



**Randolph Oaks Golf Club
Environmental Management Plan
Randolph AFB, TX May 07**



Randolph Oaks Golf Club Environmental Policy

**In concert with the
Randolph AFB mission,
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.**

Troy Gann, Director of Golf



Tony Osborn, Superintendent

Executive Summary

U. S. Air Force GEM Program

The U. S. Air Force Golf Course Environmental Management (GEM) program is a proactive Air Force Center for Environmental Excellence (AFCEE) initiative to foster a better understanding of the environmental challenges facing our golf courses worldwide. Armed with the support and approval of the Air Force Services Agency golf program, AFCEE's goal is to facilitate the creation of an environmentally friendly golf course facility while supporting the installation mission. AFI 32-7064 requires a GEM Plan as part of the Integrated Natural Resources Management Plan (INRMP).

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.

GEM Program process

There are five steps in the GEM program process.

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision



Environmental Compatibility Quotient

Actual ECQ	74
Potential ECQ	96

Final environmental challenges

The following environmental challenges were identified during the GEM Plan process:

- Water conservation/Endangered Species Act
- Long term water supply
- Stormwater & water quality management
- Bird/wildlife aircraft strike hazard (BASH)
- Human health & safety
- Migratory Bird Treaty Act

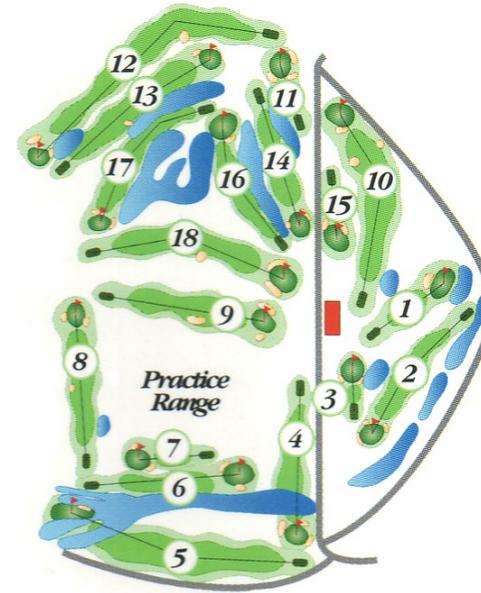
Where do we go from here?

The true measure of a successful GEM program is how well is it executed in the field each and every day. The installation golf and environmental staffs should continue to analyze, document, monitor, evaluate, revise, and implement changes based on lessons learned. The GEM Plan should be updated annually and completely revised during the next INRMP iteration update. The entire GEM process can be found on the regularly improved AFCEE GEM program website (<http://www.afcee.brooks.af.mil/ec/golf/>).

Analysis

Course details

Architect	Press & Perry Maxwell, 1949; Joe Finger, 1956; George Williams & Robert Rose, 2005
Year constructed	1949/1956/2005
Climate	Hot, humid, cold, dry
Average annual rainfall	Approx. 33 inches
Average growing season	Approx. 280 days
Elevation	Approx. 250' ASL
Winds/Prevailing Direction	North/southeast
Total Facility Acreage	Approx. 243 acres
Par	18 Holes- 36-36-70
Yardage/Rating/Slope	Blue- 7172/74.5/125 White- 6744/72.7/122 Gold- 5873/68.6/119 Red- 5486/71.5/120
Turfgrass	419 Bermuda/Common
Tees-	Common/Hybrid mix
Fairways-	Tifdwarf
Greens	Common / mix
Roughs-	



Randolph Oaks Golf Club Layout

Course description

Constructed for \$30,000 by the Oklahoma National Guard, the original 9 holes at Randolph Oaks Golf Course at the Randolph AFB in San Antonio, TX were dedicated on May 8, 1949. The second nine holes were added in 1956 from a design provided by Joe Finger, ASGCA. Under the guidance of Director of Golf, Troy Gann, the course has just completed a remarkable renovation of its greens complexes and irrigation system. The new greens, courtesy of Abilene, Texas golf course architect, George Williams, guarantee a new beginning as well as a bright future for the course. Continued command interest and an active and large group of golfing retirees should keep things moving forward.



Randolph Oaks Golf Club Aerial Photo

Determining the Baseline (ECQ)

The following is a brief compilation of some of the responses in each of the ten Environmental Compatibility Quotient (ECQ) categories obtained in an interview with the superintendent and the manager conducted during the site visit.

ECQ Categories

- Overall Management Philosophy & Documentation
- Safety, Training, And Awareness
- Compliance
- Pesticide Use, Storage, & Handling
- Pollution Prevention
- Conservation Practices
- Water Resources
- Maintenance Practices
- Customer Relations & Education
- Miscellaneous Special Projects & Activities

Key to checklist responses

- **Yes** = Practice is complete or ongoing and can be verified.
- **Partial** = Practice has been initiated but needs further attention and improvement.
- **No** = Practice is not in place.

ECQ Checklists

The Environmental Compatibility Quotient (ECQ) checklists are a convenient method of assessing the overall performance, implementation, and completeness of an installation's Golf Course Environmental Management Plan. The checklists can be used in many ways including:

- As an analytical tool while compiling a Golf Course Environmental Baseline Assessment like this one.
- As a self-assessment tool for the golf course manager or superintendent.
- As an award nomination evaluation by a Golf Course Assessment Team (GCAT).



The 14th is one of the best holes in San Antonio.

Interpreting the ECQ

The ECQ compiled for an installation's course is a snapshot of the overall performance and compliance with the GEM Plan. There are two measures obtained as a result of using the ECQ checklists to determine the status or quality of the environmental management program: 1) determining the actual and; 2) potential environmental compatibility quotients.

- **Actual ECQ-** the total percentage of "Yes" responses for all ten checklists. This number represents the current level of the golf course management practice compatibility with the environment
- **Potential ECQ-** the total percentage of "Yes" responses plus the total percentage of "Partial" responses for all ten checklists. Maybe the most significant measure; the potential ECQ represents a level of compatibility that could be reached by finalizing or fully implementing a particular practice or procedure.

ECQ Scoring Scale

Percent Responses Yes or Partial per Category	Level
90-100%	Advanced (Green)
70-89%	Showing progress (Yellow)
69% or less	Getting started (Red)



The pro shop at Randolph Oaks is one of the Air Force's best.



Mature live oaks dominate the landscape at Randolph Oaks GC..

Overall Management Philosophy & Documentation				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Has installation environmental and golf management demonstrated that the environment is an important part of their responsibilities by initiating the GEM Planning process?	✓		
2	Has the golf course adopted and posted an Environmental Policy?		✓	
3	Is the GEM Plan underway or completed, available, and updated regularly?		✓	
4	Is a map of the property highlighting identified environmental challenges available, used in the environmental management decision-making process, and is it posted for customers?			✓
5	Are environmental challenges and their management method, target, and objective, and overall golf course GEM program goals evaluated at least annually and are they regularly communicated to employees, customers, management, and the local community?		✓	
6	Are written records of water quality monitoring activities, results, and control measures collected and readily available?	✓		
7	Is there an inventory of bird and mammal species maintained and readily available?	✓		
8	Is there a general understanding of how course management practices may positively enhance or adversely impact the environment?	✓		
9	Are the environmental impacts of pest control measures considered prior to their use as part of the course environmental management planning process?	✓		
10	Are records of pest treatments and their effectiveness maintained and used to guide future pest control decisions?	✓		
	Point totals for each column	6	3	1

Safety, Training, & Awareness				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are all golf course employees familiar with the GEM program and are they trained on the importance of environmental compliance with the goals and objectives of the program as it applies to their specific duties?		✓	
2	Are all appropriate employees trained to be familiar with U. S. Air Force, federal, state, and OSHA regulations that apply to the storage, handling, and disposal of all chemicals potentially used on the property?	✓		
3	Are all employees aware of the potential risks to human health and the environment of chemical use, storage, and disposal?	✓		
4	All appropriate employees receive documented training on their work practices that may adversely impact worker health, on- and off-site water quality, and wildlife species and their habitats?	✓		
5	Is a current copy of Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property maintained and readily available for use by regularly trained employees?	✓		
6	All employees receive regular, documented training on all potential OSHA issues associated with their specific duties?	✓		
7	Are all golf course pesticide applicators active participants in a respiratory and/or pulmonary testing program?	✓		
8	Are all pesticides, fertilizers, and other chemicals stored on appropriate shelving in an approved storage facility?	✓		
9	Are golfers notified in the pro shop and on the first and tenth tees about the planned or recently completed spraying of any chemical or fertilizer that may potentially be hazardous to human health or general public safety?	✓		
10	Are key staff members trained regarding water quality and conservation issues pertinent to the course and their particular duties?	✓		
	Point totals for each column	9	1	0

Compliance				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are the fuel storage/delivery area and associated equipment managed in accordance with federal, state, and local regulations?	✓		
2	Are installation environmental staff members regularly consulted on pertinent course management discussions and plans?	✓		
3	Are there golf course staff meetings where environmental management issues are regularly discussed with all employees?		✓	
4	Do the director of golf and the superintendent attend all internal and external ESOHCAMP in-briefings and out-briefings?	✓		
5	Do the director of golf and/or the superintendent coordinate their input on the various management plans that affect or include the golf course with installation environmental staff?		✓	
6	Have all environmental challenges been physically identified and mapped to aid the golf staff's daily management efforts?		✓	
7	Has appropriate impact analysis (NEPA) been performed on all proposed actions on or affecting the golf course property?	✓		
8	Are oil containers used to collect old oil in good condition and correctly labeled?	✓		
9	Has the golf course staff assisted the installation environmental staff with the required Golf course Environmental Management Plan requirements?	✓		
10	Were there less than two major golf course facility-related findings during the last official ESOHCAMP visit?	✓		
Point totals for each column		7	3	0

Pesticide Use, Storage, & Handling				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there trained scouts on staff other than the superintendent to monitor turf and plant pest populations that notify management include findings into a report or guide for future use?	✓		
2	Are there written pest profiles of common pest species with a variety of potential control measures including cultural, biological, physical, and mechanical controls prior to treating the problem on the course?		✓	
3	Are there established, documented, and utilized aesthetic and functional thresholds for effective management of pests that may also reduce chemical use?		✓	
4	Is there a specially designed pesticide mixing area where all mixing is performed by appropriately trained personnel?	✓		
5	Has a current list of all pesticides and other chemicals stored or used at the golf facility recently been provided to the appropriate Fire Department(s)?	✓		
6	Is there a written, readily available, and regularly updated Integrated Pest Management Plan for the entire golf course facility?		✓	
7	If personal protective equipment is required for pesticide use, storage, or handling, is it available for use by trained individuals?	✓		
8	Are written and readily available records maintained of all applications of pesticides made by certified applicators, including the following? - the quantity of each pesticide used; - the chemical or common name of the active pesticidal ingredient(s); - the pest or purpose for which the pesticide was applied; and the date and place of application.	✓		
9	Is the chemical storage structure/area well ventilated, fire resistant, and locked with access limited to select personnel?	✓		
10	Are there designated and documented "no spray" areas around pond, river, stream, or lake edges and have they been communicated to pesticide applicators?		✓	
Point totals for each column		6	4	0

Pollution Prevention				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there designated and documented "minimally-maintained" or natural vegetative buffer areas around pond, river, stream, or lake edges and have they been communicated to mower operators and pesticide applicators?		✓	
2	Is there a readily available copy of the Installation Spill Plan that includes the golf course facility and is there a spill containment kit at each required location with spill containment procedures in place?	✓		
3	Does the chemical storage area have a sealed metal or concrete floor and are all liquid pesticides handled over an impermeable surface?	✓		
4	Does the chemical storage area have a lip along the edges to contain spills?	✓		
5	Are liquid products stored below dry products and are dry materials stored on appropriate pallets or shelves to keep them off the floor?	✓		
6	Do all golf facility employees regularly receive documented and approved HAZCOM and safety and health training?	✓		
7	Are grass clippings removed from equipment with compressed air instead of or prior to washing?		✓	
8	Are gasoline, motor oil, brake and transmission fluid, solvents, and other chemicals used to operate or maintain equipment and vehicles prevented from directly or indirectly entering water bodies?	✓		
9	Has the watershed in which the course resides and contributes runoff to been identified and mapped to aid the golf course staff?	✓		
10	Are appropriate quantities of fertilizers applied during weather conducive to reducing the potential for leaching and runoff?	✓		
Point totals for each column		8	2	0

Conservation Practices				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are recycling containers conveniently provided for customer and employee use throughout the golf course facility?	✓		
2	Are there appropriately designated and mapped minimally maintained areas on the golf course facility grounds?		✓	
3	Has the irrigation system or its components recently been upgraded to reduce inefficiency, malfunction, and overall water use?	✓		
4	Has all “non-target” irrigation (ponds, natural, or out of play areas, etc.) been eliminated or minimized?	✓		
5	Have irrigation system flow meters been installed to monitor water use and detect potential waste?	✓		
6	Has the entire golf course facility property been examined for landfills, critical habitats, threatened or endangered species, wetlands, floodplains, and historical/cultural resources or other environmentally sensitive features?	✓		
7	Are employees encouraged to minimize their trips around the course to conserve on the use of fossil fuels and minimize potentially harmful exhaust emissions?	✓		
8	Do the restaurant and/or snack bar utilize reusable plates and silverware for use by customers throughout the facility’s operating hours?	✓		
9	Have the annual maintenance practices for the officially designated “minimally-maintained” or natural areas been coordinated with the installation Bird/Wildlife Aircraft Strike Hazard (BASH) officer and installation environmental management personnel?	✓		
10	Are all motorized golf course equipment regularly checked for excessive air polluting emissions?	✓		
Point totals for each column		9	1	0

Water Resources				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are water features regularly monitored for algae, erosion, excessive aquatic plant growth, fish kills, and sedimentation?	✓		
2	Are equipment wash or wastewater kept from directly entering surface water and are they recycled or allowed to filter through a vegetative area?	✓		
3	Are outdoor irrigation of non-golf course landscape areas regularly monitored and maintained for leaks and efficient performance?	✓		
4	Has the golf course staff coordinated with the installation's environmental staff on potential storm water management planning requirements?	✓		
5	Have part circle irrigation heads been installed where possible to preserve water resources and reduce maintenance while minimizing potential negative impacts to surrounding minimally maintained, natural, or water feature areas?	✓		
6	Are all water feature maintenance tasks coordinated with the installation Bird/Wildlife Aircraft Strike Hazard (BASH) officer and installation environmental management personnel?	✓		
7	Has the irrigation system been completely checked for proper water distribution in all irrigated areas and are water leaks fixed in a timely manner?	✓		
8	Are moving water bodies that pass through the golf course such as streams or creeks regularly monitored both upstream and downstream of the course for overall water quality?	✓		
9	Does the facility have an approved written and readily available Drought Management Plan if, or when irrigation restrictions may be required by the community or the installation?		✓	
10	Is there a comprehensive, up to date, and readily available written Water Feature Management Plan for the entire golf course facility?			✓
Point totals for each column		8	1	1

Maintenance Practices				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is there a written, regularly updated, and readily available Golf Course Maintenance Plan?	✓		
2	Does the Maintenance Plan include individual plans such as Integrated Pest Management, Tree Management, and Hazard Communication?		✓	
3	Are green, tee, and fairway mowing heights maintained at reasonable levels that do not unduly stressing turf or requiring additional chemical inputs?	✓		
4	Are there regular and documented procedures in place to continually improve overall course soil health such as topdressing, organic amendments, aeration, and drainage improvements?	✓		
5	Is there an up to date and readily-available map of the course's "hot spots", or those areas requiring special care or regular attention?	✓		
6	Is all maintenance equipment maintained and cleaned in a manner that minimizes or eliminates the potential for spreading of pest or disease contamination?	✓		
7	Has there been a complete examination of all aspects of the golf course facility operation (including the snack bar and grill, clubhouse, pro shop, cart storage facility, and maintenance complex) for potential negative environmental impacts?	✓		
8	Is contour mowing used to conserve fuel and increase playability and aesthetics?		✓	
9	Have all playing surfaces been inventoried and mapped for potentially agronomically challenging soil types?		✓	
10	Are soil tests and plant tissue analysis used to determine nutritional requirements?	✓		
Point totals for each column		7	3	0

Customer Relations & Education				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are the course manager and superintendent involved in an on-going and documented customer environmental management educational program?		✓	
2	Is there a highly visible location at the course or clubhouse where golf course environmental management notices and informational messages are regularly posted for the education and enjoyment of customers?		✓	
3	Do the course manager and superintendent actively communicate with customers to determine their points of view?	✓		
4	Is there documented, regular communication by course management with installation civil engineering, environmental, and leadership on GEM program issues or concerns?	✓		
5	Does the golf staff regularly survey their customers on how they rate the various elements of the golf course facility?	✓		
6	Is there consistent and attractive signage around the course and grounds that would increase the awareness of the average golfer to the environmental management practices employed?			✓
7	Are there signs appropriately located to warn golfers of hazards around or near recycled or otherwise non-potable water?	✓		
8	If applicable, have areas of the course been designated "Environmentally Sensitive Zones" per USGA rules?	✓		
9	Are course staff members regularly trained on how to improve their dealings with customers?	✓		
10	Are there clinics provided to teach beginning golfers the basics of the game to include the rules as well as the environmental challenges faced by the golf staff at their facility?	✓		
	Point totals for each column	7	2	1

Miscellaneous Special Projects & Activities				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there projects planned and funded for execution in the near future that would demonstrate the compatibility of the course's management methods with GEM program initiatives?	✓		
2	Are there projects planned and funded to reduce the course's potential negative environmental impacts?	✓		
3	Are there tournaments or other events planned that may educate customers on the environmental challenges faced by the golf staff?		✓	
4	Are there regular field trips hosted at the course for local students or other community groups?	✓		
5	Are there projects planned to eliminate or minimize a potential erosion problem?	✓		
6	Does the course have a native tree installation program complete with planting plan and maintenance schedule?		✓	
7	Are any of the local schools or universities involved in educational or research activities at your course?	✓		
8	Are there facility-wide recycling programs underway?	✓		
9	Is your course an active participant in the USAF Golf Environmental Management Program?	✓		
10	Has your facility been nominated by your MAJCOM for the golf course environmental management award in the last 3 years?			✓
	Point totals for each column	7	2	1

ECQ Summary

#	Environmental Compatibility Quotient Category	Yes	Partial	No
1	Overall Management Philosophy & Documentation	6	3	1
2	Safety, Training, & Awareness	9	1	0
3	Compliance	7	3	0
4	Pesticide Use, Storage, & Handling*	6	4	0
5	Pollution Prevention	8	2	0
6	Conservation Practices	9	1	0
7	Water Resources	8	1	1
8	Maintenance Practices	7	3	0
9	Customer Relations & Education	7	2	1
10	Miscellaneous Special Projects & Activities	7	2	1
	Composite point total/response percentage	74	22	4

Apr 07 - Randolph Oaks Golf Course, Randolph AFB, TX

- Actual ECQ (# of “Yes”) = **74** (“Showing progress” - Yellow)

- Potential ECQ (Actual ECQ plus “Partial”) = **96** (“Advanced” - Green)

* = Category requires improvement or attention

Environmental challenges

One of the important results of the GCEBA process is the identification of potential environmental challenges (ECs) to be addressed in the long-term GEM Planning process. After confirming each EC, the golf staff will determine the best management approach that will satisfy the goals of the golf facility from the course playability and customer satisfaction perspectives first. Then the golf staff's preferred management approach should be coordinated with the installation's environmental staff for refinement, coordination, and approval.

Ultimately, the combined environmental and golf staff team should proceed toward finalizing the GEM Plan. The entire process can be viewed at the AFCEE GEM website (<http://www.afcee.brooks.af.mil/ec/golf/>).

The following potential environmental challenges were identified during the GCEBA process:

- Water conservation/Endangered Species Act
- Long term water supply
- Stormwater & water quality management
- Bird/wildlife aircraft strike hazard (BASH)
- Human health & safety

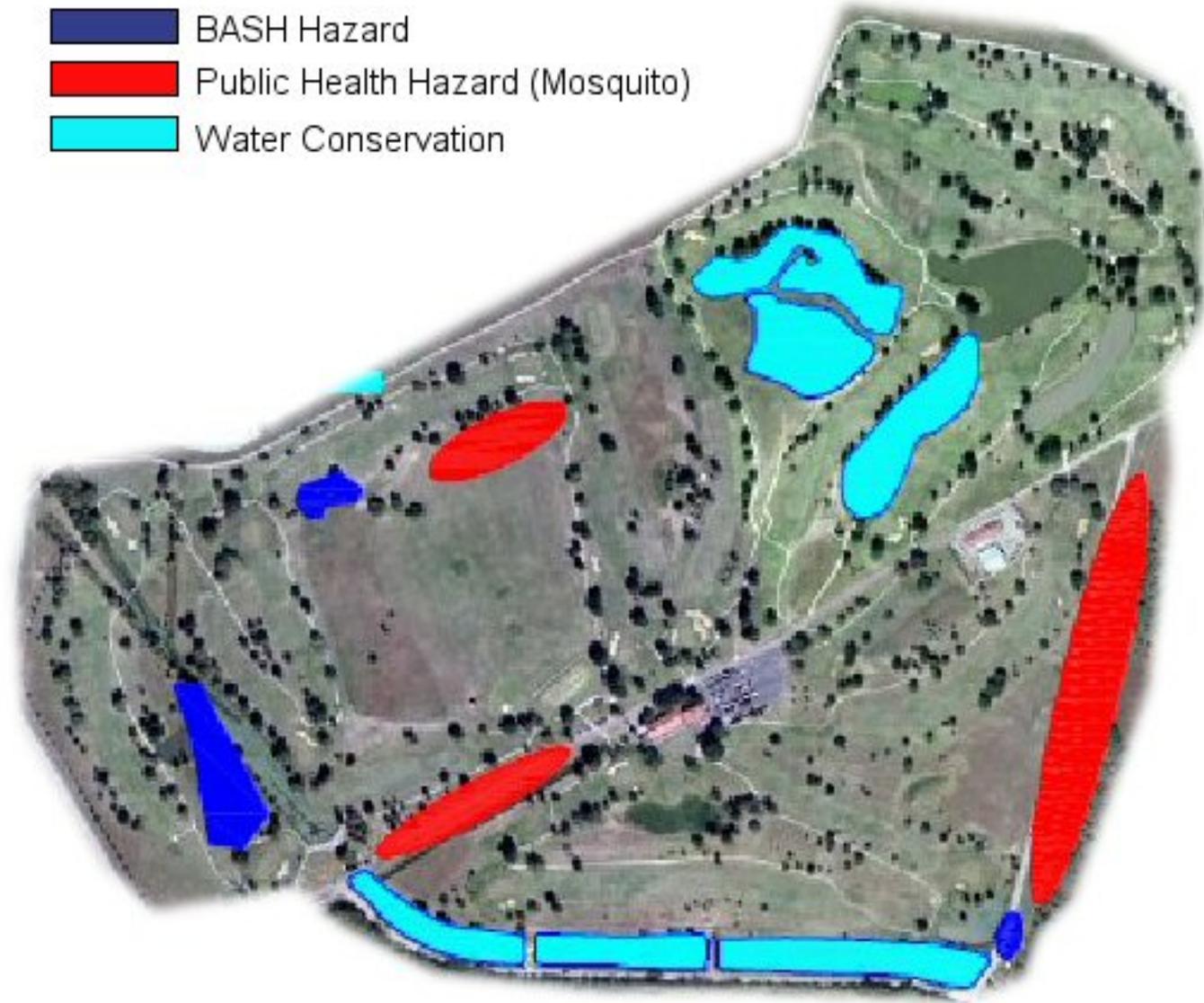


The newly installed irrigation system will assist Superintendent Tony Osborn and his staff to minimize wasted water resources.

FINAL ENVIRONMENTAL CHALLENGES

The following final environmental challenges were identified during the GEM Plan process:

- Water conservation/Endangered Species Act
- Long term water supply
- Stormwater/water quality management
- Bird/wildlife aircraft strike hazard (BASH)
- Human health & safety
- Migratory Bird Treaty Act



Randolph Oaks Golf Course Environmental Challenges

WATER CONSERVATION/ENDANGERED SPECIES ACT

According to the INRMP, the Edwards Aquifer Authority was established in 1959 and has the responsibility and duty to conserve and protect the resources of the Edwards Aquifer. A groundwater conservation plan consisting of five successive demand reduction stages is in place for the region.

In 2004, Randolph AFB approved its water conservation plan which is continuously revised and updated based on current water data. The plan parallels some of the current local community plans for water use reductions based on the levels of the aquifer in a test well located at Fort Sam Houston, Texas. Installation of low-flow devices is one area where water conservation efforts have and can continue to decrease demand at Randolph AFB.

The golf course is one of the largest and most obvious water users on the installation. Even though recycled water is used for irrigation, efforts should be made to minimize waste. A new irrigation system was recently installed to assist in this effort.

Driver/requirement

Endangered Species Act/Edwards Aquifer

Objective

Contribute to the region wide conservation of all water resources while still providing the best quality golfing experience for the Randolph Oaks customers.

Management Practices

- New computerized irrigation system provides accurate, current water use information
- Continued use of recycled water that is not subject to restrictions during regional shortages
- System is regularly checked for efficient operations
- Facility-wide drought management plan in the works
- Compile golf course drought management plan

Target

Maintain vigilance on water quality and water conservation concerns at all times.



The Endangered Species Act protects many animals in the Edwards Aquifer.

LONG TERM WATER SUPPLY

The current supplier of irrigation water for the Randolph Oaks Golf Course is the GCRCAR. The contract with the provider expires in 2013. Reliable long term supplies must be secured by the installation to ensure that the course will be viable. In March 2005, a study was initiated to explore the feasibility of using the Leona Formation, a separate shallow alluvial aquifer or perched water table located 5-20 feet below the surface of the ground as an alternate water source. Currently, this shallow alluvial aquifer is not suitable for irrigation use by the installation.

Driver/requirement

The Leona Formation is too shallow thus limiting adequate water supply or pumping capability.

Objective

Secure adequate recycled water or other sources of irrigation quality water for the foreseeable future.

Management Practices

- New computerized irrigation system provides accurate, current water use information
- Contract with recycled water provider expires in 2013. Begin negotiations to extend contract.

Target

Begin negotiations with current supplier immediately and secure a new long term contract by the end of CY 2008.



Water quality concerns abound for Woman Hollering Creek.

STORMWATER & WATER QUALITY MANAGEMENT

The Randolph Oaks Golf Course is blessed with 10 ponds and a creek that add beauty and challenge to the course. These water features greatly complicate management of the course as several regulations and most of the environmental challenges identified during this study are related to water and its management. There are even three water quality monitoring wells located on holes 2, 6, and 13.

The INRMP states, “Woman Hollering Creek is a first order stream that originates on the southern portion of Randolph AFB and runs approximately 10.1 miles southeast to Martinez Creek. Woman Hollering Creek is historically an intermittent stream receiving and

conveying water only during rainfall events and from groundwater seepage through its course. Woman Hollering Creek began receiving constant flows from Randolph AFB in 1946 as the result of the construction of a stormwater drainage ditch conveying base run-off into the creek. Randolph AFB obtained an easement along Woman Hollering Creek to maintain the drainage ditch with an agreement that historical flows of the creek would be maintained.”

The INRMP further discusses monitoring results. “Dissolved oxygen levels immediately below the installation boundary ranged from saturated conditions during February to generally low levels (3-5 milligrams per liter, mg/L) during summer. Downstream aeration typically resulted in dissolved oxygen levels greater than 6.0 mg/L during the year. Conventional pollutants (suspended solids, nitrate-nitrogen, ammonia-nitrogen, and phosphates) were generally within acceptable limits throughout the stream, with the exception of fecal coliform.”

“A variety of fish have been occasionally stocked in the WHC ponds along the Randolph AFB Golf Course simply as a “put and take method” with organized management effort to include the recording or documenting of information regarding the success or failure of these stockings.”

The INRMP states that “Woman Hollering Creek is a natural drainage system starting on the base. Stormwater runoff from the developed area of the base is directed toward the south, to a series of small detention ponds constructed along what was once

Woman Hollering Creek. The creek now exists on the base only as these detention ponds. The series of linear detention ponds continues to the south edge of the base, where they empty into the natural continuation of the creek.”

Due to the complex and important role played by Woman Hollering Creek both as a natural water body and as a golf course hazard and amenity, it is paramount that the golf staff ensures their practices do not impair the water quality or violate the Clean Water Act in any manner.



Flow capacity and the potential for pesticide and fertilizer runoff make Woman Hollering Creek the highest priority water feature.

Driver/requirement

- Clean Water Act, Section 401

Objective

Ensure that no golf course management practice diminishes the water quality..

Management Practices

- Establish and document appropriate pesticide and fertilizer application setbacks or buffers around monitoring wells
- Establish and document appropriate pesticide and fertilization application buffers and coordinate with contracted maintenance personnel around Women Hollering Creek and the golf course ponds
- Ensure that all pesticides are only applied per the label instructions

Target

Establish and map all buffers prior to the end of FY08.



Dozens of cormorants make Randolph Oaks their home.

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

According to the INRMP, “wildlife surveys of the airfield environment have indicated the Randolph Oaks Golf Course creates habitats that attract the greatest number of birds, both in number of species (diversity), population (density), and physical characteristics (size and weight). The golf course poses a significant bird attractant and threat to the Randolph AFB flying mission, which must be intensely managed to reduce this threat as much as possible. Golf course personnel and the NRM must work to find methods to reduce the attractiveness of this important recreational facility.

Trees, shrubs, and ponds maintained on the golf course must be managed to reduce their attractiveness to birds to the maximum achievable degree. Waterfowl species due to their size and body mass (density) are a significant BASH concern. Bird populations, regardless of species, should be managed either by elimination or dispersal. Bird species that exhibit highly social and flocking behaviors, like size and body mass, present a significant hazard. This hazard increases as the size and body mass of the bird species increase and the degree of socialization occurs.”

Driver/requirement

- RAFB 91-212 (Bird Wildlife Strike Hazard Plan)
- Migratory Bird Treaty Act

Objective

Ensure that golf course management practices contribute to the overall elimination of potential BASH concerns.

Management Practices

- Continue removal of highly attractive trees and shrubs
- Ensure minimally-maintained areas are mowed in accordance with airfield mowing criteria or on a requirement basis (7-14”) wherever practicable
- Continue to coordinate with installation natural resources manager, airfield management, and contracted USDA personnel
- Establish buffers and coordinate with contracted maintenance personnel for mowing and trimming practices along banks of Women Hollering Creek
- Comply with depredation permit at all times
- Attend all BASH Working Group meetings

Target

- Complete Tree Management Plan that identifies BASH-potential species and implement annual maintenance schedule



Many of the course's ponds can overflow during heavy rain events.

HUMAN HEALTH & SAFETY

According to the INRMP, "Standing water sources include the golf course ponds and any area on which water remains for a period of time exceeding 48 hours. With the exception of the golf course ponds (i.e., water hazards), these impoundments are normally rainfall dependent and can have standing water lasting from several days to a few weeks depending on the saturation of the soil. Generally, and under normal conditions, the standing water in these areas will be absorbed within 48 hours. These water sources should be identified and monitored, for not only bird activity, but also mosquito-breeding as there are several mosquito-transmitted diseases that potentially occur in this geographical area. When standing water areas have been identified, means to

eliminate the standing water and/or disperse the birds will be initiated and continued until the population either no longer uses the site or is eliminated. Areas that contain permanent water sources, such as water traps on the golf course, storm runoff ponds where mosquitoes breed, will be monitored and treated to prevent mosquito breeding. The preferred method will be to stock the permanent water sources with fish (*Gambusia affinis*) or small larvae feeding minnows."

Driver/requirement

AFI 48-102 (Medical Entomology Program)

Objective

- Protect customers, employees, and installation personnel at all times from preventable health and safety concerns

Management Practices

- Begin concerted efforts to eradicate all poorly drained areas on the golf course grounds
- Continue to monitor poorly drained areas and utilize mosquito dunks (*Bacillus thuringiensis*) or larvicide (IGRs and/or pesticides) distributed by certified pesticide applicators in all poorly drained areas
- Consider stocking permanent water sources with fish (*Gambusia affinis*), or small larvae feeding minnows

Target

- Eliminate all poorly drained areas near high use areas within 3 years

- Eliminate all poorly drained areas on the regularly maintained golf course within 5 years

MIGRATORY BIRD TREATY ACT

Protection afforded to birds protected by the Migratory Bird Treaty Act and the Empty Nest Policy per (MBTRA) includes barn swallows, raptors, and water birds, (i.e., ducks, herons, cormorants, & egrets, etc.).

Driver/requirement

- Migratory Bird Treaty Act
- Randolph AFB Depredation Permit

Objective

- To discourage bird activity by destroying nests prior to eggs being laid (Empty Nest Policy)

Management Practices

- Discourage nest construction
- Employ harassment/hazing techniques to move protected bird species
- Use approved irritants as applicable
- Utilize the depredation permit as the last option

Target

- Plan to monitor swallow nest building according to recommended timeframes per the natural resource manager's guidance and remove all observed nests immediately

GEM Plan goals & objectives

Goals are defined as actions or results that should be accomplished in the next year. A detailed description of these should be inserted here.

- Implement a customer education program
- Compile and implement a course-specific Integrated Pest Management Plan
- Establish and document all pesticide and fertilizer application buffers around water bodies
- Designate and document "minimally-maintained" or natural vegetative buffer areas around pond, river, stream, or lake edges and communicate to mower operators and pesticide applicators
- Compile a written Drought Management Plan

A detailed description of these should be inserted here. Please see the AFCEE GEM program website (<http://www.afcee.brooks.af.mil/ec/golf/>) for more information.

Objectives are defined as actions or results that are desired to be accomplished prior to the next INRMP update.

- Compile a written Water Feature Management Plan
- Compile a Tree Management Plan
- Install consistent and attractive signage around the course and grounds that would increase the awareness of the average golfer to the environmental management practices employed

GEM Plan best practices

Best practices are defined as any action, method, practice, or result that has proven its value and worth over time. The GEM program has been designed to create a body of scientific data to share with all U.S. Air Force installation golf and environmental staff members.

- Agronomist input
- Compiled and implemented a Golf Course Master Plan
- Continue education attendance to increase environmental awareness of key staff members
- Constructed new USGA specification greens to increase drainage and course playability
- Installed new variable speed pump and irrigation system to minimize energy use and conserve on precious water resources
- Utilize regional USGA agronomist input as required to maximize customer satisfaction

A detailed description of each best practice should be inserted here. Please see the AFCEE GEM program website (<http://www.afcee.brooks.af.mil/ec/golf/>) for more information.

Conclusion

Having successfully negotiated the troubled waters of renovating all nineteen greens and a completely new irrigation system, you would think the staff at Randolph Oaks Golf Course would begin to relax a little. Well, that would be wrong as Director of Golf, Troy Gann has initiated another project that will utilize the AFCEE Master Plan for the facility and begin to improve the landing areas and tees throughout the course. Tree planting and improved maintenance procedures will also add to the list of positives for Randolph Oaks. The future can only tell but with the efforts of Mr. Gann and his staff, it should be a good one for Randolph AFB and its Airmen for a long time.

The gallery

This section of the report will be where some of the more revealing photographs (of the literally hundreds taken during the site visit) of pests, maintenance practices, and other areas where improvements may be made to create the best possible golf facility within the limited budget and support of the mission.



Several teeing areas suffer from poorly drained soils.



The landing area on the 1st looks more like a soccer field.



The maintenance complex's wash rack could use improvement.



The range has been improved through several small projects.



Improved green surfaces, bunkers, and surrounds should improve play.



A Tree Management Plan would be a good long term investment.



Cormorants have just about killed their favorite roosting tree.



Randolph Oaks is surrounded by the active airfield.



Compliant fuels and waste oil area in maintenance complex.



A lone red-shouldered hawk relaxes in the shade.



Bibliography

Audubon International, Environmental Performance Audit, *Integrated Environmental Management*, Golf Course Superintendents Association of America, February 2000, New Orleans, LA.

The Center for Resource Management, *Golf & the Environment: Charting a sustainable future*. Environmental Principles for Golf Courses in the United States, 1996, Salt Lake City, UT.

Kramm, Matthew, *Integrated Natural Resources Management Plan (INRMP)*, Randolph AFB, TX, 2005.

CH2MHill, *General Plan*, Randolph Air Force Base, Texas, November 2004.

Wildie, John, *Statement of Work for Alternate Water Source Assessment on Randolph AFB, TX*, FA3089-05-P-0116, 14 Mar 05.

Osborn, Tony, *Randolph AFB Golf Course Grounds Maintenance Annual Work Plan for FY 2005*, Undated.

Air Force Center for Environmental Excellence, *Master Plan*, Randolph Oaks Golf Course, Randolph AFB, TX, Apr 04.

12th Flying Wing, Bird-Aircraft Strike Hazard Wildlife Management Plan (RAFB BASH Plan), Randolph AFB, TX, January 2005

12 MSG/CE, *Randolph Air Force Base Integrated Pest Management Plan*, Randolph AFB, TX, 2006.





**Air Force Center for Engineering & the Environment
Technical Directorate
Natural Infrastructure Division**

For additional assistance or more information, please contact:
AFCEE GEM Program Manager – 210-536-3719 - DSN 240-3719
AFCEE/TDN, 3300 Sidney Brooks, San Antonio, TX 78235-5112
afcee.td.awag@brooks.af.mil?subject=golf

Please visit our Golf Course Environmental Management Program website:
<http://www.afcee.brooks.af.mil/ec/golf/>