Air Force Center for Engineering & the Environment

Eifel Mountain Golf Course
Environmental Management (GEM) Plan
Spangdahlem AB, Germany

November 2008

San Antonio, Texas

Eifel Mountain Golf Course Environmental Management Policy

In concert with the Spangdahlem 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 = 56, Getting started**
- **Potential ECQ = 78, Showing progress**

Potential or Final environmental challenges

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

- Airfield criteria violations
- Wetlands
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Threatened or endangered species
- Explosive safety standards violations
- Water conservation
- Cultural resources

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/).

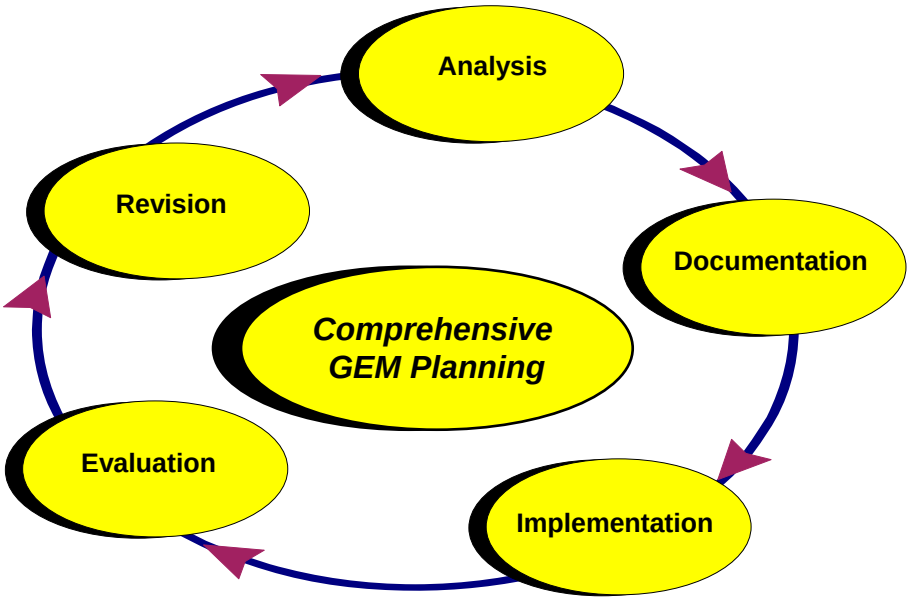
Eifel Mountain Golf Course Spangdahlem AB, Germany

Groundbreaking ceremony for Eifel Mountain Golf Course.

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.

The Eifel Mountain Golf clubhouse.

Eifel Mountain Golf Course Spangdahlem AB, Germany

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.

Eifel Mountain Golf Course Spangdahlem AB, Germany

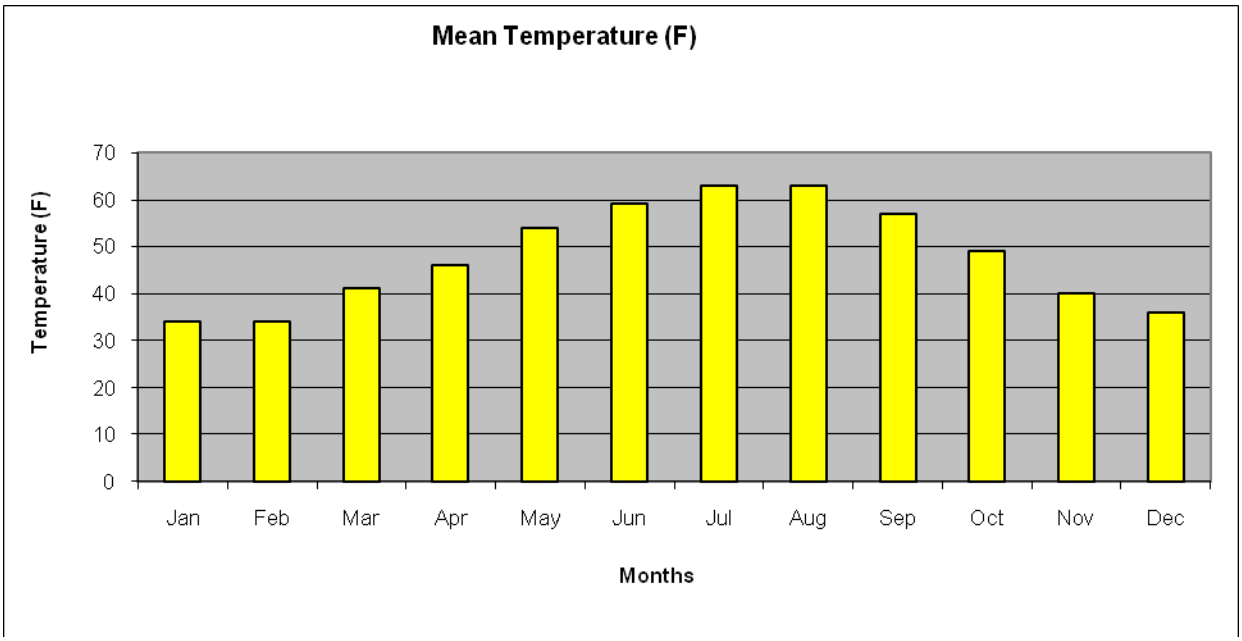
The Eifel Mountain Golf clubhouse is more utilitarian than aesthetic treasure.

Course Description

The nine-hole Eifel Mountain Golf Course is located on the southwestern edge of Spangdahlem AB nestled in the resplendent west central area of Germany. The course is relatively short as it has been shoe-horned into a small area of land between the end of the runway and the installation boundary fence. Many of the trees on the course have been removed or have been severely pruned or topped to satisfy airfield operational concerns. There is one water feature on the course that unfortunately attracts water fowl as well as surlyn and balata.

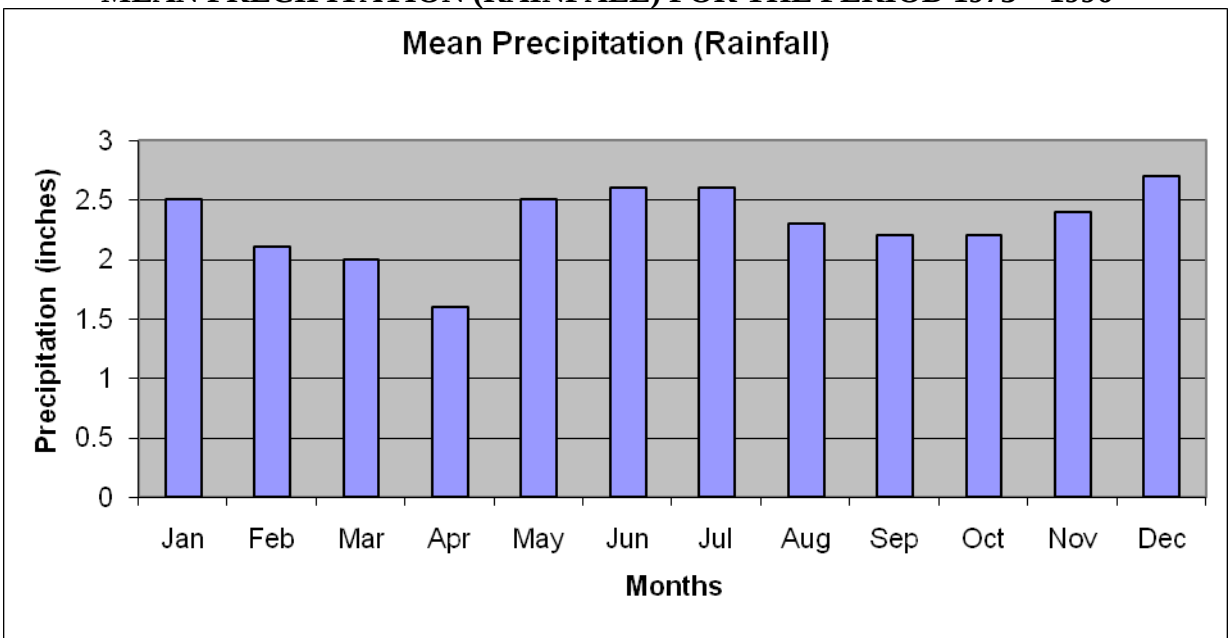
The course conditioning is worthy of more play than it receives as the local weather patterns tend to be unpredictable and somewhat unpleasant for golf at certain times of the year. Since the installation is located in a temperate climate in southwestern Germany, regular rainfall is received throughout the growing season.

MEAN TEMPERATURE FOR THE PERIOD 1973 – 1996



Reference: Operational Climatic Data Summary for Spangdahlem AB for 1973-1996 (AFCCC/DOS 1997)

MEAN PRECIPITATION (RAINFALL) FOR THE PERIOD 1973 – 1996



Reference: Operational Climatic Data Summary for Spangdahlem AB for 1973-1996 (AFCCC/DOS 1997)

Eifel Mountain Golf Course Aerial Photo
Spangdahlem AB, Germany

Eifel Mountain Golf Course Spangdahlem AB, Germany

The sheer natural beauty of the German countryside inspires from behind the 1st green.

Course Details

Architect		Unknown
Year constructed		1966
Climate		Temperate & moist
Average annual precipitation		10 inches
Average growing season		225 days
Elevation		350 m / 1200 ft ASL
Prevailing wind direction		Northeast/southwest
Total facility acreage		66 acres
Total actively maintained acreage		52 acres
Par		33-33-66 (nine holes only)
Yardage		Blue - 4856
		White- 4656
		Red- 4142
Turfgrass	Tees-	Bluegrass/fescue
	Fairways-	Bluegrass/fescue
	Greens	Bentgrass/poa annua
	Roughs-	Bluegrass/fescue
Irrigation source		Potable

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)

The following ECQ checklists are a record of the interview conducted with Eifel Mountain Golf Course manager and superintendent during the visit to Spangdahlem AB, Germany.

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	**4**	**6**	**10**

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	**12**	**1**	**7**

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	**15**	**2**	**3**

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	**14**	**0**	**6**

Eifel Mountain Golf Course Spangdahlem AB, Germany

The clubhouse interior has recently been upgraded.

Environmental Compatibility Quotient Summary			
Environmental Compatibility Category	**Yes**	**Partial**	**No**
Planning & Compliance	**4**	**6**	**10**
Operations & Maintenance	**11**	**3**	**6**
Water Resource Management	**12**	**1**	**7**
Conservation	**15**	**2**	**3**
Pesticides & Pollution Prevention	**14**	**0**	**6**
Totals	**56**	**12**	**32**

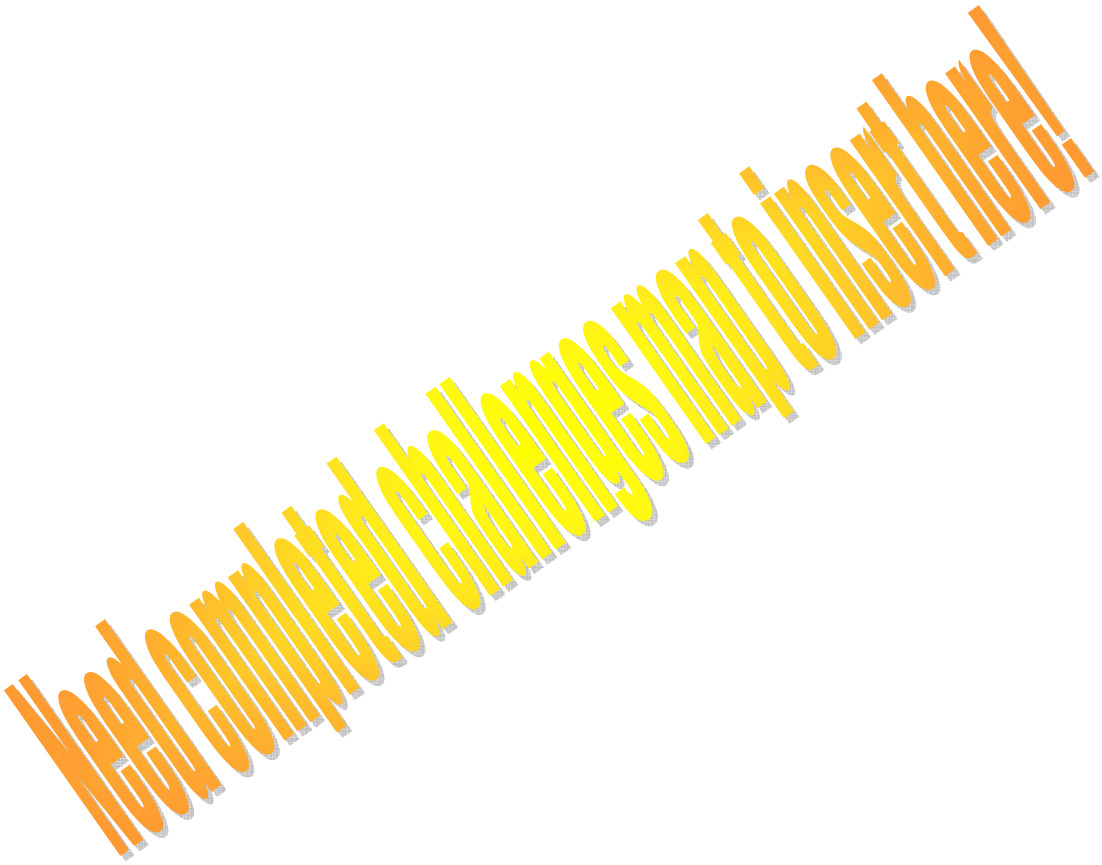
Key to checklist responses

- **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

November 2008 - Eifel Mountain Golf Course ECQ:

- **Actual ECQ = 56, Just started (Red)**
- **Potential ECQ = 78, 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 GEM process is the identification of significant environmental challenges for consideration in the GEM Plan. Along with the newly established baseline, the GEM Plan consists of a map and description of the final environmental challenges and the prescribed approach to their management. In addition, the GEM Plan includes a comprehensive list of future environmental management goals and objectives and a course-specific set of best practices.

The following environmental challenges were identified during the GCEBA process:

- Airfield criteria violations
- Wetlands management
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Threatened or endangered species

The following environmental challenges were identified during the GEM process:

- Airfield criteria violations
- Wetlands
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Threatened or endangered species
- Explosive safety standards violations
- Water conservation
- Cultural resources

Eifel Mountain Golf Course Spangdahlem AB, Germany

Drainage is one of the primary agronomic challenges facing course management.

Assessing environmental challenges

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

DESCRIPTION

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

DRIVER/REQUIREMENT

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

MANAGEMENT APPROACH

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

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.

TARGET

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

Eifel Mountain Golf Course Spangdahlem AB, Germany

Eifel's greens are small and challenging to all ability levels.

Eifel Mountain Golf Course Spangdahlem AB, Germany

Trees, a mole burrow and the airfield runway lights highlight some of the primary challenges at Eifel Mountain.

AIRFIELD CRITERIA VIOLATIONS

No specific information was gathered during the site visit on airfield criteria violations at the Eifel Mountain Golf Course. The fact that the runway approach light stanchions walk right through the course indicates that at least portions and perhaps the entire course is probably in either the clear zone or accident potential zone 1 or 2. Operationally, this is the most significant environmental challenge for the golf staff.

The addition of decorative boulders within this area is also cause for concern. Based on the limited added value they seem to provide versus their potential risk to aircraft and their crews, removal or relocation may be wise. Also, the portable toilet facility is poorly located nearly directly on the airfield centerline.

Driver/requirement

- AFI 32-7063, Airfield Installation Compatible Use Zones, (AICUZ)
- UFC 3-260-1, Airfield & Heliport Planning & Design

Objective

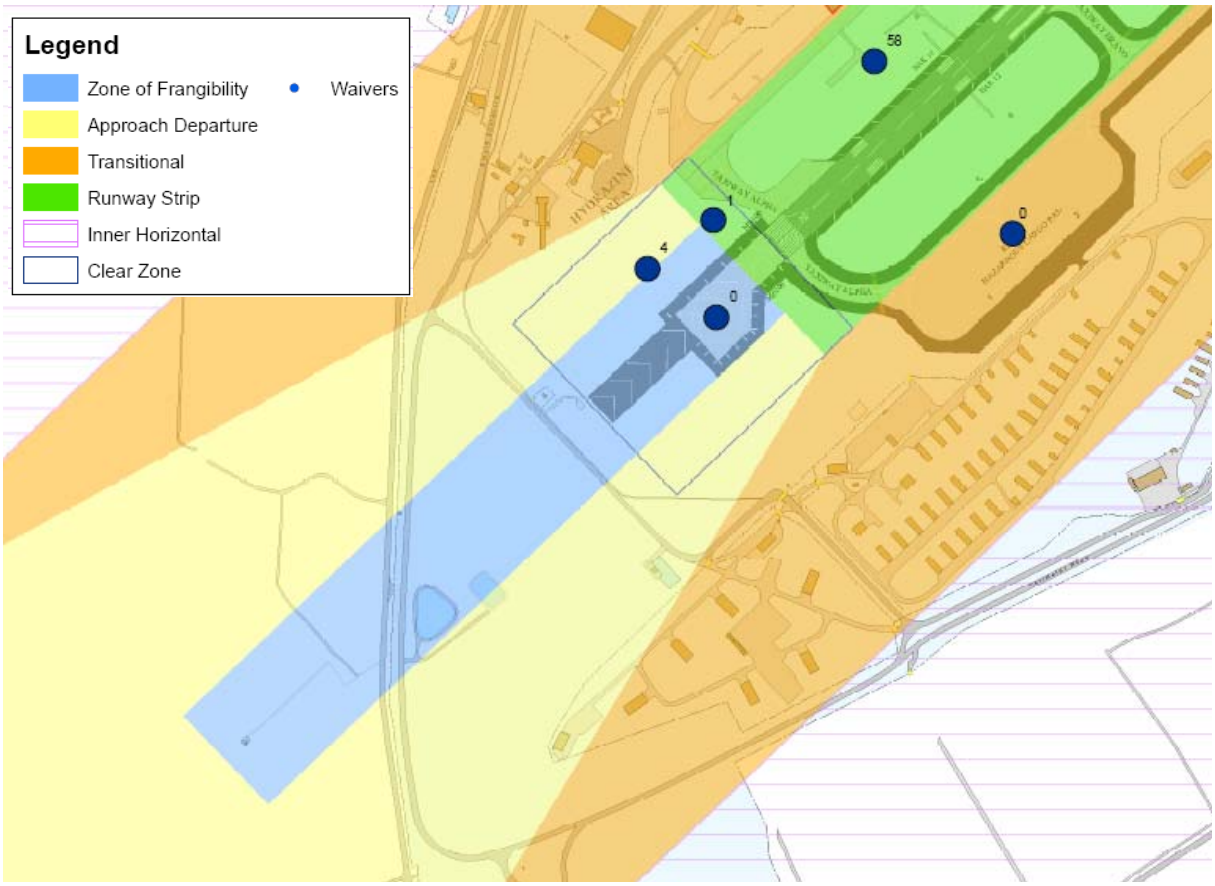
Eliminate all airfield criteria waivers and continue coordination and communication with airfield managers.

Management approach

- Secure funding to relocate all portions of the golf facility requiring waivers

Target

Regularly communicate with airfield manager on golf course maintenance practices.



There are no airfield criteria waivers associated with the golf course facility.

Eifel Mountain Golf Course Spangdahlem AB, Germany

The runway approach lights march directly through the golf course property.

Eifel Mountain Golf Course Spangdahlem AB, Germany

The golf course pond is an integral part of the golfing experience.

WETLANDS

Although there are no officially-designated wetlands on Spangdahlem AB, the ponds at the Eifel Mountain Golf Course become the focus of several issues, most being other environmental challenges identified in this report. The INRMP states "The two ponds, the large one in the golf course and the smaller pond east of the golf course are permanent bodies of water and have developed as ecologically important habitats for several threatened and endangered species." Maintenance of these areas must be coordinated with BASH and threatened or endangered species management.

The SWPPP states that "There is a pond at the south end of the SAB within TG 20 as part of the golf course. This pond collects surface runoff from the surrounding green areas. The pond is connected to the storm water system by an outlet towards the local stream "Aulbachgraben". Maintenance and emptying of sludge is performed yearly by a contractor, currently Francois GmbH in Ritterdorf. There seems to be some doubt that these statements are absolutely accurate as the runway contributes runoff to the pond as well and "yearly" maintenance has not occurred recently. There is an outfall located near the golf course. According to the SWPPP, "Outfall #20 is located west of the golf course at the southern end of SAB and discharges into an open ditch approximately 100 m west of SAB. The open ditch flows into Aulbach creek.

Driver/requirement

- Clean Water Act, Section 404
- National Pollutant Discharge Elimination System (NPDES)
- Executive Order 11990, Protection of Wetlands

Objective
Ensure that all water bodies continue to be free of pollutants potentially attributable to a golf course management practice. Correct all potentially non-compliant wetlands related aspects prior to the end of CY 2009.

Management approach
- Establish, document and communicate fertilizer and pesticide application buffers to all appropriate employees or service providers
- Consult with environmental staff prior to any changes in creek bed or pond bank maintenance
- Ensure all spill prevention procedures and spill kits are in place and all pertinent employees are adequately trained to correctly and promptly perform required actions in an emergency situation
- Consult with installation environmental staff to ensure that golf course maintenance practices are fully compliant with complex water-related regulations
- Compile a comprehensive Water Resource Management Plan for the entire golf course facility

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

Eifel Mountain Golf Course Spangdahlem AB, Germany

Ralph Lake is a small pond with a complex maintenance protocol.

Eifel Mountain Golf Course Spangdahlem AB, Germany

A large family of ducks inhabit Ralph Lake.

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

The BASH Plan lists “ducks, geese, swans, hawks, falcons, kites, eagles, vultures, cranes, pigeons, doves, crows, ravens, blackbirds, grackles, cowbirds, starlings, lapwings and magpies among the birds and rabbits, hares, rodents and fox among the mammals that are currently listed as potential BASH at Spangdahlem AB.

According to the INRMP, “under the German Federal Nature Conservation Law (Bundesnaturschutzgesetz) (Article 20d) and the Federal Species Conservation Ordinance (Bundesartenschutzver-ordnung) it is prohibited to disturb wild animals (including birds) willfully, or to catch, injure or kill them without good cause. Therefore special permission for removal of nests/birds pest control measures must be obtained from the State of Rheinland-Pfalz (specifically Rheinland Struktur-und Genehmigungsdirektion Nord) when required.”

The BASH Plan states “Migrating waterfowl are particularly dangerous to flight safety due to their numbers, size and higher flight altitude. Large flocks of waterfowl travel along traditional airways to their breeding and wintering grounds during spring and fall. Huge flocks may stop along the route awaiting favorable weather conditions. Migrating birds are most active from sunset through midnight, with numbers decreasing in the early morning hours.”

Since the course is located in such close proximity to the airfield, the golf should work closely with the BASH officer to ensure that supporting the mission is intimately integrated into their management procedures. According to the INRMP, “As part of the BASH pest management initiative, Spangdahlem AB has submitted a request to the State for permission to catch and release small mammals.”
According to the Expert Opinion, “Up to a distance of 1 km towards take-off and landing (W) as well as on both sides in a strip of 300 m width from the center of the

landing runway no relevant structures may be present due to safety reasons (damages by bird's impact at turbines). Here the maximum grass level is determined for 6 Inch, which is got by double (in the future three-times?) mowing. Mowing has the effect of a reduction of the food offer for seed feeders."

It is obvious that there are concerns about BASH potential on the golf course property. The golf staff needs to be fully cognizant of all airfield management direction and implement them faithfully on a daily basis.

Eifel Mountain Golf Course Spangdahlem AB, Germany

Small passageways through the emergent vegetation on the banks of the main pond on the golf course are proof of water fowl presence.

Driver/requirement

- Bird/Wildlife Aircraft Strike Hazard (BASH) Plan, 91-212
- AFI 13-213, Airfield Management
- AFI 32-1053, Pest Management Program
- FAA Advisory Circular 150/5200-33A, Hazardous Wildlife Attractants On Or Near Airports
- AFI 91-202, The U. S. Air Force Mishap Prevention Program
- AFPAM 91-212, Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques
- UFC 3-260-01, Airfield and Heliport Planning and Design

Objective

In direct support of the installation's mission, the golf staff shall continue to cooperate and assist the environmental and airfield management staffs with BASH reduction efforts. Minimize or eliminate the potential for installation BASH concerns as a result of golf course management practices.

Management approach

- Coordinate pond and stream maintenance procedures with installation environmental management staff
- Install only BASH-approved plant material
- Secure membership on BASH Working Group and attend all meetings
- Mow all non-play areas in accordance with AFPAM 91-212
- Secure membership on BASH Working Group and attend all meetings
- Continue to assist installation airfield and environmental managers with BASH concerns on the golf course
- Continue removal of highly attractive trees and shrubs

Target

Eliminate 25% of the BASH conditions on the course prior to the next iteration of the natural resources management plan. Initiate consultation immediately and regularly thereafter to ensure compliance with airfield management and BASH criteria by attending all BASH Working Group meetings. Complete Tree Management Plan that identifies BASH-potential species and implement annual maintenance schedule.

Eifel Mountain Golf Course Spangdahlem AB, Germany

Recently constructed water retention basins on the course may exacerbate the potential for a BASH concern at Spangdahlem AB.

Eifel Mountain Golf Course Spangdahlem AB, Germany

The Meadow Pipit is one of the most important protected species in the Spangdahlem AB region.

THREATENED OR ENDANGERED SPECIES

"Spangdahlem AB as a habitat for TES species is considered to be of regional importance. The most important species at Spangdahlem AB are the Meadow Pipit, Whinchat and Lapwing. These species favor moist grasslands: these birds were generally observed in three areas, the grasslands and ponds around the Ammunition Depot and the golf course, the ruderal area, hedges and forest southeast of the runway near the nature trail and the grassland and construction areas around the northeastern end of the runway."

The golf course pond has been associated with protected vascular plant and amphibian species. The INRMP states that this is "supported by the presence of four Early Warning List species and one Red List Species *Triturus cristatus* (Warty Newt)". The INRMP continues, "moles and rabbits are considered pests within the base and are controlled in accordance with German Law. Moles are controlled on the golf course and around the Headquarters facility only. Moles are a protected species under Host Nation and European laws; however a special permit, which is held at the Environmental Flight, has been issued to Spangdahlem AB, which authorizes the trapping of 6 moles a year. The CEOHE have also taken preventive measures, by installing high frequency solar powered devices, to discourage mole populations on base.

Rabbit populations are controlled through the use of a repellent, which is deemed effective. As part of the BASH pest management initiative, Spangdahlem AB has submitted a request to the State for permission to catch and release small mammals."

Eifel Mountain Golf Course Spangdahlem AB, Germany

The Whinchat,Saxicola rubetra, is one of Spangdahlem's most important species.

In the care of the installation's water features, the TES 2004 survey recommended that "reducing the stock of ornamental fish in the two golf course ponds could significantly improve the habitat conditions for the natural aquatic fauna consisting of amphibians, dragonflies, and grasshoppers".

Additionally, Spangdahlem AB as a habitat for TES species, is considered to be of regional importance. The most important species at Spangdahlem AB are the Meadow Pipit, Whinchat, and Lapwing. These species favor moist grasslands: these birds were generally observed in three areas, the grasslands and ponds around the Ammunition Depot and the golf course, the ruderal area, hedges and forest southeast of the runway near the nature trail and the grassland and construction areas around the northeastern end of the runway.

6 butterfly species on the Red List for Rheinland-Pfalz were recorded, of which two are also on the Red List for Germany. Four dragonfly species on the Red List for Rheinland-Pfalz were recorded, two of which are also on the Red List for Germany. There was a wide ecological range of recorded species. These species were observed in several different habitats, primarily consisting of grasslands, forested areas and in the vicinity of the ponds at the golf course. Within the base, dragonfly species were only found at the pond at the golf course and the pond east of the golf course. In addition, six grasshoppers species on the Red List for Rheinland-Pfalz were recorded, three of which are also on the Red List for Germany. Typical habitats for grasshoppers are rare within the Air Base, due to the high intensity of mowing. The grasshoppers were recorded in the meadow areas in the northeastern end of the flight line (Calluna heath) and in the vicinity of the ponds at the golf course, where the vegetation is maintained at a lower intensity.

Under the German Federal Nature Conservation Law (Bundesnaturschutzgesetz)

and the Federal Species Conservation Ordinance (Bundesartenschutzver-ordnung) most birds are protected. The Environmental Flight requests special permits from the State of Rheinland-Pfalz (specifically Rheinland Struktur-und Genehmigungs-direktion Nord) for dispensation from certain requirements under the above legislation, when required. Requested permits include permits for bird control (pigeons), mole control (the trapping of 6 moles is permitted per year at the golf course) and bird's nest removal (House Martins and Swallow Nests).

Mole control is done on the golf course and around the Headquarters facility only in accordance with German law and with permission of the Higher Nature Conservation Authority for the State of Rhineland Palatinate (Struktur-und Genehmigungsdirektion Nord at Koblenz). Trapping is the only control used on Spangdahlem AB.

The pond located on the course is also an interest area. According to the Oct 03 Threatened Species Survey, one specific issue is the potentially threatened or endangered species that may frequent or have "homesteaded" the ponds. Vegetative buffers along the banks of the ponds could increase the survivability of some of these protected species. In addition, the elimination or more intense management of fish in these ponds would greatly enhance the ability of some species to successfully compete and thrive.

Driver/requirement

- USAFI 32-7064, Integrated Natural Resources Management, 21 October 1996
- State of Rheinland-Pfalz Natural Conservation Act and Federal Species Protection Ordinance, 20 November 1999
- German Federal Nature Conservation Law
- Federal Species Conservation Ordinance

Objective

Never allow a management practice to negatively impact a known threatened or endangered species on or near the golf course.

Management approach

- Reduce ornamental fish populations in golf course water bodies to improve habitat of protected species
- Ensure that the maintenance practices for all identified potential threatened or endangered species habitats are regularly coordinated with installation environmental staffers

Target

Request a site assessment and review of current management practices immediately from the appropriate installation environmental manager.

Eifel Mountain Golf Course Spangdahlem AB, Germany y

Explosives storage is not far removed from the 7th hole.

EXPLOSIVES SAFETY STANDARDS VIOLATIONS

Air Force Manual 91-201, Explosive Safety Standards, defines explosives safety distance, or quantity-distance, as "an expression of the quantity versus distance principle involved, or the toxic hazard distance used in determining acceptable separations between given explosives sources and given exposures to the hazard." The Manual goes on to define quantity-distance as "the quantity of explosive material and distance separation relationships that provide definitive types of protection. These relationships are based on the level of risk considered acceptable for each stipulated exposure and are tabulated in the Q-D tables. Separation distances are not absolute safe distances but are relative protective or safe distances." The Manual lists the explosive evaluation zone for a recreational area or facility like a golf course as 2382 feet.

Several earth-covered explosive storage facilities are located along the northeast portion of the Eifel Mountain Golf Course. These facilities (igloos) are so close to the course that during explosive transport activities, the golf course closes the 5th, 6th and 7th holes to play. Golfers are asked to play other holes twice to account for the inconvenience. Obviously, this is not a normal situation or at least one that may be considered a good one – at least not for the golfers or golf course management.

Driver/requirement

- Air Force Policy Directive (AFPD) 91-2, Safety Programs
- DoD 6055.9-Std, DoD Ammunition and Explosives Safety Standards
- Air Force Manual (AFMAN) 91-201, Explosives Safety Standards

Objective

No losses due to inadequate explosives safety communication or planning.

Management approach

- Limit access to affected areas during times of increased risk to personnel or property

Target

Continue to act immediately upon notification of potential increased risk.

Eifel Mountain Golf Course Spangdahlem AB, Germany

The 7th green is within one hundred meters of the explosive ordnance igloos.

Eifel Mountain Golf Course Spangdahlem AB, Germany y

Just to the right of the 8th teeing area is a perfect location for storing harvested stormwater that could supplement or replace potable irrigation water supplies.

WATER CONSERVATION

Even in a relatively mild and cool climate with plenty of moisture like Spangdahlem AB enjoys nearly year round does water use become an issue. With the motivation supplied by recently passed laws and issuance of new executive orders, action must be taken on all users of precious potable water supplies. Fortunately for the golf staff, there exists a perfect situation at Eifel Mountain. There is already an existing structure and system to collect stormwater runoff right next to the course. There is a water production well nearby. Water is contaminated for drinking. All cross connections would have to be eliminated. Forward thinking and intelligent installation environmental staffers can make this happen with minimal expenditures.

In reality according to installation staffers, "irrigation is a relatively small proportion of water use at Spangdahlem AB (1-3 percent). The golf course irrigation system is a totally manual system consisting of 9-each Rain-Bird model 5000-plus sprinkler heads that are moved around in order to cover the irrigated areas on the course (mostly greens, no fairway watering). According to vendor literature the listed flow rate for each head is 0.69 m3/hr (3.04gpm).

The watering schedule was reported to be three times per week (Monday-Wednesday-Friday) for about half of the irrigation season, which at the golf course runs from May through September. During the other half of the season, the course receives enough natural precipitation to eliminate any watering needs. The specific weeks requiring water vary from year to year. The length of a typical watering session was reported to be about 4 hours, usually from 0630 to 1030 (mornings).

Estimated ("FIT" method) calculations for the course are as follows:

Frequency: 3 times/week x 5 months/yr x 4.25 weeks/month ÷ 2 (half of

season needs irrigation) = 32 times/yr (rounded to whole number)

Intensity: 9 sprinkler heads x 3.04 gpm per head = 27.36 gpm (6.2 m3/hr)

Time: 4 hrs/time x 60 min/hr = 240 min/time

FIT (Frequency x Intensity x Time):32 times/yr x 27.36 gpm x 240 min/time = 210,125 gal/yr = 210 kgal/yr (795 m3/yr)"

One recommendation from installation staffers that may assist in conserving precious resources is water-efficient landscaping which involves applying water-conscious practices to irrigate lawns, golf courses, and other landscaped areas. By definition, its purpose is not only to keep plants healthy, but also to conserve water in the process. Water-efficient landscaping makes use of native plants and grasses to reduce the need for additional irrigation. It also encompasses the use of efficient sprinkler systems with sensors to detect rainfall and discontinue watering when a particular area has received sufficient water to meet plant requirements.

Water-efficient landscape options include:

- Install appropriate irrigation scheduling for landscaping areas
- Monitor and inspect irrigation system effectiveness
- Add rain sensors to existing systems
- Retrofit and replace ineffective irrigation controllers
- Implement water-wise landscape, emphasizing native plants and grasses

Driver/requirement

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

Objective

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

Management approach

- Secure funding to install irrigation system using harvested stormwater

Target

Secure project funding for irrigation system installation prior to 2010.

Eifel Mountain Golf Course Spangdahlem AB, Germany y

This farmhouse used to be located on or near the current 3rd hole at the Eifel Mountain Golf Course.

CULTURAL RESOURCES

Very few environmental challenges encountered on a golf course are more interesting or complex as historical or cultural resources. It is believed that several of these sites used to be on or near the Eifel Mountain Golf Course. A Roman road and wall are said to have skirted the 8th and 9th holes in ancient times. A farmhouse belonging to one of the original landowners was located on the 3rd hole. Some of the larger trees in this area are judged to be growing during that time still thrive on the course. These and possibly several others need to be investigated further by installation environment and golf course staffers to ensure compliance with German law.

Driver/requirement

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

Objective

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

Management approach

- Regularly consult with installation cultural resource manager to ensure constant compliance with the Cultural Resources Management Plan (CRMP)

Target

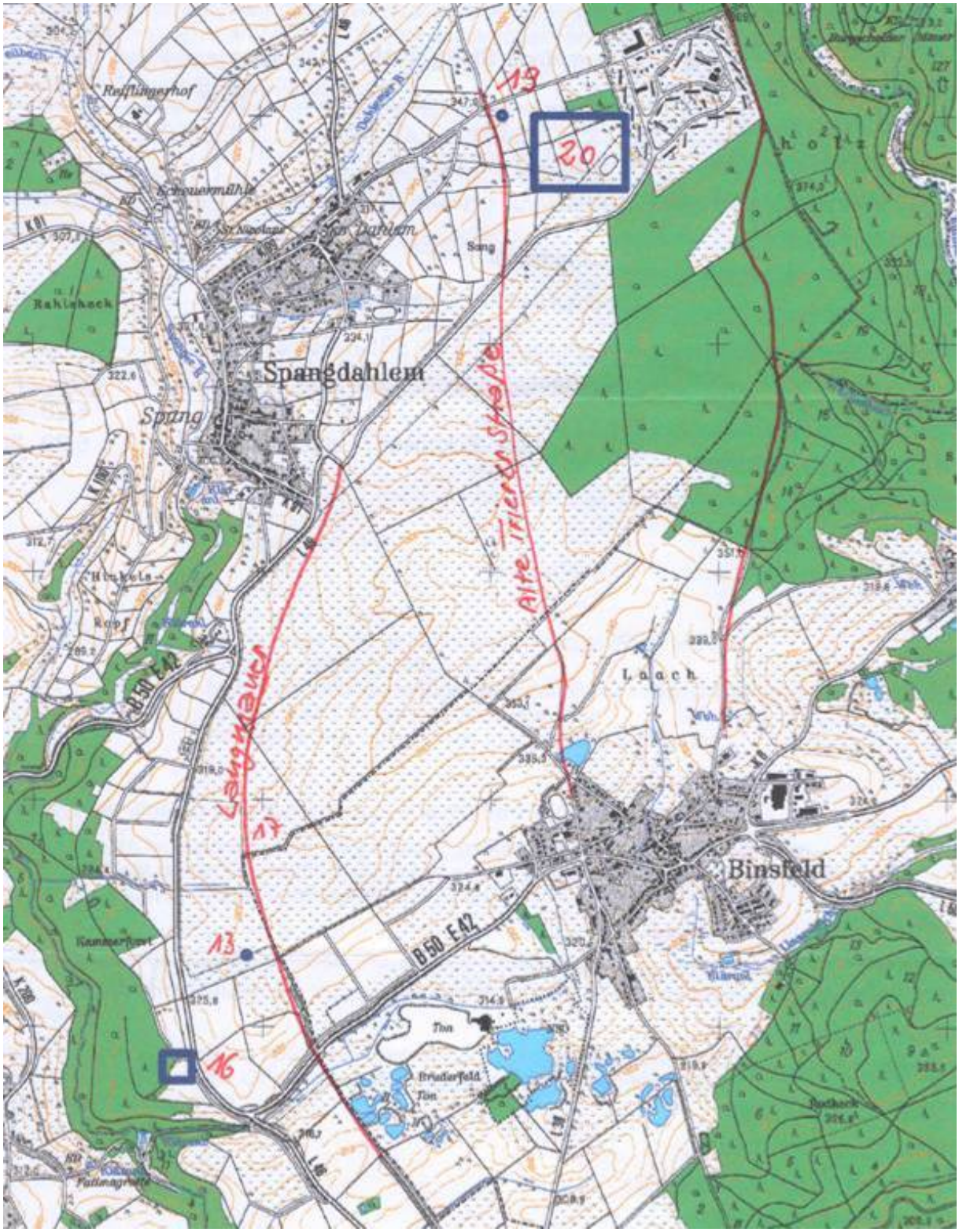
Ensure that there are no negative impacts to cultural amenities that shall be attributed to the golf course staff or its management practices. Continue to work closely with cultural resources manager as required to realize environmental challenge objective.

Eifel Mountain Golf Course Spangdahlem AB, Germany

These large trees have been deemed historical and are thought to still survive in the vicinity of the old farmhouse site.

Eifel Mountain Golf Course Spangdahlem AB, Germany

Are some of these trees some of the pre-air base specimens?



This impromptu map shows potential locations of recently discovered cultural resources.

Eifel Mountain Golf Course Spangdahlem AB, Germany

The driving range provides covered all weather practice stations.

Implementation

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

GEM Plan goals & objectives

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

- Adopt and post an environmental policy statement along with a map highlighting the environmental challenges faced by course management and discuss them regularly with the staff during meetings and documented training events
- Map the course's hot spots to enable improved procedures for areas requiring special care or attention
- Examine all maintenance procedures to determine potential negative impacts
- Write and implement a comprehensive Turfgrass Management Plan
- Establish, document and communicate fertilizer and pesticide application buffers around all sensitive course features

Objectives are defined as actions or results that are desired to be accomplished prior to the next INRMP update in 2014.

- Write and implement a facility wide Integrated Pest Management Plan that includes trained scouts and standardized scouting forms along with written pest profiles for common regional pests and documents all applications
- Compile a Water Resource Management Plan for the entire golf course facility that includes pollution abatement and water quality management zones
- Install conveniently located recycling containers throughout the facility
- Harvest stormwater for irrigation use
- Request a comprehensive energy audit for the golf facility

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.

- None provided by installation GEM team

Eifel Mountain Golf Course Spangdahlem AB, Germany

Moles have taken over the first fairway creating a hazard for players and employees alike.

Conclusion

Although the journey to improve Eifel Mountain Golf Course to the desired condition by the golf staff for their customers is a steep and heavily graveled one, it is worthy of the effort. Recreational opportunities afforded by Air Force golf courses in the form of fresh air and an attractive, safe place to launch a few Rock Flights when the feeling comes over an Airman or employee is hard to quantify. With an established goal and a workable implementation plan, improvements can become a reality. The current golf staff members are a good start. Let's finish the job they have started so well.

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.

Clubhouse improvements are nearly complete.

Constructed detention basin complicates BASH.

Third, and lowest, stormwater control device.

Fueling station needs repair so it can be used again.

Golfers must cross relatively busy perimeter road.

Tree management planning is a must for the long haul.

Lack of cart paths hinder golfers during poor weather.

Boulders are attractive – and potentially dangerous!

Utility project damage has never been mitigated.

Trees can add greatly to the overall experience.

Maintenance complex is a very nice facility.

The inside of the stormwater retention structure.

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