



***Silver Spruce Golf Course
Environmental Management (GEM) Plan
Peterson AFB, Colorado***



June 2008



San Antonio, Texas



Silver Spruce Golf Course Environmental Management Policy

**In concert with the
Peterson 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 regularly reevaluate our processes
to achieve the highest standards
of environmental excellence.**

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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 Engineering & the Environment (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. Chapter 11 of AFI 32-7064 requires a GEM Plan as part of the Integrated Natural Resources Management Plan (INRMP).

GEM Program process

There are five steps in the GEM program process.

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

Environmental Compatibility Quotient (ECQ) scores

The following is the summary of the environmental compatibility quotient (ECQ) scores for the site visit conducted in Month Year:

- **Actual ECQ = 77, Showing progress (Yellow)**
- **Potential ECQ = 89, Showing progress (Yellow)**

Potential or Final environmental challenges

The following potential environmental challenges were identified in compiling this Final GEM Plan:

- Water quality and storm water management
- Bird/wildlife Aircraft Strike Hazard (BASH)
- Construction projects
- Installation Restoration Program (IRP) sites

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 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/>).



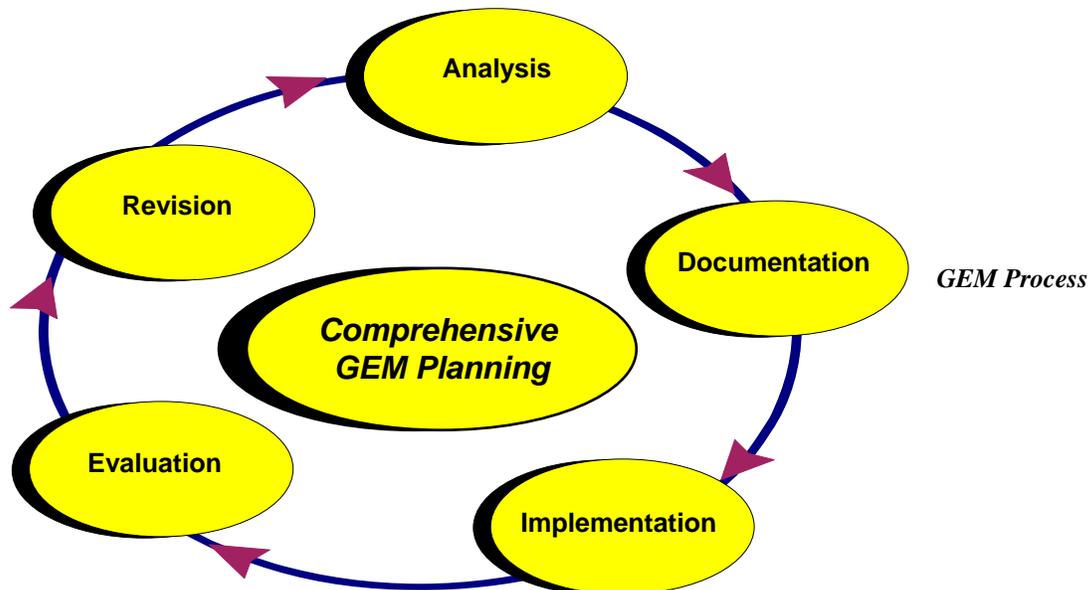
*Silver Spruce
Golf Course
Peterson AFB, CO*

Two attractive ponds serve as hazards and a place to fish for Peterson personnel.

The golf course environmental baseline assessment (GCEBA), or the Draft Golf course Environmental Management (GEM) Plan is the initial step in creating a successful ecosystem-based comprehensive GEM Plan. The intent of the GEM Plan is to provide an efficient management tool that will enable course managers 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 local community.

The GEM Initiative

The goal of the GEM initiative is to facilitate the creation of an environmentally friendly approach to golf course management while protecting and promoting the great game of golf. 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, golf courses are being managed compatibly with the environment. The comprehensive GEM planning process is the vehicle to document our successes while communicating directly with our customers, commanders, and local community.



Continual improvement is the aim of the 5-step GEM planning process.

GEM 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 comprehensive GEM planning process. The GEM Plan is derived from several diverse environmental regimes to include the National Environmental Policy Act and the ISO 14001 environmental management system.

There are five basic steps in the implementation of the GEM Planning process:

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

Analysis

Experienced environmental managers realize the importance of assembling all of the data relevant to a problem prior to determining its best solution. Comprehensive analysis is the most important task of the GEM process. Properly completing the analysis is paramount to the long-term compatibility of a golf course's management practices with the local community'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 potential 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 the community and customers alike the environmental issues that challenge golf course managers as well as their plans to deal with them. In order to reach established environmental stewardship goals the golf course staff must consistently employ only those management practices that minimize or eliminate potential negative impacts to the environment.



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The Silver Spruce snack bar does quite a business for both breakfast and lunch.

U.S. AIR FORCE 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 depicted 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 initiative recommendations

Implementation

Positive and decisive action is the only true measure of the success of the GEM Plan. 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 installation golf staff should consider adopting the GEM Initiative process and establish an environmental policy that minimizes or eliminates any and all potential negative environmental impacts.

Evaluation

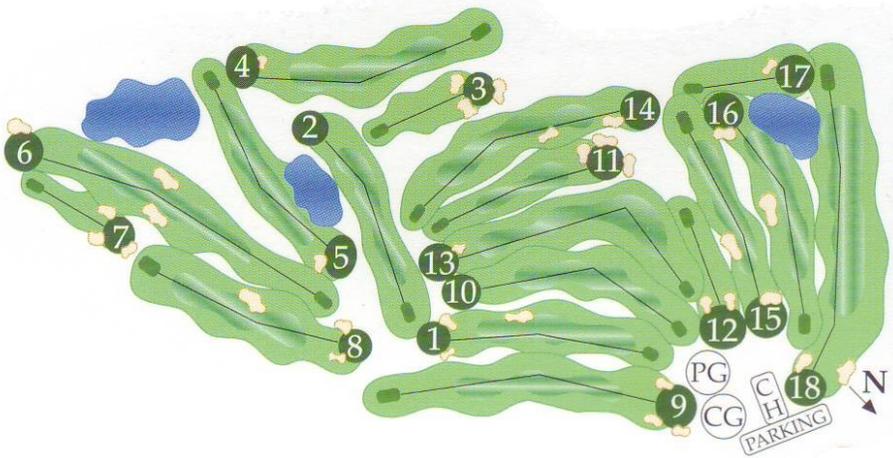
In order to ensure the highest quality of customer service and environmental stewardship, there must be continual self-evaluation and improvement. There also should be consistent, on-going measurement of the reduction or elimination of environmental impacts the newly implemented practices have on the 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 initiative. It is important for golf courses to show improvement over time. Improvements can be easily accomplished by regularly evaluating golf course maintenance methods, practices, and management approaches to day-to-day issues in concert with the desire and ability to change.

Revision

The very nature of a superior GEM Plan implies that all documents be regularly maintained to represent the most current conditions. 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 Plan. The GEM Plan should be kept as current as possible at all times. Ideally, it should be updated annually and completely rewritten on the same cycle as the Integrated Natural Resources Management Plan.

Course Specific Analysis

One of the most pragmatic and enjoyable tasks in the baseline assessment portion of the GEM process is the course specific analysis. From a general description of the course to the details of the course's history and makeup to the various observations on course playability, aesthetics, and style of management, the course specific analysis sets the stage for the rest of the GEM Plan report.



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Course Layout Map

Course Description

Silver Spruce Golf Course is a gently rolling to flat 18-hole facility. Typical of many U.S. Air Force courses, the two nines were built at different times. At least in this case the golf course architect, Dick Phelps, was the same for each. Construction on the current inward nine started in 1972 and the front nine in 1976. The course layout is somewhat confining due to the limited available land at the time of design. Several holes are side by side with minimal space between some of the adjoining fairways.

Despite all of restrictions, the course is challenging and enjoyable. The bentgrass/poa annua greens are smooth and quick and the fairways just may have the best quality turf observed in the U.S. Air Force golf program. The Silver Spruce Golf Course management and the installation commanders can be proud of this fine facility. Quality management practices are easily observed at every facet of the course's functional arms from the pro shop to the snack bar to the maintenance complex. The highly unpredictable weather seems to be the only real constraint to a highly successful operation that regularly provides a superior golfing experience for its many happy customers.



Silver Spruce Golf Course Aerial Photo



*Silver Spruce
Golf Course
Peterson AFB, CO*

Rocky mountain-sweet air and perfect temperatures for turfgrass, trees and golfers.

Course Details

Architect	Dick Phelps
Year constructed	Back- 1972, Front- 1976
Climate	Moderate and dry
Average annual precipitation	16 inches
Average growing season	153 days (Mid April – Late October)
Prevailing wind direction	NW – SW/SE
Total facility acreage	120 acres
Total actively maintained acreage	90 acres
Par	36-36-72
Yardage/Rating/Slope	Blue/6838/71.9/123 White/6498/70.3/117 Red/6103/73.2/129 Yellow/5473/70.7/126
Turfgrass	Bluegrass/Ryegrass
Tees-	Bluegrass/Ryegrass
Fairways-	Bluegrass/Ryegrass
Greens	Bentgrass/Poa annua
Roughs-	Bluegrass/Ryegrass
Irrigation source	Potable/harvested storm water (75/25)



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A newly installed and landscaped entry sign is a positive first impression.

Environmental Compatibility Quotient (ECQ) Checklists

Many diverse and complex aspects of golf course management have been revealed through the literature search conducted to compile this study. In order to simplify the process, these aspects have been summarized into eight main topics and incorporated into five distinct environmental compatibility categories.

- Planning & Compliance
- Operations & Maintenance
- Water Resource Management
- Conservation
- Pesticides & Pollution Prevention

The environmental compatibility quotient (ECQ) checklist questions have been compiled using examples from several sources including Audubon International, Center for Resource Management, and Committed to Green. The ECQ checklists represent the best method currently available to determine the relative environmental compatibility of a golf course's management practices. The checklists can be used in many ways including:

- As a tool to establish a current snapshot or baseline of a golf course's relative environmental compatibility
- As a tool to identify areas for improvement or to demonstrate current successes
- As a self-assessment tool for the golf course manager and superintendent
- As documentation for an environmental award nomination
- As documentation for regulatory requirements or inquiries from customers, the media, or the general public

Determining the Environmental Compatibility Quotient (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)



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Squirrels are damaging undesirable Russian olive trees which have been identified as the number one noxious weed on Peterson AFB.

The following ECQ checklists are a record of the interview conducted with Silver Spruce Golf Course manager, superintendent, and environmental staffer during the visit to Peterson AFB in June 2008.

Planning & Compliance				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Has management demonstrated that environmental stewardship is an important part of their responsibilities by initiating the Comprehensive Golf course Environmental Management (GEM) Planning process?	✓		
2	Is the GEM Plan complete, updated regularly, and readily available to employees and customers?		✓	
3	Has the golf course adopted and posted an environmental policy?			✓
4	Is a map of the property highlighting environmental challenges posted for employees and customers?			✓
5	Are environmental challenges and their approved and implemented management practices, objectives, and targets evaluated at least annually, and are they regularly communicated to employees, customers, management, and the local community?		✓	
6	Are there signs appropriately located to warn golfers of hazards of drinking reclaimed or otherwise non-potable water?	✓		
7	Are there signs posted that highlight key habitats or have appropriate areas been designated "Environmentally Sensitive Zones" per The Rules of Golf?	✓		
8	Is there a general understanding by the entire course management staff of how their practices may potentially adversely impact the environment?	✓		
9	Are the environmental impacts of pest control measures considered as part of the comprehensive GEM planning process?	✓		
10	Is there at least one project planned and funded for this fiscal year that would increase the compatibility of the course's management program with comprehensive GEM planning goals and objectives?	✓		

Planning & Compliance Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Have all employees been familiarized with the GEM Plan and are they trained regularly on the importance of environmental performance and compliance with its goals and objectives?		✓	
12	Are environmental management issues regularly discussed during staff meetings?	✓		
13	Does the superintendent document the actual amount of each pesticide or fertilizer annually used on each major golf course feature (greens, tees, fairways, roughs, water features, and natural areas)?	✓		
14	Has the course attained full certification in the Audubon Cooperative Sanctuary Program or similarly recognized environmental management program?			✓
15	Are all employees trained in their native language on the benefits of minimizing potential negative impacts?	✓		
16	Are comprehensive written records maintained to measure and document the environmental compatibility of the entire facility's management practices?	✓		
17	Are there documented aesthetic or functional thresholds integrated into the pest control decisions?	✓		
18	Is there a written and regularly updated Integrated Pest Management Plan for the entire golf course property?	✓		
19	Are employees trained on what to do in case of a spill and have spill containment kits been provided at all appropriate locations?	✓		
20	Has course management comprehensively examined the course to determine the activities that have a potential to negatively impact an identified environmental challenge?			✓
	Totals	13	3	4

<u>Operations & Maintenance</u>				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is contour mowing used to conserve fuel and/or to increase playability and aesthetics?	✓		
2	Are there designated non-maintained or minimally maintained buffers around core wildlife habitats?	✓		
3	Are green, tee, and fairway mowing heights maintained at levels that do not excessively stress important playing surfaces?	✓		
4	Are aeration, topdressing, and drainage improvements regularly implemented to improve soil health and minimize or eliminate use of pesticides or fertilizers?	✓		
5	Have all playing surfaces been inventoried and mapped for soil types including soil structure, nutrient levels, organic content, compaction, and water infiltration?	✓		
6	Are soil tests or plant tissue analysis used to determine turfgrass nutritional requirements?	✓		
7	Is there at least one project planned and funded for the next year that would increase the compatibility of the course's management methods with protection of the environment?	✓		
8	Are all appropriate employees trained to be familiar with (national, federal, state, and OSHA) regulations that apply to storage and handling of potentially hazardous materials used on the property?	✓		
9	Has there been a complete examination of all aspects of the operation other than the golf course (snack bar/restaurant, clubhouse, pro shop, pesticide mixing and storage facilities, fuel storage and delivery areas, and maintenance complex) for potential negative environmental impacts?	✓		
10	Are all employees encouraged to apply for education and training opportunities that may increase their awareness of the GEM Plan goals?	✓		

Operations & Maintenance Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Are containers used to store used oil for equipment maintenance in good condition, not leaking, and clearly labeled?	✓		
12	Are oil/water separators and/or golf course wash racks operating properly and correctly maintained?	✓		
13	Are all golf course vehicles and equipment maintained and cleaned in a manner that eliminates the potential for spreading of contamination?	✓		
14	Are recycling containers located throughout the facility for use by customers and employees?	✓		
15	Are grass clippings left in place (other than greens) collected, composted, and/or recycled?	✓		
16	Are products that minimize unnecessary packaging considered prior to purchasing for use throughout the facility?			✓
17	Are energy efficiency ratings factored into equipment purchases for use throughout the facility?	✓		
18	Has the entire facility been studied to quantify solid waste streams to identify functions that produce the greatest quantities and have steps been taken to reduce these quantities?	✓		
19	Does the restaurant/snack bar facility utilize at least 90% plates, cups, and utensils that are reusable rather than disposable?			✓
20	Is the food storage and prep area regularly cleaned to reduce the likelihood of pest infestations and required pesticide applications?	✓		
	Totals	18	0	2

Water Resource Management				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are written records of water quality monitoring activities, results, and pollution control measures readily available?	✓		
2	Where appropriate, are slow-release fertilizers and/or spoon-feeding techniques used to reduce the potential for runoff impacts and nutrient loading to water quality?	✓		
3	Is the irrigation system utilized solely based on the specifically calculated local daily evapotranspiration rate?	✓		
4	Are outdoor irrigation of non-golf course areas and indoor plumbing regularly monitored and maintained for leaks?	✓		
5	Have low-flow water saving devices been installed wherever possible?		✓	
6	Are recycled or other non-potable water supplies being used to irrigate at least 65% of the golf course property?			✓
7	Are there projects planned that should eliminate or minimize a potential water quality or erosion problem?	✓		
8	Are water features regularly monitored for algae, erosion, excessive aquatic plant growth, eutrophication, and sedimentation?	✓		
9	Is runoff from parking lots cleansed by control measures such as vegetative or drainage filters prior to leaving the golf course property?			✓
10	Are there procedures for reporting water quality problems to supervisors (as required) for appropriate action?	✓		

Water Resource Management Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Is the irrigation pumping station and associated equipment regularly checked for proper operation and leaks?	✓		
12	Has the irrigation system or its components recently been upgraded to reduce inefficiency, malfunction, and overall water use and are flow meters used to monitor water use and detect potential waste?		✓	
13	Is there a map of the watershed in which the golf course property resides and location(s) of floodplains and stormwater drainage exist on the property?	✓		
14	Is the quality of the water entering and leaving the property tested regularly for contaminants, pH, dissolved oxygen, and nutrients?	✓		
15	Is water quality data collected to establish baseline conditions for all water features on the property?	✓		
16	Are settling ponds and/or detention ponds used to effectively remove sediments and pollutants from water features?	✓		
17	Are biological processes such as the addition of grass carp or white amur used to control unwanted aquatic vegetation in water features?	✓		
18	Is there a written Water Resource Management Plan that delineates the care of the course's water features to include creeks, streams, ponds, irrigation system components, conservation efforts and water supply concerns?		✓	
19	Has the property been examined for potentially significant wetlands or associated sensitive water-based habitats?	✓		
20	Has the property's water features been studied to determine the aquatic and amphibious species population?	✓		
Totals		15	3	2

Conservation				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is all motorized golf course equipment checked regularly for excessive air polluting emissions?	✓		
2	Has the entire golf course property been examined for critical habitats, state species of concern, and threatened or endangered species?	✓		
3	Have all potentially significant wildlife habitats and their maintenance practices been coordinated with local natural resource manager, the Fish & Wildlife Service, or other appropriate local or regional regulatory agency?	✓		
4	Are employees encouraged to minimize their trips around the course to conserve on the use of fossil fuels?	✓		
5	Have efforts been made to connect natural areas to facilitate wildlife movement through the course property?	✓		
6	If applicable, have all necessary permits been updated and their requirements satisfied in a timely manner?	✓		
7	Are recycling containers conveniently provided for customer and employee use throughout the golf course facility?		✓	
8	Has there been a study to determine the presence of invasive or exotic species on or near the course?	✓		
9	Is there a readily available Drought Management Plan for the entire golf course facility?		✓	
10	Is there at least one project planned and funded that is expected to minimize or eliminate the course's potentially existing negative environmental impacts?	✓		

Conservation Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Is stormwater collected for supplementing irrigation water supplies for use anywhere on the golf course facility grounds?	✓		
12	Are a majority of plants used in landscaped areas drought-tolerant native trees, shrubs, groundcovers, or their cultivars?	✓		
13	Have local wildlife species and their habitats been documented and mapped?	✓		
14	Does the course have a Tree Management Plan complete with planting plan and maintenance schedule?		✓	
15	Are all employees trained to understand that poor management practices may adversely impact worker and environmental health and welfare?	✓		
16	Is there an inventory of bird and mammal species documented, maintained, and readily available?	✓		
17	Are food, shelter, and nesting attributes of plant species for landscape development considered during the design/selection process?	✓		
18	Have all degraded habitats due to construction or maintenance of the course been fully restored or improved?	✓		
19	Has the entire property been examined for archaeological, cultural, or historical resources?	✓		
20	Are customers and employees regularly informed/trained on the golf course's conservation practices?		✓	
Totals		16	4	0

Pesticides & Pollution Prevention				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there minimally maintained, natural areas, no spray zones, and buffer areas around water features or sensitive landscapes and have they been communicated to equipment operators and pesticide applicators?	✓		
2	A spill containment kit is readily available and spill containment procedures are 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	Are equipment or vehicle wash and wastewater kept from making direct contact with surface water?	✓		
7	Is equipment cleaned with compressed air or with blowers on part of the course instead of or prior to washing at a designated wash rack where pollution prevention measures are employed?			✓
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	Does the fuel storage/delivery area comply with local, state, federal, or other applicable regulations?	✓		
10	Are written records maintained of all applications of pesticides to include: - the pest and treatment type (preventative/curative); - the location (specific playing area) of each pesticide used; - the area (SF/SM) and quantity of each pesticide used; - the chemical or common name of the active ingredient(s); - the date, location, or purpose?	✓		

Pesticides & Pollution Prevention Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Is there a map of the course's "hot spots" that may require special care or attention?		✓	
12	Are there trained scouts on staff other than the superintendent to monitor turf and plant health and pest problems?	✓		
13	Are there scouting forms utilized and are they collected and organized into a report or guide for use in future pest control decisions?			✓
14	Is there an established aesthetic or functional threshold for insects, fungal diseases, and weeds for all managed areas that may possibly reduce pesticide and fertilizer inputs?	✓		
15	Are current copies of all Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property maintained and readily available?	✓		
16	Are chemical applicator(s) encouraged to apply for regular training to maintain currency?	✓		
17	Is the chemical storage structure/area locked, well-ventilated, fire resistant and is access limited to appropriate personnel?	✓		
18	Are records of pest treatments and their effectiveness maintained and used to guide future pest control decisions?	✓		
19	Are golfers adequately 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?	✓		
20	Are there written pest profiles for common regional pests along with alternative potential control measures readily available?		✓	
Totals		15	2	3



*Silver Spruce
Golf Course
Peterson AFB, CO*

High quality turf and a nice design combine for a satisfying golfing experience.

Environmental Compatibility Quotient Summary			
Environmental Compatibility Category	Yes	Partial	No
Planning & Compliance	13	3	4
Operations & Maintenance	18	0	2
Water Resource Management	15	3	2
Conservation	16	4	0
Pesticides & Pollution Prevention	15	2	3
Totals	77	12	11

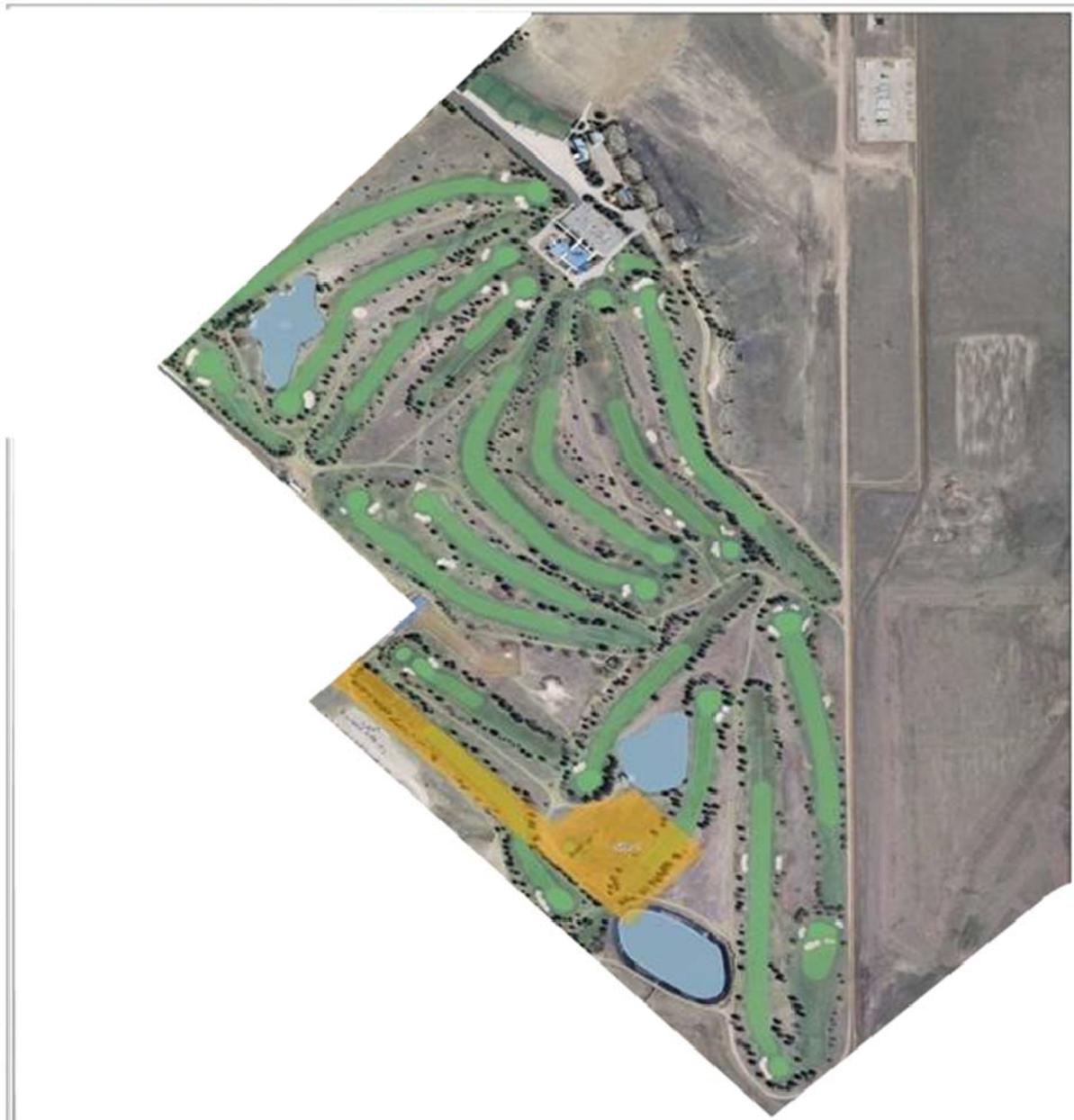
Key to checklist responses

- **Yes** = Practice is complete or ongoing and can be verified
- **Partial** = Practice has been initiated yet is not completed
- **No** = Practice is not in place

Jun 08 Silver Spruce Golf Course ECQ:

- **Actual ECQ = 77, Showing progress (Yellow)**
- **Potential ECQ = 89, Showing progress (Yellow)**

Environmental Compatibility Quotient Scoring Scale	
Total Yes or Yes plus Partial Responses	Environmental Compatibility Level
90-100%	Advanced (Green)
70-89%	Showing progress (Yellow)
69% or less	Just started (Red)



Legend

BRAC	FUDS
BROWNFIELD	RCRA
CERCLA	SUPERFUND
ER	SWMU

Peterson AFB C-1 Base Map

Environmental Challenges Map

Environmental Challenges

One of the important results of the GCEBA process is the identification of significant environmental challenges to be addressed in the GEM Plan. Ideally, the golf staff will address their management approach to each challenge to accomplish course and local community environmental management objectives while still attaining acceptable levels of course playability and customer satisfaction. Along with the newly established baseline, the GEM Plan consists of a map and description of the final environmental challenges and the prescribed approach to their management. In addition, the GEM Plan includes a comprehensive list of future environmental management goals and objectives and a course-specific set of best practices.

The following environmental challenges were identified during the GEM process:

- Water quality and storm water management
- Bird/wildlife Aircraft Strike Hazard (BASH)
- Construction projects
- Installation Restoration Program (IRP) sites

Assessing environmental challenges

The assessment of the environmental challenges is probably the most crucial as it provides a prioritized list of coordinated actions significant to the long-term success of the golf facility. The finalized GEM Plan will include the description, driver or requirement, management practice, objective, and target:

DESCRIPTION

Once the challenge has been identified, a short description and a few historical or statistical details assist greatly in understanding the key factors in devising management practices.

DRIVER/REQUIREMENT

Challenges are defined as “things that are bigger than the course”. Some of the reasons behind why a particular issue becomes a challenge are important to recognize and understand. A driver or requirement may be a local, regional, or national law, regulation, or initiative that creates the requirement to protect species, habitat, or preserve a resource such as open space or unique ecosystems.

OBJECTIVE

Objectives are the overall goals for environmental performance focusing specifically on management activities associated with each challenge and the potential for impacts. The objective should directly relate to the environmental policy.

MANAGEMENT APPROACH

A course’s approach to managing environmental challenges in accordance with the driver or requirement, environmental policy (see page 2), and established objectives and targets is the heart of the GEM Plan.

TARGET

The target is the time frame and/or quantifiable unit of measure to achieve the established objectives.



*Silver Spruce
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Peterson AFB, CO*

A group of Russian olives near Pond #3 could be considered for removal.



*Silver Spruce
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Peterson AFB, CO*

Fishing is encouraged on golf course ponds 1 and 2 at Silver Spruce.

Water quality and storm water management

According to the INRMP, “Peterson AFB stormwater discharge points are located at the intersection of East Gate Entrance Road and Marksheffel Blvd, to Sand Creek near the West Gate, to Sand Creek near the West Fork drainage structure, to Colorado Springs Municipal Airport Detention Pond One for the PAFB apron and Golf Course Pond 3. Stormwater from Pond 3 is diverted into two golf course ponds. The northwest portion of the base discharges into Sand Creek.” The INRMP continues with “The northwest corner of the Main Base gradually slopes toward the East Fork of Sand Creek drainage that cuts through the northwest corner of the installation. The remainder of the developed portion of the base generally slopes toward golf course Pond #3, and surface water flows either directly or via storm sewers into this pond”.

In addition, Ponds 1 and 2, which are outfitted with pumps to irrigate the golf course, are also used for recreational fishing by Peterson AFB residents. The INRMP states “The fishing resources in golf course Ponds #1 and #2 are used by permit between March and November on specified days and at specified times. In 2002, fishing was permitted at Pond #1 during weekday mornings, and at Ponds #1 and #2 from late afternoon (at varying times in spring, summer, and fall) until dark during all days of the week. Fishing is no longer allowed at Pond #3 because of its use for storm water detention and the consequent potential for its water to be contaminated.”

It is extremely important that water quality is maintained at the highest possible level in the golf course ponds used for fishing. The INRMP states that “Trout, channel catfish and grass carp have been introduced into golf course Ponds #1 and #2 in the past. The last introduction of channel catfish was of from 500 eight-inch fish obtained from the USFWS and stocked in 1997. Grass carp were last stocked in 1998, when 150 and 100 sterile individuals were placed in Ponds #1 and #2, respectively. The

addition of more grass carp will be considered if the summer aquatic vegetation starts to reach the surface of the pond.”

Another water quality related concern is the new EPA regulations that will go into effect in 2009. These regulations will have a direct impact as they will require all development occurring on previously developed areas of PAFB to utilize low impact development (LID) and best management practices to reduce peak storm water flow rates and volume by 25%. All development occurring on previously undisturbed areas of PAFB require low impact development and best management practices to infiltrate the 85th percentile storm.

DRIVER/REQUIREMENT

- National Pollutant Discharge Elimination System
- Safe Drinking Water Act
- Federal Water Pollution Control Act of 1977 (Clean Water Act), as amended (33 U.S.C. 1251-1376)

OBJECTIVE

Ensure that golf course management practice never diminish the water quality.

MANAGEMENT APPROACH

- Establish, document and communicate all pesticide and fertilizer application buffers to appropriate personnel
- Consult with installation civil engineering and environmental staff on all practices that have the potential to diminish water quality
- Fence and revegetate potential erosive areas not used for cart paths
- Curb or install river stone in concrete in eroded areas along cart paths

TARGET

Eliminate the potential for degradation of the water resources at the course by establishing, documenting and communicating all pesticide and fertilizer application buffers to appropriate personnel prior to the end of the year. Maintain positive relationship with civil engineering and environmental staffers to attain and maintain compliance without delay on all water-related regulations and requirements.



*Silver Spruce
Golf Course
Peterson AFB, CO*

Pond #3 may offer the largest BASH challenge for Peterson AFB.

Bird/wildlife Aircraft Strike Hazard (BASH)

According to the BASH Plan, “the annual migration of various species and the concentration of non-migratory bird types, particularly the raptorial species on and around the airfield provide a low but continual hazard of bird strikes”. The Plan goes on to list the following birds as specific hazards for Peterson AFB: geese, duck, coot, rail, robin, cedar waxwing, hummingbird, scissortail flycatcher, blue martin, swallow, whitewing dove, Inca dove, oriole and sandhill crane.

According to the superintendent, hundreds of Canada geese can be observed on the golf course during certain times of the year. The two golf course water hazards and Pond #3 are the main BASH concerns at Silver Spruce. This is especially true when their flight paths can cross the runway. According to the INRMP, “The primary threat occurs when flocks of Canada geese pass through the area along the Front Range. The movement of waterfowl between the ponds on the golf course and the small detention basin on Peterson East also poses a BASH threat because the birds cross runway 17L/35R on their route.” Accordingly, the golf course is in Bash Control Zone 1.

DRIVER/REQUIREMENT

- 21 SW Bird/wildlife Aircraft Strike Hazard (BASH) Plan 91-212
- AFPAM 91-212, *Bird Aircraft Strike Hazard (BASH) Management Techniques*
- AFD 91-2, *Safety Programs*
- Executive Order 13186, Migratory Bird Protection

OBJECTIVE

Minimize or eliminate the potential for installation BASH concerns as a result of golf course management practices.

MANAGEMENT APPROACH

- Coordinate pond and stream maintenance procedures with installation environmental management staff
- Install only BASH-approved plant material listed in the INRMP
- Secure membership on BASH Working Group and attend all meetings
- Mow all non-play areas in accordance with AFPAM 91-212

TARGET

Initiate consultation immediately and regularly thereafter to ensure compliance with airfield management and BASH criteria.



*Silver Spruce
Golf Course
Peterson AFB, CO*

Current pond maintenance practices appear to be appropriate to minimize or eliminate potential BASH concerns at the Silver Spruce Golf Course.



*Silver Spruce
Golf Course
Peterson AFB, CO*

Part of this large area next to the 18th hole will be the new home of the driving range and cart storage facility.

Construction projects

As a result of the U.S. Air Force housing privatization initiative, the Silver Spruce Golf Course management has two major projects proposed for construction. A new driving range and cart storage facility will be constructed in a new location as the current land for these facilities has been transferred to the housing contractor.

In addition, the previously mentioned low impact development (LID) and best management practice requirements both apply here as well.

DRIVER/REQUIREMENT

- National Environmental Policy Act
- AFI 32-7060, Environmental Impact Analysis Process

OBJECTIVE

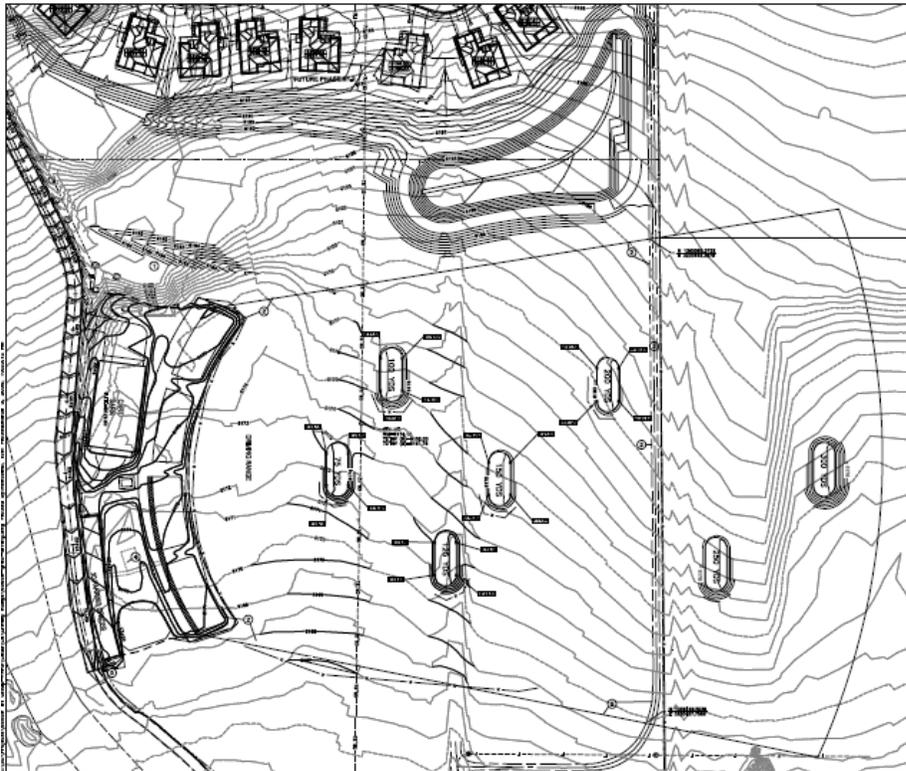
Ensure that all project proposals receive appropriate impact analysis well in advance of scheduled implementation of the proposed action.

MANAGEMENT APPROACH

- Complete appropriate work request and impact analysis forms to ensure that environmental documentation is complete prior to taking any action
- Consult with installation impact analysis program manager at earliest possible time

TARGET

Initiate all projects by completing an AF Form 332 and AF Form 813 as soon as feasible.



*Silver Spruce
Golf Course
Peterson AFB, CO*

This construction drawing shows the new driving range layout.



*Silver Spruce
Golf Course
Peterson AFB, CO*

Golfers will use the area in the foreground as the tee and hit practice shots out into this now barren field. The challenge for the golf staff will be to stabilize the area with some type of vegetative cover.



*Silver Spruce
Golf Course
Peterson AFB, CO*

IRP sites are present on the Silver Spruce Golf Course.

Installation Restoration Project (IRP) sites

According to the INRMP, there is at least one IRP site on or near the Silver Spruce Golf Course property. Further investigation reveals that there are a few current or formerly managed IRP sites. The first is Site 2 (WP006) – East Boundary Leach Field. The Site Summary Report characterizes it as follows: “The site was located on land now utilized as the Base golf course. The former leach field system consisted of a settling tank, an oil/water separator (OWS), and a gravel envelope drainage (leach) field. Influent to the system came from the industrial area waste drainage lines. Beginning in 1956, this leach field system received the majority of the industrial liquid waste, including solvents, paint, paint residues, paint strippers, and waste oils. Throughout its history, numerous operational problems with the system were reported, and in 1978, the system was abandoned when the industrial waste drain line was connected to the Base’s new sanitary sewer line. The leach field site was re-graded during construction of the golf course, and the exact perimeters of the former gravel drainage area and settling tank were visually obscured.”

The second is Site 3 (LF005), Southeast Landfill, Landfill 3 (LF-3). “Site 3 (LF005) is located along the southern boundary of Peterson AFB southwest of the Small Arms Ranges (Figure 3-1). It was in operation from 1962 to 1986. From 1962 to 1972, the landfill was operated as a waste landfill. After 1972, only construction rubble was permitted in the land-fill. The landfill received excavated material from the Leach Field and the Old Fire Training Area during construction of the golf course, and from Landfill 2 during construction of the CE Building during the mid- to late-1970s. Small quantities of paint and shop waste also may have been disposed of in the landfill.”

The third is Site 5 (FT002) – Former Firefighter Training Area (FTA-1). “The FT002, Site 5, Former Firefighter Training Area (FTA-1) is located along the eastern boundary of Peterson AFB near the end of Runway 12/20, as shown in Figure 2. The site is situated on what is now a 10-to-20 foot rise just south of the golf course and adjacent to a storm water retention basin. The shallow, unlined burn pit of FTA-1

was used for fire training exercises from the 1960's until 1977. The jet fuel JP-4 was burned during the majority of the exercises, although waste oils and solvents also were occasionally used. Training activities occurred on an average of once or twice a month throughout the tenure of the site."

DRIVER/REQUIREMENT

- AFI 32-7020, The Environmental Restoration Program
- Resource Conservation Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation, and Liability Act, (CERCLA)

OBJECTIVE

Ensure daily compliance with restoration program site requirements.

MANAGEMENT APPROACH

- Abide with all specified land use controls (LUCs)
- Work closely with installation restoration program manager to ensure compliance

TARGET

Immediately integrate specified land use controls into regular maintenance practices.



*Silver Spruce
Golf Course
Peterson AFB, CO*

Several water quality monitoring wells dot the Silver Spruce Golf Course grounds.

Implementation

Setting goals and objectives is an important step in the implementation of an installation's GEM Plan. Implementation is the single best evidence that the installation GEM team is working well together in their task of supporting the mission.

GEM Plan goals & objectives

Goals are defined as actions or results that should be accomplished in the next year.

- Adopt and post an environmental policy statement
- Compile and post an environmental challenges map for employees and customers
- Compile a Drought Management Plan for the entire golf course facility

Objectives are defined as actions or results that are desired to be accomplished prior to the next INRMP update currently scheduled for 2013.

- Reduce overall golf course facility water use in accordance with Executive Order 13423
- Comprehensively examine the course to determine all management activities that have a potential to negatively impact an identified environmental challenge
- Upgrade irrigation system to enable efficient use of precious water resources
- Compile a comprehensive Water Resource Management Plan that will examine all uses of water for the entire golf course facility
- Create and maintain a Tree Management Plan for the entire golf course facility
- Regularly inform and train customers and employees on the golf course's conservation practices
- Compile a map of the course's "hot spots"
- Create and utilize a scouting process that will include a report to guide future pest control decisions
- Compile written pest profiles for common regional pests

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.

- Determined by installation golf and environmental staff
-



*Silver Spruce
Golf Course
Peterson AFB, CO*

The cart storage facility will be replaced as a result of housing privatization.

Conclusion

The Silver Spruce Golf Course represents what is best about the U.S. Air Force – high quality services at a nominal price provided with a smile. The course has some of the best greens surfaces observed in recent years. The clubhouse is nicely outfitted with all of the normal amenities and the staff is extremely efficient and hospitable to a fault. At this rate, lowering the price may be the only way to improve things for Peterson AFB golf customers. One thing for sure, the course is in top condition from tee to green.

The gallery

On the following pages are some of the more revealing photographs of challenges, maintenance practices, and other areas of interest.



Organized and outfitted for customers.



Aerating with water jets allows painless improvement.



Pond #3 is showing signs of sedimentation.



Practice facilities are well appointed.



Even the rear of the clubhouse is nicely landscaped.



High quality golf is the norm at Silver Spruce.



Rocky mountain golf at its finest.



Large native areas occur outside the reach of irrigation.



Newly landscaped areas provides positive first impression.



Maintenance complex is roomy and safe.



Irrigation pump house.



Use waste oil is collected for proper disposal.

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<https://www.afceprivweb.brooks.af.mil/ec/golf/default.asp>