



Willow Lakes Golf Course
Environmental Management Plan
Pope AFB, NC Apr 07



Willow Lakes Golf Course Environmental Policy

**In concert with the
Pope AFB mission,
we pledge to employ
only those management practices
that minimize or eliminate the potential
for negative impacts to the environment
and the surrounding community,
ensure compliance with all appropriate regulations,
and to constantly reevaluate our processes
to achieve the highest standards
of environmental excellence.**



Executive Summary

U. S. Air Force GEM Program

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

The primary tenets of the GEM Program are to minimize or eliminate potential negative environmental impacts, maintain daily compliance with all appropriate regulations, and constantly examine all aspects of golf course management to achieve the highest standards of environmental excellence.

GEM Program process

There are five steps in the GEM program process.

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision



Environmental Compatibility Quotient

Actual ECQ	61
Potential ECQ	80

Final environmental challenges

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

- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Historic district
- Wetlands
- Air quality early action compact
- Environmental Restoration Program (ERP) sites & spill sites
- Water quality, stormwater management, & floodplains

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/>).

Analysis

Course details

Architect	George W. Cobb
Year constructed	Front-1978; Back-1969
Climate	Temperate
Average annual rainfall	46 inches
Average growing season	210 days
Winds/Prevailing Direction	WNW
Total Facility Acreage	128 acres
Par	36-36-72
Yardage/Rating/Slope	Tee- Yards/Rating/Slope
	Black- 7174/75.1/134
	Blue- 6871/74.0/129
	White- 6556/71.0/123
	Gold- 6018/67.6/111
	Red- 5677/70.8/118
Turfgrass	Tees- 419 Bermudagrass
	Fairways- 419 Bermudagrass
	Greens 328 Bermudagrass
	Roughs- 419 & Common
Irrigation water source	Potable city water



Willow Lakes Course Layout

Course description

At 7174 yards from the back tees, Willow Lakes Golf Course is one of the most challenging of U.S. Air Force links. The course features heavily treed, rolling terrain with several ponds and streams that must be negotiated. This makes the Director of Golf's course tough for all levels of golfers - no matter which tee they choose to play.

Although the greens are in dire need of a major overhaul, Willow Lakes is still fun and rewarding for the avid player. The superintendent does the best that can be expected considering he only has a 3-person staff.

If the Army decides to continue with Willow Lakes as part of the new Fort Bragg and they implement a few improvements, the Willow Lakes Golf Course should provide a phenomenal recreational resource and a steady income for a long time.



Willow Lakes Golf Course Aerial Photo

Determining the Baseline (ECQ)

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

ECQ Categories

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

Key to checklist responses

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

ECQ Checklists

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

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



The clubhouse is relatively new addition to Willow Lakes Golf Course.

Interpreting the ECQ

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

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

ECQ Scoring Scale

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



Many impoundment devices and bridges are in need of replacement.



The Willow Lakes Golf Course is a challenge for all ability levels.

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

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

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

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

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

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

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

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

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

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

ECQ Summary

#	Environmental Compatibility Quotient Category	Yes	Partial	No
1	Overall Management Philosophy & Documentation	5	3	2
2	Safety, Training, & Awareness	8	0	2
3	Compliance	6	2	2
4	Pesticide Use, Storage, & Handling	6	3	1
5	Pollution Prevention	8	1	1
6	Conservation Practices*	4	3	3
7	Water Resources	7	1	2
8	Maintenance Practices	8	1	1
9	Customer Relations & Education*	5	2	3
10	Miscellaneous Special Projects & Activities*	4	3	3
	Composite point total/response percentage	61	19	20

Apr 07 - Willow Lakes Golf Course, Pope AFB, NC

- Actual ECQ (# of “Yes”) = 61 (“Red”)

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

* = Category requires improvement or attention

Environmental challenges

One of the important results of the GCEBA process is the identification of potential environmental challenges to be addressed in the long-term GEM Planning process. After determining the relative significance and validation of each potential environmental challenge, the installation golf and environmental staffs should determine the set of final challenges that will be actively managed in the GEM Plan. Armed with the list of final environmental challenges, the golf staff should determine the best management approach that satisfies the goals of the golf facility from the course playability and customer satisfaction perspectives. Then the golf staff's preferred management approach should be coordinated with the installation's environmental staff for refinement, coordination, and approval.

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

- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Tree management
- Irrigation supply water costs
- Air quality early action compact
- Environmental Restoration Program (ERP) sites & Areas of Concern (AOCs)
- Water quality/stormwater management
- Threatened or endangered species



Willow Creek Golf Course has numerous water resource management-related environmental challenges.

FINAL ENVIRONMENTAL CHALLENGES

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

- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Historic district
- Wetlands
- Air quality early action compact
- Environmental Restoration Program (ERP) sites & spill sites
- Water quality, stormwater management, & floodplains

Image removed due to the perceived potential security threat.

Willow Lakes Golf Course Environmental Challenges



Canada geese are Willow Lakes' primary BASH concern.

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

According to the INRMP, “the Pope AFB BASH Plan (43 AW SPLAN 91-212) provides guidance for reducing bird and wildlife aircraft strike hazards in areas where aircraft operations are conducted. The installation golf course contains six small impoundments with a total combined area of approximately three acres.

Muskrats (*Ondatra zibethicus*) are primarily a problem on the golf course, where they can destabilize pond shorelines and damage emergent aquatic vegetation. If necessary, the USDA Wildlife Services agreement can also be used to Final Integrated Natural Resources Management Plan February 2006 Pope

AFB, North Carolina 92 implement muskrat control. Deer, beaver, muskrats, and some of the bird species [e.g. mourning doves (*Zenaidra macroura*), Canada geese (*Branta canadensis*), and ducks] are classified as game animals, and are therefore subject to State hunting and fishing regulations. Consequently, depredation permits are required for the removal of these species. Appropriate trapping methods shall be employed for other animals that present a hazard to aircraft.

The INRMP continues, “The BASH management program has employed numerous methods to deter or remove birds from the Airfield. Currently, use of scare shot is judged to be the most effective means of harassment, and therefore, is the primary means of bird management used by the Airfield Management BASH Team. Additionally, the Willow Lakes Golf Course has used a dog to harass geese. Harassment can be done without a permit, provided the animal is not an endangered species.”

A project to dredge the ponds and streams associated with flooding hazards at the Manchester Road Gate has been discussed for some time. Current status is the project may have been canceled. This project would not only mitigate the flooding hazard, it would greatly improve the golf course aesthetically and functionally. In addition, the dredging would eliminate an attractive place for birds such as the Canada goose and others from loafing on the golf course and endangering the installation mission.



Many of the streams and ponds at Willow Creek are full of sediment.

Driver/requirement

- 43 AW SPLAN 91-212, Pope AFB BASH Plan

Objective

In direct support of the Pope AFB mission, the Willow Lakes golf staff shall continue to cooperate and assist installation environmental management staff with BASH reduction efforts.

Management approach

- Coordinate pond and stream maintenance procedures with installation environmental management staff
- Continue to pursue project funds to accomplish dredging of all detention ponds and associated streams

- Install only BASH-approved plant material listed in the INRMP
- Implement planned dredging of all retention features associated with streams that meander through the course
- Secure membership on BASH Working Group and attend all meetings

Target

- Eliminate 25% of the BASH conditions on Willow Lakes Golf Course before the next iteration of the INRMP.



Water features may be an attractant to Canada geese but they utilize the entire course to feed and nest.

AIR QUALITY EARLY ACTION COMPACT

According to the environmental assessment, “Pope AFB...has entered into an agreement with the United States Environmental Protection Agency (USEPA) and the North Carolina Department of Environment and Natural Resources (NCDENR) to participate in the Early Action Compact because of elevated ozone levels.” The EA goes on to say that the “Pope AFB region is not designated a nonattainment area and neither a State Implementation Plan nor a Management Plan is in place for the region. As a result, Pope AFB does not need to demonstrate compliance with the general conformity requirements of the CAA.” The EA also states that the “goal is for the region to be in attainment for the 8-hour ozone NAAQS by December 31, 2007.” The Willow Lakes staff may be able to assist by altering their daily work plans on announced air quality health alert days.

Driver/requirement

Clean Air Act, Early Action Compact

Objective

Minimize or eliminate excessive emissions from golf course equipment, vehicles, and equipment care procedures.

Management approach

- Continue regular engine maintenance
- Replace older equipment when funding allows
- Encourage employees to minimize their trips on and around the course

- Ensure equipment cleaning solution containers are closed at all times
- Eliminate all aerosols from maintenance and clubhouse inventories
- Replace 2-cycle powered equipment as funding and technology allow
- Prepare policy to alter maintenance staff work plans during announced regional air quality health alert days

Target

- Perform scheduled annual engine overhauls and regular equipment maintenance as necessary to minimize or eliminate excessive exhaust emissions



Environmental restoration program sites on Willow Lakes GC.

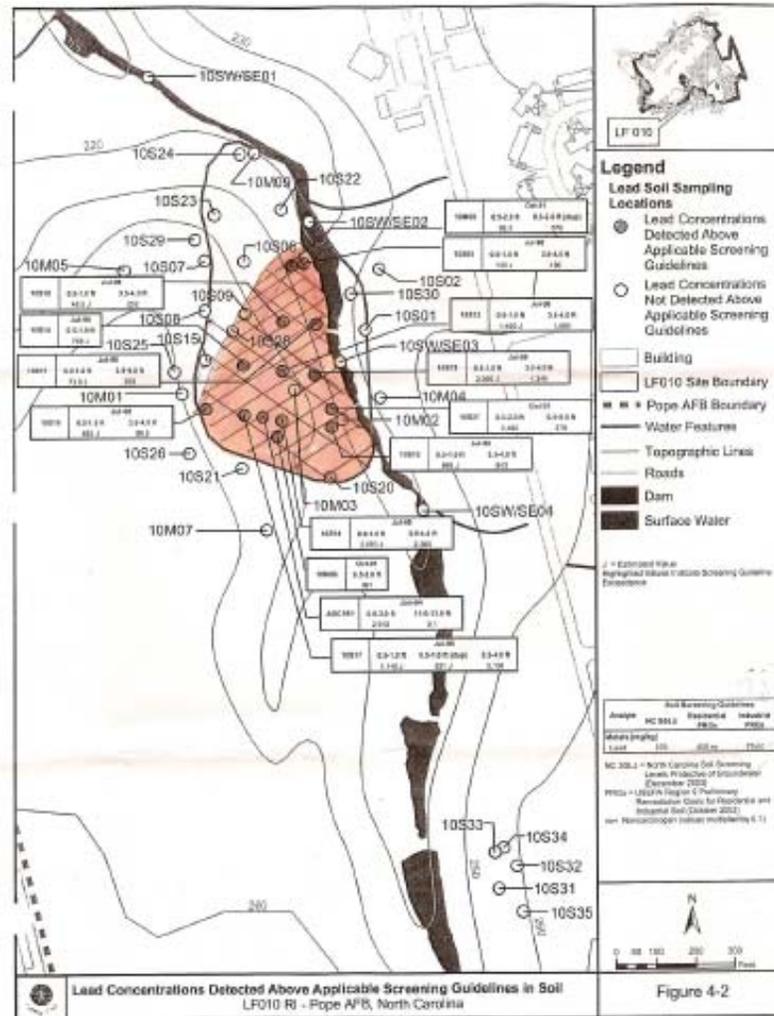


Monitoring wells are located on the Willow Creek grounds.

ENVIRONMENTAL RESTORATION PROGRAM (ERP) SITES & SPILL SITES

The Willow Lakes Golf Course has two managed CERCLA restoration sites within its boundaries. The largest is Site LF010, a historical hard fill debris disposal area. Various types of concrete, metal, and other construction debris were previously disposed of at this site. The recommended alternative in the Feasibility Study is land use controls with an engineered vegetative cover. These controls are still being finalized in discussions with the state of North Carolina.

The other site is former Area of Concern 69. This site has been redesignated LF24.



LF10 is characterized with high lead concentrations.

Driver/requirement

- CERCLA

Objective

Coordinate maintenance practices with installation environmental staff.

Management approach

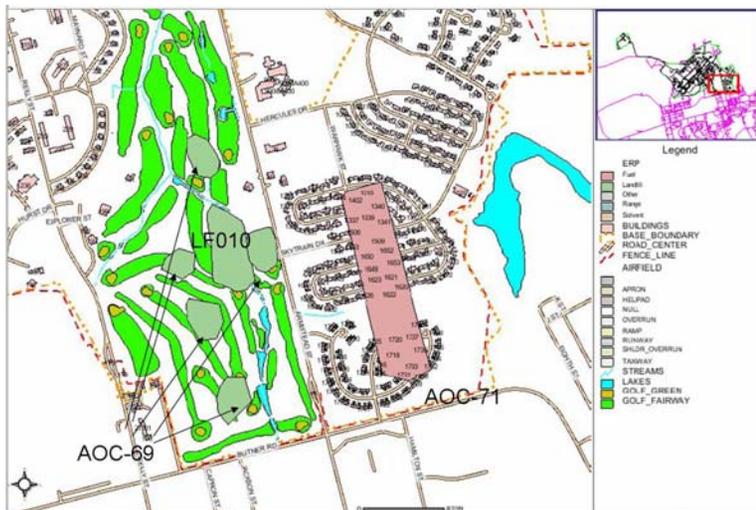
- Although there are no formal land use controls, any projects in or close to this area are subject to National Environmental Policy Act requirements which will trigger waiver request, if necessary. Golf course staff will continue with relative “hands-off” approach.

Target

- Consult with installation environmental and historical staff prior to initiating any significant changes to management practices



Still a mystery to the golf staff, someone has entered the golf course property and “officially delineated” wetlands.



IRP sites and Areas of Concern (AOCs) abound on Willow Lakes GC.

WETLANDS

The Final Wetlands Delineation Report states that there are “twenty-seven jurisdictional wetlands are present within Pope AFB. Human activities have altered many of these wetlands. Pope AFB manages wetlands located under the flight line of the airfield to keep vegetation low. Some wetlands, including those along the downstream portion of Tank Creek, have diminished in size by activities such as ditching and stream channelization.”

The report continues with “nonwetland waters of the United States occurring at Pope AFB included impoundments at the Willow Creek Golf Course, Tank Creek, Willow Creek, and their tributaries. Within the

Willow Creek Golf Course, portions of Willow Creek and its tributaries were impounded to create a series of 10 ponds. Willow Creek enters Pope AFB within the golf course boundaries and flows toward the airfield. These impoundments are excavated, maintained structures, usually with constructed outfall devices. ”

Many of these outfall devices are in poor condition and will require expensive replacement or major repairs to allow the flood detention system to function as intended by designers.

Driver/requirement

- Clean Water Act, Section 404

Objective

Never violate Section 404 requirements as a result of golf course management practices.

Management approach

- Establish appropriate fertilizer and pesticide application buffers along all delineated wetlands
- Coordinate in advance all maintenance practices within boundaries, if any, with installation environmental management personnel

Target

- Within 45 days of approval of management approach, by the installation environmental staff we will conduct training, and visit each water feature with appropriate maintenance personnel to confirm buffer locations.



This “pond” in front of the 4th green is rapidly evolving into a wetland.



Water near the 18th green reveals signs of sedimentation after a storm.

WATER QUALITY, STORMWATER MANAGEMENT, & FLOODPLAINS

According to the U.S. EPA, “Phase I of the U.S. Environmental Protection Agency’s (EPA) stormwater program was promulgated in 1990 under the CWA. Phase I relies on National Pollutant Discharge Elimination System (NPDES) permit coverage to address stormwater runoff from: (1) “medium” and “large” municipal separate storm sewer systems (MS4s) generally serving populations of 100,000 or greater, (2) construction activity disturbing 5 acres of land or greater, and (3) ten categories of industrial activity.

The Stormwater Phase II Final Rule is the next step in EPA’s effort to preserve, protect, and improve the Nation’s water resources from polluted stormwater runoff. The Phase II program expands the Phase I program by requiring additional operators of MS4s in urbanized areas and operators of small construction sites, through the use of NPDES permits, to implement programs and practices to control polluted stormwater runoff.”

Due to the seeming presence of water features on nearly every hole, water quality, stormwater, and floodplain issues dominate the environmental challenges faced by Director of Golf, Jack McCormic and his Superintendent, Dale Ivey. Willow Creek, an intermittent tributary of Tank Creek, flows through the golf course before joining with Tank Creek near the northeastern end of the airfield. There are at least six detention impoundments associated with this creek

system. Accordingly, there is a large floodplain swath encompassing the Willow Creek Golf Course streams. An associated delineated wetlands complicates the situation.

At the course’s northernmost boundary, sediment-laden stormwater regularly flows in from Fort Bragg. The deposit of sediment in the stream is exacerbating the BASH on the installation and reduces the course’s ability to deal with excessive flows during high precipitation events. Most of the structures used to detain water in the numerous ponds associated with this water way are in need of repair.



Behind the formerly pristine and now highly vegetated detention pond is the 4th green.

The installation has proposed to dredge the ponds and clear the streams of all sediment and excess vegetation. There is an environmental assessment underway to clear the way. This proposal is currently beyond the funding of the civil engineers and will probably never be implemented.

Driver/requirement

- Clean Water Act
- National Pollutant Discharge Elimination System

Objective

Encourage the installation to implement the proposed dredging project.

Management approach

- Establish buffers around all ponds and streams to protect from fertilizer and pesticide runoff
- Remove all undesirable or poorly located volunteer woody plants from ponds and streams

Target

Continue regular maintenance as required and secure funds and contracting action to implement dredging project as proposed in environmental assessment.



An architectural historic district runs along the 10th and 11th holes.

HISTORIC DISTRICT

“The NHPA requires Pope AFB to protect and maintain historic properties under its care. The protection and maintenance of historic properties is closely linked to character-defining features and the relationship of those features to the historical significance for which the property was listed in the NRHP. The historic properties currently identified at Pope AFB are the NRHP-listed Pope Field Historic District and an individually eligible building, #708. The District consists of 33 properties (32 contributing), almost all of which have distinctive exterior features that contribute to the historic character of the District as a whole and link the properties visually and aesthetically.

The pastoral setting of the historic district is considered character-defining, and the setting is also to be protected. The setting may be affected by projects occurring outside the historic district. Projects undertaken near the historic district have an Area of Potential Effect (APE). An APE is the area(s) in which undertaking may cause alteration in the character or use of historic properties. An APE will include locations where elements of the undertaking may be visible or audible; or where the undertaking may result in changes in traffic patterns or land use.”

Driver/requirement

- Archeological and Historical Preservation Act (16 U.S.C. 469)
- National Historical Preservation Act

Objective

Comply at all times with the prescribed land use controls identified in the Cultural Resources Management Plan (CRMP).

Management approach

- Continue to manage signage to inform golf course customers do not use golf carts within the historical district area
- Coordinate all maintenance activities that may impact the historical district with appropriate installation environmental staffers

Target

Comply with the “encouraged policy of continued use of identified historic properties in a manner compatible

with their original function” by coordinating all maintenance activities along the shared boundary of the historic district and the golf course.



The log cabin sits between the clubhouse and the historic district.

GEM Plan goals & objectives

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

- Develop/post a map of special needs areas around the golf course
- Train/Document all maintenance employees on water quality impacts and wildlife
- Develop/Post pest profiles with various control methods

Please see the AFCEE GEM program website (<http://www.afcee.brooks.af.mil/ec/golf/>) for more information.)

Objectives are defined as actions or results that are desired to be accomplished prior to the next INRMP update currently scheduled for 2011.

- Upgrade irrigation system to reduce inefficient water use
- Terminate the use of disposable plates/silverware except for takeout orders
- Host an environmental awareness golf tournament

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. The following best practices are in use at Willow Lakes Golf Course, Pope AFB, NC:

- Incorporate GEM program materials into new employee orientation and training
- Continue to work closely with base biologist on BASH issues
- Develop/Provide brochures for players highlighting golf course environmental practices

Please see the AFCEE GEM program website (<http://www.afcee.brooks.af.mil/ec/golf/>) for more information.



Conclusion

The Civil Engineering Squadron’s unit environmental coordinator program should provide the key oversight to assist in improving the ability of the golf and environmental staffs to work together to better support the Pope AFB mission. In addition, conserving precious water supplies through the application of science, engineering, and demonstrated environmental stewardship may be the only other major issue facing the Pope AFB environmental and golf staff members.

The gallery

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





The Willow Lake clubhouse is relatively new and well-appointed.



Delineated wetlands occur alongside Willow Lakes GC.



The 4th green is hiding behind the vegetation lining one of many ponds.



Much of the stream beds are within dense natural areas.



Azaleas provide aesthetic relief on the 18th hole.



Trees are a major component of the Willow Lakes golfing experience.



Sink holes in the 10th fairway are caused by failed storm drain.



Sediment from Fort Bragg has nearly filled this creek on the 2nd hole.



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<http://www.afcee.brooks.af.mil/ec/golf/>