Eagle Creek Golf Course
Environmental Baseline Assessment
Dover AFB, Delaware Jun 02

Executive Summary

U. S. AIR FORCE GEM PROGRAM GOALS

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's designated military 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 our processes on 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

This report is the result of the analysis step.

EAGLE CREEK GOLF COURSE DOVER AFB, DELAWARE ENVIRONMENTAL CHALLENGES

The following environmental challenges were identified during the GCEBA process:

- Watersheds, wetlands, floodplains, & water quality management
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Threatened & endangered species
- Air quality
- Water use
- Biodiversity enhancement
- Installation Restoration Program (IRP) sites
- Pest management

Further information on the environmental challenges at Eagle Creek Golf Course can be found in the Conclusion of this Golf Course Environmental Baseline Assessment.

WHERE DO WE GO FROM HERE?

The golf course staff should determine their preferred management approach for the challenges above in context with their ongoing goals of providing the best golfing experience for the money. They should then coordinate these practices with the installation environmental staff to ensure their compatibility with installation wide natural resources and environmental goals and objectives followed by implementation.

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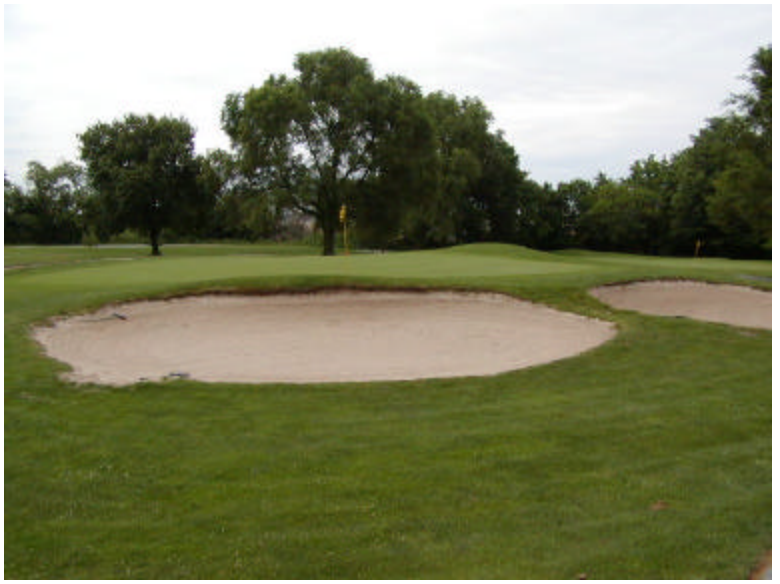
Introduction

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 ultimate intent of the program is to provide a foolproof, 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 course. Properly designed and implemented, the GEM Plan will keep the facility in compliance with the ever-changing environmental rules and regulations while providing a vital recreational opportunity for the installation.

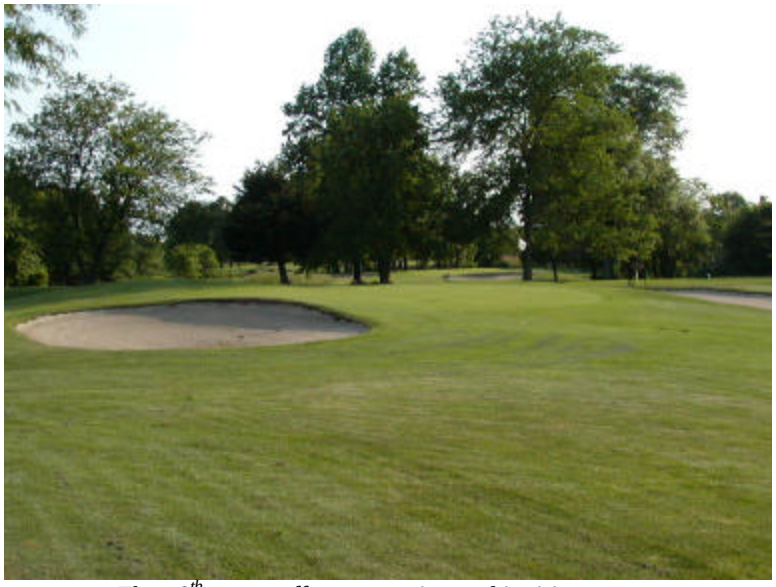
Eagle Creek Golf Course supports the Dover AFB mission.



Subtle, smooth-rolling greens and minimal grade changes are typical.

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 the golfers, our commanders, and the local community.



The 10th green offers attractive and inviting target.

Program Process

Implementation is the most important phase of any initiative where practices and procedures are examined and may undergo significant change. This is especially true of the GEM Plan process. The specifics for the GEM Plan components and directions for their completion will be delineated in AFCEE's ***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 14000 environmental management system. 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 our processes on all aspects of golf course management to achieve the highest standards of environmental excellence. There are five basic steps in the implementation of the GEM Program process:

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

Daylilies have naturalized stream banks.

Thirteen is a long, tough par 3 that rewards accuracy and strength.

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 has to be a written record of 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 be a comprehensive report with a map that will assist in the daily management of the course while providing a convenient vehicle to communicate to our customers the environmental issues that challenge us on our golf course and 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 Eagle Creek 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.

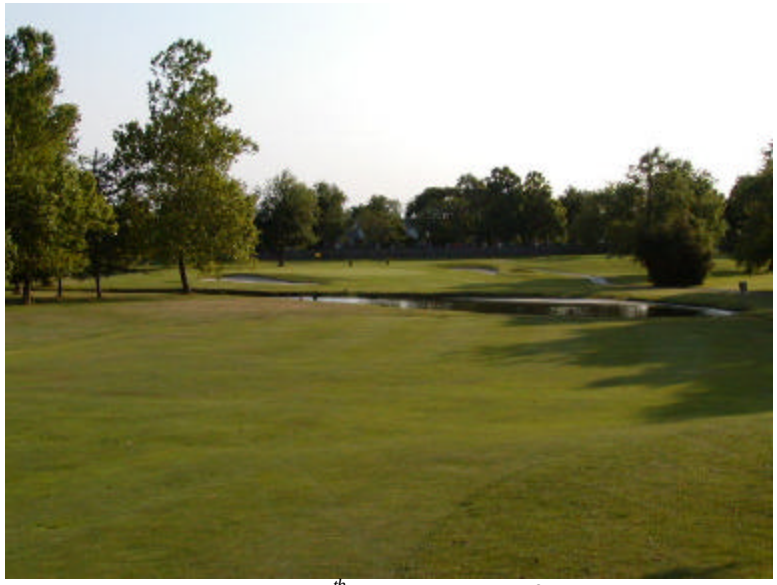
Revision

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
- Maintenance facility evaluation
- Miscellaneous facilities examination



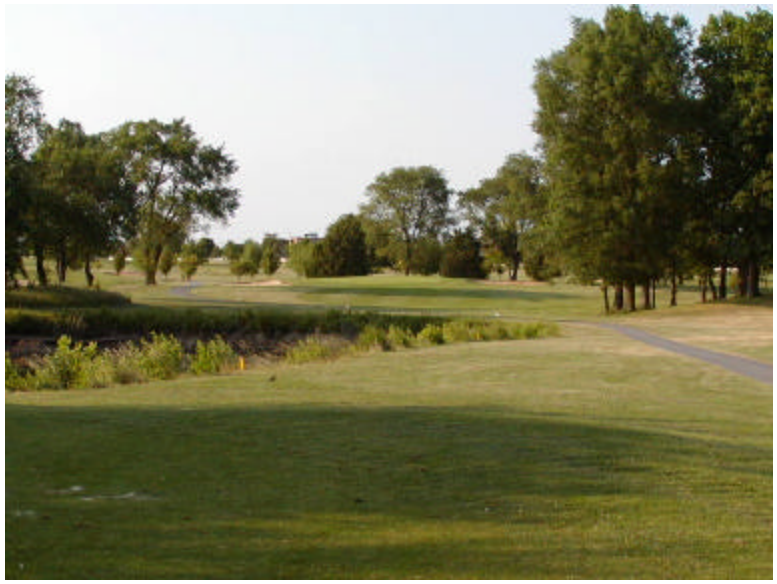
Approach shot to the 12th must cross one of several creeks.

Course description

Dover AFB's Eagle Creek Golf Course is located southwest of the main cantonment area in the Atlantic Coastal Plain and accounts for 89 acres of Dover AFB's improved grounds. Surface elevations range from 10-30 feet above mean sea level.

Course details

Architect		Not provided
Year constructed		50s-60s
Climate		Warm, humid, tropical
Average annual rainfall		42,7 inches
Average growing season		163 days per year
Winds/Prevailing Direction		North/East/South
Total Facility Acreage		140
Par		33-36-69
Yardage/Rating/Slope		Back- 5925/67.8/121 Middle- 5645/66.4/116 Forward- 4882/69.4/103
Golf course manager		Fran Estabrook
Superintendent		Harry Wanner
Turfgrass	Tees	Ryegrass/Bluegrass
	Fairways	Ryegrass/Bluegrass
	Greens	Poa annua/Bentgrass
	Roughs	Mix



Eagle Creek is a naturally beautiful recreational resource.

These trees will provide an attractive foreground to new clubhouse

Miscellaneous Facility Review

Although the course is primary to the enjoyment and eventual return of most of Eagle Creek' customers, the support facilities play a huge role is 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
- Practice areas
- Maintenance complex
- Pesticide mixing and storage
- Cart barn
- Infrastructure

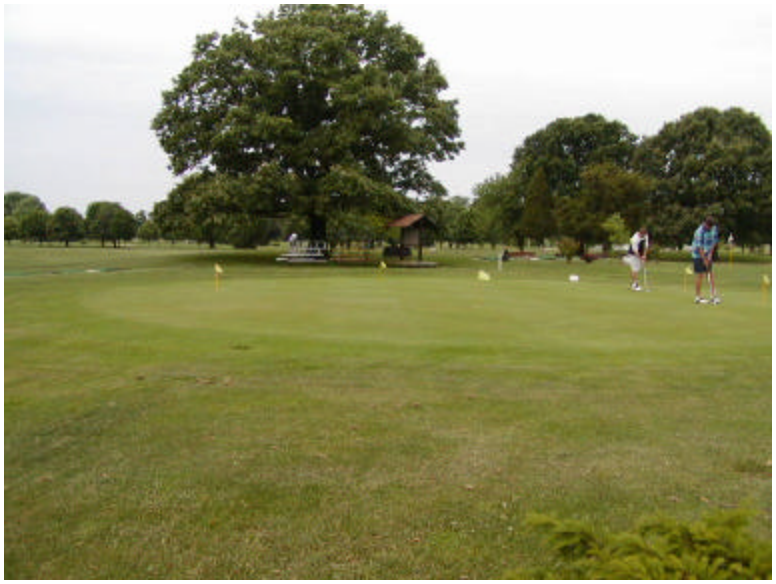
The maintenance staff may use existing clubhouse.

Pro shop is attractive and serviceable yet, a notch below par.

Clubhouse

The clubhouse is scheduled for replacement. The existing facility provided years of slowly eroding service. The quality of the course demonstrates a situation where the clubhouse may have been a limiting factor for marginally regular customers frequenting the facility. A new clubhouse is paramount to the success of the golf course as a whole.

The new clubhouse will be sited across from the new and spacious billeting facility on the former Officer's Club site on the opposite side of the course. Unfortunately, there will not be room for the driving range nearby. Construction will begin as soon as funds are made available.



Putting green and driving range may need relocating in future.

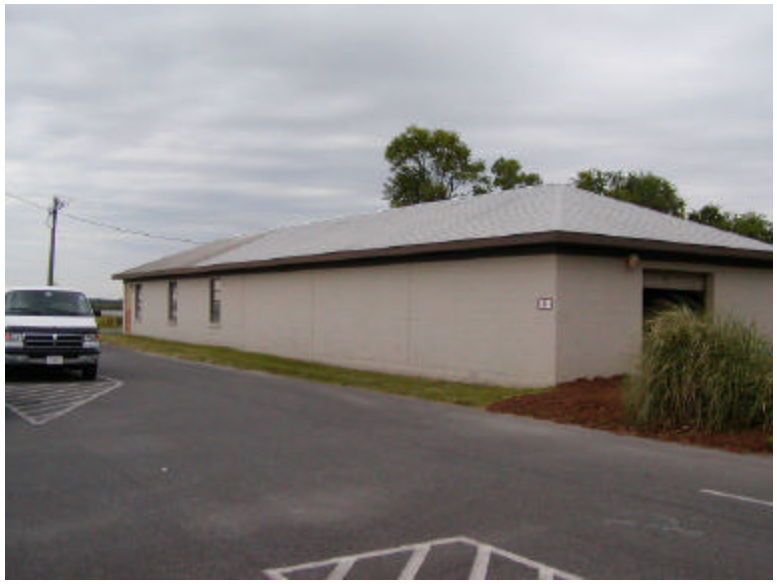
Practice areas

Eagle Creek Golf Course currently has a driving range and a practice putting green. The range is undersized and puts some players at risk to being hit by errant practice shots. After the new clubhouse is constructed, the existing driving range will be over 600 yards away. The new clubhouse site does not seem to have enough open space to accommodate a driving range any closer. The existing putting green may be used in the future as a nursery for potential turf replacement on the course's greens. The new clubhouse site does allow for a new practice putting green.

Current pesticide facility is aged, yet functional.

Pesticide mixing and storage

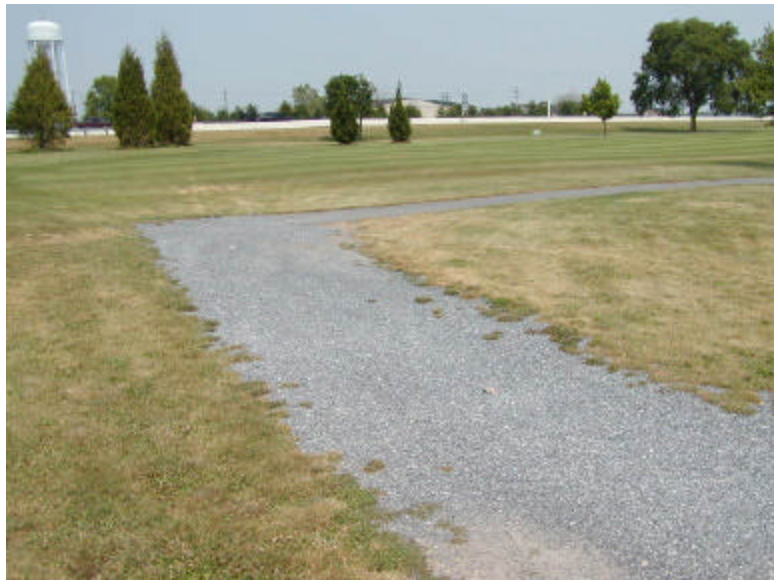
Really just an old building used for storage, this is one of the weak points of the maintenance complex. Several features of the existing pesticide storage facility further detract from its attractiveness for long-term use. A new facility would decrease potential environmental risks and increase employee safety.



Aesthetically challenged cart barn.

Cart barn

The Eagle Creek cart storage facility will be replaced when the new clubhouse is constructed. Future use of the facility is unknown but it has been suggested that it may be used for maintenance equipment or chemicals or fertilizers. Currently, the facility is too small and old to be considered satisfactory.



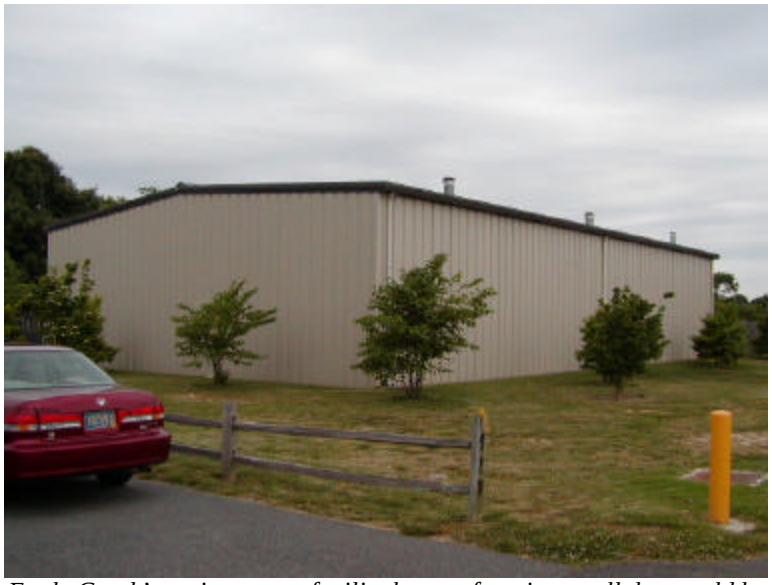
Cart path paving is incomplete.

Infrastructure

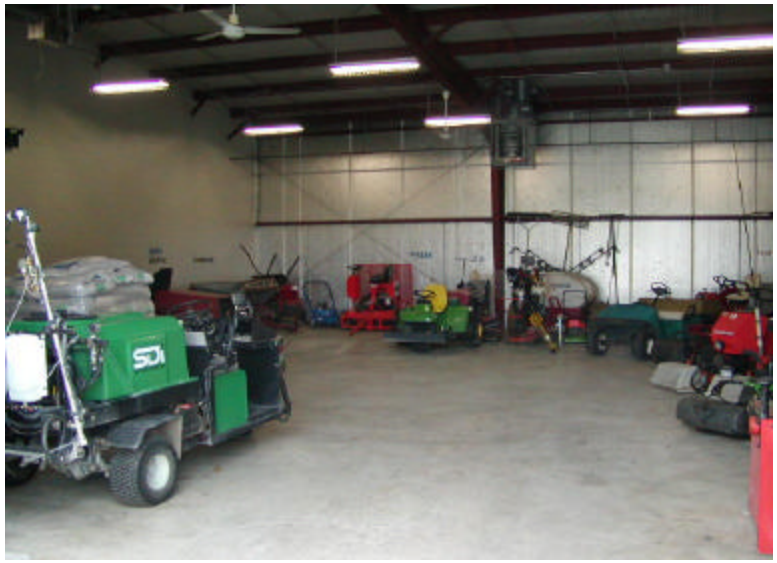
This section examines important elements of a quality golf course that are difficult to group into another category. Cart paths are in fair condition where paved. When the course hole numbering is redone, there should be a comprehensive study undertaken to determine the best location and need for bridges over the numerous streams on the course. The parking lot is in good condition and seems barely large enough to satisfy the regular demands of Eagle Creek customers. Landscape development should be continued only where appropriate. Hole signs will need to be re-accomplished when course is rerouted. This would be a great time to update the site amenity group at each tee.

Maintenance complex

The maintenance complex is short on space. Superintendent Wanner and his staff must, and do, keep the area relatively organized and clean. Space for equipment, parking, storage, and administrative areas are all equally lacking for a truly ideal situation. When the clubhouse is replaced, the old one can be used for additional administrative space.



Eagle Creek's maintenance facility houses functions well, but could be larger in all categories.



Equipment storage space is nearly adequate during good weather.

Superintendent Harry Wanner's office is humbly appointed.

Environmental Compatibility Quotient Checklists

The following is a brief compilation of some of the observations in each of the ten Environmental Compatibility Quotient (ECQ) categories during the site visit.

ECQ Categories

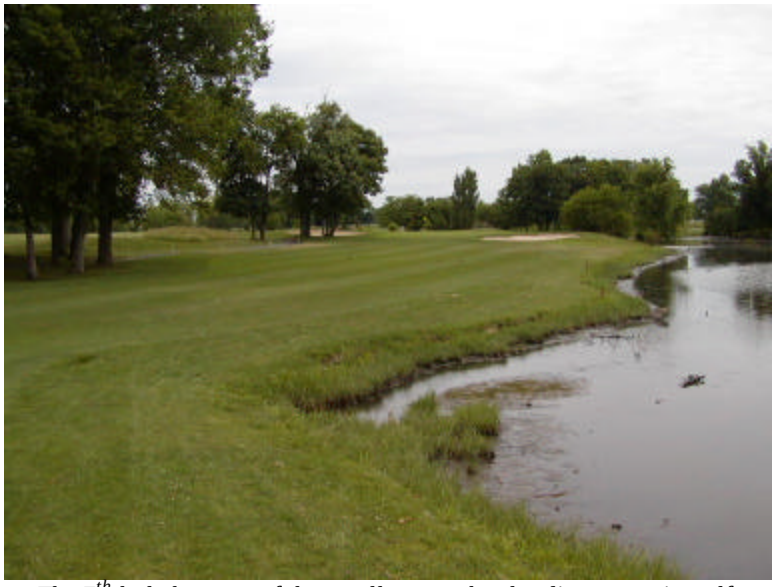
- Overall Management Philosophy & Documentation
- Safety, Training, And Awareness
- Compliance
- Course Playability
- Pollution Prevention
- Conservation Practices
- Aesthetics & Naturality
- Maintenance Practices
- Customer Relations & Education
- Miscellaneous Special Projects & Activities

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).

Native trees provide an attractive backdrop behind the 6th green.



The 7th hole has one of the smallest tee shot landing areas in golf.

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.

Determining the Environmental Compatibility Quotient

The ECQ compiled for an installation's course is a snapshot of the overall performance and compliance with the GEM Plan. There are two ways to use the ECQ checklists to determine the status or quality of the environmental management program: determining the actual and potential environmental compatibility quotients.

- **Actual ECQ-** the total percentage of "Yes" responses for all ten checklists.
- **Potential ECQ-** the total percentage of "Yes" responses plus the total percentage of "Partial" responses for all ten checklists.

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

Overall Management Philosophy & Documentation

U.S. Air Force GEM program goals

- Enhance the installation ecologically and economically
- Demonstrate that the golf course is managed with consideration for the unique conditions of the ecosystem of which it is a part
- Document management practices to promote more widespread understanding and appreciation for environmentally sound golf course facilities
- Share information on the environmental opportunities and constraints of your golf facility with your customers, the golfers

Observations

- 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
- New clubhouse interior should be appointed with a location to present environmental information to customers

Drought is a recurring concern on the East Coast.

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 wildlife habitat, water resources, sensitive landscapes, special management zones, etc. 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 wildlife species and habitats?	✓		
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	**4**	**3**	**3**

Safety, Training, & Awareness

U.S. Air Force GEM program goals

- Educate all employees on the benefits of an ecosystem based golf course environmental management program
- Store and handle all potentially harmful products to minimize employee exposure
- Regularly train employees on the potential health hazards associated with their duties
- Involve entire staff in ensuring a safe golfing opportunity for their customers

Eye safety station is located outside in the storage yard.

Protective screen only works some of the time.

Observations

- Expanded training for all employees a must to completely realize GEM goals
- Ensure employee's health is prime consideration
- Demonstrate genuine concern for player health and safety through actions
- Consider using AFCEE for on-site golf course environmental management training
- Lack of funding hinders training plans
- Business tempo and training scheduling makes it difficult to involve much of the staff at one time

Safety, Training, & Awareness

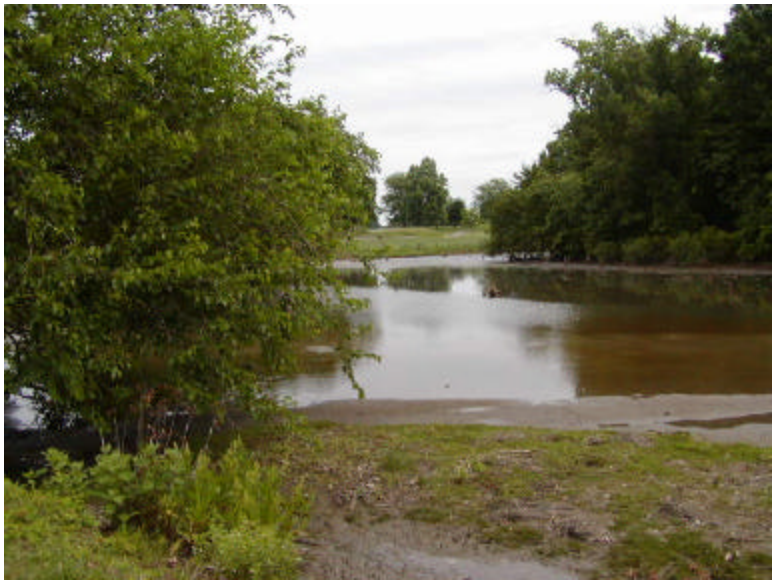
#	Environmental Compatibility Indicator	Yes	Partial	No
1	All employees are familiar with the GEM Plan and are trained regularly on the importance of environmental performance and compliance with the goals and objectives of the program?			✓
2	All appropriate employees are trained to be familiar with USAF, federal, state, and OSHA regulations that apply to storage and handling of chemicals used on the property?	✓		
3	All employees are aware that chemical manufacturing, use, storage, and disposal may pose 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	Chemical applicators are encouraged to apply for continuing education programs and receive regular training to maintain currency?	✓		
7	The chemical storage structure/area is locked, well-ventilated, fire proof, and access is limited to select personnel?	✓		
8	Pesticides, fertilizers, and other chemicals are stored on plastic or metal shelving?	✓		
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	**8**	**1**	**1**

Compliance

U.S. Air Force GEM program goals

- Integrate management practices with appropriate regulatory requirements and procedures
- Guarantee safe, healthy, and enjoyable experience for golfers while ensuring long-term operation of the facility
- Utilize installation expertise regularly on all matters dealing with bird aircraft strike hazards, regulators, impact analysis, and cleanup

Although fuel tank is in compliance, full containment lessens risk.



The St. Jones River puts water quality concerns at the top of Dover's environmental challenges list.

Observations

- Assemble all required documents in one place
- Inconsistent interpretations of compliance actions among installation, MAJCOM, and ECAMP evaluators confuses and confounds
- Ensure ECAMP results are outstanding
- Relationship with installation environmental and engineering staff is exemplary

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 regularly scheduled meetings?			✓
3	Are there regularly scheduled staff meetings to discuss environmental management issues?			✓
4	Does the director of golf and the superintendent attend ECAMP 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	Are MSDSs readily available for all required substances?	✓		
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	Are oil/water separators operating properly and correctly maintained?	✓		
10	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.	✓		
	Point totals for each column - Response percentage	**7**	**1**	**2**

Course Playability

U.S. Air Force GEM program goals

- Create desirable playing conditions through the utilization of sound, ecosystem based environmental management practices
- To daily offer and enjoyable and challenging yet fair golfing experience for all levels of golfers
- Establish a open, courteous, and friendly relationship between the course manager, the superintendent, and the customer to maintain enthusiasm and interest

Although lacking in yardage, Eagle Creek offers plenty of challenge.

"Natural" area may appear contrived and unkempt to some.

Observations

- Improve test while maintaining equitable playing conditions for all levels of golfers
- Reconsider the "natural" areas left unmowed around the golf course for location, equity, and appearance
- Maximize variety in course set-up by including a diversity of challenging pin placements and numerous tee locations
- Continue focusing maintenance efforts on in-appropriate play areas of the course
- Increase contour mowing for greater definition of fairway landing areas

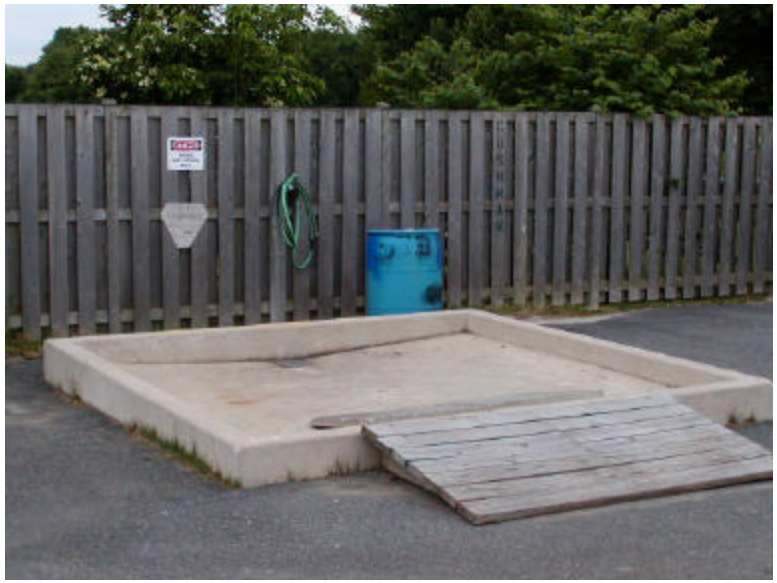
Course Playability

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Pin placements and tee markers are regularly moved to minimize the impacts of play while increasing the enjoyment and diversity of the experience of the customer?	✓		
2	Course has sufficient number of tees to satisfy need of all types of golfers and their individual talent levels?	✓		
3	At least 75% of the greens are proportionally sized for the average length of approach shot for required all levels of golfers?	✓		
4	The speed of the greens is appropriate to their contours and size?	✓		
5	Fairway width and turf quality is sufficient for equitable challenges to all levels of golfers?	✓		
6	Roughs are regularly maintained to produce an equitable challenge to all levels of golfers?	✓		
7	Course conditioning and maintenance practices do not contribute to extending average playing times?	✓		
8	Extraneous fairway bunkers have been eliminated or converted to grass bunkers to help speed play?	✓		
9	Is bunker sand of appropriate quality and consistency?	✓		
10	Is proper drainage maintained near at least 95% of all greens and tees?	✓		
	Point totals for each column - Response percentage	**10**	**0**	**0**

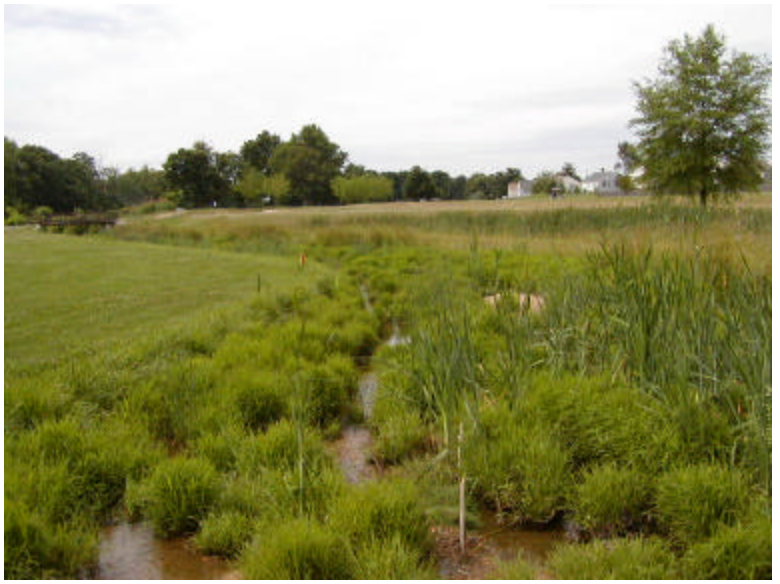
Pollution Prevention

U.S. Air Force GEM program goals

- Employ practices that eliminate or avoid the potential for polluting the environment
- Guarantee that the golf course facility will not allow chemicals, fertilizers, detergents, or petroleum products they use to migrate outside their property boundaries
- Create and utilize a comprehensive pollution prevention plan for all aspects of the golf course and its facilities



Equipment wash pad keeps unwanted substances from reaching ponds, streams, or rivers.



Slow release fertilizers can prevent nitrification of water bodies.

Observations

- Increase the use of slow release fertilizers
- Provide regular training for all employees on the specifics of their role in preventing pollution
- Encourage customers to assist in recycling efforts
- Although pesticide facility is functional, consider purchasing state of the art facility and relocating nearby maintenance complex
- Consider completely covering and containing fueling area

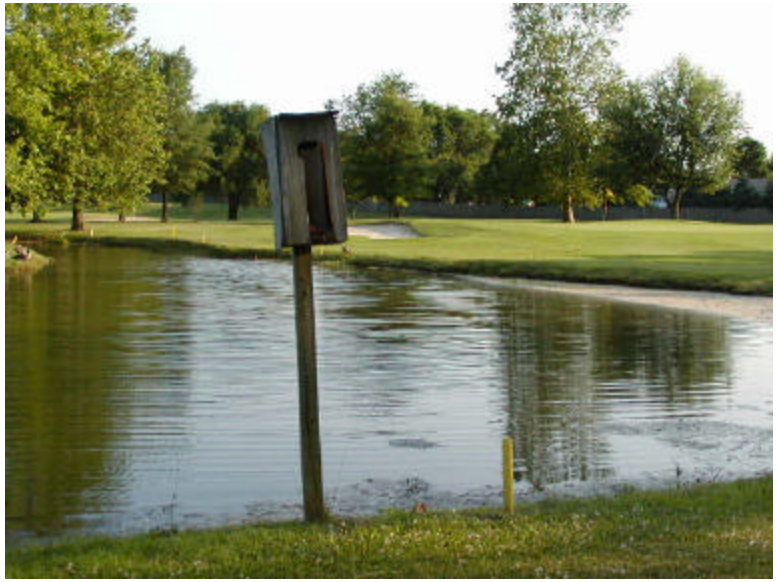
Pollution Prevention

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there designated "no-mow" areas and established "no spray zones" and buffer areas around pond, stream, or lake edges and have they been communicated to mower operators and technicians?	✓		
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	Wash and wastewater is kept from making direct contact with surface water and is recycled or allowed to filter through a vegetative area when cleaning and maintaining equipment?		✓	
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	Does the fuel storage and delivery area comply with local, state, and federal regulations?	✓		
10	Are slow-release fertilizers used to reduce the negative potential for runoff?	✓		
	Point totals for each column - Response percentage	**6**	**2**	**2**

Conservation Practices

U.S. Air Force GEM program goals

- Use natural resources efficiently while respecting their long term value to the local community and the mission of the USAF
- Provide important greenspace benefits
- Closely monitor and manage water use to prevent unnecessary depletion of installation or local water resources



Bird box demonstrates Eagle Creek's concern for other course users.

Snakes populate the waterways at Eagle Creek Golf Course.

Observations

- Incorporate contour mowing procedures
- Increase communication with customer on conservation practices that are in place or planned for the future
- Building personal relationships with installation natural resources manager and other environmental professionals
- Provide detailed input on the update of installation integrated natural resources management plan (INRMP)

Conservation Practices

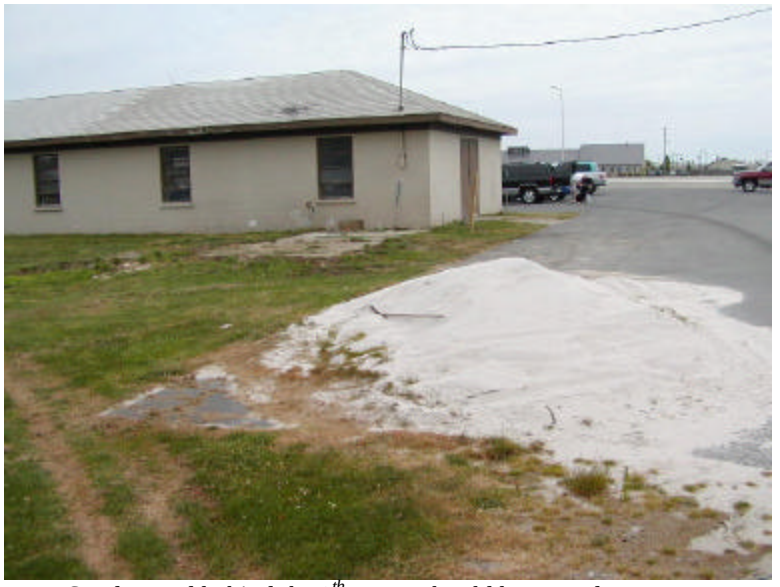
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are all motorized golf course equipment checked regularly for excessive air polluting emissions?			✓
2	Has the irrigation system been completely checked for proper water distribution in all irrigated areas and are water leaks fixed in a timely manner?	✓		
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, out of play areas, etc.) been eliminated or minimized?	✓		
5	Have flow meters been installed to monitor water use and detect potential waste?	✓		
6	Have part circle irrigation heads been installed where possible to save water 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 wildlife habitats and their maintenance practices been coordinated with the installation BASH officer and environmental management personnel?			✓
10	Are recycling containers conveniently provided for customer and employee use throughout the golf course facility?	✓		
	Point totals for each column - Response percentage	**7**	**0**	**3**

Aesthetics & Naturality

U.S. Air Force GEM program goals

- Create and maintain an attractive golf course facility that requires minimal outside chemical or fertilizer inputs
- Utilize native or indigenous plant materials exclusively
- Consider every aspect of the golf course facility as a positive contributor to the overall satisfaction of the customer

New clubhouse site offers opportunity for an attractive facility.



Sand stored behind the 9th green should be moved to a more appropriate location.

Observations

- Increase number and variety of new native trees added to course every year
- Funds needed to expand landscape improvements to selected areas on the course should be programmed for incremental implementation at selected, highly visible locations only
- Keep bulk materials in appropriate locations
- Improve signage around the course

Aesthetics & Naturality

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is the area near the clubhouse attractively landscaped and maintained?	✓		
2	Is there an appropriately located and attractive facility sign and has the on course signage been designed and maintained attractively?			✓
3	Does the course seem to be part of the natural landscape and overall contours?	✓		
4	Are pest-resistant and drought-tolerant native trees, shrubs, groundcovers, or their cultivars used in landscaped areas?	✓		
5	Are there "targeted", highly visible areas where flowering annuals or perennials are appropriately maintained?			✓
6	Are the relative numbers of the prominent deciduous, evergreen, and flowering golf course trees balanced and at least 75% native species?	✓		
7	Are the maintenance facility and the course's miscellaneous "outbuildings" maintained sufficiently and/or screened from view?		✓	
8	Is there an attractive and well-maintained site amenity group (bench, washer, etc.) at least 75% of the tees?		✓	
9	Do the driving range, practice areas, and parking areas present a positive image?	✓		
10	Is the cart barn integrated into the overall landscape plan of the course or the area in which it is located?			✓
	Point totals for each column - Response percentage	**5**	**2**	**3**

Maintenance Practices

U.S. Air Force GEM program goals

- Integrate the concept of ecosystem management into all course management decisions and practices
- Employ the principles of integrated pest management
- Document all activities for future reference
- Constantly examine management practices to look for improvements
- Insist on a well-trained staff

Turf quality on greens is excellent throughout the course.

Vegetative buffers along small drainage ways can help keep unwanted substances out and down-stream users smiling.

Observations

- Increased training and involvement of staff on integrated pest management procedures
- Compile written pest profiles of common pest species
- Improve water hazard care to eliminate unwanted vegetation while improving aesthetics and habitat
- Increase number of trained scouts on the maintenance staff

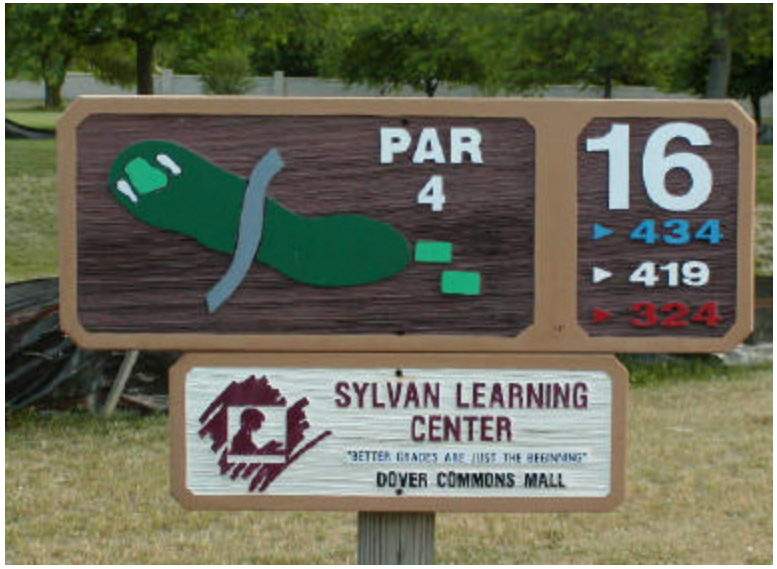
Maintenance Practices

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is contour mowing used to conserve fuel and 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 reasonable levels without continually stressing turf or maximizing chemical inputs?	✓		
4	Are there regular procedures in place to continually improve soil health such as organic amendments, aeration, and drainage?	✓		
5	Is there a map of the course's "hot spots" requiring special care or regular attention?		✓	
6	Are there trained scouts on staff other than the superintendent to monitor turf and plant health and pest populations using scouting forms to record the type, severity, location, and treatment of pest problems and organized into a report or guide so that they can be used for future pest control solutions?		✓	
7	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?			✓
8	Are there established and documented aesthetic and functional thresholds for insects, fungal diseases, and weeds for all managed areas to precisely and effectively manage pest populations and reduce chemical inputs?		✓	
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	**6**	**3**	**1**

Customer Relations & Education

U.S. Air Force GEM program goals

- Ensure that the customer knows that their opinions count and will be acknowledged, assessed, and acted upon
- Educate the customers about the benefits of environmentally responsible golf course management and the future of the game and the environment
- Enlist customer support and assistance on caring for the course and its facilities as well as GEM Plan goals



Tee signs are another potential customer educational opportunity.

Ensure there is a designated location for informing customers on the environmental management plans in the new clubhouse.

Observations

- Efforts to solicit customer opinions and concerns are a great example for all U. S. Air Force golf facilities
- Create a location to communicate environmental management goals and maintenance plan in the new clubhouse
- Continue to involve installation youth through rules and instruction clinics

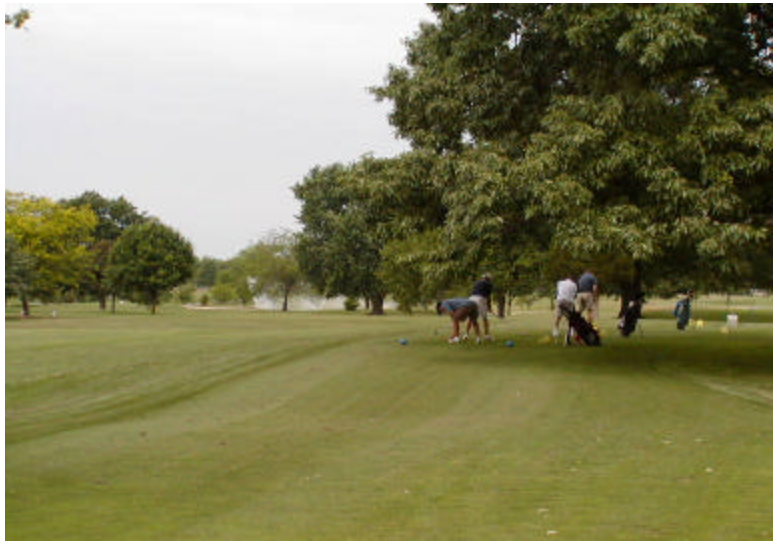
Customer Relations & Education

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are the course manager and superintendent involved in a long-term customer educational program that is regularly updated and documented?		✓	
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?		✓	
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 Council, Civil Engineering, Environmental Management, the Services manager, and commanders by course management?	✓		
5	Are there warning signs posted near parking lots to make highly sensitive individuals aware of the potential danger to their health and are all state posting requirements being met?	✓		
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	**6**	**2**	**2**

Miscellaneous Special Projects & Activities

U.S. Air Force GEM program goals

- Educate the local community about the benefits of an environmentally responsible golf course management approach is for the future of the game and the environment
- Reach out to school children to raise their awareness and appreciation for the game of golf and the GEM Plan principles
- Further the great game of golf at all times in as many ways as possible



Consider enlisting regulars to assist in environmental efforts.

Interpret key environmental situations to increase customer education.

Observations

- Conduct field trips at the course for local school children
- 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
- Need to demonstrate dedication to "growing" the great game of golf to young airmen, other installation non-golfers, and youth

Miscellaneous Special Projects & Activities

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there projects planned and funded for the next year that would communicate 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 fundraising tournaments planned that may provide for future environmentally-related projects?			✓
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	**4**	**3**	**3**

ECQ Summary

#	Environmental Compatibility Quotient Category	Yes	Partial	No
1	Overall Management Philosophy & Documentation	4	3	3
2	Safety, Training, & Awareness	8	1	1
3	Compliance	7	1	2
4	Course Playability	10	0	0
5	Pollution Prevention	6	2	2
6	Conservation Practices	7	0	3
7	Aesthetics & Naturality	5	2	3
8	Maintenance Practices	6	3	1
9	Customer Relations and Education	6	2	2
10	Miscellaneous Special Projects & Activities	4	3	3
	Composite points & response percentage	**63**	**17**	**20**

GCEBA Results

✳ **Eagle Creek Golf Course, Dover AFB, DE**

- Actual ECQ (# of "Yes") = 63 "Early Stages"

- Potential ECQ (Actual ECQ plus "Partial") = 80 "Showing Progress"

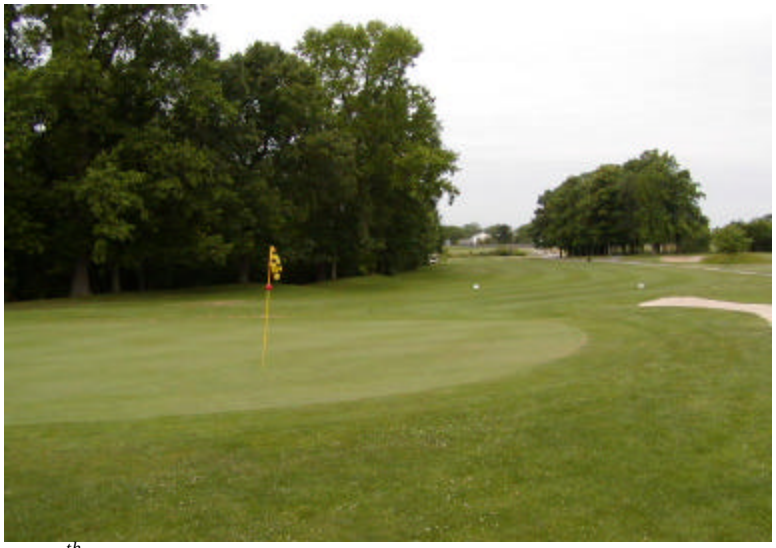
Conclusion

Eagle Creek Golf Course is an amazing example of how a small crew and an even smaller budget can successfully grow quality turf and provide a satisfying recreational activity. The course's layout provides adequate design diversity to test better players while accommodating beginners and the average golfers.

Areas needing improvement

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

- Overall Management Philosophy & Documentation
- Aesthetics & Naturality
- Miscellaneous Special Projects & Activities

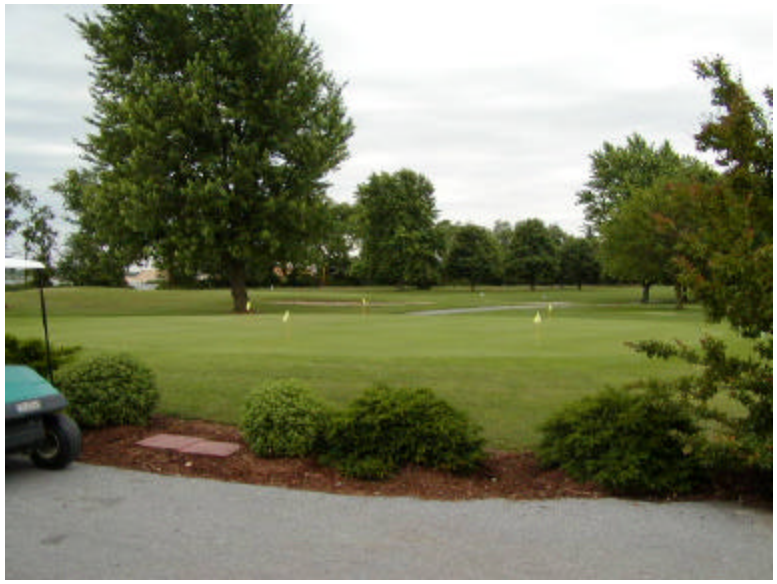


The 8th green can prove hard to reach unless the tee shot is well struck.

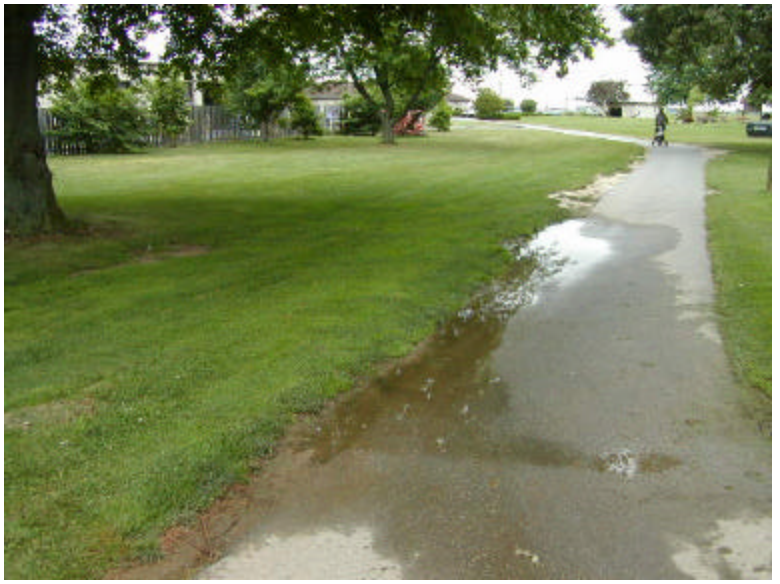
The 375 yard, par four 8th is a wonderfully designed golf hole.

The gallery

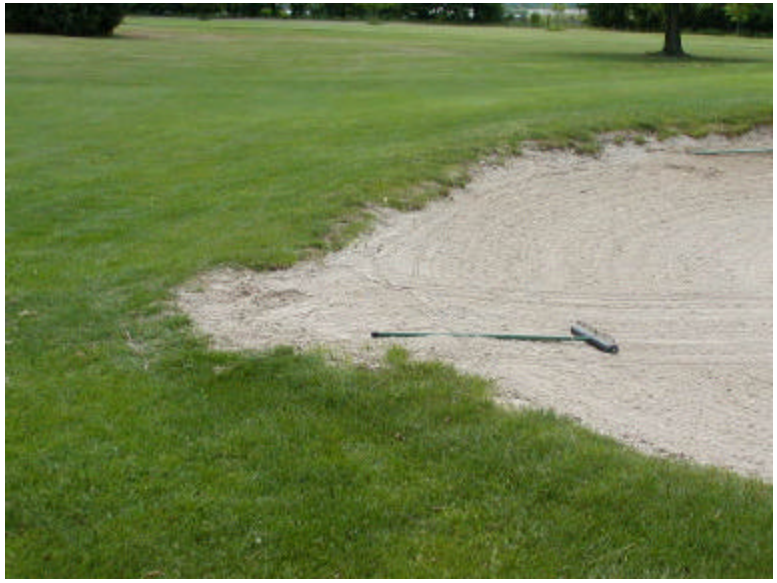
This section of the report will be where some of the more revealing photographs (of the literally hundreds taken during the site visit) of pests, maintenance practices, and other areas where improvements may be made to create the best possible golf facility.



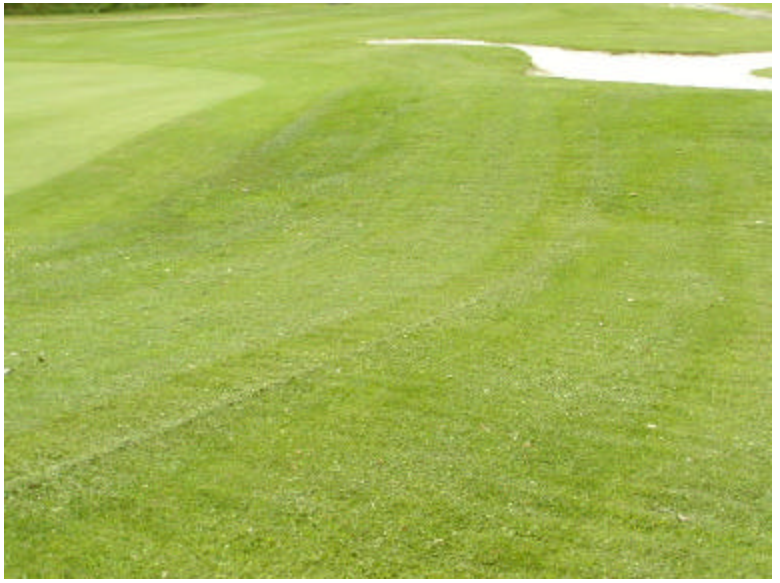
Existing putting green & driving range will not adjoin new clubhouse.



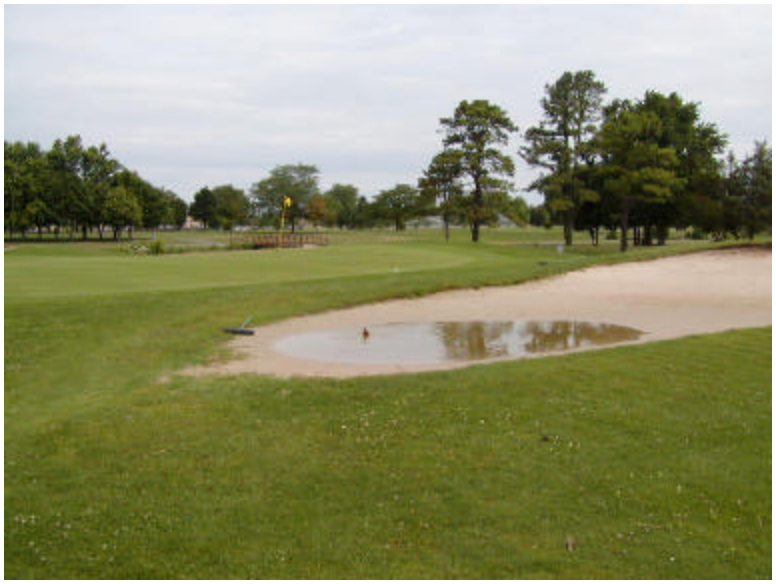
Poor drainage conditions can lead to cart path failure.



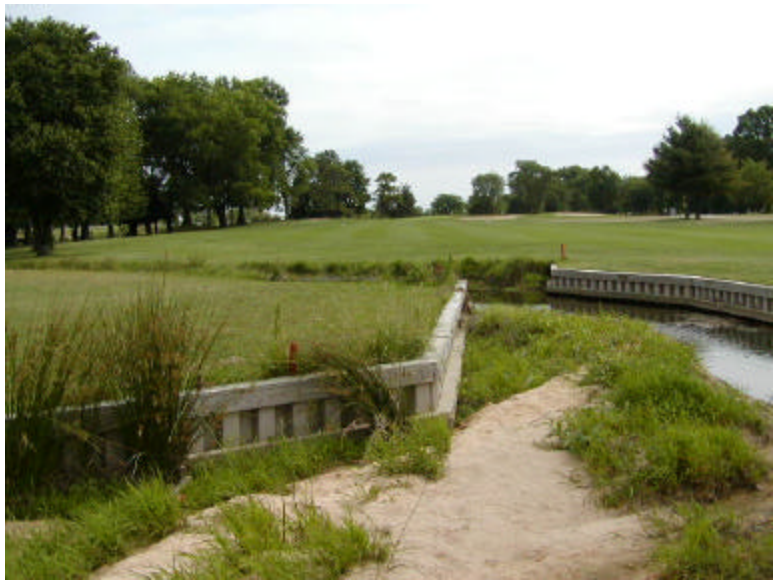
Poor bunker rake machine operation causes damage.



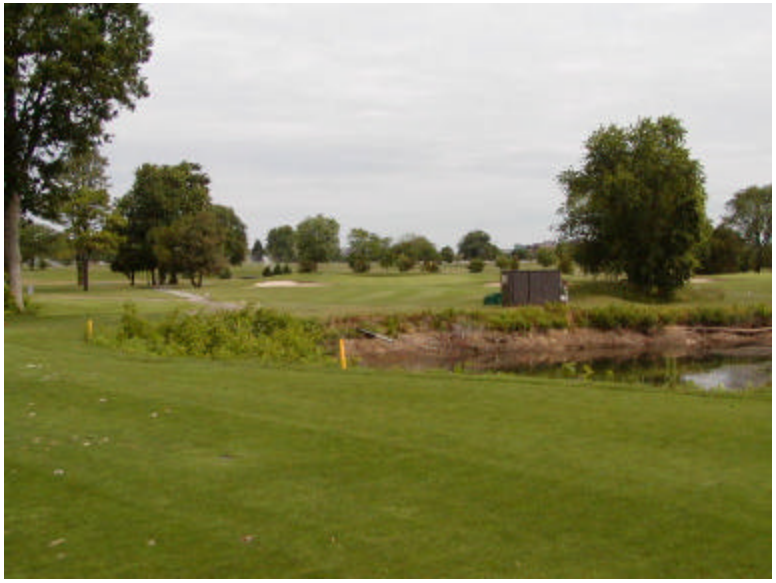
Ripples in turf are proof positive of excessive mower speeds.



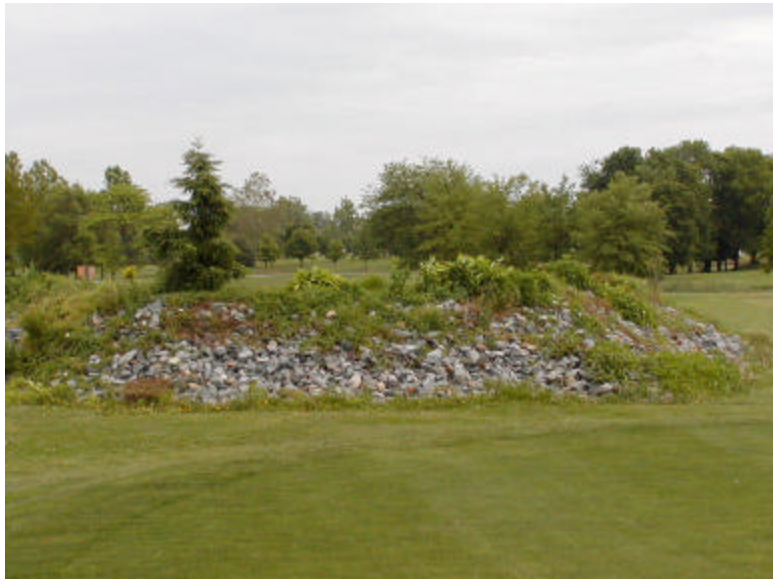
Poor bunker drainage hampers playability and customer satisfaction.



Drainage way beginning to show silt accumulation.



Pump house is in pay for some golfers.

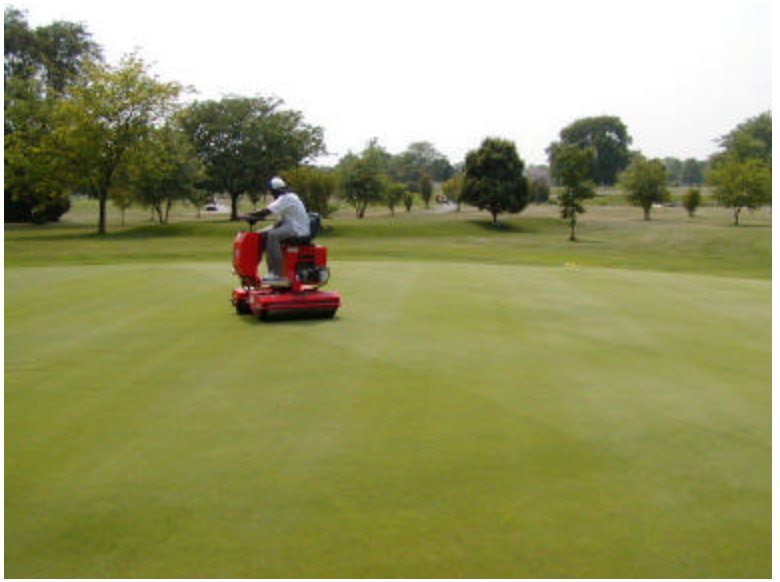


New tee box is not integrated into the overall landscape.

More bridges than any other course in the U. S. Air Force?

The 12th features the only blind shot on the course.

Maintenance complex has minimal space.



Smooth greens with consistent speeds are the norm at Eagle Creek.

Environmental challenges

One of the important results of the GCEBA process is the identification of significant issues or challenges that should 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 Eagle Creek Golf Course, Dover AFB, DE:

- Watersheds, wetlands, floodplains, & water quality management
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Threatened & endangered species
- Air quality
- Water use
- Biodiversity enhancement
- Installation Restoration Program (IRP) sites
- Pest management

Wetlands, floodplains, and water quality are the primary challenges.

WATERSHEDS, WETLANDS, FLOODPLAINS, & WATER QUALITY MANAGEMENT

Just about every golf course has water related issues. Eagle Creek deals with several related specifically to water quality management to include pollution prevention, floodplain management, wetland protection, and irrigation supplies. The protection of the watershed and connected water bodies are among the most important environmental challenges for Dover AFB managers.

The Eagle Creek Golf Course is the owner of the only designated floodplains on Dover AFB. Regeneration of the woodland buffers around wetlands area is desired.

There are three large watersheds draining Dover AFB. One of these watersheds drains to the unnamed stream that crosses the golf course draining into the St. Jones River and, eventually, the Delaware Bay. The St. Jones River receives drainage from 907 acres from buildings, parking areas, and the golf course.

Although there are no naturally occurring ponds on Dover AFB, the golf course has at least 5 small water bodies that support grass carp and turtles. There is also a wet meadow that was created by Dover AFB to satisfy stormwater management requirements associated with outfall 007 (the James Bond outfall).

Creating turf buffers, no-mow, and no-spray zones around each of Eagle Creek's water bodies should be considered to protect the watershed. Also, slow release fertilizers should be used exclusively. Pesticides should never be applied when potentially severe rainfalls are predicted or expected.

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

Since Dover AFB is close to large migratory routes and overwintering sites, BASH has been a long-time concern. The state-operated Ted Harvey Wildlife Area encompasses the St. Jones River corridor adjacent to the golf course. This river corridor acts as an attraction to several and diverse species of animals and birds. Birds of primary concern include Canada geese, snow geese, sea gulls, and flocks of starlings and blackbirds.

Loafing Canada geese are increasingly hazardous to flying operations.

THREATENED & ENDANGERED SPECIES

No federally listed or candidate plant species occur on Dover AFB. There are, however, four rare species that have been identified as State Special Concern and include green frog-fruit, hyssop-leaf hedge-nettle, tickseed sunflower, and tiny-headed goldenrod.

No federally listed threatened or endangered species have been found on Dover AFB. There are six species of state rare fauna observed to include the mud sunfish, four-spine stickleback, great blue heron, broad-winged hawk, upland sandpiper, and short-eared owl. Any of these species could possibly be observed on the golf course property.

AIR QUALITY

Dover AFB is in located in a region of severe non-attainment for ozone. This designation is largely driven by large quantities of volatile organic compounds (VOCs), a precursor of ozone pollution, used in maintaining its aircraft operations. The potential Beddown of C-17 aircraft in the future generate a high amount of nitrous oxide, another precursor of ozone problems, and would almost demand that future golf cart fleet purchases consider battery-generated electric power. The rest of the golf equipment should be regularly tested for excessive ozone-related emissions.

WATER USE

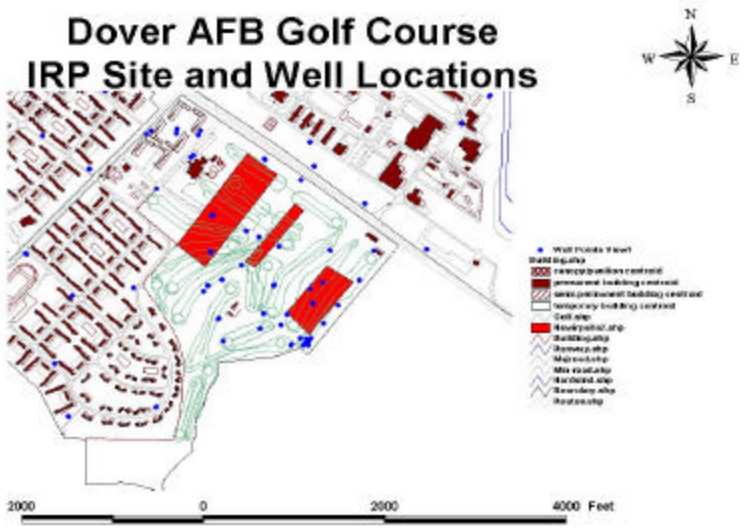
Water for irrigating the course is supplied completely by groundwater withdrawals from underlying aquifers. In some areas, test well water levels decreased over 100 feet between 1952-1977. Recent tests by the U. S. Geological Survey confirm the continuation of this trend. Runoff from rainstorms supplies irrigation water for the golf course and is stored in a 1/3-acre artificial pond located between holes 4 and 10. This pond can be nearly emptied from one night's irrigation cycles. Seemingly connected to a shallow aquifer, droughts can severely hamper the course's ability to irrigate greens and tees. The irrigation pond can take days to refill without significant replenishing rainfalls.

BIODIVERSITY ENHANCEMENT

Several recommendations for improvements to the golf course grounds were itemized in the INRMP. Many of these are based on increasing wildlife numbers. The U. S. Air Force golf program does not promote this idea as the Dover AFB mission entails flying aircraft and in no way, shape, or form should the golf course increase the risk for bird strikes by enhancing, creating, or restoring wildlife habitat for the purpose of increasing animal populations. Many of the other recommendations are valid for implementation by the golf course.

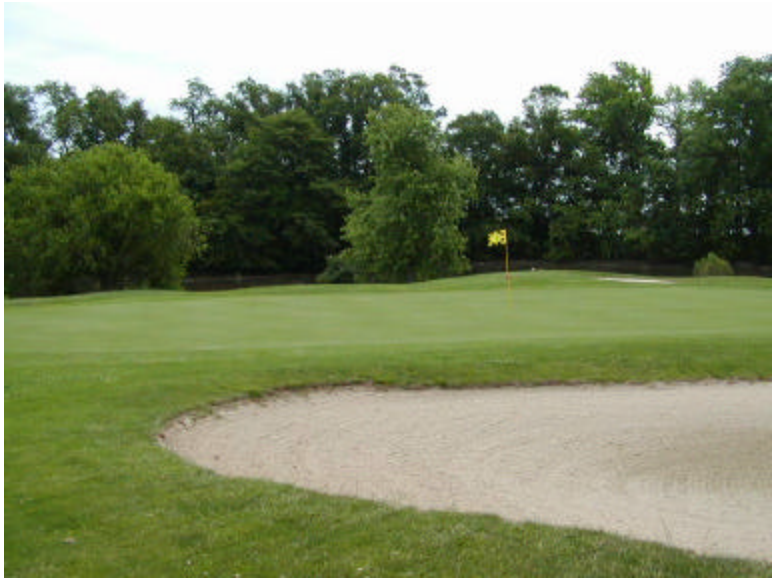
INSTALLATION RESTORATION PROJECT SITES

Landfills seem to occur under nearly every U. S. Air Force golf course. Eagle Creek is no exception as it once hosted LF-18, a troublesome landfill that was identified as the source of contamination to both groundwater and surface water. Fortunately, this landfill was completely remediated in 1997. An old fire training area adjacent to the course within the St. Jones River drainage has also been identified.



PEST MANAGEMENT

The golf course is maintained by the Services Squadron licensed pesticide applicators. A Nov 02 update schedule was set for the Pesticide Management Plan. Golf course pests include groundhogs and their burrows in the roughs. There is also a seasonal greenhead fly problem caused by the close proximity of breeding grounds in surrounding salt marsh habitats. One of the concerns listed in the INRMP was that the golf course staff had started using granular pesticides to liquid. Also, the rinse water from the maintenance equipment wash rack supposedly sheet flows into drainage ways and eventually wetlands.



Small quantities of pesticides are being used at Eagle Creek.

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HQ 436th Airlift Wing, *436 AW OPLAN 91-1, Bird Aircraft Strike Hazard (BASH)*, 15 January 2001

For additional assistance or more information, please contact:

Air Force Center for Environmental Excellence
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Or visit our Golf Course Environmental Management Program webpage:
http://www.afcee.brooks.af.mil/ec/golf/