines, digital analysis, or the transect method as described in the WI-DATCP-UWEX Integrated Pest Management for Wisconsin Schools publication (see Section IX).
- I. Watering Recommendations – It is recommended to water in fertilizers placed on slopes. Use enough water to deliver the product without causing runoff.
- J. Equipment Calibration – It is recommended to calibrate equipment prior to each use. For further guidance concerning equipment calibration see UWEX publication A2306.

IX. References

Healthy Lawn, Healthy Environment Caring for Your Lawn in an Environmentally Friendly Way EPA Handout, Prevention, Pesticides and Toxic Substances (H7506C), 735-K-04-001, September 2004.

http://www.epa.gov/oppfead1/Publications/lawn_care.pdf

Natural Resources Conservation Service, Field Office Technical Guide, Section IV, Standard 590 Nutrient Management.

<http://www.wi.nrcs.usda.gov/technical/>

O.J.Noer Turfgrass & Research Facility, UWEX. 3103 County Hwy M, Verona, WI 53593. Integrated Turfgrass Management.

UWEX Publications are available online at: <http://cecommerce.uwex.edu> and hardcopy: Cooperative Extension Publishing 45 N. Charter St., Madison, WI 53715.

UWEX Publication A2306 Calibrating and Using Lawn Fertilizer and Lime Spreaders

UWEX Publication A3434 Lawn Establishment and Renovation

UWEX Publication A2303 Lawn Fertilization

UWEX Publication A3435 Lawn Maintenance

UWEX Publication A2166 Sampling Lawn and Garden Soils for Soil Testing

Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) and University of Wisconsin Extension (UWEX). Integrated Pest Management for Wisconsin Schools. Monitoring Weed Populations, p. 150 of the appendix.

Wisconsin Department of Natural Resources (WDNR) Construction Site Erosion & Sediment Control Technical Standards: <http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm#Construction>.

WDNR Spills Program: <http://dnr.wi.gov/org/aw/tr/spills/>

X. Definitions

Apparent water table (V.D.3) – Continuous saturated zone in the soil to a depth of at least six feet without an unsaturated zone below it.

Calcareous (V.A.4.b.ii) – An alkaline soil containing free CaCO₃ typically with a pH of 7 to 8.3.

Established turf (V.B) – Turf is considered established once it achieves a minimum density of 70%, the grass species is physically mature, and able to support the intended use.

Five or more total acres (III) – A parcel of land under one ownership where turf areas are receiving nutrient applications regardless of whether they are all contiguous. For example, a park may have shelters, sidewalks and parking lots that break up the pervious areas. All turf areas in the park that receive nutrients will be included in the five acre calculation.

Foliar (V.E.3.c) – Spray application of liquid nutrients to turf.

High permeability soils (V.B.2.b.iii) – Equivalent to drained hydrologic group A that meet both of the following criteria:

1. Permeability = 6 inches/hour or more in all parts of the upper 20 inches, and
2. Permeability = 0.6 inches/hour or more in all parts of the upper 40 inches.

High traffic turf area (V.B.3) – Typically an area used by ten or more people per acre per week. Examples of areas considered high traffic include but are not limited to athletic fields, golf courses, and high use park areas.

Interseeding / overseeding (V.C.2) – Application of seed to an existing turf area.

Low-traffic turf areas (V.B.2) – Typically an area used by ten or less people per acre per week.

Ordinary high-water mark (V.E.3.c) – Ordinary high-water mark is the point on the shore up to which the presence and action of the water is so continuous as to leave a distinct mark by one of the following: erosion, destruction of terrestrial vegetation, or other easily recognized characteristics.

Representative area (V.A.1.a) – Locations having similar management (i.e. all the sand based greens on a golf course), soil type, topography, and species of turf.

Saturated soils (V.D.1) – Soils where all pore spaces are occupied by water and where any additional inputs of water or liquid fertilizers cannot infiltrate into the soil.

Sensitive area (VI.B) – Areas of aquatic vegetation offering critical or unique fish and wildlife habitat, including seasonal or life stage requirements, or offering water quality or erosion control benefits to a body of water. For management purposes the area can be located above and/or below the ordinary high water mark.

Starter fertilizer (V.A.1.e) – The concept of a starter fertilizer in an agronomic context is the placement of small amounts of nutrients in close proximity to the seed, at the time of planting. For grass seed, this placement could be broadcast application of fertilizer since the seed is broadcast applied. The intent is to provide newly germinating seedlings with a supply of phosphate, until the seedlings have a better-developed root system. The starter fertilizer will have a higher P concentration than N. Given the typical make-up of a commercial starter fertilizer, applying no more than one lb N / 1000 ft² of a starter fertilizer will result in an application somewhere between 1.3 and 2 lbs of P₂O₅. Higher formulations of P are also acceptable, provided the nitrogen application does not exceed one lb N / 1000 ft².

Surface water quality management areas (V.E.3) – For the purposes of nutrient management planning surface water quality management areas are defined as follows:

1. The area within 1,000 feet from the ordinary high-water mark of navigable waters that consist of a lake, pond or flowage, except that for a navigable water that is a glacial pothole lake, “surface water quality management area” means the area within 1,000 feet from the high-water mark of the lake.
2. The area within 300 feet from the ordinary high-water mark of navigable waters that consist of a river or stream that is defined as:

- Perennial streams (continuous flow) identified on the NRCS soil survey and/or USGS 1:24,000 scale topographic map as solid lines,
- Otherwise determined through an onsite evaluation and documented in an approved plan.