



***Whispering Firs Golf Course
Environmental Management (GEM) Plan
McChord AFB, WA***



August 2009



San Antonio, Texas



***Whispering Firs Golf Course
Environmental Management
Policy***

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

Table of Contents

Table of Contents	ii
Executive Summary	3
U. S. Air Force GEM Program.....	3
GEM Program process.....	3
Environmental Compatibility Quotient (ECQ) scores.....	3
Final environmental challenges.....	3
Where do we go from here?.....	4
The GEM Initiative.....	4
GEM Process	5
Analysis.....	5
GCEBA components.....	6
Documentation.....	6
U.S. Air Force GEM Plan components.....	7
Implementation.....	7
Evaluation.....	7
Revision.....	7
Course Specific Analysis	8
Course Description.....	8
Course Details.....	9
Environmental Compatibility Quotient (ECQ) Checklists	10
Determining the Environmental Compatibility Quotient (ECQ).....	10
ECQ Scoring Scale.....	10
Planning & Compliance.....	11
Operations & Maintenance.....	13
Water Resource Management.....	15
Conservation.....	17
Pesticides & Pollution Prevention.....	19
Environmental Compatibility Quotient Summary.....	21
Environmental Compatibility Quotient Scoring Scale.....	21
Environmental Challenges	22
Assessing environmental challenges.....	23
Installation Restoration Program (IRP) sites.....	24
Invasive species.....	26
Explosive Safety.....	28
Tree management.....	29
Wetlands.....	30
Water quality management.....	32
Air quality.....	34
Implementation	35
GEM Plan goals & objectives.....	35
Conclusion	36
The gallery.....	36
Bibliography	39



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 = 55, Just started (Red)**
- **Potential ECQ = 66, Just started (Red)**

Final environmental challenges

The following potential environmental challenges were identified in compiling this document:

- Installation Restoration Program (IRP) sites
- Invasive species
- Explosives safety
- Tree management
- Wetlands
- Water quality management
- Air quality

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/>).



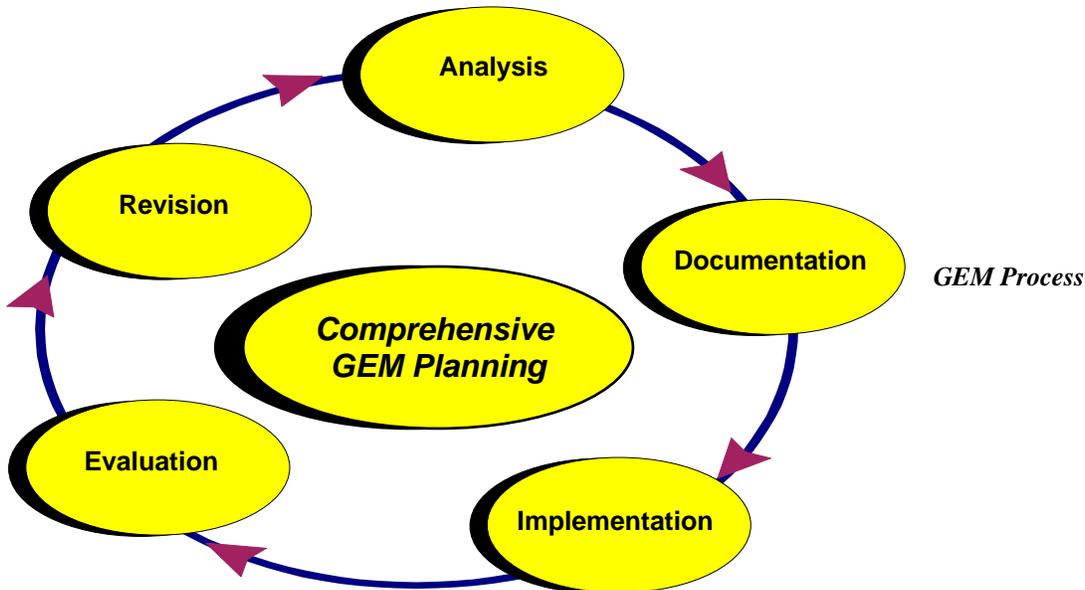
*Whispering Firs Golf Course
McChord AFB, WA*

Heavily-treed and rolling lushness best describes Whispering Firs 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.



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.



*Whispering Firs Golf
Course
McChord AFB, WA*

Staff members at the Whispering Firs Golf Course are topnotch.

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

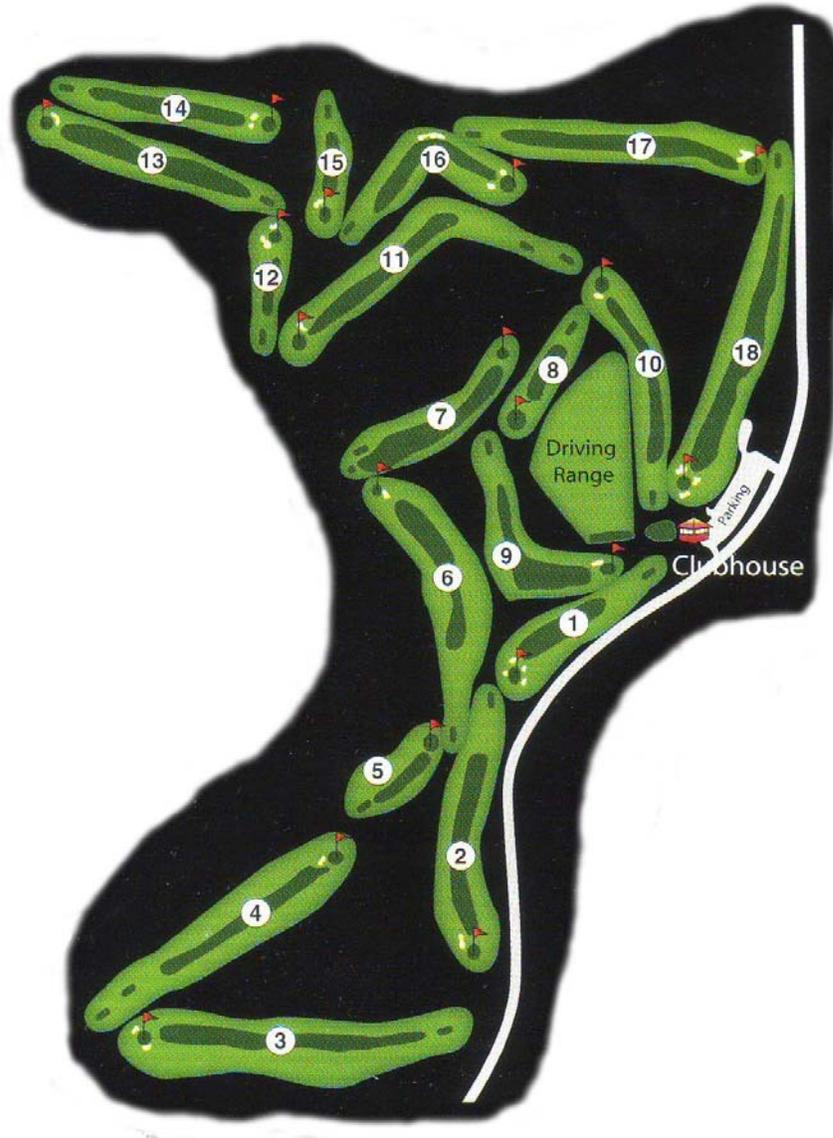
In order to ensure the highest quality of customer service and environmental stewardship, there must be continual self-evaluation and improvement. There also should be consistent, on-going measurement of the reduction or elimination of environmental impacts the newly implemented practices have on the 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 Description

Whispering Firs Golf Course is a wonderful assemblage of quality golf holes. Environmental challenges abound yet are dwarfed by the massive and omnipresent Douglas fir trees that give the course its character. Relatively narrow fairways, smallish greens and rolling topography are the rule. Straight and true golf skills are a great help to those not equipped with a dozen or so extra ammunition. Wetlands are plentiful throughout the course – mostly out of play. The Whispering Firs Golf Course staff has a great resource at their disposal and it shows that they respect its value to their success and to their customers.



Whispering Firs Golf Course Aerial Photo, McChord AFB, WA

Course Details

Architect	John Stiedel
Year constructed	1962/1973
Climate	Maritime- Moderate temps/gentle rains
Average annual precipitation	38 inches
Average growing season	200 days
Elevation	278 feet ASL
Prevailing wind direction	N/NE & SW
Total facility acreage	Not provided
Total actively maintained acreage	110 acres
Par	36-36-72
Yardage/Rating/Slope	Blue/6691/72.4/123 White/6345/70.7/121 Red/5818/73.7/121
Turfgrass	Ryegrass/Poa annua
Tees-	Ryegrass/Poa annua
Fairways-	Poa/Bentgrass
Greens	Mix
Roughs-	
Irrigation source	Non-potable well water (Yellow)

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 Whispering Firs Golf Course manager and superintendent during the visit to McChord AFB, WA.

<u>Planning & Compliance</u>				
#	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	5	5	10

<u>Operations & Maintenance</u>				
#	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	10	3	7

<u>Water Resource Management</u>				
#	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

<u>Conservation</u>				
#	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	12	1	7

<u>Pesticides & Pollution Prevention</u>				
#	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		16	1	3



*Whispering Firs
Golf Course
McChord AFB, WA*

Welcoming entry to clubhouse is just the beginning of an excellent all-around golfing experience.

<u>Environmental Compatibility Quotient Summary</u>			
Environmental Compatibility Category	Yes	Partial	No
Planning & Compliance	5	5	10
Operations & Maintenance	10	3	7
Water Resource Management	12	1	7
Conservation	12	1	7
Pesticides & Pollution Prevention	16	1	3
Totals	55	11	34

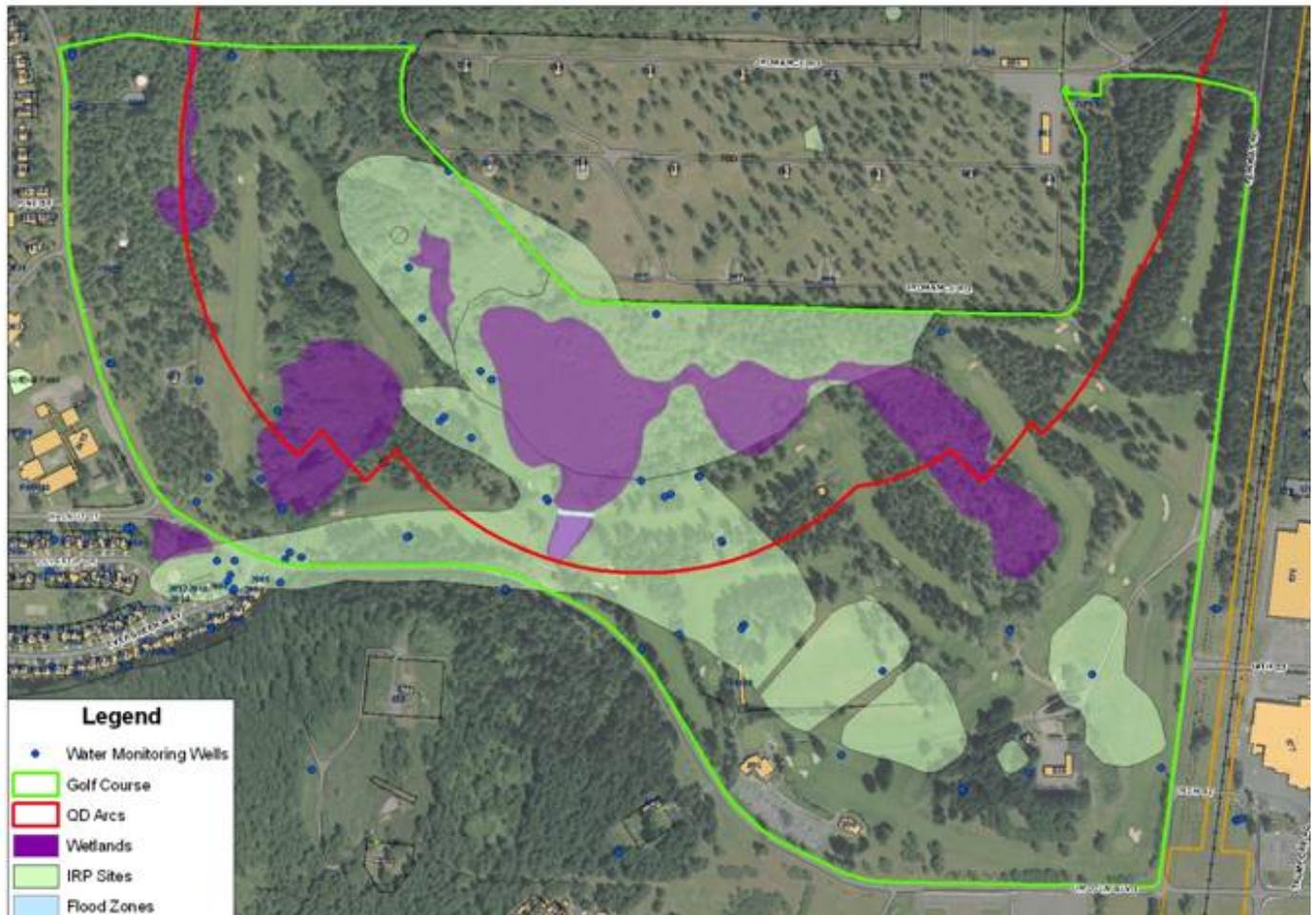
Key to checklist responses

- **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

August 2009 - Whispering Firs Golf Course ECQ:

- **Actual ECQ = 55, Just started (Red)**
- **Potential ECQ = 66, Just started (Red)**

<u>Environmental Compatibility Quotient Scoring Scale</u>	
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 initial GEM process:

- Installation Restoration Program (IRP) sites
- Invasive species
- Explosives safety
- Tree management
- Wetlands
- Water quality management
- Air quality



*Whispering Firs
Golf Course
McChord AFB, WA*

As a result of lengthy, comprehensive interviews in the field, a significant majority of the native wildlife consider the course to be a great place to live.

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 developing sensitive 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.

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.



*Whispering Firs
Golf Course
McChord AFB, WA*

Groundwater extraction well and treatment system at Whispering Firs.

INSTALLATION RESTORATION PROGRAM (IRP) SITES

Investigations into the American Lake Garden Tract to include Installation Restoration Program (IRP) sites 5 and 39 “exhibited contamination that exceeded drinking water standards”. At least 124 monitoring wells later, trichloroethylene (TCE) and DCE were present in studies of seven disposal sites. Site 5 was used as an industrial, domestic and construction waste landfill from 1951-1967. Studies revealed waste oil and fuel solvents. Site 39 operated from 1953 until 1960 featuring waste solvents, fuel, JP-4 and POL.

There is a groundwater extraction well operating along Hole #3 that removes the contamination and recharges the groundwater with the treated water. This water is then used for irrigating the golf course. The final remedy Record of Decision signed in Sep 91 states “Remediation of contaminated groundwater by eliminating or reducing risks posed by the site to levels that are protective of human health and the environment.” Pesticides were not among the 129 contaminants identified.

Driver/requirement

- CERCLA (42 USC 6901)
- Executive Order 12580 (Superfund Implementation)
- National Oil & Hazardous Substances Pollution Contingency Plan
- Safe Drinking Water Act (40 USC 300)

Objective

Restore groundwater to its beneficial use as a potential drinking water source.

Management approach

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

Target

Immediately integrate specified land use controls into regular maintenance practices.



*Whispering Firs
Golf Course
McChord AFB, WA*

The groundwater extraction well facility is barely visible through the trees not far from the 3rd teeing area.



*Whispering Firs
Golf Course
McChord AFB, WA*

Scotch broom can be beautiful at times. It is always difficult to control.

INVASIVE SPECIES

Scotch, or Scot's broom is the most prevalent invasive at McChord AFB. The plant grows to ten feet tall and crowds out desirable natives like white and Garry oak. Scot's broom is remarkable in its ability to survive and spread. The plant "displaces native and beneficial plants and its seeds and other plant parts are toxic to humans, horses and livestock". In addition, the plant can hinder animal movement, add to fire hazards and can "render rangeland and grasslands worthless".

A common chemical used to control it is Garlon 3A. The active ingredient is triclopyr usually only slows down this tenacious European native. Mechanical mowing and hand-pulling can also be partially successful. The

Other invasive plants occurring on the installation include spotted knapweed, English and Irish ivy and purple loosestrife.

Driver/requirement

- Federal Noxious Weed Act of 1974
- Executive Order 13112, Invasive Species
- National Invasive Species Act (1996)
- Plant Protection Act (2000)
- Federal Noxious Weed Act of 1976 (7 U.S.C. 2801)
- Alaska Statutes 03.05.010, 03.05.030 and 44.37.030
- Executive Order 13112, Invasive Species, February 3, 1999

Objective

Prevent introduction and establishment of invasive species to reduce their impact on the environment, economy and health of the United States.

Management approach

- Never knowingly install a listed or potentially invasive species
- Regularly inspect likely areas for invasives to establish themselves
- Work with installation environmental staff to contain or reduce invasives
- When possible, restore native species and habitat conditions
- Train all pertinent employees on the latest invasive species identification and control measures
- Restore disturbed areas dominated by invasive species to natural vegetation where practical and consistent with mission requirements
- Utilize native or indigenous plant materials whenever possible

Target

Conduct invasive species survey and complete an approved plan to contain or reduce invasives prior to the end of FY10.



*Whispering Firs
Golf Course
McChord AFB, WA*

Spotted knapweed is an European native.



*Whispering Firs
Golf Course
McChord AFB, WA*

The ammunition storage area is just beyond the 12th green.

EXPLOSIVE SAFETY

Located just north of the golf course is the primary weapons storage area for McChord AFB. The “800” area is home to a significant number of U.S. Air Force weaponry. Weapons storage is serious business and the Whispering Firs’ employees and customers are the only authorized personnel within the quantity distance areas. Weapons storage areas have quantity distance (QD) clear zones that limit development. The current QD for the weapons storage area near Whispering Firs Golf Course is 1,250 feet.

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 and maintain compliance with all land use restrictions.

Management approach

- Continue to limit access to affected areas during times of increased risk to personnel or property
- Warn all customers and employees of the potential risk

Target

Continue to act immediately upon notification of potential increased risk.



*Whispering Firs
Golf Course
McChord AFB, WA*

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

TREE MANAGEMENT

With more than 1000 acres of timberland, McChord's "forests contribute vital forest resources and wildlife habitats". The natural resources brochure goes on to discuss the income generated by timber sales and products. Whispering Firs Golf Course needs to be brought in on this deal. Trees are obviously abundant whether examining the entire installation or just the golf course. One of the biggest challenges to the superintendent's task of providing quality turf and generating interest, play and profits is excessive shade and root competition from the Douglas firs and oaks. Sustainable practices like multiple use will ensure that our natural resources will last for generations. Coordinated management between environmental and golf staffers should enable resource protection while providing the best possible recreation facility for McChord Airmen.

Driver/requirement

- Land management plan
- Tree City USA program
- Natural resource protection initiatives

Objective

Ensure all tree maintenance and care is coordinated with installation natural resource manager.

Management approach

- Utilize native or indigenous plant materials whenever possible
- Compile a comprehensive Tree Management Plan for the entire golf course property

Target

Complete Tree Management Plan prior to the next iteration of the INRMP in 2014.



*Whispering Firs
Golf Course
McChord AFB, WA*

This overgrown pond is officially classified as wetlands.

WETLANDS

Of the 46 wetlands totaling 138.34 acres delineated on McChord AFB, approximately 34 acres occur on or near the Whispering Firs Golf Course. Most of these are classic kettle hole wetlands influenced. The installation has conducted several wetland enhancement projects to include the removal of cattails and yellow pond lilies from the golf course pond. The INRMP noted that “open water on the golf course was found to be extensively utilized by bats”.

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.

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
- Comply with all requirements included in the approved installation SWPPP
- 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

Ensure that all water bodies continue to be free of pollutants potentially attributable to a golf course management practice.

Maintain positive relationship with civil engineering and environmental staffers to attain and maintain compliance without delay on all water-related regulations and requirements.



*Whispering Firs
Golf Course
McChord AFB, WA*

Of the 138 plus acres of delineated wetlands on McChord AFB, Whispering Pines Golf Course is home to nearly a quarter of them.



*Whispering Firs
Golf Course
McChord AFB, WA*

Housing project upstream of course is potential depositor of sediment in violation of the Clean Water Act.

WATER QUALITY MANAGEMENT

In addition to the obvious desire to keep golf course-applied pesticides and fertilizers out of wetlands and streams, water quality concerns include increased water temperatures and elevated bacteria counts. Several areas of the golf course are susceptible to potential degradation due to poor management practices.

Soils at McChord are highly pervious and can be a limiting factor for vegetation growth, especially during the potentially dry summers. Groundwater depth varies between 10 – 40 feet. This combination makes it critical to protect valuable groundwater supplies from ongoing operations and accidental spills. Groundwater recharge is directly from precipitation and infiltration. Wellhead protection is another concern.

Driver/requirement

- Clean Water Act, Section 401
- National Pollutant Discharge Elimination System
- Safe Drinking Water Act
- Federal Water Pollution Control Act of 1977 (Clean Water Act), as amended (33 U.S.C. 1251-1376)
- Washington Administrative Code (WAC) Section 246-290

Objective

Ensure that no golf course management practice diminishes the water quality.

Management approach

- Floor drains are directed to sanitary drains with oil water separator
- Operational protocol understood by employees
- Drums stored on pallets

- Spill response equipment available
- Dumpsters covered
- All material and waste stored inside buildings or cabinets
- Covered wash rack with grass cuttings trap
- Tanks are double walled
- Repair activities are performed under a covered area
- Covered & bermed pesticide/herbicide storage and mixing area
- Flammables stored in secure cabinets
- Drip pans under dispensing units
- Site personnel perform visual inspections of the area
- Security fencing installed
- Operational protocol understood by employees
- Spill response equipment is available
- Inspections performed
- Activity performed inside facility
- Secondary containment for fuel storage tank
- Drip pans under dispensing units
- 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
- Establish, document and communicate pesticide and fertilizer application buffers around all water features and monitoring wells

Target

Eliminate the potential for degradation of the water resources at the course by establishing, documenting and communicating all pesticide and fertilizer application buffers to appropriate personnel prior to the end of the year.

Maintain positive relationship with civil engineering and environmental staffers to attain and maintain compliance without delay on all water-related regulations and requirements.



*Whispering Firs
Golf Course
McChord AFB, WA y*

In addition to the customer-utilized golf carts, the maintenance complex has the potential to impact air quality due to excessive emissions.

AIR QUALITY

When a region's air does not meet national ambient air quality standards, the Clean Air Act can require vehicle emission inspections and other mitigative actions. Usually this applies that only those individuals actually living in non-attainment counties. The Clean Air Act requires all military employee vehicles to be emission checked despite the fact that they may not live in normal testing areas. New vehicles are exempt for the first two years.

According to the state of Washington, the Puget Sound region to include McChord AFB, are in a moderate maintenance area for carbon monoxide. McChord AFB works with the local clean air agency in monitoring and implementing the installation's permits and emissions inventory.

Driver/requirement

- Clean Air Act

Objective

Curb carbon monoxide pollution emissions as a result of golf course maintenance activities.

Management approach

- Replace older equipment when funding allows
- Encourage employees to minimize their trips on and around the course
- Ensure equipment cleaning solution containers are closed at all times
- Eliminate all aerosols from maintenance and clubhouse inventories
- Replace 2-cycle powered equipment as funding and technology allow
- Prepare policy to alter maintenance staff work plans during announced regional air quality health alert days

Target

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



*Whispering Firs
Golf Course
McChord AFB, WA*

Next on the first tee...!

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.

- Post a map of the golf course facility highlighting the identified environmental challenges for customers and employees
- Ensure that all employees are familiarized with the GEM Plan processes through documented training that increases their awareness of environmental stewardship goals and objectives
- Encourage all employees to minimize their trips around the course to conserve on the use of fossil fuels and their air polluting emissions

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

- Compile a Tree Management Plan for the entire golf course facility
- Map the courses "hot spots" to document areas that may need special care or attention
- Enlist civil engineering staffers to conduct a comprehensive energy audit of the golf course facility

Conclusion

To those who have not played or visited the Whispering Firs Golf Course lately will be pleasantly surprised of the quality conditioning and general improvement of the entire facility. The golf staff has done wonders over the last several years in making the McChord golf course into one of the finest in the Air Force inventory. The recreational golfing experience is one of the best anywhere. In addition, the fine natural landscape, wildlife and supreme maintenance conditions and customers have to be smiling. Although the environmental challenges are many and somewhat complex, a continued cooperative relationship with installation civil engineering and environmental staffs point to a bright future for the Whispering Winds Golf Course and its customers, employees and the community.

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.



Scotch broom is establishing itself on this bank.



Wetlands are common at Whispering Firs.



Wash racks are one of the biggest issues on courses today.



Blowing clippings away before washing is a great practice.



Some signs get the message across to everyone.



The course snack bar can be a big income generator.



Moles can be a problem for the superintendent.



Valuable sunshine is limited in the northwest at times.



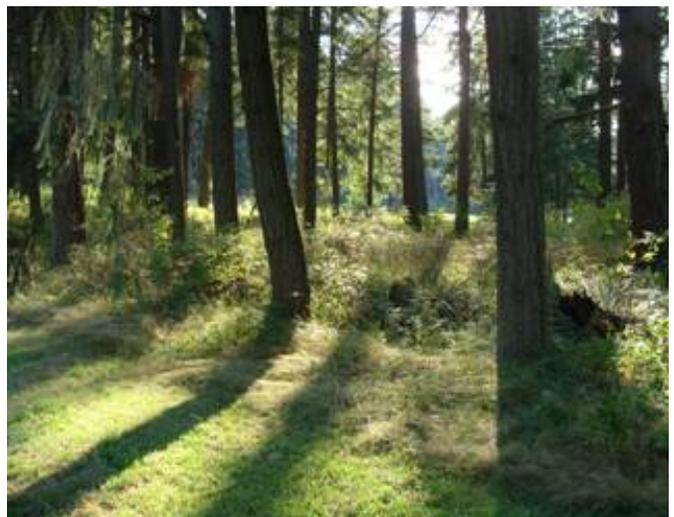
The course is beautiful and fun to play.



Shop is well-maintained and roomy.



The greens are consistent and extremely playable.



Quality care exhibited in minimally-maintained areas.

Bibliography

Audubon International, *Environmental Performance Audit, Integrated Environmental Management*, Golf Course Superintendents Association of America, New Orleans, LA, February 2000.

The Center for Resource Management, *Golf & the Environment: Charting a sustainable future*. Environmental Principles for Golf Courses in the United States, Salt Lake City, UT, 1996.

Bushman, William H., *A Process to Quantify the Environmental Compatibility of Golf Course Management Practices*, University of Texas at San Antonio, Thesis, The University Of Texas At San Antonio, College of Sciences, Department of Earth and Environmental Sciences, May 2003.

Bushman, William H., *Comprehensive Golf Course Environmental Management Planning*, Golf Course Superintendents Association of America, Atlanta, GA, February 2006.

USAF, *Record of Decision for the Area D/American Lake Garden Tract*, McChord AFB, WA, 19 Sep 91.

62 CES/CEV, *Draft Integrated Natural Resource Management Plan for McChord AFB, WA*, 13 Mar 09

HQ AFSVA, *Staff Assistance Visit, Whispering Firs Golf Course Maintenance Report*, 7-10 Aug 07.

engineering-environmental Management, *Environmental Assessment of Installation Development at McChord Air Force Base, Washington*, Nov 07.

62 CES/CEV, *Washington State Motor Vehicle Emission Check Program*, undated.

62 CES/CEV, *Natural Resources*, brochure, McChord AFB, WA, Jan 95.

Chambers-Clover Planning Unit, *Chambers-Clover Watershed Management Plan*, brochure, May 03.

King County Noxious Weed Control Program, *Scotch Broom Best Management Practices*, <http://kingcounty.gov/weeds>, Jan 08.



**Air Force Center for Engineering & the Environment
Technical Directorate
Built Infrastructure Division**

For additional assistance or more information, please contact:
AFCEE GEM Program Manager – 210-395-8391 - DSN 969-8391
AFCEE/TDB, 2261 Hughes Ave, Suite 155, Lackland AFB, TX 78236-9853

Please visit our Golf Course Environmental Management Program website:
<http://www.afcee.lackland.af.mil/gem>