



Mamala Bay Golf Course
Environmental Baseline Assessment
Hickam AFB, Hawaii Jun 03



Executive Summary

U. S. AIR FORCE GEM PROGRAM GOALS

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

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

GEM PROGRAM PROCESS

There are five steps in the GEM program process.

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

This report is the result of the analysis step.

MAMALA BAY GOLF COURSE HICKAM AFB, HAWAII ENVIRONMENTAL CHALLENGES

The following environmental challenges were identified during the GCEBA process:

- Installation Restoration Program (IRP)
- Water quality management
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Invasive exotics
- Archaeological
- Proposed new clubhouse

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

WHERE DO WE GO FROM HERE?

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

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Introduction

The golf course environmental baseline assessment (GCEBA) is the initial step in the process of creating a successful ecosystem-based Golf Course Environmental Management (GEM) Plan.

The ultimate intent of the program is to provide a foolproof, customer-driven management tool that will free up course managers and superintendents to devote more of their efforts to caring for their customers and the course. Properly designed and implemented, the GEM Plan will keep the facility in compliance with the ever-changing environmental rules and regulations while providing a vital recreational opportunity for the installation.



Dramatic bunkering adds to the challenge and beauty.



Quality course conditioning is one of the major reasons for Mamala Bay's remarkable popularity with their customers.

Goal of the GEM Program

The goal of the U. S. Air Force GEM program is to facilitate the creation of an environmentally friendly golf course facility for its customers while supporting the installation mission. The Air Force Center for Environmental Excellence (AFCEE) is dedicated to helping to identify ways that more rounds can be played on better-conditioned courses while minimizing or eliminating negative impacts to the environment. In most cases, the U. S. Air Force's golf courses are being managed compatibly with the environment. The GEM program is the vehicle to document our successes while communicating directly with the golfers, our commanders, and the local community.



Mamala Bay shares their “airspace” with jets from all over the world.

Program Process

Implementation is the most important phase of any initiative where practices and procedures are examined and may undergo significant change. This is especially true of the GEM Plan process. The specifics for the GEM Plan components and directions for their completion will be delineated in AFCEE’s ***Golf and the Environment, Guidelines for the 21st Century.***

The GEM Program is derived from many diverse environmental regimes such as the National Environmental Policy Act, the Environmental Compliance Assessment and Management Program, and the ISO 14000 environmental management

system. The primary tenets of the GEM Program are to minimize or eliminate potential negative environmental impacts, attain and maintain daily compliance with all appropriate regulations, and constantly examine our processes on all aspects of golf course management to achieve the highest standards of environmental excellence. There are five basic steps in the implementation of the GEM Program process:

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision



The Pacific Ocean is not far removed from play here at the 15th.



Another perfect day in paradise...

Analysis

Experienced environmental managers realize the importance of assembling all of the data relevant to a problem prior to determining its best solution. Analysis is the first and most important task of the golf course environmental baseline assessment (GCEBA) and the GCEBA is the initial step in the process of creating an ecosystem-based Golf Course Environmental Management (GEM) Plan. Properly completing the GCEBA is paramount to the long-term compatibility of an installation's golf course management practices with the GEM Program, and more importantly, the U. S. Air Force's natural resource and environmental management goals and objectives.

GCEBA COMPONENTS

The GCEBA is comprised of the following components:

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

Documentation

It is not enough just to know how to create a successful golf course environmental management program. There has to be a written record of existing site data, maintenance practices, pesticide applications, and other historical golf course activities. By documenting what we know, we will be able to determine how to make better decisions in the future. The completed GEM Plan will be a comprehensive report with a map that will assist in the daily management of the course while providing a convenient vehicle to communicate to our customers the environmental issues that challenge us on our golf course and our plans to deal with them. In order to reach the environmental stewardship goals set by the U. S. Air Force, we must consistently employ only those management practices that minimize or eliminate potential negative impacts to the environment.

GEM PLAN COMPONENTS

The GEM Plan will be comprised of the following components:

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

Implementation

Positive and decisive action is the only true measure of the success of a GEM Program. By implementing new practices, whether to knowingly improve the course's role in the environmental stewardship of the installation or to just try new ideas to determine their value, will the golf staff and golfers benefit. The Mamala Bay staff should adopt the GEM Program Environmental Policy and immediately begin finding ways to minimize or eliminate any and all negative impacts to the environment.

Evaluation

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

Revision

The very nature of a superior GEM program implies that all documents be regularly maintained to represent the most current conditions. U. S. Air Force golf course managers and superintendents should be constantly looking for ways to improve their environmental stewardship. Acting on lessons learned is right behind initial implementation as the most important aspect of a successful GEM Program. The GEM Plan should be kept as current as possible at all times. Ideally, it should be completely updated at least every three years.

Course Specific Analysis

One of the most pragmatic and enjoyable tasks in the GCEBA process is the course specific analysis. From a general overall description of the course to the details of the course's history and makeup to the various observations on the way the course plays, looks, and is managed, the course specific analysis sets the stage for the rest of the GCEBA report. It is comprised of the following tasks:

- Course description
- Course details
- Maintenance facility evaluation
- Miscellaneous facilities examination

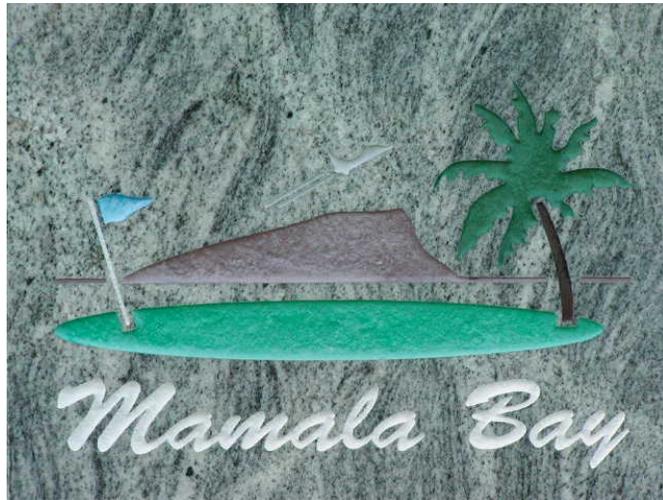


Rounds begin in this area today at Mamala Bay Golf Course's 1st tee.

Course description

Annually, Hickam AFB's Mamala Bay Golf Course challenges the rest of the Air Force golf courses worldwide for the most customers for an 18-hole facility. Mamala Bay will record well over 70,000 rounds this year which is about what they have averaged over the last several years. The Director of Golf and his staff along with the superintendent have played a major role in the continuing success of Hickam AFB's largest golf facility.

Hickam AFB command and staff members conceived Mamala Bay Golf Course in the early 1960s. With their appetites for the game whetted by the still-existing par three course, it was just a matter of time before the installation outfitted itself with a full length golf course. Early planning and siting studies determined that it was plausible to create a golf course on the site of the old Tri-Service landfill that occupied a prime piece of beach frontage along the southeastern most portion of Hickam AFB. Using a design created by golf architect Robert Baldock, the Hickam AFB golf course was created using non-appropriated funds and a lot of hard work and sweat from commanders, Services employees, and low-paid labor. The course was completed in 1966 at a cost of \$249,000 with limited, yet positive, local fanfare. Over the years, many kiawe trees have populated the areas between holes along with hundreds of coco palms to form what is now one of the finest military golf facilities in the United States inventory.



Course details

| | |
|----------------------------|---|
| Architect | Robert Baldock |
| Year constructed | 1965-1966 |
| Climate | Mild & tropical all year |
| Average annual rainfall | Varies 10-22 inches |
| Average growing season | Relatively year round |
| Winds/Prevailing Direction | Trades from NNE |
| Total Facility Acreage | 178 acres |
| Par | 36-36-72 |
| Yardage/Rating/Slope | Back- 6868/71.9/129 Middle- 6418/70.3/126 Forward- 5675/72.9/120 |
| Turfgrass | Tees- Tif 328, 4 acres (ac) Fairways- 328/Cmn, 55 ac Greens- Tif 328, 3 ac Roughs- Common, 116ac |





Mamala Bay Golf Course

Miscellaneous Facility Review

Although the course is primary to the enjoyment and eventual return of most of Course Name' customers, the support facilities play a huge role in the overall success of the operation. This section of the GCEBA will examine the following facilities for their aesthetic, functional, and environmental values:

- Clubhouse/pro shop/snack bar
- Practice areas
- Maintenance complex
- Pesticide mixing and storage
- Cart barn
- Infrastructure



The pro shop is well-stocked with the latest and greatest amenities.



Clubhouse complex is attractive yet is approaching the end of its utility.

Clubhouse

Mamala Bay's clubhouse is comprised of two facilities connected by a breezeway. The pro shop and golf course management and administration offices are in one facility and the snack bar, kitchen, dining area, and locker room are in the other. Attractive to the first time visitor and relatively functional overall, the longer one dwells on the details of the buildings the easier it is to see that replacement is imminent if not downright necessary. The snack bar sports two outdoor patio areas complete with several tables that afford tremendous vistas of the course and the ocean. What a great place! Unfortunately, the hill that provides the elevated perspective where a new facility should be built is directly over Hickam AFB's largest challenge.

Practice areas

Tom Stanfill loves the game of golf. You can tell by the way he has outfitted his facility. As a PGA pro, one proven method to ensure that the game thrives at your course is to have ample practice areas to teach, perfect, and learn the game. Accordingly, Mr. Stanfill has two putting greens, a large driving range, and a short game practice area at his disposal to accomplish his objective. Condition of the driving range turf, as is common at many facilities with as much traffic as Mamala Bay gets, is not the best. Matted hitting stations have been added to ameliorate this situation. The driving range depth is somewhat lacking as the 10th hole angles across from the right.



Short game practice area is perfect for beginning players.



Storing pesticides properly is a serious business in the military.

Pesticide mixing and storage

Russell Higa and his staff properly manage the mixing and storing of pesticides at all times. The area is fenced, locked, and signed. Barbed wire all around the top of the fence is being added and signs will be added to the fencing itself to fully comply with the letter of the regulations governing pesticide storage on U. S. Air Force installations. All in all, Mr. Higa has an operation worth emulating by his peers.



Electric carts are the standard for Mamala Bay.

Cart barn

The cart barn is well located and generally serviceable inside and out. The cart wash areas could benefit from improvements from functionality to aesthetic appeal. Electric golf carts are used exclusively for maximum efficiency and minimum environmental impacts at the Mamala Bay Golf Course.

Infrastructure

This section examines important elements of a quality golf course that are difficult to group into another category. Cart paths are in good condition. Most are curbed nearby greens and tees to control circulation patterns of Mamala Bay customers. The parking lot is excellent and seems large enough to satisfy the regular demands of Mamala Bays' customers. Landscape development attempts have been relatively successful and should be continued where appropriate. There is a site amenity group near most teeing areas and the course signage could be improved.



Quality curbed cart paths near tees and greens along with durable and serviceable site amenities contribute to the quality experience.

Maintenance complex

Mamala Bay Golf Course is outfitted well at the maintenance complex. The grounds are well cared for and attractive. Most of the equipment and almost all of the unsightly elements one would find at a golf course maintenance complex are not in view. Russell Higa, long time superintendent at Mamala Bay, operates with a soft-spoken style that encourages quality work while demanding respect for himself and his chosen profession.



The superintendent has been at Mamala Bay over 18 years.



The maintenance complex offers a good first impression to visitors.



Outdoor equipment storage yard.

Environmental Compatibility Quotient Checklists

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

ECQ Categories

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

ECQ Checklists

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

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



The Brazilian cardinal is a common inhabitant of the islands and the golf course grounds and is a personal favorite of the author.



Protecting the quality of its water resources is a primary concern to both Hickam AFB and the state of Hawaii.

Determining the Environmental Compatibility Quotient

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

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

Key to checklist responses

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

ECQ Scoring Scale

| Percent Responses Yes or Partial per Category | Level |
|--|------------------|
| 93-100% | Advanced |
| 83-92% | Getting there |
| 73-82% | Showing progress |
| 63-72% | Early stages |
| Less than 62% | Just started |

Overall Management Philosophy & Documentation

U.S. Air Force GEM program goals

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

Observations

- Utilize installation environmental management geographic information system and civil engineering digital aerial photographs for mapping requirements
- Best overall observed approach to both course management and maintenance
- Continue to document practices to ensure long term improvements are realized



The director of Golf's space is a little confining yet efficient.



Quality playing surfaces and tremendous aesthetic appeal abound.

| Overall Management Philosophy & Documentation | | | | |
|--|--|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | Has management demonstrated that the environment is an important part of their responsibilities by initiating the GEM Planning process? | ✓ | | |
| 2 | Has the golf course adopted and posted an Environmental Policy? | | ✓ | |
| 3 | Is the GEM Plan underway or completed, available, and updated regularly? | | ✓ | |
| 4 | Is a map of the property highlighting environmental opportunities or constraints such as wildlife habitat, water resources, sensitive landscapes, special management zones, etc. posted for customers? | | | ✓ |
| 5 | Environmental goals, objectives, issues, projects, and progress are evaluated at least annually and are regularly communicated to employees, customers, management, and the local community? | | ✓ | |
| 6 | Are written records of water quality monitoring activities, results, and control measures readily available? | ✓ | | |
| 7 | Is there an inventory of bird and mammal species documented, maintained, and readily available? | ✓ | | |
| 8 | Is there a general understanding of how course management practices may positively enhance or adversely impact wildlife species and their habitats? | ✓ | | |
| 9 | Are the environmental impacts of pest control measures such as leaching and runoff potential, toxicity to non-target organisms, soil absorption capacity, pesticide persistence, water solubility, and effects on soil microorganisms and non-target species considered as part of the course management planning process? | ✓ | | |
| 10 | Are records of pest treatments employed and their effectiveness maintained and used to guide future pest control decisions? | ✓ | | |
| | Point totals for each column | 6 | 3 | 1 |

Safety, Training, & Awareness

U.S. Air Force GEM program goals

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



Hard hats are required of all course maintenance employees.



Locked, labeled, and fenced...adequate? Surprisingly not!

Observations

- Expanded training for all employees a must to completely realize GEM goals
- Ensure employee's health is prime consideration
- 620 ± coconut palms must be pruned twice annually to remove fruits to protect customers and players at a cost of \$24 each
- Consider using AFCEE for on-site golf course environmental management training
- Business tempo and training scheduling makes it difficult to involve much of the staff at one time

| Safety, Training, & Awareness | | | | |
|--|---|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | All employees are familiar with the GEM Plan and are trained regularly on the importance of environmental performance and compliance with the goals and objectives of the program? | | ✓ | |
| 2 | All appropriate employees are trained to be familiar with USAF, federal, state, and OSHA regulations that apply to storage and handling of chemicals used on the property? | ✓ | | |
| 3 | All employees are aware that chemical manufacturing, use, storage, and disposal may pose risks to human health and the environment? | ✓ | | |
| 4 | All employees are trained to understand that poor management practices may adversely impact worker health, on- and off-site water quality, local soil health, and wildlife species and their habitats? | ✓ | | |
| 5 | A current copy of all Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property is maintained and readily available for use by employees? | ✓ | | |
| 6 | Chemical applicators are encouraged to apply for continuing education programs and receive regular training to maintain currency? | ✓ | | |
| 7 | Are all golf course pesticide applicators active participants in the local respiratory and pulmonary function testing program? | ✓ | | |
| 8 | Pesticides, fertilizers, and other chemicals are stored on plastic or metal shelving? | ✓ | | |
| 9 | Are golfers notified in the pro shop and on the first and tenth tees about the day's planned or recently completed spraying of any chemical or fertilizer that may be hazardous to human health and safety? | | ✓ | |
| 10 | Are key staff members trained regarding water quality and conservation issues? | ✓ | | |
| | Point totals for each column - Response percentage | 8 | 2 | 0 |

Compliance

U.S. Air Force GEM program goals

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



Cart barn battery storage area is well signed.



Mamala Bay's fuel tanks and containment are exemplary.

Observations

- Assemble all documents in one place
- Do more than what is required
- Inconsistent interpretations of compliance actions among installation, MAJCOM, and ESOHCAMP evaluators confuses and confounds
- Continue building relationship with installation environmental and engineering staff

| Compliance | | | | |
|-------------------|--|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | Is fuel storage/delivery managed in accordance with federal, state, and local regulations? | ✓ | | |
| 2 | Are installation environmental staff members included in on-going course management discussions and plans at regularly scheduled meetings? | ✓ | | |
| 3 | Are there regularly scheduled staff meetings to discuss environmental management issues? | ✓ | | |
| 4 | Does the director of golf and the superintendent attend ECAMP in-briefings and out-briefings? | ✓ | | |
| 5 | Does the director of golf and/or the superintendent coordinate with installation environmental staff on the various management plans that affect or include the golf course? | ✓ | | |
| 6 | Have all necessary permits been updated and their requirements satisfied in a timely manner? | ✓ | | |
| 7 | Has appropriate impact analysis (NEPA) been performed on all proposed actions on or affecting the golf course property? | ✓ | | |
| 8 | Are containers used to store used oil in good condition, not leaking, and clearly labeled? | ✓ | | |
| 9 | Are oil/water separators operating properly and correctly maintained? | ✓ | | |
| 10 | Are projects planned and funded for the next year that would increase the compatibility of the course's management methods with the environment? | | ✓ | |
| | Point totals for each column - Response percentage | 9 | 1 | 0 |

Pesticide Use, Storage, & Handling

U.S. Air Force GEM program goals

- Ensure that all chemicals will be used, stored, and handled in appropriate manner at all times
- Compile and utilize an Integrated Pest Management approach to caring for the entire golf facility
- Licensed pest applicators will be strongly encouraged to attend personal safety training and health monitoring programs



Quality storage for pesticides and fertilizers is standard.



We love signs on military installations!

Observations

- Appropriate storage organizational protocols observed
- Written pest management plan one of the few actually observed
- Complete understanding of the ramifications of borderline unnecessary pesticide applications
- ESOHCAMP findings quickly being satisfied to once again reach full compliance

| Pesticide Use, Storage, & Handling | | | | |
|---|--|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | Are there trained scouts on staff other than the superintendent to monitor turf and plant health and pest populations using scouting forms to record the type, severity, location, and treatment of pest problems and organized into a report or guide so that they can be used for future pest control solutions? | ✓ | | |
| 2 | Are there written pest profiles of common pest species with a variety of potential control measures pre-evaluated including alterations in cultural management, biological, physical, and mechanical controls prior to treating the problem on the course? | ✓ | | |
| 3 | Are there established and documented aesthetic and functional thresholds for all managed areas to effectively manage pest populations and reduce chemical use? | | ✓ | |
| 4 | Is there a specially designed pesticide mixing area where all mixing occurs by only trained personnel? | ✓ | | |
| 5 | Has a list of pesticides and other chemicals stored or used at the golf facility been provided to the appropriate Fire Department(s)? | | ✓ | |
| 6 | Is there a written Integrated Pest Management Plan readily available and updated regularly in use at the facility? | | ✓ | |
| 7 | Are food storage and prep areas properly cleaned to reduce the likelihood of pest infestations and required pesticide applications? | ✓ | | |
| 8 | Are scouting forms collected, processed, and mapped to aid decisions for control? | | | ✓ |
| 9 | Are written and readily available records maintained of all applications of pesticides made by certified applicators, including the following? <ul style="list-style-type: none"> - the quantity of each pesticide used - the chemical or common name of the active pesticidal ingredient(s) (not the product name) - the pest or purpose for which the pesticide was applied - the date and place of application | ✓ | | |
| 10 | Is the chemical storage structure/area locked, well-ventilated, fire proof, and access is limited to select personnel? | ✓ | | |
| | Point totals for each column - Response percentage | 6 | 3 | 1 |

Pollution Prevention

U.S. Air Force GEM program goals

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



Cart wash area could use some improvements.



The reef runway lagoon is within area of influence from golf course pesticide or fertilizer runoff.

Observations

- Further reduce solid waste streams from clubhouse and maintenance operations
- Increase the use of slow release fertilizers
- Regularly provide training for all employees on the specifics of pollution prevention and how they can help
- Consider covering fueling area
- New oil/water separator scheduled for purchase and installation FY05

| Pollution Prevention | | | | |
|---|--|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | Are there designated "no-mow" areas and established "no spray zones" and buffer areas around pond, river, stream, or lake edges and have they been communicated to mower operators and technicians? | | ✓ | |
| 2 | A spill containment kit is readily available and spill containment procedures are in place? | ✓ | | |
| 3 | Does the chemical storage area have a sealed metal or concrete floor and are all pesticides handled over an impermeable surface? | ✓ | | |
| 4 | Does the chemical storage area have a lip along the edges to contain spills? | ✓ | | |
| 5 | Are liquid products stored below dry products and are dry materials stored on pallets or shelves to keep them off the floor? | ✓ | | |
| 6 | Has the Installation Spill Plan been amended to include the golf course facility? | ✓ | | |
| 7 | Are grass clippings blown off equipment with compressed air instead of or prior to washing? | | ✓ | |
| 8 | Are gasoline, motor oil, brake and transmission fluid, solvents, and other chemicals used to operate or maintain equipment and vehicles prevented from directly or indirectly entering water bodies? | ✓ | | |
| 9 | Does the fuel storage and delivery area comply with local, state, and federal regulations? | ✓ | | |
| 10 | Are slow-release fertilizers used to reduce the negative potential for runoff? | | ✓ | |
| Point totals for each column - Response percentage | | 7 | 3 | 0 |

Conservation Practices

U.S. Air Force GEM program goals

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



Water resources must be protected through sensitive management practices and long term planning.



Although shy by nature, mongooses can be observed during a round.

Observations

- Although only two federally listed animal species have actually been observed on the installation, familiarize the staff with practices and procedures just in case...
- Consider initiating a native tree planting program on the course property
- Continue building relationships with installation natural resources manager and other environmental professionals
- Provide detailed input to the next update of installation integrated natural resources management plan (INRMP)

| Conservation Practices | | | | |
|---|--|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | Are all motorized golf course equipment checked regularly for excessive air polluting emissions? | | | ✓ |
| 2 | Are there designated non-maintained or minimally maintained buffers around core wildlife habitats? | ✓ | | |
| 3 | Has the irrigation system or its components recently been upgraded to reduce inefficiency, malfunction, and overall water use? | ✓ | | |
| 4 | Has all "non-target" irrigation (ponds, out of play areas, etc.) been eliminated or minimized? | ✓ | | |
| 5 | Have flow meters been installed to monitor water use and detect potential waste? | ✓ | | |
| 6 | Has the property been examined for critical habitats, threatened or endangered species, wetlands, and floodplains? | ✓ | | |
| 7 | Are employees encouraged to minimize their trips around the course to conserve on the use of fossil fuels? | ✓ | | |
| 8 | Does the snack bar utilize reusable plates and silverware for use by customers throughout the facility's operating hours? | | ✓ | |
| 9 | Have all potential wildlife habitats and their maintenance practices been coordinated with the installation BASH officer and environmental management personnel? | ✓ | | |
| 10 | Are recycling containers conveniently provided for customer and employee use throughout the golf course facility? | ✓ | | |
| Point totals for each column - Response percentage | | 8 | 1 | 1 |

Water Resources

U.S. Air Force GEM program goals

- Minimize or eliminate potentially negative environmental impacts to all on- or off-site water resources
- Preserve water resources by using only those quantities required to maintain quality playing surfaces
- Ensure that any maintenance practices on or near water features are coordinated with appropriate personnel prior to taking action



The Pacific Ocean is never far away and is susceptible to impacts.



Monitoring water quality operations at the Mamala Bay Golf Course.

Observations

- Begin planning for utilizing recycled water for irrigation purposes if or when it becomes available
- Evaluate irrigation scheduling to minimize potential waste
- Consult with installation environmental staff on how to further protect water quality in the few features on the course

| Water Resources | | | | |
|---|--|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | Are water features regularly monitored for algae, erosion, excessive aquatic plant growth, fish kills, and sedimentation? | ✓ | | |
| 2 | Wash and wastewater is kept from making direct contact with surface water and is recycled or allowed to filter through a vegetative area when cleaning and maintaining equipment? | ✓ | | |
| 3 | Outdoor irrigation of non-golf course areas and indoor plumbing are regularly monitored and maintained for leaks? | ✓ | | |
| 4 | Has the golf course staff been provided with stormwater management planning requirements from the installation's environmental staff? | | ✓ | |
| 5 | Have part circle irrigation heads been installed where possible to preserve water resources and reduce maintenance while minimizing potential negative impacts to surrounding natural areas? | ✓ | | |
| 6 | Are all water feature maintenance tasks coordinated with the installation natural resource manager and bird/wildlife aircraft strike hazard officer? | ✓ | | |
| 7 | Has the irrigation system been completely checked for proper water distribution in all irrigated areas and are water leaks fixed in a timely manner? | ✓ | | |
| 8 | Are the parking lots for customers and employees at least partially constructed with permeable surfaces and are they drained through an area of turfgrass or vegetation prior to discharge into a water feature? | ✓ | | |
| 9 | Does the facility have a Drought Management Plan written, ready, and available when, or if, irrigation restrictions may be instituted? | | | ✓ |
| 10 | Are water quality problems immediately reported to supervisors or regulatory agencies (if required) for appropriate action? | ✓ | | |
| Point totals for each column - Response percentage | | 8 | 1 | 1 |

Maintenance Practices

U.S. Air Force GEM program goals

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



Excellent maintenance includes the seemingly minor details.



Coconut palms convey Hawaiian style but come with a high price.

Observations

- Continue aggressively training and involving rest of staff on integrated pest management procedures
- Best maintenance plan and overall organization yet observed at a U. S. Air Force golf course
- Increase number of trained scouts on the maintenance staff
- Goosegrass, smutgrass, lovegrass, Hilo grass, and crabgrass are the primary weed species
- Melting out, pythium, curvularia, and Bermudagrass decline are the primary turfgrass diseases

| Maintenance Practices | | | | |
|---|---|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | Is contour mowing used to conserve fuel and increase playability and aesthetics? | ✓ | | |
| 2 | Are there designated non-maintained or minimally maintained buffers around core wildlife habitats? | ✓ | | |
| 3 | Are green, tee, and fairway mowing heights maintained at reasonable levels without continually stressing turf or maximizing chemical inputs? | ✓ | | |
| 4 | Are there regular procedures in place to continually improve soil health such as organic amendments, aeration, and drainage? | ✓ | | |
| 5 | Is there a map of the course's "hot spots" requiring special care or regular attention? | | | ✓ |
| 6 | Is all maintenance equipment maintained and cleaned in a manner that eliminates the potential for spreading of contamination? | ✓ | | |
| 7 | Has there been a complete examination for potential negative environmental impacts of all aspects of the operation including snack bar/grill, clubhouse, pro shop, and maintenance complex? | | ✓ | |
| 8 | Are green, tee, and fairway mowing heights maintained at reasonable levels without excessively stressing turf? | ✓ | | |
| 9 | Have all playing surfaces been inventoried and mapped for soil types including soil structure, nutrient levels, organic content, compaction, and water infiltration? | ✓ | | |
| 10 | Are soil tests and plant tissue analysis used to determine nutritional requirements? | ✓ | | |
| Point totals for each column - Response percentage | | 8 | 1 | 1 |

Customer Relations & Education

U.S. Air Force GEM program goals

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



Hickam AFBs youth are important at Mamala Bay.



There seems to be no limit to the amount of information important to customers. Keeping the information current is the real challenge.

Observations

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

| Customer Relations & Education | | | | |
|---|---|------------|----------------|-----------|
| # | Environmental Compatibility Indicator | Yes | Partial | No |
| 1 | Are the course manager and superintendent involved in a long-term customer educational program that is regularly updated and documented? | ✓ | | |
| 2 | Is there a conveniently located and highly visible place at the course or clubhouse where golf course environmental management notices and informational messages are regularly posted? | ✓ | | |
| 3 | Do the course manager and superintendent actively communicate with customers to determine and document their points of view? | ✓ | | |
| 4 | Is there active and regular communication with the Golf Council, Civil Engineering, Environmental Management, the Services manager, and commanders by course management? | ✓ | | |
| 5 | Are there warning signs posted near parking lots to make highly sensitive individuals aware of the potential danger to their health and are all state posting requirements being met? | | | ✓ |
| 6 | Is there consistent and attractive signage around the course and grounds that would increase the awareness of the average golfer to the environmental management practices employed? | | ✓ | |
| 7 | Are there signs appropriately located to warn golfers of hazards when drinking reclaimed or otherwise non-potable water? | ✓ | | |
| 8 | Are there interpretive signs posted to highlight key habitats or have appropriate areas been designated "Environmentally Sensitive Zones" per USGA rules? | | | ✓ |
| 9 | Are course staff members trained regularly on how to improve their dealings with customers? | ✓ | | |
| 10 | Are there clinics provided to teach beginning golfers the basics of the game and to teach all levels of golfers the rules of the game? | ✓ | | |
| | Point totals for each column | 7 | 1 | 2 |

Miscellaneous Special Projects & Activities

U.S. Air Force GEM program goals

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



Expand on youth program to capture teens and high schoolers.



Plant only those tree varieties that are hardy natives with demonstrated long life spans and minimum litter in carefully considered locations.

Observations

- Conduct field trips at the course for local school children
- Initiate Earth Day environmental awareness golf tournament
- Educate customers about the benefits of an environmentally friendly golf course
- Continue to demonstrate Mamala Bay's dedication to "growing" the great game of golf to young airmen, other installation non-golfers, and youth

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

ECQ Summary

| # | Environmental Compatibility Quotient Category | Yes | Partial | No |
|----|---|-----------|-----------|-----------|
| 1 | Overall Management Philosophy & Documentation | 6 | 3 | 1 |
| 2 | Safety, Training, & Awareness | 8 | 2 | 0 |
| 3 | Compliance | 9 | 1 | 0 |
| 4 | Pesticide Use, Storage, & Handling | 6 | 3 | 1 |
| 5 | Pollution Prevention | 7 | 3 | 0 |
| 6 | Conservation Practices | 8 | 1 | 1 |
| 7 | Water Resources | 8 | 1 | 1 |
| 8 | Maintenance Practices | 8 | 1 | 1 |
| 9 | Customer Relations and Education | 7 | 1 | 2 |
| 10 | Miscellaneous Special Projects & Activities | 5 | 1 | 4 |
| | Composite points & response percentage | 72 | 17 | 11 |

GCEBA Results

Σ Mamala Bay Golf Course, Hickam AFB, HI

- Actual ECQ (# of “Yes”) = 72 “Early stages”

- Potential ECQ (Actual ECQ plus “Partial”) = 89 “Getting there”

Conclusion

Overall, the golfing experience at Hickam AFBs Mamala Bay Golf Course is a highly rewarding and extremely enjoyable one well worth investing the necessary time and money. It is amazing what a well-trained and friendly staff can produce armed with an innate, seemingly burning desire to provide the finest recreational value to their customers.

The course itself is a fine collection of golf holes with enough diversity to keep the regular recreational golfer happy while challenging enough for the tournament player to test their games. All in all, Mamala Bay Golf Course staff will be tested in the future by the several identified environmental challenges. There is not much need for worry though, as far as U. S. Air Force golf course staffs are concerned, Hickam AFB is in good hands.

Areas needing improvement

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

- Miscellaneous Special Projects & Activities

The gallery

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



Unique clubhouse occupies the highest point on the property.



Pruning is a good thing unless taken to unhealthy, unnatural extremes.



The culmination of the outgoing nine begins with this tee shot.



Driving range ball machines are housed in a typical Air Force facility.



This practice putting green is nearby the short game area and range.



The 12th tee is beginning to show a little wear and tear.



Breakfast on the patio can hardly be beat!



Tee box improvements are starting to pay off.



The 18th features the only blind shot on the course.



Cart traffic and shade hinder turf quality near this path.

Environmental challenges

One of the important results of the GCEBA process is the identification of significant issues or challenges that should be addressed in the long term GEM Planning process. Ideally, the golf staff will address each issue from the best way to satisfy the goals of the golf facility and acceptable levels of course playability and customer satisfaction. The golf staff's preferred management approach for these issues should then be coordinated with the installation's environmental staff for refinement, coordination, and approval.

The GEM Plan would then consist of the environmental challenges, the approach to their management, a map showing where these challenges occur on the golf course, a booklet that describes the mapped challenges, goals and objectives for future years, and a set of best management practices.

The following environmental challenges were identified during the GCEBA process at Mamala Bay Golf Course, Hickam AFB, HI:

- Installation Restoration Program (IRP)
- Water quality management
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Invasive exotics
- Archaeological
- Proposed new clubhouse



It is truly hard to imagine that this was what the site looked like prior to construction back in 1964.

INSTALLATION RESTORATION PROJECT (IRP)

There are two IRP sites on or near the golf course. The first site is SS24, located nearby the maintenance complex but outside of the golf course property, where petroleum and other compounds have been found. Scheduled completion of the project is set for December 2018.

The primary environmental challenge for the facility and maybe the installation is the Tri-Services Landfill or LF05. This is the historical landfill upon which the golf course and especially the clubhouse was constructed back in the mid-1960s. Comprising an area of approximately 51 acres, the former landfill site

is currently being investigated. An assessment was conducted to determine the risks for maintenance workers or construction and excavation workers, indoor workers in potential future buildings on the site, and recreational users of the Manuwai Canal waters nearby. The assessments show that the risks are at or above levels set by the Environmental Protection Agency for both the excavation and construction workers and the indoor workers.

The U. S. Air Force has determined that there are approximately 1 million cubic yards of landfill materials buried beneath a thin and sometimes absent soil layer. Unfortunately, the landfill contains contaminants such as solvents, arsenic, lead, PAHs, and dioxins. Two separate groundwater areas under the landfill also are contaminated. A Feasibility Study is currently being prepared to evaluate the potential alternatives to remedy the situation. December 2012 is the estimated date for completion of the cleanup of the former Tri-Services Landfill LF05.

WATER QUALITY MANAGEMENT

Obviously closely related to the prior challenge, the management of the quality of surface and ground waters at Hickam AFB is not only a matter of regulatory significance, but maybe the key to the long term success of the installation. Canals over the years have been created to handle stormwater course through portions of the course. Management of the banks of these is sound. Sandy beaches come into play on just a few holes and significant stands of vegetation have been allowed to populate these areas in most cases protecting these valuable resources.



Monitoring water quality nearby landfill is a continual process.



One of the few Mamala Bay water features outside of the Big Pond.

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

There are few of the open water features on Mamala Bay Golf Course that traditionally attract birds and wildlife and threaten the safety of Hickam AFB's flying operations. According to the INRMP, BASH control is required in runway areas. Unfortunately, many of these birds frequent the golf course property foraging for food. The cattle egret is so successful in gaining numbers that at times humanely imposed controls are necessary to reduce their populations to a safer level for the operation of the airfield. The golf staff should be aware of this issue and their role in the installation's efforts. One way is to consult with the local BASH officer prior to any significant changes in management procedures for course water features.



Cattle egrets represent one of the biggest BASH threats at Hickam.



Several tree species at Mamala Bay can be classified as invasive.

INVASIVE EXOTICS

The state of Hawaii has undertaken an aggressive program to remove or at least stem the negative influence of invasive exotics, or alien species, on the islands natives. Although the INRMP states that there are no natural ecosystems remaining on Hickam AFB due to the impacts of man, the Mamala Bay staff should contribute to the state's program when selecting plants to install at their facility. One of the existing tree species at the course that is on the state's hit list is the ironwood or Australian pine (*Casuarina*). Consult with installation environmental staff to determine acceptable plant material and make a selection from that list.

ARCHAEOLOGICAL

According to the installation archaeological expert, Section 106 consultation in compliance with the National Historical Properties Act still needs to be completed for the golf course property. Any plans for work need to obtain proper concurrence or an archaeological survey or monitoring through consultation with the installation archaeologist. A much anticipated Programmatic Agreement with the state of Hawaii is stalled at the state level. Although this issue does not directly affect daily operation of the course, it probably will have significant impacts on any major improvements such as a new clubhouse. At the very least, costs may be inflated for development on the golf course property.



This may be the type of subgrade existing under the clubhouse.

PROPOSED NEW CLUBHOUSE

The existing clubhouse is serviceable and attractive in its own way. Designed with an obvious affection for the “islands”, the architectural style seems to fit the locale, especially for visitors from the mainland. Constructed sometime in the 1970s, the facility is beginning to show its age. Hickam AFB services personnel, commanders, and most especially, Director of Golf Tom Stanfill feel it is time to begin the process of replacing the worn structures. Unfortunately, a huge hurdle must be cleared prior to the dreams begin to reach fruition. The current clubhouse was purposely constructed atop a large pile of miscellaneous trash that had been deposited in the landfill during the 1950s and 1960s. There are a wide variety of impacts to the eventual project due to the Installation Restoration Project site LF05 as the old landfill has been designated to at least cause severe consternation among proponents of the new facility and predictable head shaking among the Hickam AFB environmental personnel. Ultimately, the entire project may be in jeopardy. Only time will tell.

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Or visit our Golf Course Environmental Management Program webpage:
<http://www.afcee.brooks.af.mil/ec/golf/>