



# Ten Steps for Developing a Nutrient Management Plan for a Golf Course

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As the March 10, 2008 deadline rapidly approaches, it is time to make sure your nutrient management plans are completed. Below are some instructions to help you complete your nutrient management plan; however, these instructions do not stand alone. You should also read and become familiar with the DNR Technical Standard (Turfgrass Nutrient Management 1100). You can download it from the UW turfgrass website ([www.turf.wisc.edu](http://www.turf.wisc.edu)). Fact sheets were developed to help make the interpretation of the technical standard easier; these are also available from the UW turfgrass website. Hopefully, a thorough reading of the technical standard in addition to this article and the NR-151 fact sheets will help you to complete your nutrient management plan.

## Step 1: Collect soil samples from representative areas from your course.

There are no clear definitions of what constitutes a

representative area. A representative area might be as simple as "greens" or "tees". However, it is likely that you'll want to have more specific representative areas such as "sand greens" and "soil greens", or "new greens" and "old greens". In my opinion, the best approach is to collect samples from each individual green, tee complex and fairway. This will result in a large amount of work and a significant amount of money (at \$7/sample), but the results will give you a clear picture of the soil P and K status of your entire golf course. Doing so will allow you to split areas into smaller groups such as "greens with adequate soil P" and "greens requiring P fertilizer". There are endless ways to group areas, pick the way that makes the most sense to you. If you choose to sample extensively now, next time you can combine areas that had similar results. Soil tests numbers can be used for 5 years, although UW-Extension has always advocated sampling at 3 year intervals.



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**Step 2: Submit soils to a reputable soil testing lab for Bray-1 or Mehlich-3 analysis.**

From my observations at the NR-151 Training Workshops, many superintendents have soil test reports that don't state name of the soil test used. I've also seen many test reports where the soil test method switches based on the soil pH. In the most common case, soils with pH < 7.1 are analyzed with the Bray-1 test, and if the soil pH exceeds 7.1 the Olsen soil test is used. This is problematic because the technical standard only recognizes the Bray-1 or Mehlich-3 tests. If your soil test does not clearly indicate which test was used to extract soil phosphorus, contact the lab and ask. If you soil tests are not Bray-1 or Mehlich-3 you should re-sample and submit the soils for the proper analysis as soon as possible.

**Step 3: Obtain maps of soil properties and topography**

The procedure for obtaining the required maps was published in the Sept/Oct 2007 issue of *The Grass Roots*, and won't be discussed here.

**Step 4: List characteristics and maximum allowable N and P of various areas (i.e. greens, tees, fairways, roughs, clubhouse lawns) according to the technical standard.**

Examples #1 and #2 below show the type of information required for the section of the plan that gives the characteristics of the fertilized sites. You should group areas that are treated similarly. In the below two examples, I've separated the soil greens from the sand greens because I will not be applying any phosphorus to the soil greens, but because of the low levels of P detected in the sand greens, I'll probably want to

Example #1

Site:	Soil greens
Location:	Holes 1-9, practice green
Size:	1.3 acres
Age:	35 years
Grass Species:	Creeping bentgrass, annual bluegrass
Root zone or soil type:	Silt loam
Traffic:	High
Maximum allowable N/M/year:	5 lbs
Soil Test P Level	62 - 125 ppm Bray-1
Maximum allowable P <sub>2</sub> O <sub>5</sub> /M/year:	0 lbs

Example #2

Site:	Sand greens
Location:	Holes 10-18
Size:	1.1 acres
Age:	5 years
Grass Species:	Creeping bentgrass
Root zone or soil type:	Sand
Traffic:	High
Maximum allowable N/M/year:	8 lbs
Soil Test P Level	25 - 45 ppm Bray-1
Maximum allowable P <sub>2</sub> O <sub>5</sub> /M/year:	0.5 - 2 lbs

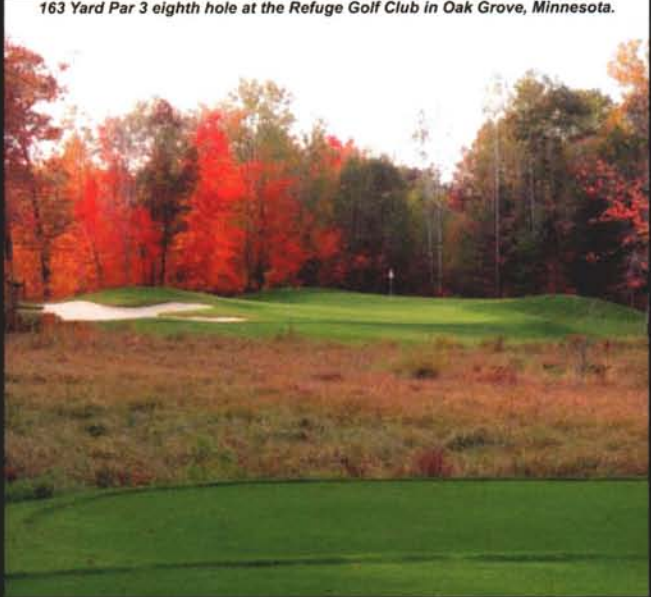
consider applying phosphorus to those areas. Also notice that the maximum allowable N differs for these two areas. The maximum allowable N for various areas can be found in the technical standard. You can also find the information on the "high traffic fact sheet", which summarizes the technical standard for high traffic areas. You should complete the information shown in the examples below for each area that is on a different fertility plan.

**Step 5: Identify surface and groundwater management areas using soil and topography maps**

*Type I Surface Water Management Areas (SWMA):*

Identify the areas with slopes >10% within 1000 ft of a navigable water that consists of a lake, pond, wetland or flowage (glacial pothole lakes or ponds without outlets are not considered navigable waters) AND the 10% slopes within 300 ft of a perennial stream or river. Perennial streams and rivers are indicated by a solid blue line on the topographic map obtained from the web soil survey. Within Type I SWMAs, fertilizers with equal to or less than 50% slow release N should be used. The Type I SWMAs should

163 Yard Par 3 eighth hole at the Refuge Golf Club in Oak Grove, Minnesota.



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also be indicated on a map and described in a table like the shown in Example #3. If not slopes steeper than 10% exist, then you do not have and Type I SWMAs on the property.

*Type II Surface Water Management Areas:*

Defining and describing the Type II SWMAs is easier than doing so for the Type I SWMAs. However, the application restrictions for Type II SWMAs are more stringent. Type II SWMAs are the areas within 20 feet of any navigable body of water. Within these areas only liquid N and P may be applied, and no more than 2 lbs N/M/yr can be used. However, drop spreaders can be used on putting greens and their surrounds.

Identify the Type II SWMAs on a map or aerial photograph and indicate their location using a table as shown in Example #4 below.

*Groundwater Management Areas (GMAs):*

Groundwater management areas exist where Hydrologic Group A Soils occur, or where the depth to apparent water table is less than 12 inches, or where the depth to bedrock is less than 20 inches. All three pieces of information can be found from the soil survey maps. Indicate on a map where the GMAs exist and include a table similar to the one shown in Example #5. Within GMAs, fertilizers with greater than or equal to 50% slow release N should be used.

**Step 6: Fertilizer Spill Response Plan**

Standard language for the fertilizer spill response plan is included below. Include it in your plan.

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 unless the spill had 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.

**Step 7: General Fertilizer Application Schedule**

This section should give an overview of the approximate amounts of N and P that are applied in each month of the growing season. It is meant to serve as a guide so a DNR agent can get a quick understanding of the general timing and rates of fertilizer applications on the golf course. The locations should be the same as the areas listed in Examples #1 and #2. See Example #6 on page 28.

**Step 8: Spreader Calibration Information**

Information on the frequency of the calibration of fertilizer equipment should be included somewhere in the plan. It might be wise to include exact dates of calibration as well as the names of the employees conducting the calibration.

**Step 9: Actual Fertilizer Application Record Keeping**

This is obviously a major component of a nutrient management plan. Fortunately, the vast majority of golf course superintendents keep thorough fertilization records already. You may continue to keep records as normal, but also keep a copy of the records in the

Example #3. Type I Surface Water Management Areas

Site:	TYPE I SURFACE WATER MANAGEMENT AREAS are areas with slopes >10% within 1000 feet of lake, pond (with an outlet) or wetland; or areas with slopes >10% within 300 feet of a perennial stream or river.
Location:	Indicate locations of the steeply sloped areas here. The highest priority slopes are those that are large and slope directly or indirectly towards navigable water. Small slopes, like the ones found on bunker faces and tee banks are usually not as environmentally important.
Size:	Indicate approximate acreage that falls in this category
Restrictions:	Fertilizers with 50% or less slow-release N can be used in accordance with the rest of the nutrient management plan. For example, a fairway (maximum allowable N = 5 lbs/M/yr), can still receive up to 5 lbs N/M/yr, except the majority of the N must be in the soluble form.

Example #4. Type II Surface Water Management Areas

Site:	TYPE II SURFACE WATER MANAGEMENT AREAS (Areas within 20 feet of lake, pond (with an outlet), river, stream or wetland)
Location:	20 feet from banks of river and lake on golf course (see map)
Size:	Indicate approximate acreage of Type II SWMAs
Restrictions:	Only foliar (liquid) N and P applications are allowed, except on greens and surrounds where drop spreaders may be used.  No more than 2 lbs N/1000 sq. ft. can be applied annually.

Example #5. Groundwater Management Areas

Site:	GROUNDWATER MANAGEMENT AREAS (Areas with hydrologic group A soils, OR where the depth to apparent water table is less than 12 inches, OR where the depth to bedrock is less than 20 inches)
Location(s):	Indicate locations here, or refer reader to a map where the GMAs are delineated.
Size:	Indicate approximate acreage in GMAs
Restrictions:	Fertilizers with 50% or more slow-release N can be used in accordance with the rest of the nutrient management plan.  Fertilizers with less than 50% should be applied at rates of 0.25 lbs N/1000 sq. ft.

nutrient management plan. Example #7 gives the type of information to include.

## Step 10: Narrative Description

The narrative description is intended to describe the golf course to a person who is completely unfamiliar with the site. This section does not have to be very long, but it should include a short description of the site and location (XYZ golf course in central Dane County), the number of fertilized acres, the general soil type (sandy soils, silt loam soils, clay soils), the predominant grasses grown on the site, the size and extent of water bodies, and the locations and sizes of the environmentally sensitive areas on the course (surface and groundwater management areas).

Example #6. General Nutrient Application Schedule – Nitrogen/Phosphorus (lbs/1000 ft<sup>2</sup>)

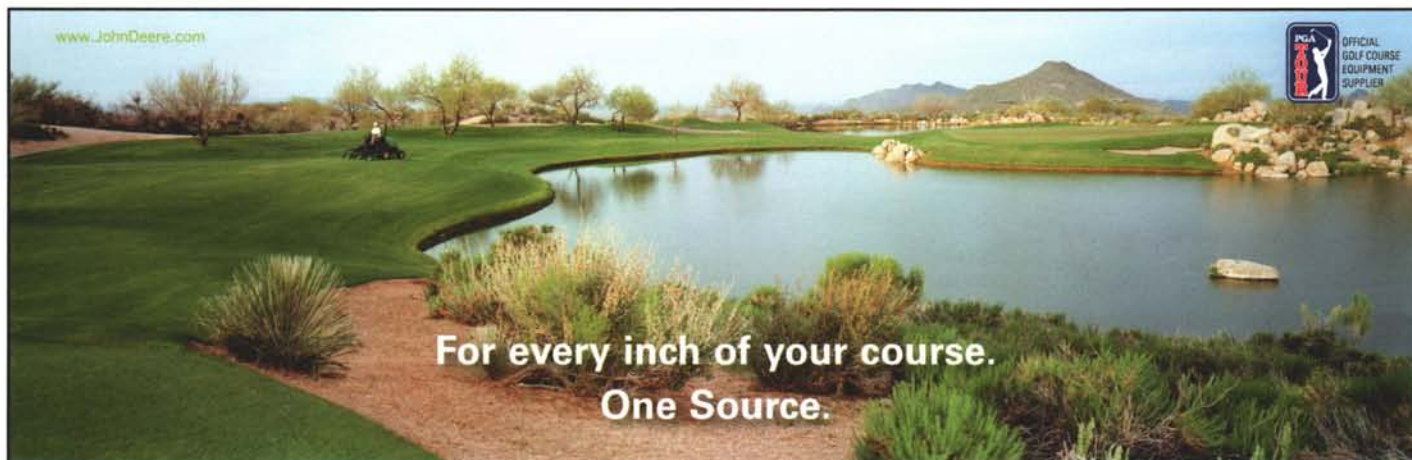
Location	April	May	June	July	Aug	Sept	Oct	Nov	Total
Soil Greens	0/0	0.5/0	0.25/0	0.25/0	0.25/0	1/0	1/0	0/0	3.25/0
Sand Greens	0/0	0.5/1	0.25/0	0.25/0	0.25/0	1/0	1/1	0/0	3.25/2
Tees	0/0	0.5/0	0.5/0	0.5/0	0.5/0	0.5/0	1/0	0/0	3.5/0
Fairways	0/0	1/0	0/0	0/0	0/0	1/0	1/0	0/0	3/0
Fairways 10, 12, 13	0/0	1/2	0/0	0/0	0/0	1/0	1/0	0/0	3/2
Roughs	0/0	0/0	0/0	0/0	0/0	0/0	1/0	0/0	1/0
Clubhouse Lawns	0/0	1/0	0/0	1/0	0/0	0/0	1/0	0/0	3/0

Example #7. Actual Fertilization Records

Date	Location	N rate (lbs/M)	P <sub>2</sub> O <sub>5</sub> rate (lbs/M)	Fertilizer Grade	N source	% SRN	Form	Applicator
7/6/08	Sand greens	0.25	0	46-0-0	urea	0	liquid	Soldat

I hope you find these instructions useful as you work to finish up your nutrient management plan. The UW turfgrass website contains a nutrient management template which contains all of the tables shown in the examples

above. A checklist is also available at the website to help you identify any missing plan components. As always, feel free to contact me with questions and concerns as they arise. 



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