Golf Course Environmental Management Plan

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Chapter 1 Introduction

Purpose of Plan

In 1996, the Air Force began development of the Golf Course Environmental Management (GEM) program which is a proactive initiative to foster better understanding of the environmental challenges facing golf courses worldwide. The goal of this Air Force Services Agency-approved program is to facilitate the creation of an environmentally friendly golf course facility while supporting the installation mission. The primary tenets of the GEM program are to minimize or eliminate potential negative environmental impacts, attain and maintain daily compliance with all appropriate regulations, and constantly examine all aspects of golf course management to achieve the highest standards of environmental excellence.

Plan Organization

The GEM Plan consists of the following components:

Section 1 – Introduction

Section 2 – Environmental Challenges

Section 3 – Environmental Management Strategy

Policy Statement

Tinker AFB supports and encourages sound environmental stewardship on its golf course. In demonstration of that commitment, the base has adopted the U.S. Air Force Golf Course Environmental Management Policy which states:

> ***In concert with the mission of the United States Air Force, we pledge to employ only those management practices that minimize or eliminate the potential for negative impacts to the environment and the surrounding community, ensure compliance with all appropriate regulations, and to constantly reevaluate our processes to achieve the highest standards of environmental excellence.***

This overarching statement has directed development of this Plan and will guide future environmental-related management decisions on the golf course. More specific policies appear in Section 3 (Environmental Management Strategy).

Status and Trend of the Golf Course Environment

In 2001, the Air Force Center for Environmental Excellence (AFCEE) (today known as the Air Force Civil Engineer Center, AFCEC) initiated the GEM process on Tinker AFB by conducting a golf course environmental baseline assessment (GCEBA, report available in 72 FSS/FSCG office). An update was accomplished by AFCEE in 2004. In the update, overall performance, implementation, and completeness of the golf course's environmental management program was assessed using an Environmental Compatibility Quotient (ECQ). The ECQ was determined for both *actual* (i.e., represents current level of the golf course management practice compatibility with the environment) and *potential* (i.e., represents a level of compatibility that could be reached by finalizing or fully implementing a particular practice or procedure). In 2004 the ECQ (actual) was 84, or "getting there," and the ECQ (potential) was 95, or "advanced." The program was reassessed in 2006. At that time, the ECQ (actual) was 93, or "advanced," and the ECQ (potential) was 98, or "advanced." Thus the trend of environmental improvements on the golf course is upward.

This GEM Plan is the next step of the GEM planning process and is intended to guide natural resources conservation actions on Tinker's golf course into the future. This plan is consistent with the land management goals of the Integrated Natural Resources Management Plan (INRMP).

Chapter 2 Environmental Challenges

The GCEBA identified environmental challenges on Tinker's golf course. Additional challenges have been added by Tinker AFB natural resources staff consistent with natural resources management policy and guidance outlined in the Tinker AFB INRMP. The following describes each environmental challenge and its associated regulatory driver. To aid in management, and as appropriate and available, each challenge has been mapped (Attachment 1).

Challenge 1: Air Installation Compatibility Use Zone (AICUZ)

(Map 1) (Regulatory Driver: AFMAN 32-7003)

Areas governed by the AICUZ include, but are not limited to, the clear zone (CZ) and accident potential zones (APZ). As defined in UFC 3-260-01, the CZ is a surface on the ground or water beginning at the runway end and symmetrical about the runway centerline extended. The length of the CZ is 3,000 feet and is measured along the extended runway centerline beginning at the runway end. The width is 3,000 feet and is centered on and measured at right angles to the extended runway centerline.

APZ I is defined as the area beyond the clear zone that possesses a significant potential for accidents. The length of APZ I is 5,000 feet and starts at the end of the CZ, and is centered and measured on the extended centerline. The width is 3,000 feet.

APZ II is defined as the area beyond APZ I that has a measurable potential for accidents. The length of APZ II is 7,000 feet and starts at the end of APZ I, and is centered and measured on the extended centerline. The width is 3,000 feet.

According to the Installation Development Plan (IDP), "DOD uses the AICUZ program to protect aircraft operational capabilities at its installations and to assist local government officials in protecting and promoting the public health, safety, and quality of life." Tinker's golf course is within the CZ and APZ I, which limits installation of buildings, certain plant materials, and other structures. The primary areas of concern are the golf course clubhouse and large trees which are located in the clear zone.

Challenge 2: Floodplains/Wetlands

(Map 2) [Regulatory Drivers: Executive Orders 11988, and 11990; AFMAN 32-7003; Sikes Act; TAFB Green Infrastructure Plan].

Within the golf course boundaries shown in this plan, the course is comprised of a total of 189 acres. Eighty-six acres (46%) are within the 100-year floodplain. The 500-year floodplain, which includes the 100-year floodplain is slightly larger than the 100-year floodplain. Of the 86 acres of floodplain, 72 acres (84%) are improved grounds (i.e., intensively manicured turf grass and paved surfaces/buildings), and 14 acres (16%) are unimproved grounds (riparian woodlands and native grass conservation areas).

The primary environmental-related floodplain/wetland challenge that exists on the golf course is compliance with Executive Order 11988, *Floodplain Management*, which requires Tinker AFB to restore and preserve the natural and beneficial functions and values served by floodplains in carrying out its responsibilities.

Floodplains and wetlands provide many beneficial functions and values. Functions currently provided by the golf course floodplain include:

- protection of banks from erosion,
- attenuation of flood peaks,
- fish and wildlife habitat,
- flora and fauna migration corridors,
- nutrient filtering,
- water quality maintenance by acting as sediment repositories, and
- ground water recharge.

Human-derived values from Tinker's floodplain include:

- recreational sites/opportunities (e.g., golf course),
- natural beauty,
- flood storage (reduce flood-related damage), and
- non-point source pollutant (e.g., pesticides, fertilizers) filtering which improves water quality and ensures compliance with NEPDS permit limits and ensures continuance of the base mission.

Although these functions and values are realized, it is on a relatively small scale because the majority (84%) of the golf course floodplain is improved grounds which contributes very little to the functions and values stated above. The challenge lies in how to improve floodplain functions and values while at the same time providing a championship-level golf course.

Challenge 3: Water quality; Groundwater Management Unit; and Installation Restoration Program (IRP) Sites

(Map 3) [Regulatory Drivers: Clean Water Act; Resource Conservation and Recovery Act (RCRA)].

Water quality, both ground and surface water, are areas of ecological concern on the golf course. Portions of the golf course are located over potentially contaminated ground water plumes. This presents possible challenges during excavation activities (e.g., installation of a subsurface irrigation line).

Maintaining a balance between high water quality and a lush attractive golf course is an additional challenge. Significant applications of herbicides and fertilizers must be made to maintain the desired visual attractiveness of the course. However, these could lead to the harmful introduction of these chemicals into the adjacent waterways.

A recent base-wide aquatic benthic macroinvertebrate assessment was conducted to determine the health of base aquatic systems and water quality (Jones, et. al. 2010). Five sampling sites were

located on the golf course. Three of the five sites were determined to be among the most stressed aquatic sites on base.

Challenge 4: Soils Uses and Limitations

(Map 4) [Regulatory Drivers: Clean Water Act].

Soils have many uses and limitations. Performance of trees is largely determined by the type soil the tree is growing in. Turf grass irrigation schedules may vary from one area to another based on the underlying soil types. Ponds must be constructed on soils of low permeability to ensure they adequately retain water. The primary environmental challenge associated with soils is that they may not support the specific desired improvements on the golf course.

Another soil-related challenge is erosion. Currently, all pond shorelines and some creek banks are mowed to the waterline, primarily for aesthetic reasons and to permit course play. This lack of vegetative cover contributes to shoreline and creek bank erosion. Erosion results in soil loss, degraded water quality, sedimentation, and other problems. In some cases cart bridge stability has been compromised by erosion at the bridge abutments.

Challenge 5: Oklahoma Species of Concern; Migratory Birds; Bird/Wildlife Aircraft Strike Hazard (BASH)

(Map 5) [Regulatory Drivers: Migratory Bird Treaty Act; AFMAN 32-7003; AFI 91-202; TAFB Plan 91-212].

Seven species at risk have been observed at the golf course: Spotted Sandpiper (*Actitis macularia*), Tree Swallow (*Tachycineta bicolor*), Swamp Sparrow (*Melospiza georgiana*), Loggerhead Shrike (*Lanius ludovicianus*), Bobolink (*Dolichonyx oryzivorus*), Alder Flycatcher (*Empidonax alnorum*), and Green Heron (*Butorides virescens*). The migrant loggerhead shrike *Lanius ludovicianus* spp *migrans*, has been identified as potentially occurring on the golf course. This is based on a single sighting during a 1995 sensitive species survey. However, due to difficulty in differentiating *Lanius ludovicianus* from *Lanius ludovicianus* spp *migrans* in the field, it was not certain whether this was the migrant race. Therefore, the actual status of this species on the golf course is uncertain.

Over 400 fish and wildlife species (including invertebrates) have been identified base-wide, many of which are expected to inhabit or visit the golf course; however, no comprehensive golf-course specific survey has been conducted. Status and trends of wildlife populations on the golf course are unknown.

Tinker AFB is located in the Central Migratory Flyway. Millions of waterfowl migrate through central Oklahoma via this flyway in the spring and fall of each year. Of particular concern is the potential attraction of migrant and resident geese. The large size and flocking habits of these birds pose significant bird/aircraft strike hazard potential. Since 2001, the United States Department of Agriculture Wildlife Services (USDA-WS) has been contracted by Tinker AFB to provide wildlife control services for Tinker AFB to include hazing and removing geese from the golf course. This has been effective in reducing waterfowl-related hazards.

Another species of particular concern is the Mississippi kite, a medium-sized raptor. Kites have historically nested on the golf course and can become very aggressive during the breeding season. Kites may attack golfers who come within close proximity to nest trees. Moreover, densities of this species appears to have risen substantially in recent years. Their soaring behavior, particularly late in the year when they soar in larger numbers, makes them significant potential bird aircraft strike hazards. Control of these birds in the golf course area is important to ensuring a safe flying environment for aircraft utilizing Tinker's airfield and for golfers on the course.

Beaver have also caused conflicts with golf course landscaping goals by damaging/killing large shade trees. However, they also play an important role in the creek ecosystem ecology by providing pools, promoting creek aggradation in a degradation-dominated system, and other benefits and therefore should be managed to maintain a balance on the course.

Challenge 6: Environmental Exclusion Areas

(Map 5)

No excavation is permitted in environmental exclusion areas. This challenge may limit certain golf course improvements, such as planting trees, running subsurface irrigation lines, etc. in the exclusion areas.

Challenge 7: Vegetation Management

(Map 6) [Regulatory Drivers: AFMAN 32-7003; Executive Order 13112; and *Presidential Memorandum, Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds*," April 26, 1994.].

Several vegetation management challenges have been identified on the golf course. Of the course's 189 acres, 169 acres (89%) are improved grounds and 20 acres (11%) are unimproved grounds. The improved grounds require intensive maintenance which limits use of manpower for other golf course improvements.

Unimproved grounds are comprised of linear riparian woodlands and about 26 acres that are being converted from turf grass to native prairie grasses. Invasive herbaceous exotics such as Bermuda grass persists in some areas of the native grass stands, and larger exotic ornamental grasses are spreading into the stands at some locations. Also, invasive, exotic woody species such as Siberian and Lacebark elm and panicled golden raintree, as well as invasive native trees, such as eastern red cedar and American elm, are rapidly becoming established in native grass stands.

Nutrient loads from fertilizers have caused blue algae blooms and aggressive aquatic weeds such as filamentous algae to become densely established in ponds causing them to become unattractive at certain times of the year. Grass carp have been used to provide some control; however, algae continues to be a problem.

From 2007 to 2017, over 350 native trees were planted on the golf course. In 2007, the base planted a Centennial Grove [one-hundred eastern redbuds (*Cercis canadensis*)] around the 9th green in celebration of Oklahoma's 100th birthday. This Arbor Day event was recognized as an official Centennial project by the Oklahoma Capitol Complex and Centennial Commemoration

Commission. These tree planting projects have been important in off-setting the recent urban forestry challenge (i.e., massive tree loss that occurred in Dec 2007 as the result of a destructive ice storm).

Chapter 3 Environmental Management Strategy

This section outlines the strategy planned to address the aforementioned challenges and other environmental-related issues for the future. As appropriate, proposed improvements such as shoreline stabilization, vegetative screening, native grass conversion, and others have been mapped (Attachment 2). This map also depicts "evaluation areas," which require more detailed evaluation and design to correct areas which are particularly problematic in meeting both environmental and golf course play goals simultaneously[1].

Challenge 1: Installation Compatibility Use Zone (AICUZ)

Objective 1: To meet clear zone requirements, demolish existing clubhouse, and remodel B-6001 as the new clubhouse, which is outside the clear zone. (This objective has been established for general planning purposes consistent with the Installation Development Plan; no completion date is set due to uncertainty of funding).

Challenge 2: Floodplains/Wetlands

Objective 1: By 2023, and following completion of Challenge 7 (Objectives 2 & 3), improve floodplain and adjacent habitat functions by completing conversion of turf grass areas to native grasses. ***[Mgt, Habitat (WWYKA53226119 and out-years) & Mgt, Invasive Species (WWYKA53226121)]***

Challenge 3: Water quality; Groundwater Management Unit; and Installation Restoration Program (IRP) sites

Objective 1: By 2023, improve water quality by reducing pesticide and fertilizer inputs to waterways.

> **Activity 1:** Annually maintain pesticide applicator certifications IAW AF and DOD pesticide regulations. **[M—refer to Section 10 of INRMP for L, M, and H definitions]**
>
> **Activity 2:** Quarterly, the golf course maintenance superintendent will report all previous quarter pesticide usages in pounds of active ingredient (AI) per acre to Civil Engineering.

Challenge 4: Soils Uses and Limitations

No objectives were established for this challenge for this planning cycle.

[1] **Must fund projects are shown in *green italics*.** Execution of projects labeled as "must fund" (or otherwise indicating that projects are required) is dependent on availability of funds, and nothing in this plan may exceed appropriations available for payment. Further, labeling of projects as "must fund" cannot be considered as implying that Congress will at a later date appropriate funds sufficient to meet deficiencies.

Challenge 5: Oklahoma Species of Concern; Migratory Birds; Bird/Wildlife Aircraft Strike Hazard (BASH)

Objective 1: Through 2023, maintain golf course diurnal raptor nesting at zero and minimize diurnal raptor foraging to ensure a safe aircraft flying environment northwest of Runway 13-31.

> **Activity 1:** By May/Jun of each year, USDA Wildlife Services initiate management actions to discourage Mississippi kite nesting on golf course. **[M]**
>
> **Metric 1-1:** This objective will be tracked by conducting annual surveys and comparing data with the 2006 raptor baseline data.

Challenge 6: Environmental Exclusion Areas

No objectives were established for this challenge for this planning cycle.

Challenge 7: Vegetation Management

Objective 1: Through 2023, as funding permits support Tinker's Urban Forestry Objective 1 which states, *"By 2020, improve environmental quality by increasing base urban forest percent canopy cover towards and overall canopy coverage of 25%; 9% for industrial areas; 18% for commercial areas; and 35% for residential areas (including golf course) and move towards a base-wide native to non-native tree ratio of 100:0."*

> **Metric 1:** This objective will be tracked in conjunction with the urban forestry metrics under the Urban Forestry section of the INRMP.

Objective 2: By 2025, restore existing native grass stands in out-of-play areas.

> **Project 1:** By Sep 2024 and consistent with the TAFB Green Infrastructure Plan [i.e., ***Mgt, Habitat (WWYKA53226119 and out-years) & Mgt, Invasive Species (WWYKA53226121)***], eradicate invasive non-native grasses and woody plants in areas being converted from turfgrass to native grass and seed/reseed where necessary. **[H]**

Objective 3: By 2023, continue routine prescribed burning of existing native grass areas on the golf course consistent with TAFB Green Infrastructure Plan.

Literature Cited:

Air Force Center for Environmental Excellence. 2004. *Tinker Golf Course Environmental Baseline Assessment (GCEBA)*. AFCEE/TDE. San Antonio, Texas.

Jones, J. J. and M.J. St. Germain 2010. *Aquatic Benthic Macroinvertebrate Assessment on Tinker Air Force Base, Oklahoma City, Oklahoma.* Conservation Management Institute, Virginia Polytechnic Institute and State University, College of Natural Resources and Environment, Blacksburg, Virginia.