



Prairie Ridge Golf Course
Environmental Baseline Assessment
Ellsworth AFB, SD Sep 04





Table of Contents

Executive Summary	1
U. S. Air Force GEM Program	1
GEM Program process	1
Environmental challenges	1
Where do we go from here?	1
Introduction	2
Goal of the GEM Program	2
GEM Program Process	3
Analysis	4
Documentation.....	4
Implementation	5
Evaluation	5
Revision	5
Course Specific Analysis	6
Course description.....	6
Course details.....	7
Prairie Ridge Golf Course Aerial Photo.....	8
Miscellaneous Facility Review	9
Clubhouse.....	9
Maintenance complex	10
Practice areas.....	11
Pesticide mixing and storage	11
Cart storage facility	12
Infrastructure.....	12
Determining the Baseline (ECQ)	13
ECQ Categories.....	13
Key to checklist responses	13

ECQ Checklists	13
Interpreting the ECQ.....	14
ECQ Scoring Scale.....	14
Overall Management Philosophy & Documentation	
.....	15
Safety, Training, & Awareness	16
Compliance	17
Conservation Practices.....	20
Water Resources.....	21
Maintenance Practices	22
Customer Relations & Education.....	23
Miscellaneous Special Projects & Activities.....	24
ECQ Summary	25
GCEBA Results	25
Conclusion	26
Observations	26
Areas needing improvement.....	27
The gallery.....	27
Environmental challenges	30
Bibliography	34

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.

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 challenges

The following environmental challenges were identified during the GCEBA process:

- Airfield clear zone policy violation
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Water resource management
- Floodplains
- Installation Restoration Program (IRP)
- Stormwater & wastewater outfalls

Where do we go from here?

Once the environmental challenges are identified, it is paramount that the golf course staff should determine their preferred management approach in the context of their ongoing, long-term goal of providing the best golfing experience for their customer's dwindling recreation resources.

Armed with this well-conceived, golf facility-based management approach, the golf staff should then coordinate with the environmental staff to ensure that there is consistency and compatibility with installation-wide natural resource and environmental management goals and objectives.

Finally, the staff should proceed with the next steps in the GEM Program process documented in this study.

Introduction

The golf course environmental baseline assessment (GCEBA) is the initial step in the process of creating a successful ecosystem-based Golf Course Environmental Management (GEM) Plan.

The intent of the program is to provide an efficient, customer-driven management tool that will free up course managers and superintendents to devote more of their efforts to caring for their customers and the golf course. Properly designed and implemented, the GEM Plan will keep the entire golf facility in compliance with the constantly changing environmental requirements while contributing to the installation's vital recreational opportunities.



The Prairie Ridge GC clubhouse is nicely sited.



Wastewater effluent and stormwater drain right through the course.

Goal of the GEM Program

The goal of the U. S. Air Force GEM program is to facilitate the creation of an environmentally friendly golf course facility for its customers while supporting the installation mission. The Air Force Center for Environmental Excellence (AFCEE) is dedicated to helping to identify ways that more rounds can be played on better-conditioned courses while minimizing or eliminating negative impacts to the environment. In most cases, the U. S. Air Force's golf courses are being managed compatibly with the environment. The GEM program is the vehicle to document our successes while communicating directly with our customers, commanders, and local community.



The 2nd hole is partially in the clear zone.

GEM Program Process

Efficient implementation is the most important aspect of any initiative where practices and procedures are examined and may undergo significant change. This is especially true of the GEM Plan process. The latest requirements for the GEM Plan components are described and outlined on the AFCEE golf course environmental management program website: <http://www.afcee.brooks.af.mil/ec/golf/>. Detailed explanations and directions for completing the GEM Plan will be delineated in AFCEE's proposed handbook ***Golf and the Environment, Guidelines for the 21st Century***.

The GEM Program is derived from many diverse environmental regimes such as the National Environmental Policy Act, the Environmental Compliance Assessment and Management Program, and the ISO 14001 environmental management system. There are five basic steps in the implementation of the GEM Program process:

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision



The tabletop-like green at the par three, 180 yard 3rd hole requires a large measure of touch and skill to get the tee shot close.



Compact and efficient aptly describes Jim Holec's pro shop.

Analysis

Experienced environmental managers realize the importance of assembling all of the data relevant to a problem prior to determining its best solution. Analysis is the first and most important task of the golf course environmental baseline assessment (GCEBA) and the GCEBA is the initial step in the process of creating an ecosystem-based Golf Course Environmental Management (GEM) Plan. Properly completing the GCEBA is paramount to the long-term compatibility of an installation's golf course management practices with the GEM Program, and more importantly, the U. S. Air Force's natural resource and environmental management goals and objectives.

GCEBA COMPONENTS

The GCEBA is comprised of the following components:

- Site visit, interviews, and data collection
- Course specific analysis
- Miscellaneous facility review
- Environmental compatibility quotient checklists
- Identification of environmental management challenges
- Summary report

Documentation

It is not enough just to know how to create a successful golf course environmental management program. There must be a written record documenting existing site data, maintenance practices, pesticide applications, and other historical golf course activities. By documenting what we know, we will be able to determine how to make better decisions in the future. The completed GEM Plan will assist in the daily management of the course while providing a convenient vehicle to communicate to commanders and customers alike the environmental issues that challenge us on our golf course as well as our plans to deal with them. In order to reach the environmental stewardship goals set by the U. S. Air Force, we must consistently employ only those management practices that minimize or eliminate potential negative impacts to the environment.

GEM PLAN COMPONENTS

The GEM Plan will be comprised of the following components:

- GCEBA report
- Map of the entire golf course facility grounds depicting locations of the significant environmental management challenges and the golf course facilities
- Booklet that describes the environmental management challenges on the GEM Plan map
- Specific practices that will be employed by the golf course staff to deal with each environmental management challenge after coordination with and approval by the installation environmental staff
- Compilation of best management practices employed at the golf course in their implementation of the GEM program recommendations

Implementation

Positive and decisive action is the only true measure of the success of a GEM Program. By implementing new practices, whether to knowingly improve the course's role in the environmental stewardship of the installation or to just try new ideas to determine their value, will the golf staff and golfers benefit. The Windy Trails staff should adopt the GEM Program Environmental Policy and immediately begin finding ways to minimize or eliminate any and all negative impacts to the environment.

Evaluation

In order to ensure the highest quality of customer service and environmental stewardship, there must be continual self-evaluation and improvement. There also should be consistent, on-going measurement of the reduction or elimination of environmental impacts the newly implemented practices have on the course. For example, documenting the reduced use of inputs such as fertilizers, pesticides, and irrigation can be used to demonstrate the increased environmental stewardship of the golf course management practices as well as the overall value of the GEM Program. It is important for U. S. Air Force golf courses to show improvement over time. This can be easily accomplished by regularly evaluating golf course maintenance methods, practices, and management approaches to day-to-day issues and changing when appropriate.

Revision

The very nature of a superior GEM program implies that all documents be regularly maintained to represent the most current conditions. U. S. Air Force golf course managers and superintendents should be constantly looking for ways to improve their environmental stewardship. Acting on lessons learned is right behind initial implementation as the most important aspect of a successful GEM Program. The GEM Plan should be kept as current as possible at all times. Ideally, it should be completely updated at least every three years.

Course Specific Analysis

One of the most pragmatic and enjoyable tasks in the GCEBA process is the course specific analysis. From a general overall description of the course to the details of the course's history and makeup to the various observations on the way the course plays, looks, and is managed, the course specific analysis sets the stage for the rest of the GCEBA report. It is comprised of the following tasks:

- Course description
- Course details
- Miscellaneous facilities examination



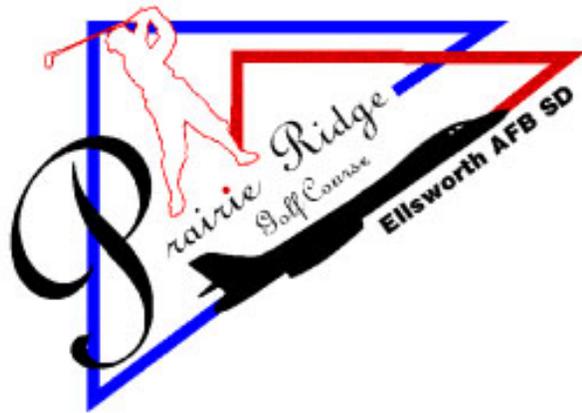
The rolling, relatively treeless terrain of South Dakota.

Course description

Prairie Ridge Golf Course is perched on a rolling, windswept 88-acre parcel just outside the Ellsworth AFB perimeter fence. Still on U.S. Air Force property, the 9-hole facility is one of the more recent additions to the inventory. Unfortunately, the course is located within the airfield clear zone. The superintendent, one of the U.S. Air Force's only golf course managers that is also the superintendent, has his hands full caring for the profitable operation.

The course is an amenable collection of holes routed up and over and around a large hillside where the low-lying landscape is bisected by a constantly running stream. The perennial watercourse functions as the drainage way for most of the installation's stormwater as well as the tertiary treated wastewater from the nearby water treatment plant. Accordingly, Prairie Ridge customers are required to play over or along streams or ponds on several holes. Not only does this add to the flavor and character of the golfing experience, it keeps customers coming back again and again for another round of golf at Ellsworth AFB.

Considering the limited golfing season afforded by the South Dakota climate and the budget and manning constraints, the manager/superintendent has Prairie Ridge Golf Course in satisfactory economic shape. Visitors should now be adding Holec's Prairie Ridge to their list of things to do in western South Dakota other than Mount Rushmore.



Course details

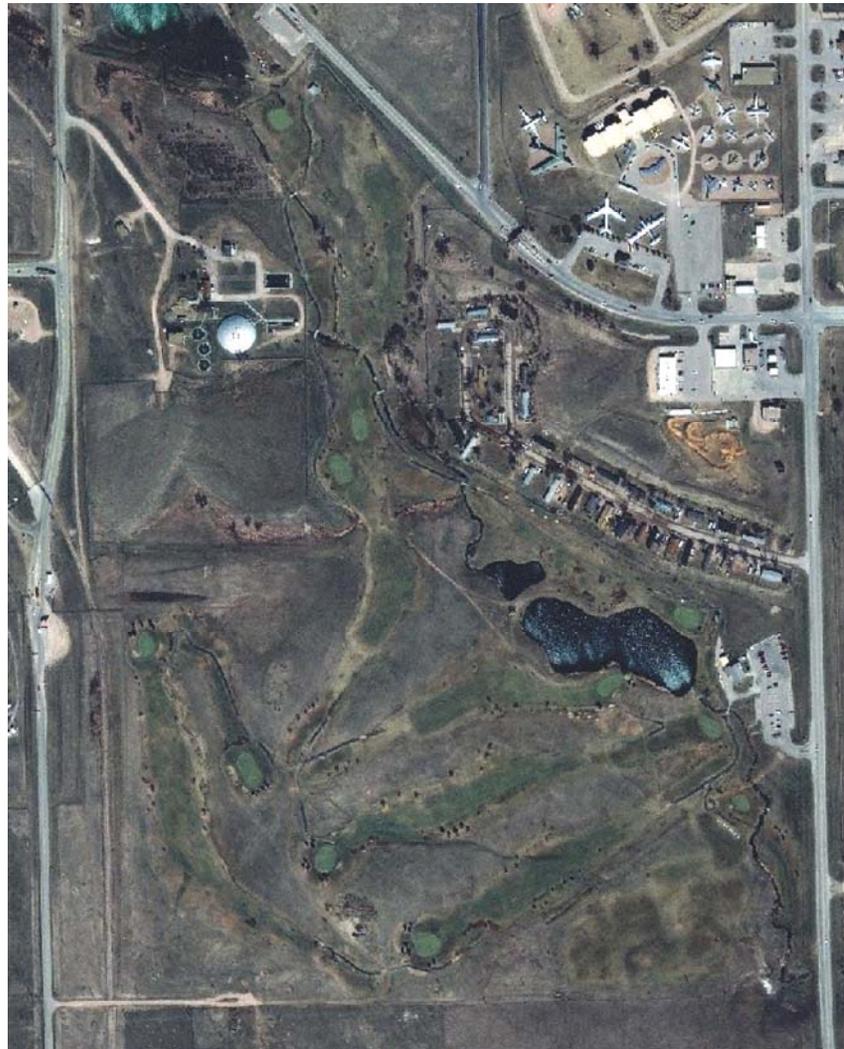
Architect	Patrick Wyss
Year constructed	1989
Climate	Temperate & dry
Average annual rainfall	43 inches
Average growing season	Mar- Oct (215 days)
Total Facility Acreage	88 acres
Par	36-36-72 (Nine holes only)
Yardage/Rating/Slope	Blue- 6456/71.9/116 White- 6034/67.8/112 Red- 5176/70.4/116
Turfgrass	Tees- Per. Rye/Kent. Bluegrass
	Fairways- Per. Rye/Kent. Bluegrass
	Greens Creeping Bent/Penncross
	Roughs- Per. Rye/Kent. Bluegrass



The 8th hole is attractive as it is testing.



Prairie Ridge Golf Course routing plan.



Prairie Ridge Golf Course Aerial Photo

Miscellaneous Facility Review

Although the course is primary to the enjoyment and eventual return of most of Windy Trails' customers, the support facilities play a huge role in the overall success of the operation. This section of the GCEBA will examine the following facilities for their aesthetic, functional, and environmental values:

- Clubhouse/pro shop/snack bar
- Maintenance complex
- Practice areas
- Pesticide mixing and storage
- Cart storage facility
- Infrastructure



The Prairie Ridge Golf Course clubhouse was constructed in 1989.



Pro shop satisfies the needs of its customers.

Clubhouse

Constructed in concert with the golf course, the Prairie Ridge Golf Course clubhouse has already experienced a major modification. In 2001, the snack bar was closed and the pro shop was moved from the bottom floor to the "second" story. Director of Golf, Jim Holec's office was oppositely affected as it is now on the bottom floor along with what is now a large tournament gathering room. The only "prepared" food offered at the course is hotdogs. Holec believes that the move will prove to help him with his bottom line and has had no significant complaints about the change to date.

Maintenance complex

There is no maintenance complex at Prairie Ridge Golf Course and has not been one since demolition of the formerly existing maintenance facility three years ago. Ellsworth AFB civil engineer and contracting staff are currently working the issue. Design on the new complex was initiated in 2003. As of Aug 04, the design/construction process was back to 35% as the original low bid exceeded available funds. Actual construction start dates were not available during the site visit.



Equipment "storage" facility near the 8th tee.



Considering the severe nature of the South Dakota climate, the new maintenance complex is sorely needed.



The future site of the proposed new maintenance complex.



Putting and short game practice areas provide customers with additional reasons to frequent Ellsworth's Prairie Ridge Golf Course.

Practice areas

For a small 9-hole facility, Prairie Ridge is outfitted with a fine, comprehensive array of practice facilities. There is a proportionally sized putting green, nicely appointed driving range, and a unique, up to 70-yard shot, short game practice area. All were constructed along with the golf course back in 1989 and are equally well maintained by Holec and his staff.

Pesticide mixing and storage

All of the pesticides utilized by Superintendent Jim Holec and his staff are stored at the Ellsworth AFB entomology shop. When applications are needed, Holec exclusively utilizes his injection system pesticide applicator. This device actually mixes the chemical as it sprays so there is no tank and no rinsate to deal with after the application. The proposed new maintenance complex will be outfitted with compliant pesticide material storage facilities.



New maintenance complex will be constructed on the hill above the 9th green. Care will need to be taken to ensure that any potential spills runoff and enter irrigation pond just out of the photo to the right.

Cart storage facility

There is no existing cart storage facility at Prairie Ridge Golf Course with the exception of a small covered area near the clubhouse that offers little to no bad weather protection for the carts. During the off-season, the carts are stored in multiple facilities on the installation miles away from the golf course. The proposed new maintenance complex project will also satisfy cart storage requirements. Time will tell if the solution proves to be adequate.



Existing covered cart area fails to even approach adequacy.



The “silt collection” pond needs dredging as does the irrigation pond just downstream.

Infrastructure

This section examines important elements of a quality golf course that are difficult to group into another category. Cart paths are in fair condition. The parking lot is in good condition and may not be large enough to satisfy the regular demands of Prairie Ridge’s customers once the proposed maintenance complex is constructed. Landscape development attempts have been largely unproductive. There is a site amenity group near most teeing areas and the course signage could be improved. The functional operability of the irrigation system should receive immediate attention as the pump shuts itself off due to lack of water at the intake due to pond siltation.

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).



This small stream is at the bottom of the watershed and is incapable of handling the potential quantity of water possible during flooding.

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
93-100%	Advanced
83-92%	Getting there
73-82%	Showing progress
63-72%	Early stages
Less than 62%	Just started



Minimal to non-existent describes buffers around water features.



Sign, sign, everywhere a sign. Blockin' up the scenery, breakin' my....

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 environmental opportunities or constraints such as water features, sensitive landscapes, threatened or endangered species habitat, special management zones, etc. used in the environmental management decision-making process and is it posted for customers?	✓		
5	Environmental goals, objectives, issues, 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	3	2

Safety, Training, & Awareness				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	All employees are familiar with the overall GEM Plan and are trained on the importance of environmental compliance with the goals and objectives of the program?		✓	
2	All appropriate employees are 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 employees are trained to understand that poor management practices may adversely impact worker health, on- and off-site water quality, local soil health, and wildlife species and their habitats?	✓		
5	A current copy of all Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property is maintained and readily available for use by employees?	✓		
6	All employees receive regular, documented training on all potential OSHA issues?	✓		
7	Are all golf course pesticide applicators active participants in a local respiratory and pulmonary testing program?		✓	
8	Pesticides, fertilizers, and other chemicals are 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 and safety?	✓		
10	Are key staff members trained regarding water quality and conservation issues?			✓
	Point totals for each column - Response percentage	7	2	1

Compliance				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is fuel storage/delivery managed in accordance with federal, state, and local regulations?	✓		
2	Are installation environmental staff members included in on-going course management discussions and plans at scheduled meetings?			✓
3	Are there regularly scheduled golf course staff meetings to discuss environmental management issues?		✓	
4	Does the director of golf and the superintendent attend 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 containers used to store used oil 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 - Response percentage	3	3	4

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 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? - the quantity of each pesticide used - the chemical or common name of the active pesticidal ingredient(s) (not the product name) - 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 proof, and access is limited to select personnel?	✓		
10	Are food storage and prep areas properly cleaned to reduce the likelihood of pest infestations and required pesticide applications?	✓		
Point totals for each column - Response percentage		6	2	2

Pollution Prevention				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there designated "no-mow" areas (other than ponds) and "no spray zones" and buffer areas around pond, river, stream, or lake edges and have they been communicated to mower operators and pesticide applicators?	✓		
2	Has the Installation Spill Plan been amended to include the golf course facility and is there a spill containment kit at each required location and are spill containment procedures in place?	✓		
3	Does the chemical storage area have a sealed metal or concrete floor and are all 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 mapped 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 - Response percentage	8	1	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 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 snack bar utilize reusable plates and silverware for use by customers throughout the facility’s operating hours?	✓		
9	Have all potential “no-mow” area maintenance practices been coordinated with the installation 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 - Response percentage		7	2	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 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	If required, 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 or regulatory agencies (if required) for appropriate action?	✓		
	Point totals for each column	5	3	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 to include Integrated Pest Management, Tree Management, Hazard Communication, Drought Management, Water Feature Management, and a Site-Specific Spill Prevention Response Plan?		✓	
3	Are green, tee, and fairway mowing heights maintained at reasonable levels without continually stressing turf or maximizing chemical inputs?	✓		
4	Are there regular procedures in place to continually improve soil health such as topdressing, organic amendments, aeration, and drainage?	✓		
5	Is there a 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 - Response percentage		7	1	2

Customer Relations & Education				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are the course manager and superintendent involved in a regularly updated, documented, and on-going customer 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 the golf management staff, 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 when drinking reclaimed or otherwise non-potable water?	✓		
8	Are there interpretive signs posted to highlight key habitats or have appropriate areas 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	7	1	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 local 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	5	0	5

ECQ Summary

#	Environmental Compatibility Quotient Category	Yes	Partial	No
1	Overall Management Philosophy & Documentation	5	3	2
2	Safety, Training, & Awareness	7	2	1
3	Compliance	3	3	4
4	Pesticide Use, Storage, & Handling	6	2	2
5	Pollution Prevention	8	1	1
6	Conservation Practices	7	2	1
7	Water Resources	5	3	2
8	Maintenance Practices	7	1	2
9	Customer Relations and Education	7	1	2
10	Miscellaneous Special Projects & Activities	5	0	5
	Composite point total/response percentage	60	18	22

GCEBA Results

Σ Prairie Ridge Golf Course, Ellsworth AFB, SD

- Actual ECQ (# of “Yes”) = 60 “Just started”

- Potential ECQ (Actual ECQ plus “Partial”) = 78 “Showing progress”



Conclusion

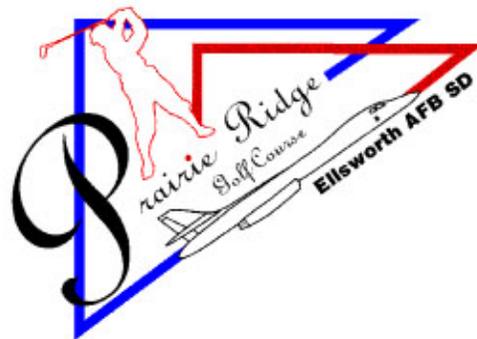
As one of the few directors of golf also in charge of the course maintenance, the manager is a unique breed of U.S. Air Force manager. Limited budget, staff, and golfing weather both inside the clubhouse and outside on the links, Holec is an expert on dealing with reality. Currently, his most significant challenge is dealing with the siltation of his irrigation pond and its effect on the course. The intake of his irrigation system is becoming blocked with vegetation and assorted stuff from upstream influences out of his control. When the flow of the intake falters, the irrigation system automatically shuts down to protect the pump. Unfortunately, this tends to occur during the times when irrigating the course, especially the greens, is paramount.

Combining this challenge with the potential impacts to the flying mission due to clear zone policy violations and bird/wildlife aircraft strike hazards, Holec is in a quandary. Based on his 10 years of experience at Prairie Ridge and Ellsworth AFB, the problem will eventually be solved. In this case though, Holec may need assistance from installation and major command leadership.

Observations

- Fine example of the beginnings of quality coordination and team work with installation environmental staff
- Need to compile and document actions already taken to create “continuity” document
- Implement planned improvements to all aspects of the golf facility management
- Utilize installation environmental management geographic information system and civil engineering digital aerial photographs for mapping requirements
- Need to secure computer hardware and software upgrades to increase overall efficiency and provide high speed internet access
- Clubhouse interior should be appointed with a location to present environmental information to customers
- Consider using AFCEE for on-site golf course environmental management training
- Do more than what is required
- Ensure next ECAMP results are outstanding
- Provide regular training for all employees on the specifics of pollution prevention and how they can help
- Consider incorporating contour mowing procedures where appropriate

- Continue building relationships with installation natural resources manager and other environmental professionals
- Provide detailed input to the scheduled update of installation integrated natural resources management plan (INRMP)
- Increase training and involvement of staff on integrated pest management
- Compile written pest profiles of common pest species
- Improve water resource management procedures and care to eliminate unwanted vegetation while improving aesthetics and habitat
- Increase number of trained scouts on the maintenance staff
- Enlist the assistance of local city and county officials on golf course environmental planning initiatives
- Initiate Earth Day environmental awareness golf tournament
- Educate customers about the benefits of an environmentally friendly golf course



Areas needing improvement

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

- Overall Management Philosophy & Documentation
- Compliance
- Water Resources
- 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.



Outfall 005 is on the golf course grounds below the treatment plant.



This grassy, always wet area is between the clubhouse and the 1st tee.



The pulse-raising approach to the 4th green may be the best.



Problems with fairway turfgrass may be due to irrigation water quality.



The wastewater treatment plant discharges effluent through the culvert.



Several areas of native grasses are minimally maintained.



Streams are rife with undesirable vegetation.



Greens are showing stress from lack of irrigation.



The old housing area property across the street could prove valuable.

Environmental challenges

One of the important results of the GCEBA process is the identification of significant environmental challenges to be addressed in the long-term GEM Planning process. Ideally, the golf staff will address each issue from the best way to satisfy the goals of the golf facility and acceptable levels of course playability and customer satisfaction. The golf staff's preferred management approach for these issues should then be coordinated with the installation's environmental staff for refinement, coordination, and approval.

The GEM Plan would then consist of the environmental challenges, the approach to their management, a map showing where these challenges occur on the golf course, a booklet that describes the mapped challenges, goals and objectives for future years, and a set of best management practices.

The following environmental challenges were identified during the GCEBA process at Prairie Ridge Golf Course, Ellsworth AFB, SD:

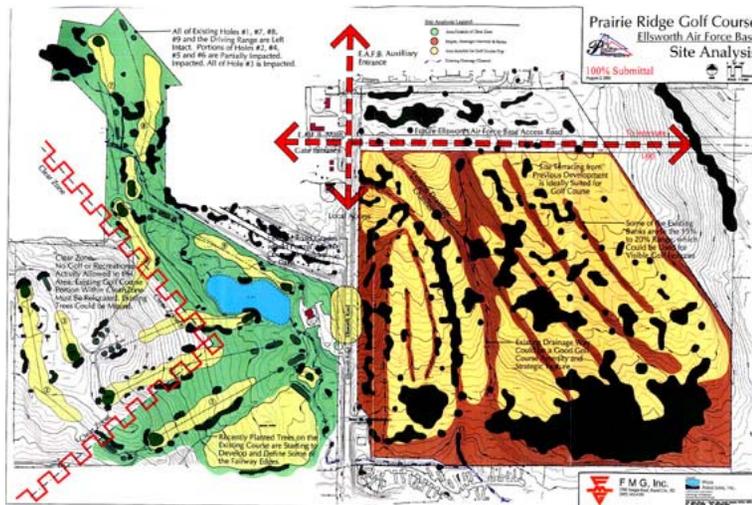
- Airfield clear zone policy violation
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Water resource management
- Floodplains
- Installation Restoration Program (IRP)
- Stormwater & wastewater outfalls

AIRFIELD CLEAR ZONE POLICY VIOLATION

According to AFI 32-7063 and AFH 32-7084, recreation land uses cannot be located in the clear zone, an area defined as a 3000' X 3000' square centered on the runway center line and starting on the runway threshold. Portions of the 2nd, 3rd, 4th, 5th, and 6th holes at Prairie Ridge Golf Course are within the clear zone. This is a policy violation and is one of the "hot" issues throughout the U.S. Air Force today. The installation staff is aware of the issue and has even obtained golf course redesign alternatives to assist in formulating an action plan. This is assuredly the most significant challenge facing the golf course and the installation. Especially when considering the additional challenge of the Bird/Wildlife Aircraft Strike Hazard potential also facing the Prairie Ridge GC manager.



A B-1 on approach as seen from the far side of the golf course.



The site analysis shows clear zone violation on the course's west side.

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

Ellsworth AFB's draft BASH Plan, EAFB OI 91-212, lists several organizations that comprise the Bird Hazard Working Group. Although the group does not list Services, the golf course manager is specifically identified as part of this group. Jim Holec must be notified in advance about scheduled BASH meetings.

Since the BASH Plan states that "the ponds and waterways on and around the airfield as well as the location of the golf course create the perfect mating and nesting ground for Ducks and Geese", the golf course manager should aggressively pursue an active role in all things BASH at Ellsworth AFB. The primary function is to ensure that no BASH incident can possibly be traced to the golf course due to lack of communication, education, or concern.

WATER RESOURCE MANAGEMENT

Water resources are the most prevalent potentially impacted aspect of the natural world as a result of golf course management. At Prairie Ridge GC, water resources form the core of several issues to include those already mentioned. The clear zone and BASH are always important. When these challenges are combined with the water features on the golf course, they become paramount. At Ellsworth AFB, the water resource management issues include irrigation system maintenance and water quality and availability, pond and stream maintenance, waterfowl habitat creation, West Nile virus proliferation, and wastewater treatment plant effluent outfalls. Accordingly, the management of the many, interconnected water bodies are probably the primary environmental concern for installation managers.



All of Prairie Ridge's streambeds are overgrown with cattails.



The eastern bank of the irrigation supply pond shows signs of possible excess nutrients, poor aeration, and inadequate depth.

Turf buffers, no mow, and no spray zones should be created around all water bodies and all pertinent golf course staff should be trained concerning water quality issues. Slow release fertilizers should be used whenever possible. Past pesticide use patterns should be examined and lessons incorporated into daily practices.

The golf course water bodies have the potential to receive inputs of pesticides, herbicides, and fertilizer from course maintenance activities. Extreme care should be taken to ensure that dredging and water improvement projects are undertaken throughout the installation to accomplish appropriate goals that support the mission of safe aircraft operations.

FLOODPLAINS

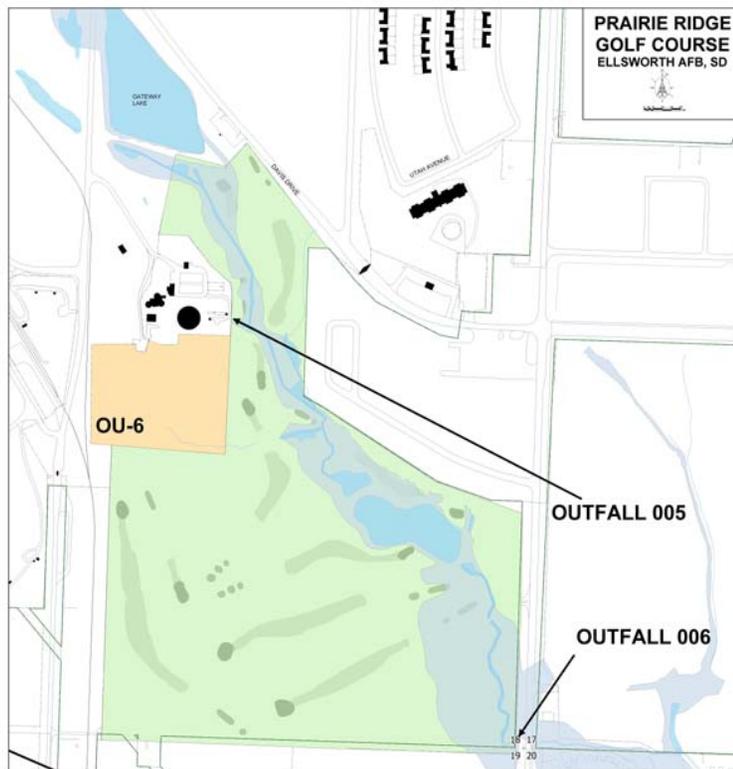
The INRMP states “the EAFB Floodplain Delineation Study (EAFB 1996b) indicates that there are floodplains on base. Portions of this study are included as an appendix to the Wetlands and Watershed OCP in Section 8 of the INRMP. For a detailed description of EAFB’s floodplains refer to the complete study on file in 28 CES/CECN. Additionally, the Box Elder Creek floodplain is located approximately 50 feet beyond the southern boundary of the base”. Based on the maps obtained from civil engineering, this floodplain is 50 feet beyond the installation fence line and runs directly through the golf course that is on property owned and operated by the U.S. Air Force. A severe flood will probably damage greens and tees.



Regular daily flows exceed capacity of streambed near clubhouse. A flood event could be devastating to low-lying course improvements.

INSTALLATION RESTORATION PROGRAM (IRP)

Operable Unit 6 (OU-6) is the designation for a 5-acre landfill situated just north and west of the 3rd and 6th holes at Prairie Ridge Golf Course. The landfill was used to dispose of demolition debris and hardfill materials from 1960-80. Monitoring of the soil and water has been underway for years and will continue on the site as well as downstream on the golf course. Currently, there are no expected significant impacts to the golf course as result of remediating the site.



Outfalls, wetlands, floodplains, and an IRP site are a few environmental challenges at Prairie Ridge Golf Course.

STORMWATER & WASTEWATER OUTFALLS

The INRMP states “EAFB is situated on a gently sloping north-south upland plateau between Elk Creek to the north and Box Elder Creek to the south. Storm water from the main base area is discharged by a series of drainage ditches which eventually exit the base through National Pollutant Discharge Elimination System (NPDES) permitted outfalls into Box Elder and Elk creeks which are tributaries of the Cheyenne River. The golf course is part of “drainage area 006, which consists of about 1,474 acres with about 65 percent grass covered and 35 percent hard surface. This drainage receives runoff from Fuel Storage Areas C and D, the base golf course and riding stables, the RCRA Part B Hazardous Waste Storage area, OU-6, 7, and 9, intermittent storm water runoff from industrial areas due to rainfall and snow melt, and about 800,000 gal/day from outfall 005 from the base Waste Water Treatment Plant (WWTP). Flow from this area is to outfall 006 located under LeMay Blvd. Runoff from the MSA, Fuel Storage Areas C and D, and buildings near the railroad all drain through Bandit Lake, Heritage Lake, and Gateway Lake, and eventually to the Golf Course Ponds. This chain of lakes acts as a structural control to give the Base an opportunity to catch any spills from the industrial area before leaving the Base (EAFB 1996a)”.

Based on this information, the golf course ponds are functional elements of the installation spill plan. In conjunction with the remainder of the challenges faced by the Prairie Ridge staff, the ponds should be receive the same treatment and concern.



Bibliography

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

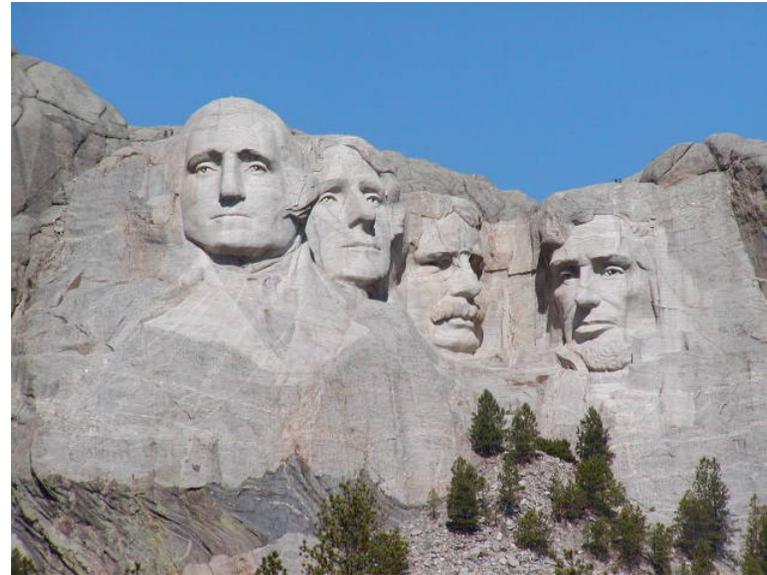
The Center for Resource Management, *Golf & the Environment: Charting a sustainable future*. Environmental Principles for Golf Courses in the United States, 1996, Salt Lake City, UT.

28 CES/CE, *Final Integrated Natural Resources Management Plan*, Ellsworth AFB, SD, Nov 01.

28th Bomb Wing Flight Safety, Nixon, Major Albert P., *Bird/Wildlife Aircraft Strike Hazard Program*, EAFB OI 91-212, Ellsworth AFB, SD, 1 Aug 04.

28 CES/CEVP, *Draft FONPA/AF Form 813, Golf Course Cart Paths*, Ellsworth AFB, SD, Sep 04.

Wendy Lopez and Associates, Inc., *Old Renel Heights Housing Land Environmental Baseline Survey*, Ellsworth AFB, SD, May 02.



Four!!!



**Air Force Center for Environmental Excellence
Technical Directorate
Environmental Science Division**

For additional assistance or more information, please contact:
U.S. Air Force GEM Program Manager – 210-536-3719 - DSN 240-3719
AFCEE/TDE, 3300 Sidney Brooks, San Antonio, TX 78235-5112

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