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Golf Course Design • Engineering • Subdivision Planning

May 6, 2001 Revised (new golf course/George Lake Plan)

Response to EPA/Army Corp of Engineers Golf Course Management Questions

Golf course designers have become increasingly sensitive to the need for conservation, maintenance, and creation of new habitat for plants and animals. The USGA (U.S. Golf Association), has funded research evaluating pesticide and nutrient fate, and the impact of golf courses on water quality and the environment. Additional research is underway to better understand these issues and to guide the decisions that affect the entire community, including the wildlife community. New golf courses can and are being developed to enhance wildlife habitat.

The average golf course is a combination of grassy areas, shrubs, woodlands, and water including streams, ponds, and lakes. This landscape can be an excellent habitat for many species of plants and animals. The average 18 hole public play (municipal) golf course includes the use of approximately 140-150 acres; of which approximately 80 acres (including practice driving range) is fairway, approximately 4-5 acres of intensely managed greens and tees, approximately 20-30 acres of mown rough, and approximately 5 acres of impervious ground cover for paved driveways-parking-maintenance facility-and clubhouse/pro-shop. The Lost Marsh Hammond Golf Course and George Lake Enhancement Project proposes to comprehend 235 acres within its integrated pest management (IPM) program using best management practices (BMPs). This maintenance/ management area proposes to include the 80 acre slag pile, the 63 acre George Lake south basin, the existing 9.5 acre Lost Marsh wetland, the existing 13 acres of retained woodland, and the existing 24 acres of abandoned buildings, streets, rubble, etc. This Project will provide restoration to significant diversity of 235 acres of the earths surface that has been ecologically compromised. That diversity is as follows: 37 acres to viable aquatic diversity, 15 acres to mud flats/shallow water wetlands and its inherent wildlife diversity, 15 acres jurisdictional wetlands and its inherent wildlife

diversity, 13 acres woodland/wetlands and its inherent wildlife diversity, 110 acres golf course turf, and 45 acres of planted trees/shrubs and the wildlife diversity that can be reintroduced into this area. The Project plan will provide a diverse landscape which is suitable for a variety of plant and animal habitat.

Golf courses can be excellent buffers around ecologically sensitive areas, i.e., woodlands, lakes, wetlands, etc., with a design focus for conservation and enhancement of those areas, and a maintenance program complimentary to that objective. Golf courses play a valuable role in contributing to biodiversity, particularly near highly developed urban areas. Regulations and laws governing the protection of wildlife and habitat are as diverse as the jurisdictions empowered to enact and enforce them and the challenges created by those regulations are compounded by the site-specific complexity of protecting and enhancing habitat.

The Lost Marsh Golf Course has been planned to develop wildlife habitat on a severe terrain (80 acres of a slag pile 20-70 feet deep that has marred the landscape, untouched, for almost 50 years), and to enhance wildlife habitat in the existing and largely retained woodlands (13 acres), to expand the existing "Lost Marsh" wetlands from 9 acres to 13.5 acres, and restore George Lake South Basin to an ecologically functional body of water, by: 1) reducing the high pH (11-12) leachate which currently emanates from the rain that falls on the slag, and 2) dredging to deepen a minimum of 37 acres of George Lake south basin from its' current maximum 3' depth to 10' depth.

Rain percolates through the slag and leaches into George Lake South basin. This leachate will be essentially eliminated by a combination of construction and maintenance activities: 1) an impermeable cap covering the slag-a mixture of sand (dredged from the lake), biosolids (aged 18-25 years), and lime compacted to a minimum 18" thickness over the entire slag pile, which mixture has been tested to provide a permeability of 1×10^{-7} cm/sec.; and, 2) surface drainage- drainage of golf a course is critical to the design and is accomplished by a combination of open drainways (creeks, ditches, swales, etc.) and enclosed storm drain pipes; and, 3) having a dense grass turf growing in a topsoil layer installed over the impermeable cap, which turf is the playing surface for the golf courses, and which grass turf annually uses (evapotranspires) slightly less (3.5") water than the average annual rainfall in Northwest Indiana. Existing monitoring wells will be maintained and will be monitored to verify the efficacy of this design strategy.

The attached drainage plan shows surface water (and some subsurface water, e.g., golf greens) drainage boundaries. Ninety-one percent (91%) (103 acres)of the area with slag subgrade will have surface drainage into wetland ditches along 129th Street and Calumet Avenue. The remaining 9% of covered-slag area will surface drain into George Lake after being filtered thru grass buffers along golf fairways and a grass lined drainway that conveys storm drainage from a FEMA floodzone A that currently includes single family residences along New York Avenue and further east.

A coffer dam will prevent rising Calumet Avenue ditch water from flowing north into George Lake. A large capacity low-lift pump station will be constructed at the Southwest corner of George Lake. This design will maintain George Lake at a constant elevation 681.5 water surface which constancy allows: 1) establish and maintain mud flats/shallow water wetlands bordering proposed golf holes with George Lake perimeters, and, 2) with this water surface elevation constant, George Lake can be considered to have storm water detention volume, and 67 single family homes can be removed from the FEMA Flood Zone A by CLOMR.

Additional benefit derived from dredging the lake will be the removal of 8"-10" of lake-bed sludge that covers the sand substrat. This will increase the dissolved oxygen level in George Lake's south basin which will promote bacterial, crustacean, insect, and fish life. Periodic bacterial treatment of the lake in order to help maintain clear water and reduce the potential for algae accumulation will be a part of the integrated pest management (IPM) program for maintaining the golf course and its surround.

Turf management regarding the application of chemicals and pesticide has evolved in the past 10 years. Recognition and acceptance of information provided by ongoing research on soil micro-organisms and their bi-products, the reactions between these and soil productivity related to the health of plants and the ability to ward off pathogens and other pests has caused development of methods for analyzing supporting conditions and established guides for biologically effective management of turf grass using less toxic materials and pesticides. This will be integral to the IPM program for maintaining the golf course turf ,as well as to other maintenance areas.

Soil analysis is currently available which in addition to testing for standard chemical, physical, and productivity values of the soil, extracts and tests natural solutions derived from soil microbial enzymes, hormones and organics known to make nutrients and other essentials available for grass root uptake.

Audubon International, a storied, credible, and aggressive environmental research, education and conservation organization offers a program wherein they become involved in site analysis, design, planning, and preparation of habitat restorative maintenance programs (Integrated Pest Management - IPM). Lost Marsh Hammond Golf Course and George Lake Enhancement Project seeks enrollment in their Signature Program. Please see attached April 13, 1999 - Audubon Internationals' Audubon Signature Program statement of purpose.

Growing turf grass "naturally" by integrated Pest Management (IPM) requires information about the environment and pests as related to turf grass management, and pest control strategies. IPM predetermines the level of pests (insects, weeds, or turfgrass diseases) that will be tolerated. Only when these predetermined thresholds are exceeded, i.e., where significant and unacceptable levels of damage will occur to the golf playing surface - turfgrass - will controls (microbes/biologicals and perhaps factored application rates of chemicals, predator insects, beneficial nematodes, etc.) be applied. Even then application will be on afflicted target areas only.

Fertilizers are applied to golf course turfgrasses to maintain adequate growth from the traffic and grass cutting height required for play. Recently, studies have been directed at determining fertilizer (nutrient) fate, particularly where golf courses have play areas parallel to and near streams and/or lakes. The primary concern is fertilizer's nutrient migration through the soil into nearby waters.

Significant research has been done regarding this issue and one report titled "FATE OF GOLF COURSE TURFGRASS CHEMICALS IN A RIPARIAN ZONE" is attached. There will be a minimum 15' turfgrass buffer (Kentucky Bluegrass - *Poa Pratensis*) along riparian borders to golf course fairways, greens, and tees, that will be maintained (mown) to a longer cut (up to 3") to facilitate nutrient/chemical capture process.

Concluding that a well balanced landscape design for the golf course with a mix of

grass, trees, and shrubs, with George Lake South basin refurbishment, with the recapture of “scrap” industrial land, with creation of mud flats/shallow water wetlands, with expansion of existing jurisdictional wetlands, and with planned reforestation of the existing and largely retained woodlands, there will certainly be enhanced diversity of habitat and enhanced diversity of plants. Additionally, the entire Lost Marsh Hammond Golf Course and George Lake Enhancement Project, will recover 235 acres to the use, education, recreation, and enjoyment of the human community,. Which will be a radical departure from its' current condition.