Buffer Zone Techniques for Golf Courses

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Michigan golf course landscapes commonly feature water as an integral part of the design and challenge of the course. Water features in Michigan range from the majestic Great Lakes to inland lakes, ponds, streams and wetlands. Golf course superintendents recognize their role as stewards of the environment and strive to incorporate best management practices in their day-to-day operations. Golf course design concepts have changed dramatically over the years as they strive to incorporate the natural features of the landscape into the overall design, giving the golf course a more natural appearance. The use of buffer zones and landscaping with native vegetation is becoming customary on new course designs and is being incorporated into existing courses. Integrating these concepts on existing courses can be challenging because space adjacent to waterways may be limited due to the original layout of the golf holes.

In order to gain the most benefit from the implementation of buffers, the buffer zone designer should have an understanding of how water flows through the entire golf course property and determine the most important functions for buffers at each site. In golf situations, nutrient/pesticide filtering is often a primary function. Other valuable functions will include stabilizing eroding banks, providing wildlife habitat, enhancing aquatic habitat, creating aesthetic value and reducing difficult to maintain areas.

In designing buffers for your area, first analyze the movement of water throughout the property and then complete the following steps to determine a strategy for both out-of-play and in-play areas:

1. Determine what functions are needed
   - Nutrient and/or pesticide filtering
   - Bank stabilization
   - Wildlife habitat (do you want to attract songbirds, butterflies, etc.?)
   - Aesthetic value (wildflowers, native grasses?)
   - Enhance aquatic habitat (does a high quality stream run through the property?)
   - Discourage geese in critical play areas
   - Reduce high maintenance walk mowing and/or string trimming

2. Determine the minimum and maximum buffer width available

3. Identify the best types of vegetation to provide the needed benefits

4. Develop an installation and maintenance plan

Out-of-Play Strategies

The criterion for out-of-play areas incorporates a zone strategy similar to those used by the Natural Resources Conservation Service (NRCS) and the U.S. Forest Service. The potential for creating wildlife habitat and enhancing aquatic habitat is much greater in these areas as opposed to in-play areas. There is often much more flexibility in the height of vegetation that can be planted in out-of-play areas without affecting the play of golf. When space permits, an ideal riparian buffer zone includes three zones:

1. Zone 1 – consisting of mature trees next to a stream, lake, or other waterbody
2. Zone 2 – consisting of managed trees/shrubs, and
3. Zone 3 – consisting of grasses and/or forbs (such as native grasses and wildflowers)

In general, it is recommended that this 3-zone configuration be used in riparian buffer areas when feasible. In some cases, the inclusion of all three zones is not necessary depending upon the desired functions. Inland buffers (those not adjacent to waterbodies), may only include one or more of the above zones, depending upon the desired functions. The incorporation of natural areas on golf courses can not only provide added aesthetic value, but also reduce long-term mowing and maintenance costs.

The width of the buffer can vary depending upon space. Studies have shown that a range of buffer widths from 3m to 200m have been effective, depending upon site specific conditions. A buffer of at least 15m (49.2 ft.) was found to be necessary to protect streams and wetlands under most conditions. Generally, buffer widths toward the lower end of the range may provide for the maintenance of the natural physical and chemical characteristics (such as nutrient filtering) of aquatic resources. Buffer widths toward the upper end of the range appear to be the minimum necessary for maintaining the biological components (such as wildlife habitat) of many wetlands and streams. A buffer of at least 100 feet should be implemented whenever possible next to high quality cold-water streams.

The Natural Resources Conservation Service (NRCS) publishes tables of recommended widths for filter strips. The width recommendations for buffers designed to remove nitrogen and pesticides vary from 24 to 108 feet based upon slope and soil type. These tables are based upon inputs from agriculture and, therefore, are not necessarily directly transferable to golf course situations. Therefore, it is recommended to use the above information as a guide and maximize riparian buffer areas to the extent possible. As noted earlier, the relocation of fairways and use areas away from sensitive water resources (ponds, streams, wetlands) should be evaluated first before implementing buffer strategies. When relocation is not possible, the installation of any sized buffer zone (even if it is below optimal widths) is preferable to no buffer at all.

In-Play Strategies

A flexible, zone system has also been developed for in-play areas on golf courses. This allows golf course managers to implement buffer strategies based upon site-specific conditions. The following items were considered essential elements in the development of in-play buffer zone criteria:

- ❖ Relocation of fairways and use areas away from sensitive water resources (ponds, streams, wetlands) should be considered as an option to enhance protection.
- ❖ Buffer zones can address one or more environmental issues, a few such areas of concern include nutrient/pesticide filtering and bank stabilization on waterways.
- ❖ Buffer zones may not be able to address all possible resource protection issues.
- ❖ Buffer zones can be established using various widths, heights and plants.
- ❖ Buffer zones can be implemented so they do not impede the play of golf.

Research has shown that even buffer zones of 3-inch tall grass provide some level of protection for streams, lakes, and ponds from pesticide and nutrient movement when grown between high maintenance turf and water bodies. Therefore, the In-Play buffer zone system incorporates a series of gradually increasing mowing heights from the fairway toward the water. The diagram below depicts Zones A thru E. In general, turf heights up to 4 inches are still considered playable as rough. Therefore, Zones A and B could be used within playable areas. Zones C and D could be installed between the fairway and the water body when space permits. Zone E includes shallow water areas adjacent to lakes or wetlands. Planting of emergent vegetation in Zone E can provide important benefits such as utilizing nutrients contained in surface runoff and helping to buffer shorelines from erosion. In areas where there are very small buffer zones and inadequate space to provide buffers in Zones A thru D, Zone E may provide the only feasible location to provide some level of buffering.

An important element of the buffer zone strategy for In-Play areas includes the implementation of a management plan for inputs. This consists of minimal fertilizer and pesticide inputs within 25 feet of the water. Grass/vegetation clippings can be removed from the buffer zone periodically in order to remove accumulated nutrients.

IN-PLAY GOLF ZONES