



Wind Creek Golf Course
Environmental Baseline Assessment
Sheppard AFB, TX Aug 06



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	64
Potential ECQ	80

Potential environmental challenges

The following environmental challenges were identified during the GCEBA process:

- Bird/Aircraft Strike Hazard (BASH)
- Water quality protection
- Wetlands
- Migratory Bird Treaty Act
- Water supply & conservation
- Installation Restoration Program (IRP) sites
- Threatened & endangered species

Where do we go from here?

After confirming the environmental challenges (EC), the golf course staff should compile their preferred management approach to each in the context of their long-term goal of providing the best golfing experience for their customers. These management approaches must then be coordinated with installation environmental managers. Finally, the combined environmental and golf staff team should proceed toward finalizing the GEM Plan. The entire process is summarized on the AFCEE GEM program website (<http://www.afcee.brooks.af.mil/ec/golf/>).

Analysis

Course details

Architect	Unknown
Year constructed	1957
Climate	Arid & hot
Average annual rainfall	28 inches
Average growing season	225 days
Winds/Prevailing Direction	S/N
Total Facility Acreage	186 acres
Par	36-36-72
Yardage/Rating/Slope	Blue- 7028/72.6/123 White- 6683/71.3/120 Gold- 6030/70.7/118 Red- 5267/69.4/116
Turfgrass	Common Bermuda grass
Tees-	Common Bermuda grass
Fairways-	Champion Hybrid Ultra
Greens	Dwarf Bermuda grass
Roughs-	Mixed/Common



Course description

Wind Creek Golf Course is constructed over gently rolling, tree studded terrain at the extreme southern edge of Sheppard AFB. Located near the border of Oklahoma, Wind Creek lives up to its name as the seemingly daylong breezes are anything but gentle. The course features a quality routing that provides Sheppard golfers with plenty of challenge and diversity. Plum Creek winds through the inward nine and is in play at several holes. The course is the only user of Wichita Falls-provided recycled water and, in season, is home to numerous Mississippi kites.



Wind Creek Golf Course 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 storm water overflow channel from the 2nd hole pond.

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	Just started (Red)



The terrain & vegetation at Wind Creek are indicative of the region.



Type II effluent is used from this pond for irrigating the course.

Overall Management Philosophy & Documentation				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Has 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 such as landfills, threatened or endangered species habitat, restoration sites, floodplains, etc. used in the environmental management decision-making process and is it posted for customers?			✓
5	Are environmental goals, objectives, challenges, projects, and progress are evaluated at least annually and are regularly communicated to employees, customers, management, and the local community?		✓	
6	Are written records of water quality monitoring activities, results, and control measures readily available?	✓		
7	Is there an inventory of bird and mammal species documented, 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 such as leaching and runoff potential, toxicity to non-target organisms, soil absorption capacity, pesticide persistence, water solubility, and effects on soil microorganisms and non-target species considered as part of the course management planning process?	✓		
10	Are records of pest treatments employed and their effectiveness maintained and used to guide future pest control decisions?	✓		
	Point totals for each column	5	4	1

Safety, Training, & Awareness				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	All employees are familiar with the GEM program and are trained on the importance of environmental compliance with the goals and objectives of the program as it applies to their duties?		✓	
2	Are all appropriate employees trained to be familiar with U. S. Air Force, federal, state, and OSHA regulations that apply to storage, handling, and disposal of chemicals used on the property?	✓		
3	All employees are aware that chemical use, storage, and disposal and their potential risks to human health and the environment?	✓		
4	All appropriate employees receive documented training on avoiding management practices that may adversely impact worker health, on- and off-site water quality, grand wildlife species and their habitats?		✓	
5	Is a current copy of all Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property maintained and readily available for use by employees?	✓		
6	All employees receive documented, regular training on all potential OSHA issues associated with their duties?	✓		
7	Are all golf course pesticide applicators active participants in a local respiratory and pulmonary testing program?	✓		
8	Are 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 day's planned or recently completed spraying of any chemical or fertilizer that may be hazardous to human health or 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	7	3	0

Compliance				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are fuel storage/delivery area and equipment managed in accordance with federal, state, and local regulations?	✓		
2	Are installation environmental staff members included in pertinent, on-going course management discussions and plans at scheduled meetings?			✓
3	Are there golf course staff meetings where environmental management issues are regularly discussed?			✓
4	Does the director of golf and the superintendent attend all internal and external ESOHCAMP in-briefings and out-briefings?			✓
5	Does the director of golf and/or the superintendent coordinate with installation environmental staff on the various management plans that affect or include the golf course?			✓
6	Have all necessary permits been secured and/or updated and their requirements satisfied in a timely manner?	✓		
7	Has appropriate impact analysis (NEPA) been performed on all proposed actions on or affecting the golf course property?	✓		
8	Are used oil containers in good condition, not leaking, and clearly labeled?	✓		
9	Has the golf course staff submitted their proposed management approach to the identified environmental challenges to the installation environmental staff for coordination and review?			✓
10	Were there less than two major golf course facility-related findings during the last official ESOHCAMP visit?	✓		
	Point totals for each column	5	0	5

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 health and pest populations regularly using a process to notify management of pest problems and organized into a report or guide so that they can be used for future pest control solutions?	✓		
2	Are there written pest profiles of common pest species with a variety of potential control measures pre-evaluated including alterations in cultural management, biological, physical, and mechanical controls prior to treating the problem on the course?	✓		
3	Are there established and documented aesthetic and functional thresholds for all managed areas to effectively manage pest populations and 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 pesticides and other chemicals stored or used at the golf facility been provided to the appropriate Fire Department(s)?	✓		
6	Is there a written Integrated Pest Management Plan readily available and updated in use at the 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? <ul style="list-style-type: none"> - 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 --the date and place of application.	✓		
9	Is the chemical storage structure/area locked, well ventilated, fire resistant, and is 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		7	3	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 copy of the Installation Spill Plan that includes the golf course facility, 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 pallets or shelves to keep them off the floor?	✓		
6	Have all the golf facility employees regularly received documented and approved HAZCOM and safety and health training?	✓		
7	Are grass clippings blown off 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 documented on a readily available map to aid the golf course staff in the management of their facility?			✓
10	Are appropriate quantities of fertilizers applied during weather conducive to reducing the potential for leaching and runoff?	✓		
	Point totals for each column	9	0	1

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 officially and appropriately designated 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 critical habitats, threatened or endangered species, wetlands, floodplains, and historical/cultural resources?	✓		
7	Are employees encouraged to minimize their trips around the course to conserve on the use of fossil fuels?	✓		
8	Does the restaurant and/or snack bar utilize reusable plates and silverware for use by customers throughout the facility’s operating hours?		✓	
9	Have all potential maintenance practices for designated “minimally-maintained” or natural areas been coordinated with the installation Bird/Wildlife Aircraft Strike Hazard (BASH) officer and environmental management personnel?			✓
10	Are all motorized golf course equipment checked regularly for excessive air polluting emissions?	✓		
Point totals for each column		8	1	1

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 wash and wastewater kept from making direct contact with surface water and are they recycled or allowed to filter through a vegetative area when cleaning and maintaining equipment?	✓		
3	Outdoor irrigation of non-golf course landscape areas are regularly monitored and maintained for leaks and efficient performance?	✓		
4	Has the golf course staff coordinated with stormwater management planning requirements from the installation’s environmental staff?		✓	
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 areas?	✓		
6	Are all water feature maintenance tasks coordinated with the installation natural resource manager and bird/wildlife aircraft strike hazard (BASH) officer?			✓
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 such as streams or creeks that pass through the golf course regularly monitored for water quality both upstream and downstream of the course?		✓	
9	Does the facility have a Drought Management Plan written, ready, and available if, or when, irrigation restrictions may be instituted and required by the community or the installation?			✓
10	Are water quality problems immediately reported to supervisors and appropriate installation environmental staff members for instruction and direction?	✓		
	Point totals for each column	6	2	2

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, Hazard Communication, Drought Management, and Water Feature Management?		✓	
3	Are green, tee, and fairway mowing heights maintained at reasonable levels without unduly stressing turf or requiring additional chemical inputs?	✓		
4	Are there regular and documented procedures in place to continually improve soil health such as topdressing, organic amendments, aeration, and drainage?	✓		
5	Is there a regularly-updated and readily-available map of the course's "hot spots" requiring special care or regular attention?			✓
6	Is all maintenance equipment maintained and cleaned in a manner that eliminates the potential for spreading of pest or disease contamination?	✓		
7	Has there been a complete examination for potential negative environmental impacts of all aspects of the golf course facility operation including the snack bar and grill, clubhouse, pro shop, and maintenance complex?	✓		
8	Is contour mowing used to conserve fuel and increase playability and aesthetics?	✓		
9	Have all playing surfaces been inventoried and mapped for soil types including soil structure, nutrient levels, organic content, compaction, and water infiltration?	✓		
10	Are soil tests and plant tissue analysis used to determine nutritional requirements?	✓		
	Point totals for each column	8	1	1

Customer Relations & Education				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are the course manager and superintendent involved in a documented and on-going customer environmental management educational program?			✓
2	Is there a conveniently located and highly visible place at the course or clubhouse where golf course environmental management notices and informational messages are regularly posted for customers?			✓
3	Do the course manager and superintendent actively communicate with customers to determine and document their points of view?	✓		
4	Is there active and regular communication with civil engineering, environmental management, the Services manager, and commanders by course management?		✓	
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 trained regularly on how to improve their dealings with customers?	✓		
10	Are there clinics provided to teach beginning golfers the basics of the game and to teach all levels of golfers the rules of the game?	✓		
	Point totals for each column	6	2	2

Miscellaneous Special Projects & Activities				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there projects planned and funded for the near future that would demonstrate the compatibility of the course's management methods with protection of the environment?			✓
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 at this installation?			✓
4	Are there regular field trips for local students or other community groups hosted at the course?			✓
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 special 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	3	0	7

ECQ Summary

#	Environmental Compatibility Quotient Category	Yes	Partial	No
1	Overall Management Philosophy & Documentation	5	4	1
2	Safety, Training, & Awareness	7	3	0
3	Compliance	5	0	5
4	Pesticide Use, Storage, & Handling	7	3	0
5	Pollution Prevention	9	0	1
6	Conservation Practices	8	1	1
7	Water Resources	6	2	2
8	Maintenance Practices	8	1	1
9	Customer Relations & Education	6	2	2
10	Miscellaneous Special Projects & Activities	3	0	7
	Composite point total/response percentage	64	16	20

Aug 06 GCEBA Results

* Wind Creek Golf Course, Sheppard AFB, TX

- Actual ECQ (# of “Yes”) = 64 (Just started – Red)

- Potential ECQ (Actual ECQ plus “Partial”) = 80 (Showing progress – Yellow)

Potential environmental challenges

One of the important results of the GCEBA process is the identification of potential environmental challenges to be addressed in the long-term GEM Planning process. After validating each environmental challenge, the golf staff should determine the best management approach that satisfies the goals of the golf facility from the course playability and customer satisfaction perspectives. 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:

- Bird/Aircraft Strike Hazard (BASH)
- Water quality protection
- Wetlands
- Migratory Bird Treaty Act
- Water supply & conservation
- Installation Restoration Program (IRP) sites
- Threatened & endangered species



Designating areas out of play as minimally-maintained has reduced the golf staff's workload and added a little diversity to the golfing experience at Wind Creek Golf Course.

BIRD/AIRCRAFT STRIKE HAZARD (BASH)

As with almost all Air Force installations, the flying mission is the primary focus for support functions like golf and environmental management. At Sheppard AFB this is underscored by the joint use of the airfield with commercial aircraft at the Wichita Falls Airport. The commercial runway is the closest to the golf course as aircraft regularly cross over holes 3, 4, 5, 6, and 7. The three ponds on the course potentially attract waterfowl – usually an aircraft's worst strike offender. At Sheppard AFB, each bird hazard working group meeting should include the golf staff or the Services unit environmental coordinator.



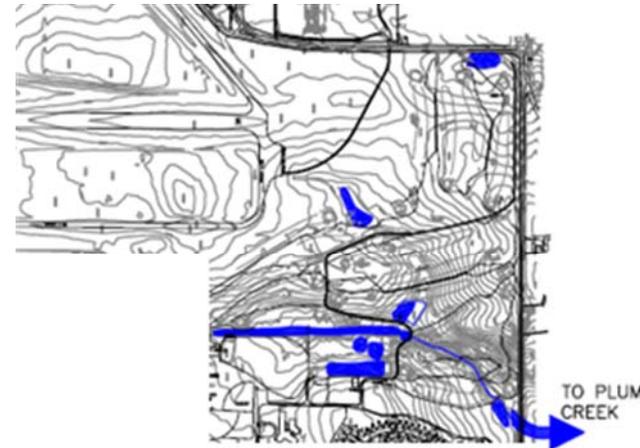
CE environmental staffers funded the addition of this solar energy powered aerator for the pond on the 2nd hole after a large algal bloom.

WATER QUALITY PROTECTION

The Wind Creek Golf Course has several water quality concerns that deserve attention from golf and environmental management. In general, potential non-point source pollution from runoff and pesticide and fertilizer applications should be minimized or eliminated. The maintenance complex equipment storage and the golf cart storage building each have facility specific storm water pollution prevention plans. The requirements of these plans should be regularly reviewed by the golf staff to ensure continual compliance is maintained.

According to information provided during the installation visit, “oil water separators (OWSs) continue as an environmental liability with high

potential for ground contamination”. A project, designated “Environmental Level 1”, that would replace the wash rack at the golf course that contributes to this problem that is “[o]ne of the main contributors to the elevated levels is OWSs on Sheppard AFB”. This document further states that this “project would have payback of less than 2 years”. Executing this project would be a great example of coordinated, mission support teamwork between the golf and environmental staffs at Sheppard AFB.



Wetlands on the Wind Creek Golf Course as excerpted from the extremely high quality General Plan.

Another issue in the water quality protection challenge at Wind Creek is the fishing in the golf course ponds. According to the INRMP, channel catfish and black bass are typical varieties. If fishing will potentially

occur at the golf course ponds, it is imperative to eliminate the chance for contaminants from golf course maintenance activities.

WETLANDS

The INRMP identifies approximately 42 acres on Sheppard AFB as wetlands. Several of these areas occur on the golf course to include the three ponds and Plum Creek. The golf staff should ensure that maintenance practices are in tune with overall installation guidance for wetlands and their surrounds. Mowing and spraying buffers should be considered as a potential management practice for these important and potentially sensitive resources.

MIGRATORY BIRD TREATY ACT

Like other installations in the region such as Tinker AFB and Altus AFB to the north, Sheppard AFB is annual, temporary home to several migratory species. These species are protected by law and must not be harmed. The Mississippi kite is one of the area's most common migratory birds. These majestic raptors have turned Wind Creek Golf Course into a birder's paradise as they are almost always either visible soaring in the bright blue north Texas skies or audible over the ever present roaring of the seemingly incessant Texoma winds.

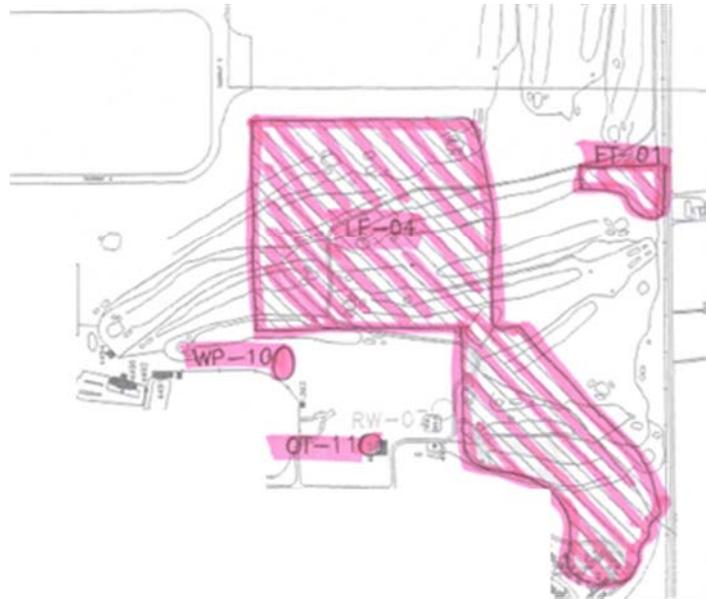


The pond on the 2nd hole is maintained with recycled water.

WATER SUPPLY & CONSERVATION

Water is the primary limiting factor for golf. Both short and long term, having sufficient high quality water available for irrigation is the key to long term success of golf courses worldwide. This is no different at Sheppard AFB. Fortunately, the city-run sewage treatment plant provides nearly 400,000 gallons of Type II recycled water for use by the Director of Golf and his superintendente. In fact, the Wind Creek Golf Course is the only current designated user of this resource. Problems have occurred with the supply though. The primary pump at the lift station up stream had difficulty keeping up with the supply from the plant at the rate needed by the golf course. This caused water to overflow from the lift station into the surrounding area. An additional pump was installed that now has the problem fixed.

In the interim though, during extreme drought and heat, there was not enough water to satisfy irrigation needs at the course. Potable water supplies were needed to supplement. Potable water should not ever be used again unless, of course, there are additional problems with the supply of city-supplied water. So, even though the golf course is using primarily recycled water, a conservation plan should be initiated to help reduce the need for supplementing with high quality, high cost drinking water.



IRP sites dominate Wind Creek Golf Course grounds.

INSTALLATION RESTORATION PROGRAM SITES

There are two IRP sites on or near the Wind Creek Golf Course. The first is a former fire training area, Site FT-01, that was used from 1941-1957. This area also was used as a storage site for waste oil and fuel drums. The site was filled and graded. Sheppard AFB has received site closure approval from the Texas authorities and is currently reviewing the final No Further Remedial Action Planned document.

Site LF-04 is a former 100-acre landfill that began operation in 1941. Mostly comprised of household and municipal refuse, the site was closed and graded for construction of the golf course in 1957. Groundwater and soil samples indicate that potential contamination was not significantly above background levels. As a result, long term monitoring begun in 2002 has led to the impending preparation of the closure verification report.

Since both of the IRP sites are either closed or soon will be, the immediate concern is limited to any digging required over these areas. Specific land use controls and excavation limits should be determined and incorporated into the GEM Plan.



The Texas horned lizard is a protected species.

THREATENED & ENDANGERED SPECIES

The INRMP identified two species of concern for Sheppard AFB – the Texas horned lizard and the loggerhead shrike. These species have been either sighted or are known to potentially occur in the Texoma region. In contrast, the General Plan listed several species under the threatened and endangered illustrated in the excerpted table below. The golf staff must ensure that they do not harm the habitat of these species in any way while they care for the golf course grounds. Direct and regular consultation with the installation natural resources manager is highly recommended as the Endangered Species Act is one of the environmental regulations with stiff penalties for violations.

**Table 4.2
Threatened and Endangered Species**

Common Name	Rating
Arctic Peregrine Falcon	E2
Bald Eagle	E3
Blue Sucker	P3
Osprey	P2
Paddlefish	E4
River Darter	P4
Shovelnose Sturgeon	E4
Texas Horned Lizard	P1
Texas Kangaroo Rat	P3
Western Sand Darter	P4
White-Faced Ibis	P2
Whooping Crane	E3
Wood Stork	P2

- E = Endangered
- P = Protected
- 1 = Known to occur on property
- 2 = Seasonal or transient occurrence
- 3 = Occurrence possible
- 4 = Property within species range



Conclusion

Wind Creek Golf Course is a typical Air Force recreational facility. As far as recreational value, the course is far above average. As far as environmental management issues and challenges, there is plenty to keep both the golf and environmental staffs at Sheppard occupied. None of the documented potential environmental challenges are mission significant. The course is in fine condition even considering the extended drought and oppressive heat observed during the visit. There is definitely room for improved communication and teamwork.

The Civil Engineering Squadron's unit environmental coordinator program should provide the key oversight to assist in improving the ability of the golf and environmental staffs to work together to better support the Sheppard AFB mission. In addition, conserving precious water supplies through science and dedication is probably the only other major issue facing the Wind Creek Golf Course staff.

Areas needing improvement

The ECQ Summary on the previous page highlights the following areas for relative improvement:

- Overall Management Philosophy & Documentation
- Compliance
- Miscellaneous Special Projects & Activities

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.



Drainage way near the clubhouse could use additional care.



Customers like the Superintendent's Champion greens.



The mechanic's area is fully outfitted and orderly.



Most of the trees at Wind Creek Golf Course are in good condition.



The irrigation pond and the pump house are the course's lifeblood.



The irrigation pond and the pump house are the course's lifeblood.



Plum Creek drainage maintenance needs improvement.



The cedar elm may be the perfect Texas golf course tree.



Landscape improvements dress up the 10th tee.



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**Air Force Center for Environmental Excellence
Technical Directorate
Natural Infrastructure Division**

For additional assistance or more information, please contact:
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AFCEE/TDN, 3300 Sidney Brooks, San Antonio, TX 78235-5112**

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