Air Force Center for Engineering & the Environment

Alpine Golf Course
Environmental Management (GEM) Plan
Aviano AB, Italy

October 2008

San Antonio, Texas

Alpine Golf Course Environmental Management Policy

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

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Executive Summary

U. S. Air Force GEM Program

The U. S. Air Force Golf Course Environmental Management (GEM) program is a proactive Air Force Center for Engineering & the Environment (AFCEE) initiative to foster a better understanding of the environmental challenges facing our golf courses worldwide.

Armed with the support and approval of the Air Force Services Agency golf program, AFCEE's goal is to facilitate the creation of an environmentally friendly golf course facility while supporting the installation mission. Chapter 11 of AFI 32-7064 requires a GEM Plan as part of the Integrated Natural Resources Management Plan (INRMP).

GEM Program process

There are five steps in the GEM program process.

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

Environmental Compatibility Quotient (ECQ) scores

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

- **Actual ECQ = 60, Getting started**
- **Potential ECQ = 80, Showing progress**

Potential or Final environmental challenges

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

- Long term water supply
- Water quality
- Storm damage
- Proposed projects

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/).

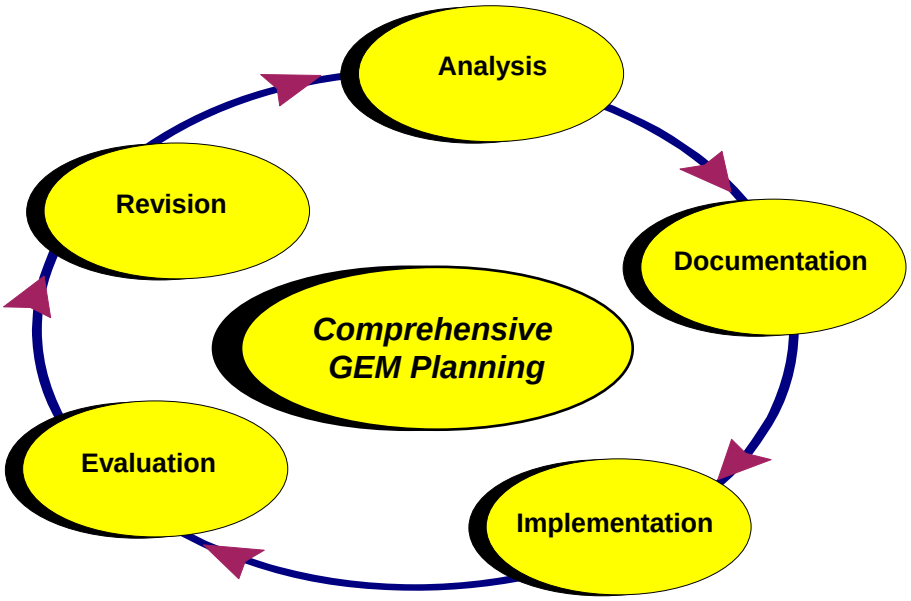
Alpine Golf Course
Aviano AB, Italy

The 3rd hole is a 491 yard, par 5.

The golf course environmental baseline assessment (GCEBA), or the Draft Golf course Environmental Management (GEM) Plan is the initial step in creating a successful ecosystem-based comprehensive GEM Plan. The intent of the GEM Plan is to provide an efficient management tool that will enable course managers to devote more of their efforts to caring for their customers and the golf course. Properly designed and implemented, the GEM Plan will keep the entire golf facility in compliance with the constantly changing environmental requirements while contributing to the local community.

The GEM Initiative

The goal of the GEM initiative is to facilitate the creation of an environmentally friendly approach to golf course management while protecting and promoting the great game of golf. AFCEE is dedicated to helping to identify ways that more rounds can be played on better-conditioned courses while minimizing or eliminating negative impacts to the environment. In most cases, golf courses are being managed compatibly with the environment. The comprehensive GEM planning process is the vehicle to document our successes while communicating directly with our customers, commanders, and local community.



GEM Process

The five steps of the GEM Process are based on continual improvement.

GEM Process

Efficient implementation is the most important aspect of any initiative where practices and procedures are examined and may undergo significant change. This is especially true of the comprehensive GEM planning process. The GEM Plan is derived from several diverse environmental regimes to include the National Environmental Policy Act and the ISO 14001 environmental management system.

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

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

Analysis

Experienced environmental managers realize the importance of assembling all of the data relevant to a problem prior to determining its best solution. Comprehensive analysis is the most important task of the GEM process. Properly completing the analysis is paramount to the long-term compatibility of a golf course's management practices with the local community's natural resource and environmental management goals and objectives.

GCEBA COMPONENTS

The GCEBA is comprised of the following components:

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

Documentation

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

Damage from a recent violent storm greets Alpine's customers on the way to the 1st tee.

Alpine Golf Course
Aviano AB, Italy

U.S. AIR FORCE GEM PLAN COMPONENTS

The GEM Plan will be comprised of the following components:

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

Implementation

Positive and decisive action is the only true measure of the success of the GEM Plan. By implementing new practices, whether to knowingly improve the course's role in the environmental stewardship of the installation or to just try new ideas to determine their value, will the golf staff and golfers benefit. The installation golf staff should consider adopting the GEM Initiative process and establish an environmental policy that minimizes or eliminates any and all potential negative environmental impacts.

Evaluation

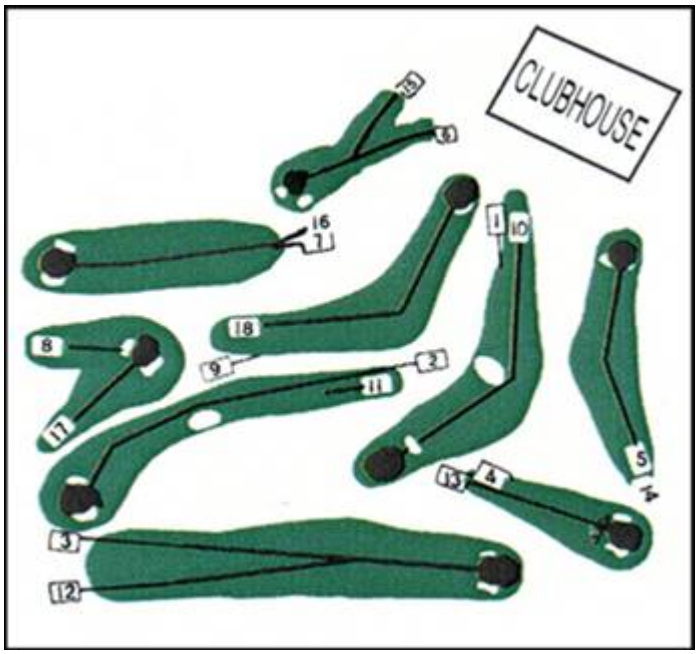
In order to ensure the highest quality of customer service and environmental stewardship, there must be continual self-evaluation and improvement. There also should be consistent, on-going measurement of the reduction or elimination of environmental impacts the newly implemented practices have on the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

Revision

The very nature of a superior GEM Plan implies that all documents be regularly maintained to represent the most current conditions. Golf course managers and superintendents should be constantly looking for ways to improve their environmental stewardship. Acting on lessons learned is right behind initial implementation as the most important aspect of a successful GEM Plan. The GEM Plan should be kept as current as possible at all times. Ideally, it should be updated annually and completely rewritten on the same cycle as the Integrated Natural Resources Management Plan.

Course Specific Analysis

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



Course Layout Map

Alpine Golf Course
Aviano AB, Italy

Course Details

Architect		Civil engineering
Year constructed		1966
Climate		Temperate w/ Mediterranean influence
Average annual precipitation		50 inches
Average growing season		240 days
Elevation		500 ft ASL
Prevailing wind direction		Southwest/northeast
Total facility acreage		88 acres
Total actively maintained acreage		72 acres
Par		35-35-70 (Nine holes)
Yardage/Rating/Slope		Black- 6971/71.9/127
		Blue- 6574/69.9/123
		Silver- 6268/68.5/120
		Green- 5889/66.9/114
Turfgrass	Tees-	Fescue/Per. Rye/Kentucky Bluegrass
	Fairways-	Fescue/Per. Rye/Kentucky Bluegrass
	Greens	Penncross
	Roughs-	Fescue/Per. Rye/Kentucky Bluegrass
Irrigation source		Potable water

Course Description

The Alpine Golf Course occupies the southwestern corner of Area F at Aviano AB, Italy. The nine-hole facility provides valuable recreation opportunities for the up tempo U. S. Air Forces Europe installation. The course is characterized by gently sloping land with mature trees providing definition for the holes in addition to aesthetic diversity. As with the rest of the installation, the course also offers a dramatic view of the Dolomite Mountains and the beginning of the Italian Alps. The Director of Golf has recently assumed the helm at Alpine and promises to bring a fresh approach based on providing a quality, professionally-run facility with a smile. Customers are definitely high priority at Aviano's Alpine Golf Course.

Alpine Golf Course
Aviano AB, Italy

A wide variety of tree species thrive in the temperate Mediterranean climate.

Alpine Golf Course Aerial Photo, Aviano AB, Italy

Alpine Golf Course
Aviano AB, Italy

A wide variety of tree species thrive in the temperate Mediterranean climate.

Environmental Compatibility Quotient (ECQ) Checklists

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

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

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

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

Determining the Environmental Compatibility Quotient (ECQ)

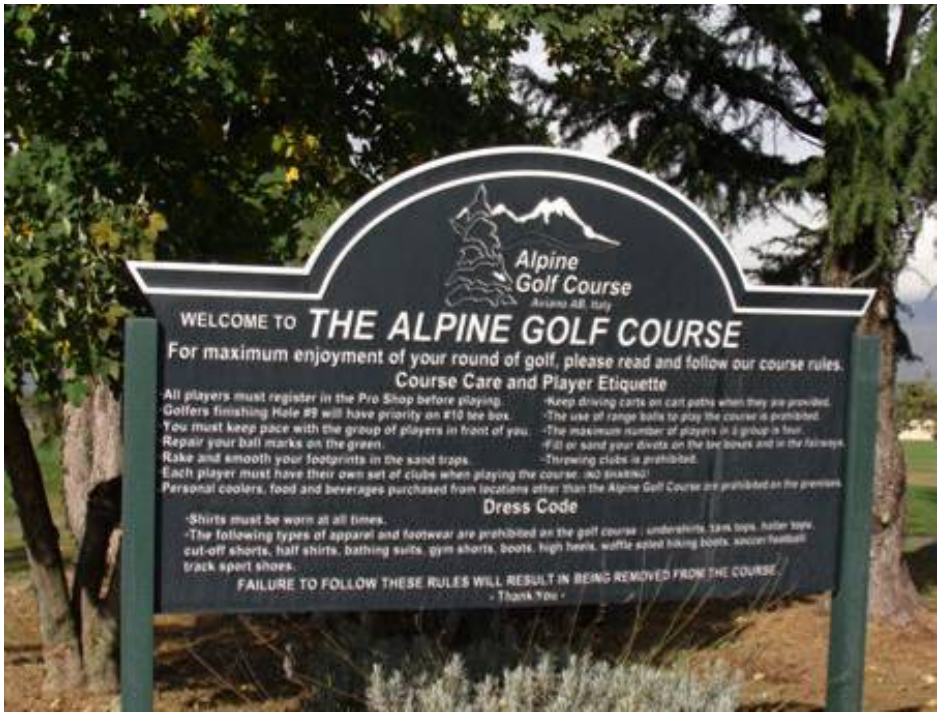
The ECQ compiled for an installation's course is a snapshot of the overall performance and compliance with the GEM Plan. There are two measures obtained as a result of using the ECQ checklists to determine the status or quality of the environmental management program: 1) determining the actual and; 2)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

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

ECQ Scoring Scale

Percent Responses Yes
or Partial per Category Level

90-100%	Advanced (Green)
70-89%	Showing progress (Yellow)
69% or less	Getting started (Red)



Attractive, high quality signage throughout the facility sets the standard for U.S. Air Force golf courses.

Alpine Golf Course
Aviano AB, Italy

The following ECQ checklists are a record of the interview conducted with Alpine Golf Course manager, superintendent, and environmental staffer during the visit to Your Installation.

Planning & Compliance

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Has management demonstrated that environmental stewardship is an important part of their responsibilities by initiating the Comprehensive Golf course Environmental Management (GEM) Planning process?	✓		
2	Is the GEM Plan complete, updated regularly, and readily available to employees and customers?		✓	
3	Has the golf course adopted and posted an environmental policy?		✓	
4	Is a map of the property highlighting environmental challenges posted for employees and customers?			✓
5	Does management conduct a comprehensive annual evaluation for each identified environmental challenge and its management approach, objective, and target?		✓	
6	Does the course have a Tree Management Plan complete with planting plan and maintenance schedule?		✓	
7	Is there a written and regularly updated Integrated Pest Management Plan for the entire golf course property?		✓	
8	Is there a map of the course's "hot spots" or specific areas that may require regular special care or attention?			✓
9	Is there an up-to-date comprehensive golf course development plan or master plan that details the desired short- and long-term improvements to the facility?		✓	
10	Is there at least one project planned and funded for the next year that would increase the compatibility of the course's management program with comprehensive GEM planning goals and objectives?		✓	

Planning & Compliance Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Have all employees been familiarized with the GEM Plan and are they trained regularly on the importance of environmental performance and compliance with its goals and objectives?		✓	
12	Are environmental management issues regularly discussed during staff meetings?	✓		
13	Are the actual amounts of each pesticide or fertilizer on the facility available in writing for every application over the last year?		✓	
14	Has the facility attained full certification in the Audubon Cooperative Sanctuary Program or similar industry-recognized environmental management program?			✓
15	Are employees trained in their native language on the benefits of minimizing potential negative impacts?	✓		
16	Are comprehensive written records maintained to measure and document the environmental compatibility of the entire facility's management practices?	✓		
17	Are there documented functional and aesthetic thresholds integrated into pest control decisions?		✓	
18	Is there a written comprehensive Water Resources Management Plan that delineates the care of each of the course's water features?			✓
19	Are employees trained on what to do in case of a spill and have spill containment kits been provided at all appropriate locations?	✓		
20	Have the maintenance activities and their performance been examined to determine the potential to negatively impact an identified environmental challenge?	✓		
	Totals	**6**	**10**	**4**

Operations & Maintenance

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is there a written, regularly updated and comprehensive Turfgrass Management Plan for each type of turf and playing area?	✓		
2	Are there designated natural or minimally maintained buffers around sensitive landforms or features and/or core wildlife habitats?	✓		
3	Are green, tee, and fairway mowing heights maintained at levels that do not excessively stress important playing surfaces?	✓		
4	Are aeration, topdressing and other drainage improvements regularly implemented to improve soil health and minimize or eliminate inputs of pesticides or fertilizers?	✓		
5	Are soil tests or plant tissue analysis regularly used to determine turfgrass nutritional requirements?		✓	
6	Is the information collected in soil tests and plant tissue analysis integrated into a regularly updated Nutrient Requirement Plan and map?			✓
7	Is there at least one project planned and funded for the next year that would improve the course's protection of the environment?		✓	
8	Are all appropriate employees trained to be familiar with (national, federal, state, and OSHA) regulations that apply to storage and handling of potentially hazardous materials used on the property?	✓		
9	Has there been an examination of all aspects of the operation for potential negative impacts for the snack bar/restaurant, clubhouse, pro shop, pesticide mixing and storage facilities, fuel storage and delivery areas, and maintenance complex?	✓		
10	Have all employees received documented training that would increase their awareness of environmental stewardship goals and objectives?	✓		

Operations & Maintenance Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Are containers used to store used oil for equipment maintenance in good condition, not leaking, and clearly labeled?	✓		
12	Are oil/water separators and/or golf course wash racks operating properly and correctly maintained?		✓	
13	Are all golf course vehicles and equipment maintained and cleaned in a manner that eliminates the potential for spreading of disease or other contamination?	✓		
14	Are biodiesel and/or ethanol products utilized everywhere they may be appropriate?			✓
15	Are waste products such as oil, grease, tires, and batteries stored in a covered container and disposed of properly off site?	✓		
16	Does the superintendent use hand held GPS units to assist in GIS mapping of the golf course areas?			✓
17	Are energy efficiency ratings factored into equipment purchases for use throughout the facility?	✓		
18	Has the entire facility been studied to quantify solid waste streams to identify functions that produce the greatest quantities?			✓
19	Are at least 90% plates, cups, and utensils in use by the restaurant/snack bar facility reusable rather than disposable?			✓
20	Does course management utilize a web-based golf course planning tool for every day decision-making and recordkeeping?			✓
	Totals	**11**	**3**	**6**

Water Resource Management

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are written records of water quality monitoring activities, results, and pollution control measures readily available?	✓		
2	Where appropriate, are slow-release fertilizers and/or spoon-feeding techniques used to reduce the potential for runoff impacts and nutrient loading to water quality?	✓		
3	Does the irrigation system operate using computerized controllers based on real-time evapotranspiration rates?		✓	
4	Are the golf course sprinklers and outdoor irrigation of non-golf course areas and indoor plumbing regularly monitored and maintained for proper distribution and leaks?	✓		
5	Have low-flow water saving devices been installed wherever possible?		✓	
6	Is at least 65% of the irrigation water for the golf course property recycled or non-potable?			✓
7	Are there projects planned and funded that may eliminate or minimize a potential water quality or erosion problem?	✓		
8	Are water features regularly monitored for algae, erosion, excessive aquatic plant growth, eutrophication, and sedimentation?	✓		
9	Are low impact design (LID) principles such as using vegetative or drainage filters to cleanse parking lot runoff prior to leaving the property?			✓
10	Are there signs appropriately located to warn golfers of the potential hazard of drinking recycled or otherwise non-potable water?	✓		

Water Resource Management Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Are there flow meters for monitoring total water use?	✓		
12	Has the irrigation system or its components recently been upgraded to reduce or eliminate inefficiency and overall water use?	✓		
13	Is there a map of the watershed in which the golf course property resides and location(s) of floodplains and storm water drainage that exists on the property?	✓		
14	Is the quality of the irrigation water regularly checked to determine overall quality or nutrient, salt or total suspended solid parameters?	✓		
15	Is water quality data regularly collected to establish baseline conditions and maintenance procedures for all water features on the property?	✓		
16	Are settling ponds and/or detention ponds used to effectively remove sediments and pollutants from entering important water features?	✓		
17	Are biological processes such as the addition of grass carp or white amur used to control unwanted aquatic vegetation in major water features?	✓		
18	Have the property's Water Quality Management Zones been identified and mapped based on industry-standard risk factors?	✓		
19	Has the property's water features been studied to determine the aquatic and amphibious species population?	✓		
20	Has the property been examined for potentially significant wetlands or associated sensitive water-based habitats?	✓		
	Totals	**16**	**2**	**2**

Conservation				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is all motorized equipment maintained for efficient operation that would minimize the potential of creating excessive air polluting emissions?	✓		
2	Has the entire golf course property been examined for critical habitats, state species of concern, and threatened or endangered species?	✓		
3	Are all manmade ponds or other large water features adequately lined to minimize or eliminate losses?	✓		
4	Are employees encouraged to minimize their trips around the course to conserve on the use of fossil fuels?	✓		
5	Have efforts been made to connect natural areas to facilitate wildlife movement through the course property by returning an area to its natural state or revising maintenance procedures?	✓		
6	Have all necessary permits been secured and are they updated and their requirements satisfied in a timely manner?	✓		
7	Are recycling containers conveniently provided for customer and employee use throughout the golf course facility?	✓		
8	Has there been a study to determine the presence of invasive exotic species on or near the course?	✓		
9	Is there a comprehensive and readily available Drought Management Plan for the entire golf course facility?		✓	
10	Is there at least one project planned and funded that may minimize or eliminate the course's potential negative environmental impacts?		✓	

Conservation Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Does management harvest storm water to supplement irrigation water supplies for use anywhere on the golf course facility grounds?			✓
12	Are at least 85% of plants used in landscaped areas drought-tolerant native trees, shrubs, groundcovers, or their cultivars?	✓		
13	Are there signs posted to highlight key habitats or have appropriate areas been designated "Environmentally Sensitive Zones" per The Rules of Golf?	✓		
14	Has a comprehensive energy audit been conducted for the entire golf course facility?			✓
15	Are all employees trained to understand that poor management practices may adversely impact worker and environmental health and welfare?	✓		
16	Is there an inventory of bird and mammal species documented, maintained, and readily available?	✓		
17	Are food, shelter, and nesting attributes of plant species for landscape development considered during the design/selection process?			✓
18	Have all damaged or degraded habitats due to construction or maintenance of the course been fully restored?	✓		
19	Has the entire property been examined for archaeological, cultural, or historical resources?	✓		
20	Is the irrigation pump station a variable speed model for energy efficiency?			✓
	Totals	**14**	**2**	**4**

Pesticides & Pollution Prevention

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there established, documented and communicated minimally maintained and fertilizer and pesticide application buffer areas around water features or sensitive landscapes?	✓		
2	Is the equipment wash rack adequately covered to minimize or eliminate collection of precipitation?			✓
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 and does it have at least 150% of total storage volume secondary containment?	✓		
5	Are liquid products stored below dry products and are dry materials stored on pallets or shelves to keep them off the floor?	✓		
6	Has the least toxic pest control strategy been identified for each of the most common pests and is it always used first when an action threshold is reached?	✓		
7	Is equipment cleaned with compressed air or blowers on part of the course instead of or prior to washing at a designated wash rack where pollution prevention measures are employed?	✓		
8	Are leachate potentials of pesticides considered in the integrated pest management process?		✓	
9	Does the fuel storage/delivery area comply with local, state, federal, or other applicable regulations?	✓		
10	Are written records maintained of all applications of pesticides to include: - the pest and treatment type (preventative/curative); - the location (specific playing area) of each pesticide used; - the area (SF/SM) and quantity of each pesticide used; - the chemical or common name of the active ingredient(s); - the date, location, or purpose of the application?	✓		

Pesticides & Pollution Prevention Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Are all pesticide applications recorded and mapped to guide future pest control decisions?		✓	
12	Other than the head superintendent, are there trained scouts on staff to monitor turf and plant health and pest problems?	✓		
13	Are there scouting forms utilized and are they collected and organized into a report or guide for use in future pest control decisions?			✓
14	Is IPMIS being used to track activities including surveillance and biological, cultural, mechanical, and chemical controls?			✓
15	Are current copies of all Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property maintained and readily available?	✓		
16	Are fertilizers and pesticides stored in separate facilities?	✓		
17	Is the chemical storage structure/area locked, well ventilated and fire resistant and is access limited to appropriate personnel?	✓		
18	Is there a regularly updated Water Pollution Abatement Plan readily available for the golf course property?			✓
19	Are golfers adequately notified in the pro shop and on the first and tenth tees about the day's planned or recently completed spraying of any chemical or fertilizer?	✓		
20	Are there written pest profiles for common regional pests along with alternative potential control measures readily available?		✓	
	Totals	**13**	**3**	**4**

Alpine Golf Course
Aviano AB, Italy

Powerful straight line winds wreaked havoc on the course's trees.

Environmental Compatibility Quotient Summary			
Environmental Compatibility Category	**Yes**	**Partial**	**No**
Planning & Compliance	**6**	**10**	**4**
Operations & Maintenance	**11**	**3**	**6**
Water Resource Management	**16**	**2**	**2**
Conservation	**14**	**2**	**4**
Pesticides & Pollution Prevention	**13**	**3**	**4**
Totals	**60**	**20**	**20**

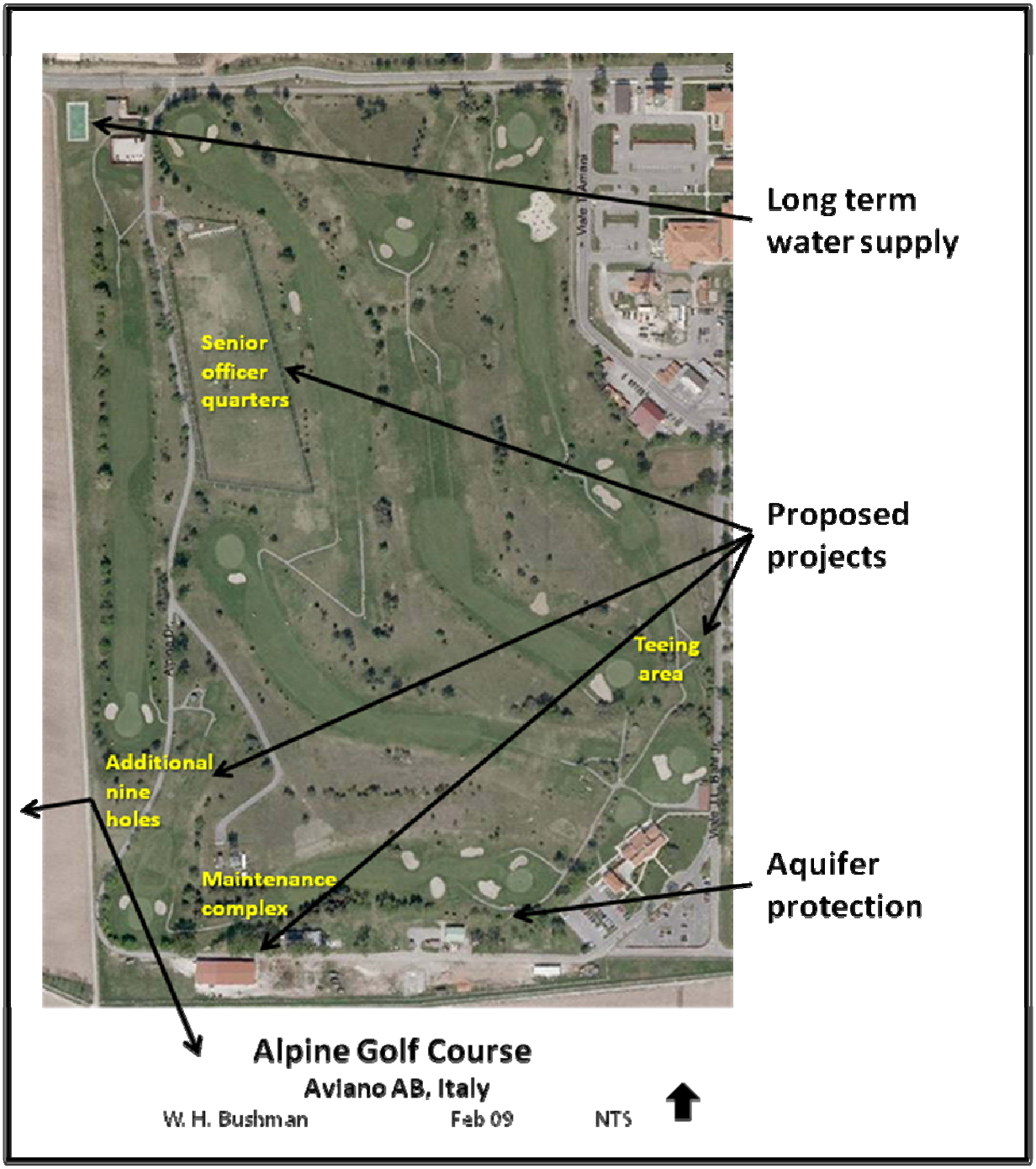
Key to checklist responses

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

Month Year - Alpine Golf Course ECQ:

- **Actual ECQ = 60, Just started (Red)**
- **Potential ECQ = 80, Showing progress (Yellow)**

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



Environmental Challenges Map

Environmental Challenges

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

The following potential environmental challenges were identified during the GCEBA process during the first installation visit in September 2005:

- Water conservation
- Water quality monitoring sites
- Proposed nine-hole addition

The following environmental challenges were identified during the GEM process:

- Long term water supply
- Aquifer protection
- Storm damage
- Proposed projects

Alpine Golf Course
Aviano AB, Italy

The September 2008 storm was severe enough to deposit the cart storage facility roof on the street.

Assessing environmental challenges

The assessment of the environmental challenges is probably the most crucial step in the GEM process. It provides a prioritized list of coordinated actions significant to the long-term success of the golf facility.

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

DRIVER/REQUIREMENT
Challenges are defined as "things that are bigger than the course". The reasons behind why a particular issue becomes a challenge are important to understand. A driver may be a local, regional, or federal law, or regulation that creates the requirement to protect or preserve an environmental resource.

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

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

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

The September 2008 storm left a lot of damage in its wake.

Alpine Golf Course
Aviano AB, Italy

Alpine Golf Course
Aviano AB, Italy

This small swimming pool like water body stores water for use for irrigation.

LONG TERM WATER SUPPLY

A reliable, long term supply of clean water is the lifeblood of a golf course. According to the Utility Infrastructure Survey Water Supply, Storage, Pumping, and Distribution System (Water Plan), "The seasonal demand of the golf course places a large tax on the distribution system. In the summer, irrigation of the golf course can consume up to 1 mgd (3,785 m^3/day) of water. This daily demand distributed over a 24-hour period is about 700 gpm (2,650 L/min). An instantaneous demand of this magnitude, while the water distribution system is meeting the normal domestic and industrial requirements of Area F, could cause the fire pumps to start. Under peak demand, and certainly with fire flow, it is questionable that even the two fire pumps at building 913 could meet the challenge while maintaining a 20 psi (1.38 bar) residual pressure." While it is true at a lot of golf courses, especially those in the desert southwest to use 1 mgd (3,785 m^3/day), according to the golf staff, using that much at Alpine Golf Course is physically impossible.

Unfortunately, this same Water Plan listed a proposed project to study the collection of storm water to relieve the golf course's peak water use as "low priority" while also stating that this project's "Information could inform cost savings and free up water resources for more critical needs." Action not plans or projects with no implementation are what make an installation function efficiently over the long haul.

The Water Plan continues with another recommendation without an implementation plan that just may be the best long-term solution for the installation – and the golf course. "The Base is considering moving Zappala Well Z2 because it is in a poor location. The well has not been used since 1992 due to contamination. If approval were granted for this move, the well could be a potential water source for the golf course. This is suggested because its use could alleviate the strained Area F water system, and because it could be piped to the golf course without chlorination, saving costs. A GAC filter has recently been installed on Well #3 in Area E. This filter has been successfully removing PCE and its dechlorination products, as well as atrazine

from the water. A GAC filter could then be installed after the well so that water could enter two pipes: one for filtration and chlorination for potable use and one for non-potable golf course watering."

Driver/requirement

- Energy Independence & Security Act
- Executive Order 13123, Greening the Government Through Efficient Energy Management
- Executive Order 13423, Strengthening Federal Environmental, Energy and Transportation Management

Objective

Eliminate use of potable water for irrigating any of the golf course grounds.

Management approach

- Efficiently utilize potable water for irrigation until valid non-potable solution (new golf course-specific well) is implemented by installation commanders
- Compile a comprehensive Water Resource Management (WRM) Plan to include a Drought Management Plan for the entire golf course facility
- Irrigation during severe droughts will be limited to the greens complex

Target

Refile AF Forms 332, 813 and 1391 prior to end of CY08 to reenergize the process to acquire new non-potable golf course well. Complete WRM Plan prior to end of CY10.

Alpine Golf Course
Aviano AB, Italy

Irrigation pump is still in pieces as the superintendent waits for completion of repairs so he can treat grubs – a major golf course pest – and minimize damage from crows searching for the grubs.

Alpine Golf Course
Aviano AB, Italy

Groundwater water quality monitoring well is located nearby the final green and the maintenance complex.

Aquifer protection

Although not a large concern for the golf staff, there is an aquifer water quality monitoring sites on the property. According to studies, the pesticide Bromicil has been identified in the groundwater samples. The golf course is not the suspected source of this chemical. According to the 31 FSS Deputy Director, "Obtaining pesticides through the requisition process can be a slow process". He continued "Funding for these supplies may pose a challenge to maintain adequate supplies within CE. Without the proper pesticides to prevent and to stop insects and disease from spreading and destroying turf – the course condition will suffer as will the playability and enjoyment of the facility for our troops."

According to the Storm Water Pollution Prevention Plan, "All fertilizers and pesticides used for the maintenance of the golf course are properly stored indoors, and loading and washing of sprayers take place at the Pest Management Shop (see paragraph 3.2.11). Application of fertilizers and pesticides to the golf course are conducted per the manufacturer's instructions and the material labels. Maintenance operations, limited to sprayers and lawn mowers, are performed occasionally and are always carried out inside the building. Equipment washing is occasionally performed outside, on a small paved area, and residues of wash water normally evaporate.

Attachment 3.11 contains an inventory maintained by the Hazardous Material Pharmacy that lists the types of chemicals stored for which the facility has the authorization. Also there is a HWAP, number 1613 (Attachment 3.12 contains an inventory of the HW). The operations performed at the golf course are not considered a concern to storm water because materials are stored indoors, limited maintenance activities occur indoors, and most sprayer loading and washing occurs

offsite. Occasional outdoor equipment washing involves relatively small amounts of wash water and is not considered a regular source of pollutants to storm water."

Driver/requirement

- Final Governing Standards (FGS)
- National Pollutant Discharge Elimination System (NPDES)

Objectives

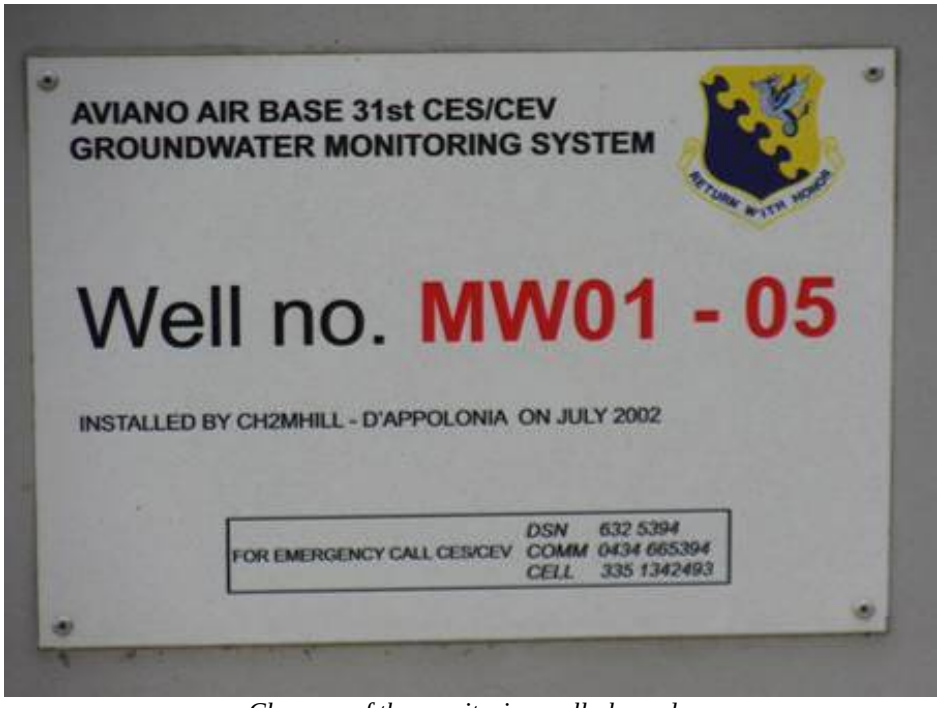
Maintain positive relationship with civil engineering and environmental staffers to attain and maintain compliance without delay on all water-related regulations and requirements. Never allow a golf course management practice pollute precious groundwater resources.

Management approach

- Establish, document and communicate fertilizer and pesticide application buffers around monitoring well
- Request and collect and organize all water quality monitoring data from golf course specific wells

Target

Finalize buffer establishment, documentation and communication procedures prior to the end of CY08.



Close-up of the monitoring well placard.

Alpine Golf Course
Aviano AB, Italy

Alpine Golf Course
Aviano AB, Italy

Large trees were toppled by the phenomenal winds of September 2008.

Storm damage

On 7 September of this year, a violent storm featuring winds clocked at over 90 miles per hour ripped through the Aviano AB property. The golf course was one of the more severely damaged. Over 132 trees were lost, a majority being large, mature specimens. The driving range netting and support poles were severely damaged, forcing continued closure to customers at an estimated loss of around $1000 per month. The cart storage facility roof was lifted off its foundations and tossed into the street. Several other minor items also received damage. Per instructions from civil engineering, the Services staff compiled and delivered a damage report. No funds or a promise of funds has been provided to allow the golf course to repair affected items and continue to care for their prized customers.

Subsequently, at least 30 trees were to be planted and tree debris has been removed and damage to the groundplane has been accomplished. In addition, according to the 31 FSS Deputy Director, “Funding has been provided to repair the damage to the driving range, cart barn, range shed, and the netting next to tee #6/15.”

Driver/requirement

- Customer wants and desires
- Air Force policy

Objective

Restore damaged customer product lines and facility infrastructure to current industry standards.

Management approach

- Continue to pursue promised storm damage funding to accomplish objective

Target

Complete repair of all damaged golf course customer services and facility infrastructure prior to end of December 2009.

Alpine Golf Course
Aviano AB, Italy

Damage to the driving range is still evident nearly two months after the storm seriously hampering Alpine golf staff from continuing teaching the game and their customers from recreation and practice.

Alpine Golf Course
Aviano AB, Italy

Driving range ball and vending machine structure storm damage.

Alpine Golf Course
Aviano AB, Italy

The land area just outside the installation boundary fence along the 3rd hole is one possibility in providing a quality solution to the proposed projects for new senior housing and an additional nine holes for the Alpine Golf Course.

Proposed projects

Like all golf courses with only nine holes, Alpine Golf Course managers and Aviano AB Services commanders wish is to "finish" the course by adding another nine holes. Other projects desired by the golf staff that would assist them in providing the best possible golfing experience at Aviano AB include greens renovation, additional trees, new teeing areas, bunker renovation, covered practice area, and relocation of the maintenance complex.

The additional nine holes is a tough alternative to satisfy. Besides clearing programming issues based on how many holes the installation can qualify for, there are other challenges such as land acquisition and water supply. Every installation deserves as many holes as they can possibly qualify for – and AFCEE can provide assistance at all stages of the effort from feasibility studies to construction management.

The greens renovation is probably the best project to improve customer satisfaction. Although the current greens are in great condition, they are typical "push-up" quality with no internal drainage. New greens designed and built to current industry standards would cost over $500K.

Additional trees have been planned for some time at Alpine Golf Course. With the storm taking or damaging over a hundred mature trees, this project is paramount to maintaining or improving the quality of the golfing experience and the safety of golfers and surrounding personal and government property as the course suffers from lack of room – and lack of length.

Properly located, designed and constructed new teeing areas can mitigate some of these concerns. The 6th hole is now missing a protective fence that kept most errant shots from reaching the perimeter road or the Fitness Center parking lot. Creating a new tee or two, changing the angle of attack rather than adding distance, could be the solution that would defer the need to rebuild the unattractive and partially successful protective fence.

Alpine Golf Course
Aviano AB, Italy

The 6th hole's protective fence – formerly known as existing.

According to the Executive Summary and Installation Overview of the General Plan as "a basis for future planning and development programs', "All of Aviano Air Base's 30+"Key and Essential" (K/E) personnel live off-base, in leased housing, potentially impacting mission readiness and operations. Change the designated land use from Recreation to Housing (Accompanied) for seven senior-level officer housing units on 2 acres in the Aviano Golf course site, without diminishing the use of the current nine holes layout. The remaining 24 K/E units will require further study to determine siting a preferred site location."

Additionally, the General Plan states, "The recreational land uses located in the southwest corner of Area F that contains the ball fields and golf course could be developed for mission-oriented uses if negotiations and agreements for joint use replacement facilities with the Castel D'Aviano golf course and other recreational facilities managers are successful.

From a strictly golf course management perspective, changing a driving range to housing is not as simple as it is described above. Time will probably confirm current concerns that at least one, if not as many as three golf holes, will be compromised if the housing/driving range alternative is pursued to completion. Further concern is generated by the fact that the General Plan does not include an area development

plan depicting how the suggested housing/driving range alternative actually might work in this area "without diminishing the use of the current nine holes layout."

Driver/requirement

- National Environmental Policy Act
- AFI 32-7060, Environmental Impact Analysis Process
- Host Nation Final Governing Standards (FGS)

Objective

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

Management approach

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

Target

Initiate all projects by completing AF Form 332, 813 and 1391 immediately.

Alpine Golf Course
Aviano AB, Italy

This existing facility near the 5th tee would be a perfect fit for the golf course maintenance complex. The golf course is already using the far side of the building for equipment storage. Unfortunately, this side of the building is being used by another Aviano AB function.

Implementation

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

GEM Plan goals & objectives

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

- Compile and post a map of the property highlighting environmental challenges
- Map all "hot spots" to assist in course management
- Consider leachate potentials of all pesticides considered for purchase and use

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

- Compile and implement Tree Management and Water Resource Management Plans
- Secure a non-potable source of water for irrigating the course
- Request a comprehensive energy audit for the entire golf course facility

GEM Plan best practices

Best practices are defined as any action, method, procedure, 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.

- None provided by installation golf or installation staffs

Conclusion

The Alpine Golf Course history is rife with positive customer-driven actions. The recent hires in key leadership positions of manager and superintendent continues this trend. In order to maintain this positive momentum, action is required. Compilation of a comprehensive strategic golf course master plan will not only bring in additional customers and improve the bottom line; it will move the Alpine Golf Course closer to the sustainability goals espoused by U.S. Air Force leadership.

Additional observations/recommendations

- Repairs due to the storm need immediate action due to the uniqueness of the program – minimal golfing opportunities in the surrounding area for the money
- New installation entry gate slated for opening in early CY09 is an opportunity worth investigation
- Alpine Golf Course customers and the Services community deserve the greatest support that civil engineering and the Aviano AB commanders can possibly provide

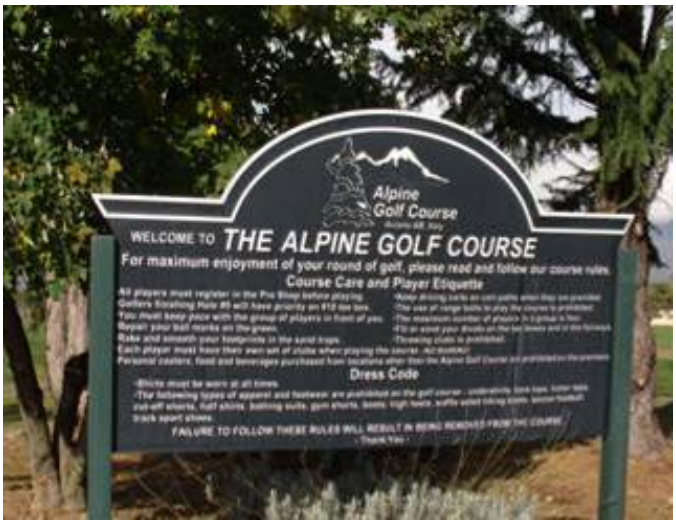
The gallery

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

This photo from 2005 shows the pine protecting the 2nd.

This is the 2nd after the September 2008 storm – no pine tree.

The pro shop delivers the goods customers want!



Signage at Alpine just may be the best in the U.S. Air Force.

What remains of the large tree is a huge safety risk.

The "leaning tower of Alpine" is another storm victim.

Clubhouse is perfectly sized for its clientele.

Bunkers not only need renovation but a new design.

Crows searching for grubs are a severe problem.

Additional waste bunkering could improve playability.

Maintenance complex deficiencies are now a union issue.

Storm debris piles dominate the landscape.

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Some of the photos used in this report were provided by Mr. Allan Beck, PGA, Alpine Golf Course Manager, Aviano AB, Italy.

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