

GOLF DEVELOPMENT STRATEGY FOR MAURITIUS

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4TH DECEMBER 2002



S U S T A I N A B L E G O L F D E V E L O P M E N T S

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SUSTAINABLE GOLF DEVELOPMENTS

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EXECUTIVE SUMMARY

This study has been commissioned by the Ministry of Tourism of Mauritius to assess the potential for golf development on the island and to review current project proposals within the context of a sustainable golf-development strategy.

1 The market potential for golf in Mauritius

Even at present levels, Mauritius can already be considered a golf destination, although golf rarely represents the primary purpose of travel for visitors to the island. Golf is also an important add-on tourism product.

There is potential to develop this market further, attracting larger numbers of high-end golfers to Mauritius, by concentrating on the proven markets for couples and groups of couples. This needs to be based around a strategic vision that includes a diversified range of products and greater accessibility. For Mauritius to establish itself as a competitive golf destination, the emphasis must be on golf course quality; in terms of playing quality, services, choice and environmental compatibility.

The fairway frontage real-estate resort model used in many other parts of the world is becoming outmoded and may not be appropriate for new destinations trying to break into the serious long-haul golf-tourism market. Moreover, such schemes do not fit so well with environmental imperatives. Golf, not housing, is likely to be the driving force for attracting visitors.

Business plans submitted to-date generally over-estimate golf course revenue based on optimistic green fee income. In addition there is little evidence to support future housing sales to foreign nationals in the quantities required to sustain all submitted proposals. No golf course should be built solely on the expectations of real estate sales.

Long-term management costs need to be realistically evaluated. Golf courses cannot be moth-balled if demand slackens for a period. To maintain consistently high standards requires continual management effort backed by appropriate resources.

2 Sustainable Golf Development

All indicators suggest that to proceed with the 12 current project proposals (14 x 18 hole golf courses) in their present form and within a short time scale (2-5 years) would be economically unsustainable. While golf courses are certainly capable of offering viable, high quality tourism development and integrating environmental protection and enhancement measures, over-development will ruin the special ambience that gives Mauritius its unique appeal. In all cases a detailed revision of the concept/master plans is necessary.

Business plans and intensity of development need to relate to a more realistic view of the golf tourism market potential, both short and long-term. Mauritius already has a reputation for excellence among the golf tourism industry. It would be more difficult to break out of this and create new products than if one was starting from scratch. Maintaining a high quality reputation is essential – any below standard facility could seriously undermine the future market, especially at this early stage in the golf sector's development on the island. The fewer the number of golf courses on the island the greater the detrimental effect of sub standard courses.

Quality is not simply a question of unlimited luxurious developments based around a standard formula. More emphasis must be placed on site-specific environmental quality, the potential for environmental enhancement opportunities, and socio-environmental concerns: notably water resources, landscape, biodiversity, public access to the coast and employment opportunities.

To achieve the required distinctiveness and to maximise socio-environmental benefits, the area allocated for each golf course should be generous. A standard 18 hole golf course, driving range and club house facilities should occupy a minimum surface area of 75 hectares and preferably nearer 100 ha., in which about one third is golf playing area, one third transition zone and one third natural area. Given the number of courses to be built, the size of land ownerships and changes in land use policy on the island, the issue of land take for golf should not be problematic.

3 Key criteria for selecting golf course development sites

The safest course of action, designed to avoid economic failure down the line, would be to gradually increase the golf tourism market by adding golf resort facilities near to existing courses or adjacent to well established tourism destinations within the island.

Priority should, be given to sites offering the greatest potential for creating outstanding, 'Sustainable Golf Courses' – based on location, topography, site area, internal and external landscape quality, golf course ecology, water availability and social compatibility.

In applying these criteria, it is likely that appropriate golf development sites could well be found in inland locations. This should be encouraged, in line with government policy to take development pressure off the coastal zone.

Contrary to popular and received wisdom, golf courses are generally an environmentally compatible land use. The use of agro-chemicals and water consumption compare favourably with agricultural use. Well-managed, established turfgrass is an effective 'bio-filter', breaking down nutrients and pesticides before they can leach into groundwater systems. The principal threats to the lagoon and coastal environment are over-development of associated tourism infrastructure and activities, not the physical presence of well designed, constructed and maintained golf courses.

Strong emphasis is placed on an effective Environmental Impact Assessment process, whereby golf courses and all associated project development proposals are thoroughly researched and evaluated. As golf courses entail special environmental considerations, there needs to be more detailed guidance both for the project proponent and their environmental consultants, and for the receiving authorities (the EIA Committee) to facilitate interpretation of the studies.

4 Site recommendations

Although Mauritius is a small island, the classic cluster model for golf destinations still applies. It is best to have a number of courses reasonably in proximity of each other. Three 'mini-clusters' can be envisaged:

1. East (Flacq)– existing cluster with Belle Mare Old and New, plus Ile aux Cerfs.
2. South-west (Black River and Savanne) – existing Le Morne Paradis, plus potential for stand alone, high quality scenic golf courses.
3. North-west (Pamplemousses) – to supplement existing hotel resorts between Port Louis and Grande Baie.

The central part of the island would equally be appropriate for such developments due to high water availability/rainfall, availability of land and the very low pressure on the coastline.

To achieve an optimum number of golf courses on Mauritius, two phases of development are proposed.

Phase 1: Sites most likely to sustain new golf courses based around existing tourist accommodation centres. A maximum of four golf courses to be located within the above clusters. Additionally, a fifth, 'stand alone' project of exceptional environmental and golfing quality outside these areas could be encouraged. The latter would be likely to achieve viability over a longer time frame but could serve as a flagship project to represent the new image of golf in Mauritius.

Phase 2: Additional projects in response to market demand. Projects that meet the criteria of the golf development strategy can be brought on-line once the demand starts to catch up with the supply generated by the completion of Phase 1 development. Phase 2 developments should be triggered ahead of the time at which demand catches up with supply provided by the Phase 1 projects.

A general recommendation would be to commence Phase 2 approvals once annual rounds played across all eight established courses (i.e. pre-existing and Phase 1 courses) reaches a total of 180,000 rounds, or when six out of the eight 18-hole courses reach 70% capacity.

5 Support structures.

Given the strategic importance of establishing the right kind of golf-tourism product in Mauritius, the government will need to be proactive in facilitating an orderly sequence of projects and in providing back up services. Key recommendations include:

- ❑ Encouraging greater flexibility and accessibility between resort facilities, so that new golf courses can draw customers from existing hotels.
- ❑ Ensuring a consistent, transparent and streamlined planning process. Allied to this, there needs to be better coordination between ministries and recourse to qualified expertise in the relevant disciplines. Permissions should be time limited.
- ❑ Providing and enforcing golf-specific guidelines for Environmental Impact Assessment procedures and provision for post-EIA implementation monitoring. EIAs need to be more effective and analytical.

- ❑ Establishing agronomic research programmes:
 - Testing local adaptation of turfgrass cultivars
 - Developing local turfgrass management techniques
 - Monitoring impacts on the lagoon from leaching and run-off of treated wastewater as well as agrochemicals used for the irrigation of golf courses.
- ❑ Establishing education programmes for greenkeeping staff and other golf course related trades. To support the growth of the golf sector in Mauritius there will need to be investment in training and continual professional development, aimed in particular at the Mauritian workforce.

There are some excellent opportunities to use this new form of development to work in partnership with conservation efforts on key endemic species. Habitat restoration, predator management and release programmes for the Mauritius Pink Pigeon and native song birds could readily be incorporated into golf course management programmes. Not only would this be of significant environmental benefit but it could represent an important marketing tool and added attraction for visitors.

Next Steps

- ❑ National Sustainable Golf Development Workshop

To present the Golf Development Strategy, to study its implications and to discuss technical issues and means of implementation. The target audience should include government officers, NGO's, environmental consultants, agronomists, developers, landowners, investors, tourism operators, estate agents, and resort planners.
- ❑ Sustainable Golf Pilot Project

Adopting one or more of the Phase 1 projects as a case study to gain experience and establish a data bank on technical issues specific to Mauritius, including golf-related environmental integration and restoration. This will require full support from the project development team and constructive participation from the planning authorities and other relevant agencies, plus expert input from golf-development and environmental specialists.
- ❑ Monitoring

Consistent and objective monitoring of progress of supply and demand is recommended. This will enable the subsequent pace of the development strategy to be adjusted accordingly
- ❑ A Golf Tourism Marketing Strategy

This should be developed for the island no later than 18 months prior to the opening of the new Phase 1 courses.

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INTRODUCTION AND TERMS OF REFERENCE

This report has been commissioned by the Ministry of Tourism of Mauritius to evaluate current golf project proposals, and to elaborate a strategy for sustainable golf development on the island. The study has been carried out by a team of four independent golf sector specialists working together under the group title of *Sustainable Golf Developments*.

- ❑ Jeremy Pern Golf Course Architect, Toulouse, France
- ❑ Paolo Croce Turfgrass agronomist, Turin, Italy
- ❑ David Stubbs Environmental consultant, London, UK
- ❑ Peter Walton Golf Tourism specialist, London, UK

Additional input from local and regional environmental specialists has been provided by Vassen Kauppaymuthoo (Delphinium Consultants, Environment and Oceanography Impact Assessment specialists, Mauritius) and Dr. Ted Avis (Coastal Environmental Services, RSA)

This report is based on the findings of the consulting team during a 10 day visit to Mauritius in September 2002. During this period all main existing golf courses, all those under construction and all current project sites have been visited. In total this amounted to:

- ❑ Existing operational 18-hole courses: Belle Mare Legend, Le Paradis and Gymkhana
- ❑ Existing operational 9-hole courses: St Geran, Trou aux Biches, Maritim [The facility at Shandrani Hotel was not visited]
- ❑ Courses under construction: Belle Mare Links and Ile aux Cerfs
- ❑ New project sites: Wolmar; Le Morne; Bel Ombre; Domaine du Chasseur; Roches Noire; Mont Choisy; Massilia; Balaclava; Les Salines; Beau Rivage; Beau Champ; Bel Air

Each visit included meetings with managers or representatives of the project developers and site inspections. A detailed questionnaire, split into three sections - existing courses, new developments, and tourism data - was pre-circulated to the relevant stakeholders. Technical data and reports have been gathered from a variety of sources and meetings and/or telephone interviews were held with the following organisations:

- ❑ Ministry of Agriculture and Natural Resources
- ❑ Forestry Department of the Ministry of Agriculture and Natural Resources
- ❑ Ministry of Environment
- ❑ Ministry of Housing and Lands – including NPDP consulting team
- ❑ Central Water Authority
- ❑ Water Research Unit Water Resources Unit of the Ministry of Public Utilities
- ❑ Irrigation Authority
- ❑ Waste Water Authority Wastewater Management Authority
- ❑ Mauritius Sugar Industry Research Institute
- ❑ Mauritius Sugar Authority
- ❑ Mauritius Wildlife Foundation
- ❑ Specialist Golf Tour Operators

A general inspection of some inland areas and visits to native vegetation restoration projects within the Black River Gorges National Park and Ile aux Aigrettes Nature Reserve was carried out on 15 September.

The main report is structured according to the five objectives within the Terms of Reference. Substantial additional material and guidelines are appended.

EXTRACTS FROM THE TERMS OF REFERENCE

OBJECTIVE

The main objective of the study will be to provide decision-makers with guidance on:

- 1 Whether Mauritius could compete as a golf tourism destination or whether golfing should be an add-on to the Tourism product.*
- 2 The future golf map of Mauritius*
- 3 The optimal and sustainable number of golf courses and their distribution on the island taking into consideration the profile and characteristics and needs of the market*
- 4 The general impacts of golf courses on the environment particularly in terms of conflicting land use resources, water requirements, use of fertilisers and pesticides, percolation into the aquifer and lagoons, level of risks and loss of fauna and flora.*
- 5 Means of achieving sound environmental performance and practices for golf in Mauritius, taking into account the specific and ecological fragility of the country.*

SCOPE

The consultant shall appraise new applications and take stock of the present situation and identify if necessary, alternative potential sites for golf course development after having inter alia assessed:

- 1 The conflicting land use and the demand placed in limited land resource.*
- 2 The impact of the alteration of land uses in respect to changes to habitats plant diversity and flora and fauna.*
- 3 The impact and desirability of landform changes and subsequent damage patterns.*
- 4 The impact of atmosphere and noise pollution from vehicles and spraying.*
- 5 The overall impact of the proposed development especially in relation to economic and social incidences such as investments, returns, direct, indirect and induced job creation.*
- 6 The market potential for golf.*
- 7 The impacts on water resources availability*
- 8 The risks of infiltration of fertilisers and pesticides, the possible environmental implications on the surrounding lagoons, and impacts on the marine environment and ground water.*

The consultant shall:

- 1 Effect site inspections on proposed and potential locations, especially with regard to present use and nature of soil.*
- 2 Carry out a detailed analysis of each site in respect of present land use, nature and composition of soil and lost opportunities.*
- 3 Take into account the regional and international context and trends on commerce and trade and their impacts on the Mauritian economy.*
- 4 Assess the economic, environmental and social impacts of a potential golf course on the proposed site and make recommendations for the mitigation of negative impacts, if any. The consultant shall pay particular attention to the impacts generated by the use of fertilisers and pesticides on the underground water table through leaching and percolation and run off in the lagoon.*
- 5 Study the demand for water requirements for future golf development on each site and make recommendations on ways of meeting such demand.*
- 6 Make recommendations on the number of golf courses Mauritius can sustain, their locations and the extent of land required.*
- 7 Propose a management plan to achieve a sound environmental performance for golf in Mauritius including stipulation on factors such as water and chemical use, the management of greens, greenkeeper training and management.*

1 WHETHER MAURITIUS COULD COMPETE AS A GOLF TOURISM DESTINATION OR WHETHER GOLFING SHOULD BE AN ADD-ON TO THE TOURISM PRODUCT.

1.1 Golf Tourism Definitions

The following interpretations and definitions have been employed in this report:

- 1) A tourism “**add-on**” in this context is defined as being “*a product or service that does not by itself generate incremental tourist arrivals to Mauritius*”.
 - a. An add-on will usually generate “**direct incremental tourism revenue**” via the “sale price” of the product or service – in the case of golf, this direct revenue relates to a) green fees, b) food & beverage sales, c) trolley, buggy and caddy hire, and d) merchandise and souvenir sales.
 - b. An add-on may also generate “**indirect incremental tourism revenue**”. Golf often achieves this by increasing the length of stay of a visitor. It is common for a round of golf to absorb 5-7 hours of a visitor’s day once transfer times, checking in, changing, and the “19th hole” are taken into account. For time and energy reasons golf is therefore seldom combined with other half-day excursions or activities. Tourists playing golf as an add-on occasionally allow more time for their visit and stay longer than would otherwise be the case. This is particularly true in the meetings and incentive market.
- 2) The term “**golf destination**” in this context describes a holiday destination where the presence of one or more golf courses leads directly to additional tourist arrivals – visitors who would otherwise not choose to visit Mauritius.
- 3) One further important concept needs to be considered: “**primary purpose of travel**”. If the result of this survey indicates that Mauritius is a “golf destination” as defined above, does the golf on the island represent the primary purpose of travel for these additional tourist arrivals? In other words did these tourists select Mauritius above other destinations primarily because of the golf product on the island?

1.2 Defining the Existing Golf Product in Mauritius

Before predicting the future golf tourism status of Mauritius, the status of its existing golf product must be ascertained. Information relevant to this question is provided at the end of paragraph 1.2. (see Existing Golf Product - Tourism Data)

1.2.1 Golf Course Differentiation

9-Hole Courses

With very few exceptions, 9-hole courses throughout the golf tourism industry can only be considered “add-ons” to the overall tourism product. They rarely represent the primary factor in the selection of a golf-holiday destination. The further a holidaymaker travels, the less likely a 9-hole course is to be anything other than an add-on. The four 9-hole courses in Mauritius are no exception and definitely represent add-on tourism product.

Gymkhana Club

The 18-hole Gymkhana Club at Vacoas is away from the main tourism areas and not considered a draw for tourists. It is a club mainly for Mauritian residents and occasional visitors.

Belle Mare Plage Legend & Le Paradis

Each of the remaining two 18-hole courses form an integral part of two up-market beach resorts on opposite sides of the island. Interestingly, although both can be classed as golf resorts, the word “golf” does not appear in the official name of either resort.

Belle Mare Plage Links & Ile aux Cerfs

These two additional 18-hole courses are scheduled for completion in late 2002 and 2003 respectively, and therefore have not been taken into account here where the status of only the existing golf product has been considered.

Therefore, the only two existing courses relevant to the consideration of whether or not Mauritius currently constitutes a “golf destination” are the Belle Mare Plage Legend and Le Paradis.

1.2.2 Incremental Golf Tourism

Does the golf offered by the Belle Mare Plage and Le Paradis attract visitors to Mauritius who would otherwise travel elsewhere?

It is clear from the specialist golf tour operator interviews that the primary reason golfers select Mauritius is because of its image as an up-market *exotic tropical island paradise* with beautiful palm fringed beaches, calm and clear waters and scenic backdrops to match. The operators acknowledge that the golf itself rarely, if ever, represents the primary purpose of travel.

However, because golf is in these cases a very important secondary purpose of travel for the clients of golf tour operators, the availability of golf on-site is nearly always the principal reason why golfers choose the Belle Mare Plage and Le Paradis over hotels which do not have direct access to a golf course. Therefore, if there were no golf resorts on Mauritius, it can be concluded that many of the clients of specialist golf operators, representing, we estimate, up to 20% of the sales to the existing golf resorts, would choose an alternative holiday destination to Mauritius.

We believe that the majority of the golf rounds at Belle Mare Plage are played by golfers who have travelled with general leisure tour operators with no golf speciality. It is likely that many of these holiday-makers would also choose another destination if Mauritius had no golf resorts. To support this, Belle Mare Plage have indicated that if general leisure operators include a photograph of the golf course in their brochure, their sales are higher than when they do not.

As a Beachcomber property, promoted through in-house operator Beachcomber Tours, Le Paradis generates sales in a manner much more comparable to the general leisure operators selling Belle Mare Plage, rather than to those specialist golf tour operators selling Belle Mare Plage. Applying the same argument presented in the previous paragraph, it can be concluded that a proportion of Beachcomber clients would also be likely to select an alternative golf destination if Le Paradis did not have a golf course.

1.2.3 Conclusion

Whilst golf in itself does not represent the primary purpose of travel for golfers choosing to visit Mauritius, even with only two 18-hole golf resorts currently operational a significant proportion of holiday-makers currently choosing to visit either Belle Mare Plage or Le Paradis would select an alternative *exotic tropical island paradise with golf* if these two golf resorts did not exist.

Golf clearly also comprises an add-on tourism product throughout the island.

In summary:

- ❑ Mauritius can already be considered to be a Golf Destination.
- ❑ The golf courses in Mauritius also represent an important Add-On tourism product.
- ❑ Whether it represents an add-on product or whether it represents an important secondary purpose of travel, golf already generates both Direct and Indirect incremental tourism revenue for Mauritius.
- ❑ Golf rarely represents the Primary Purpose of Travel for visitors to Mauritius.

EXISTING GOLF PRODUCT – TOURISM DATA

Currently, the island's golf product comprises:

- ❑ Four 9-hole courses
- ❑ One 18-hole inland course – the Gymkhana Club
- ❑ Two 18-hole golf resorts, where golf is accessible primarily to hotel guests

Le Paradis reports that it is running close to operational capacity with between 25,000-30,000 rounds per year. The course allows non-resident visitors to play the course for a green fee of US\$80, five times higher than the hotel guest green fee.

Belle Mare Plage Hotel's Legend golf course has also reached operational capacity (hence the opening of a second course – the Links - in November 2002) with current annual golf round estimates in excess of 40,000. Both courses are for the exclusive use of hotel guests (with the exception of a reciprocal arrangement with the St. Geran Hotel with its 9-hole golf course).

Interviews with 24 golf tour operators in the major markets selling Mauritius suggest the following:

- ❑ We estimate that less than 20% of all room night sales at existing golf resorts in Mauritius are delivered by specialist golf tour operators – although the golf resorts themselves have not provided figures to either support this estimate or indicate otherwise.
- ❑ All golf tour operators stated that their clients selected Mauritius primarily because of its reputation as an up-market *exotic tropical island paradise*.
- ❑ These specialist golf tour operators acknowledged that it is not primarily the golf that drives their business to Mauritius.
- ❑ Golf was most frequently referred to as their clients' secondary purpose of travel.
- ❑ Operators stated that the availability of golf on site is nearly always the principal reason why their clients choose either Belle Mare Plage or Le Paradis over hotels that do not have a golf course.
- ❑ Golf tour operators have voted for Mauritius as one of 10 nominees for IAGTO's 'Emerging Golf Destination of the Year' Award 2002, showing a confidence in Mauritius as an attractive emerging golf destination.

It is therefore most likely that general leisure operators are responsible for the majority of room night sales at golf resorts in Mauritius at present.

- ❑ General leisure operators who include a photograph of a resort's golf course achieve higher sales than in years when they do not include a golf course photograph, indicating that the promotion of the availability of golf generates incremental sales.
- ❑ Inclusive golf resort members of IAGTO have indicated that the clients of specialist golf tour operators tend to play more rounds of golf during their stay than the clients of general leisure operators. For comparison purposes IAGTO uses a ratio of 2:1 for golf rounds played by the clients of golf operators at inclusive golf resorts compared to the clients of general leisure operators.

Therefore we estimate that the clients of specialist golf tour operators are probably responsible for up to 30% of the golf rounds at golf resorts in Mauritius. This situation is clouded somewhat at Le Paradis where the bulk of the sales are driven by in-house operator Beachcomber Tours which is not itself a specialist golf tour operator but does target golfers.

1.3 The Future Status of Mauritius as a Golf Destination

Whilst technically it has been demonstrated that Mauritius is already a golf destination, it is also acknowledged that with only two 18-hole golf resorts, both with a minority of bookings being delivered by specialist golf tour operators, Mauritius is currently a very small fish in an enormous pond (visitor rounds played in Mauritius represent less than 0.001% of all visitor rounds played worldwide).

With the development of new courses and golf resorts, can Mauritius become an established golf destination attracting a more sizeable proportion of the global US\$12 billion golf tourism market? Because of the strength of Mauritius' attraction as an exotic tropical island paradise, both the Belle Mare Plage and Le Paradis have already shown that, even with golf as a secondary selection factor, Mauritius can be a draw for both the avid golfer and the occasional golfer.

Providing that Mauritius does not lose its appeal as an exotic tropical island paradise through poor planning or over-development, quality additions to the island's golf product will without doubt attract more and more visitors who would otherwise travel elsewhere.

All specialist golf tour operators interviewed confirm that currently the vast majority of golfers visiting Mauritius fall into the category of "couples" or "groups of couples". Mauritius does not yet attract the other main category of golf travellers: "groups of golfers (predominantly male), whose primary purpose in visiting a destination is to play golf". In terms of volume, this latter category of golf traveller is by far the largest segment within the golf tourism industry. However, the couples and family golf markets have been rapidly increasing at least since 1997.

Through the development of a new golf infrastructure, can Mauritius attract business from this largest golf tourism market: groups of predominantly male golfers travelling primarily for the purpose of playing golf? Specialist golf tour operators in Europe, at the moment, are adamant that this will not happen for the following reasons:

- ❑ Mauritius does not have a wealth of restaurants, bars and nightlife options, of a style frequented by groups of male golfers, outside of the resorts. Unlike, Barbados for example, it is not common practice for resort guests to book a taxi to take them outside the resort.
- ❑ Mauritius is generally considered to be a single-centre destination, with a low occurrence of self-drive visitors, with a road infrastructure that, whilst being extensive, is not considered to be that visitor friendly, when compared with other predominantly self-drive golf destinations.
- ❑ Mauritius is not perceived as a destination with a wealth of cultural, historical or natural attractions, compared with, for example, Thailand, South Africa or even Jamaica, Puerto Rico, Cuba and Hawaii.

Mauritius is viewed by golf tour operators and golfers as a single, often inclusive, resort destination, where all facilities required are at hand or nearby. The Mauritius Tourism Development Bureau (MTDB) in the UK reports that even with an average duration of stay of 13 days, British visitors make an excursion out of their resort on average only once during their entire visit.

Comparisons with other competitive golf destinations are useful in explaining this further:

South Africa (with over 400 courses) attracts many golfers to Cape Town, where a modern cosmopolitan waterfront city offers most of the non-golf related facilities and services required by visiting groups of male golfers, as well as couples and groups of couples. Single-centre resorts, such as Fancourt in the southern Cape and Sun City (north-west of Johannesburg), are also successful, but predominantly frequented by couples and groups of couples.

Thailand (with over 200 courses) attracts groups of golfers, with a wide variety of bars and restaurants and shopping opportunities in all major resorts, easy transportation and plenty of self drive options within resort areas.

Dubai (with only 6 courses) is an interesting comparison because of its relatively low number of courses. Dubai is only 7 hours from major European gateway cities and offers beaches, sea, shopping, a bustling city centre and nightlife as well as high quality golf. Dubai attracts both major segments of the golf tourism market: groups of male golfers and couples.

Jamaica (with 8 courses) is another destination well known for its inclusive resorts. It was interesting therefore that the specialist golf tour operators who sold both Jamaica and Mauritius remarked that Jamaica presented more opportunities for golf visitors to take trips outside of the resort itself.

1.3.1 Conclusion

- ❑ Mauritius can become a viable, established golf destination, attracting much larger numbers of high-end golfers, by concentrating purely on the proven market of couples and groups of couples.
- ❑ However, through the development of high quality golf courses in the appropriate locations, Mauritius can also attract a further sub-section of the couples market which are keen to play a variety of courses in different parts of the island.
- ❑ By aiming to attract golfers who will be willing to tour the island to fulfil their “golfing habit”, this will also serve the wider purpose of making more and more visitors aware of the variety of landscape, culture and nature easily accessible throughout the island.
- ❑ Infrastructure development, specifically road maintenance, road signage and the development of restaurants and other facilities outside of hotels and resorts, must run parallel to golf expansion on the island, if Mauritius is to compete with other long-haul golf destinations.

This approach will have the effect of developing a golf destination which, through focusing on expanding a proven market, is economically viable yet will at the same time attract the more avid golfer and result in the medium to long-term in attracting a proportion of visitors who have selected golf destination Mauritius for the primary purpose of playing golf.

2 THE OPTIMAL AND SUSTAINABLE NUMBER OF GOLF COURSES AND THEIR DISTRIBUTION ON THE ISLAND TAKING INTO CONSIDERATION THE PROFILE AND CHARACTERISTICS AND NEEDS OF THE MARKET

2.1 Overview

Guestimating the number of golf courses ultimately attainable on the island is not a meaningful exercise. The process will be market driven and it would be inappropriate to put an artificial floor or ceiling on the number of courses, if realistically costed projects come forward.

However, while it may be feasible in the longer term for 12 or more new projects to emerge, it would be unwise for this number to proceed at the same time at this stage. Destinations build up by reputation which by definition is a gradual process. The importance of differentiating the tourism product within the context of the *Tourism Development Plan for Mauritius 2002 Report* (TDP) development zones is recognised. It would be inappropriate for all new golf projects to offer nearly identical concepts. More effort is also required to adapt these projects to their local environmental context.

Four of the 12 projects have apparently been 'approved' in principle, although for most of these there are only sketchy concept details available. The choice of the four was based on spreading golf provision around the island, taking into account the availability of such facilities in the vicinity of existing hotels, the need to diversify the existing product with the aim of attracting the golf segment, and siting new golf facilities close to hotels in the pipeline. These choices have not been based on detailed golf market analysis, nor have the projects been examined in relation to site specific land use and planning criteria, including potential environmental and social impacts. For the purposes of this study, these 'approvals' are considered provisional and are not assumed to be more likely to go ahead than any other projects.

Golf course development does provoke strong public concern if not handled sensitively from the outset. All new projects developed in Mauritius from now on must therefore be done well in order to avoid significant environmental and social conflict. Mauritius cannot afford to allow another Ile aux Cerfs situation to arise.

The limiting factors must include land use, social and environmental planning considerations, to ensure that the coastline and other high value natural and landscape areas are adequately conserved and that public access issues are properly heeded. This means placing much more emphasis on the EIA process within the recent Environmental Protection Act (2002). [N.B. The First Schedule (Section 15(2) Part B) of the EPA (2002) gives the list of undertakings requiring an Environmental Impact Assessment Report. Golf courses are listed in this legislation under subsection 18 of this Schedule.]

2.2 Golf Development Strategy

The optimal and sustainable number of golf courses for an island golf destination the size of Mauritius is not determinable at this stage in its golf development. However, the island's long-term success as a golf destination will be dependent on the adherence to parameters established at the outset of this development programme.

Parameters will determine:

- ❑ what type of golf courses or golf resorts should be built,
- ❑ where they should be built, and
- ❑ when they should be built.

This report is designed to establish parameters which, if implemented, will achieve maximum growth as a golf destination, maintaining financial viability and environmental compatibility throughout. The parameters must enable decision makers to implement a cohesive strategy, identify and react to changing market demands, and adjust the strategy accordingly, phase by phase.

The parameters will become self-defined once the following objectives are met:

1. All golf course and golf resort developments must be economically viable.
2. The quality of design and construction must be high and the location and design of each course must complement Mauritius' appeal as an exotic tropical island paradise.
3. Courses must be environmentally sustainable and must not be approved if they are deemed to degrade an environmentally sensitive area.
4. Courses must fit into an overall tri-purpose golf development plan designed to maximize revenue from three major golf tourism sectors.
5. The golf courses must be built in phases to reflect and anticipate the growing demand, but not to overwhelm it.

2.3 Economic Viability

From a tourism perspective, the imperative is that the courses must be economically viable and sustainable in the long term. Business plans of new developments must be tested prior to the granting of planning permission.

New developments must be able to demonstrate that they will be economically viable. Unlike hotels, restaurants and other “bricks & mortar” tourism facilities, golf courses cannot be “mothballed” (preserved for better economic times) if they prove to be unsuccessful. Degradation of a golf course occurs rapidly if the daily maintenance recommended by the architect is reduced due to lack of funds. Standard golf course maintenance can cost anywhere between US\$250,000 and US\$1,000,000 per year. A poorly maintained golf course will immediately have a detrimental affect on the perception of Mauritius as a competitive high quality golf destination.

The figure below shows the percentage of golf travellers in each market whose choice of destination is affected by the opinions of their friends, colleagues and family. This demonstrates that reports from visitors of poorly maintained courses will immediately affect the destination choice of potential new arrivals. This stresses the overriding importance of delivering a great experience to all golf visitors.

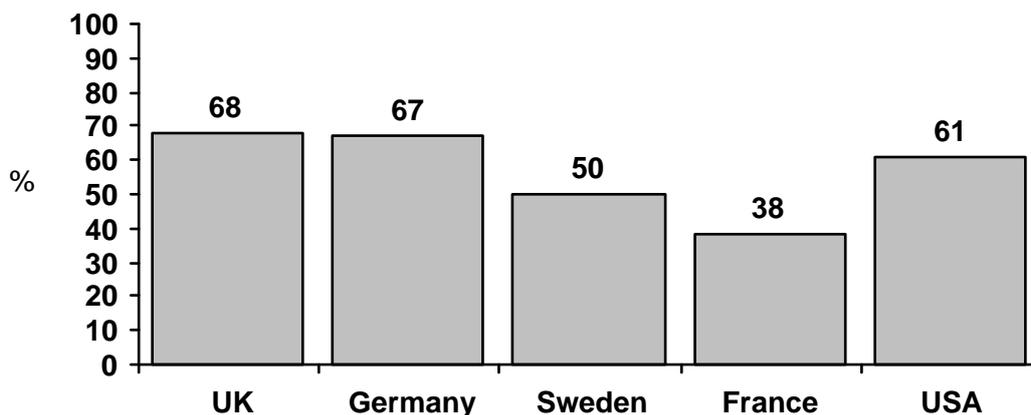


Figure 1: Importance of ‘Word of Mouth’ Recommendations (Source: SMS 2000)

Key aspects affecting economic viability are detailed below.

2.3.1 Golf Round Targets

Over-optimistic annual golf round targets in the feasibility studies of golf course developments will lead to the failure to meet return on investment targets. Golf round targets should be assessed by an independent third party to determine financial viability and sustainability.

The projected number of rounds played on a golf course usually forms an important part of any golf course business plan. One exception is a private member course built purely for a limited number of shareholders who each have an investment in the course itself.

Accurate projection of rounds played is important for two reasons: 1) underperformance will affect a project’s economic viability, and 2) the number of new courses which are sustainable in any phase of the island’s golf development will be circumscribed by the anticipated growth in golf tourism and therefore the total number of rounds attainable (see section 2.7.2. “Golf Course Capacities”).

Business plans have not been received from all prospective golf course developments. Those business plans that have been submitted to-date generally anticipate a high number of annual rounds. Both Belle Mare Plage and Le Paradis report operating close to capacity, yet Le Paradis reports 25,000-30,000 rounds per year compared to over 40,000 at the Belle Mare Plage Legend. The potential number of rounds that any 18-hole golf course can accommodate depends on the following factors:

- i. **Seasonality:** Golf is generally seasonal. Few destinations enjoy maximum capacity during every month of the year.

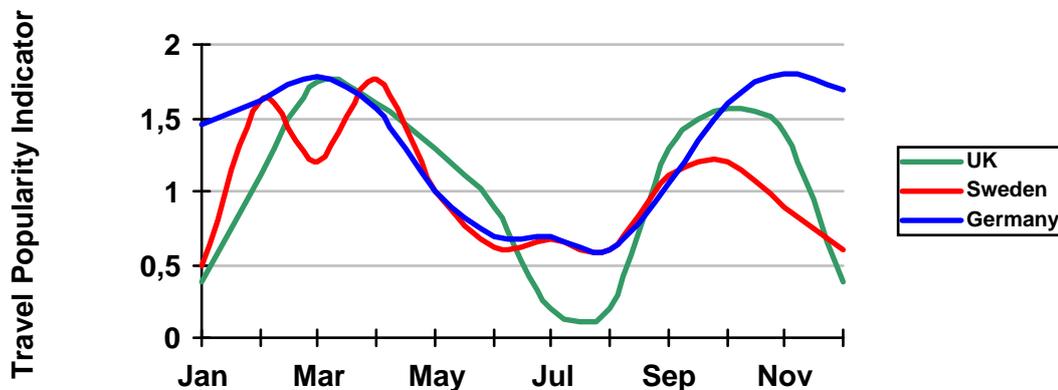


Figure 2: Seasonal variations in golf travel for selected European markets
(Source: IAGTO 2000)

The above chart shows that golf travel from the major European markets is highly seasonal and that operational capacity is unlikely to be achieved every month of the year purely from dedicated golf-holiday-makers from Europe.

- ii. **Weather:** Heavy un-seasonal rains can have a dramatic effect on golf rounds played if golf is not pre-booked as part of a golf package. Where golf is not the primary purpose of travel – as identified for Mauritius – visitors are more likely to abstain from playing in adverse weather conditions. [The average effect of seasonal weather is taken into account in part (i)].
- iii. **Green Fees:** Belle Mare Plage is an inclusive golf resort where golf is free to hotel guests. Tour operators report that their clients staying at inclusive golf resorts play more frequently than those who incur a commercially levied green fee for each round of golf. On average the number of rounds played by golfing guests at inclusive resorts is estimated to be double that played under other circumstances. Le Paradis charges a heavily subsidized green fee for its hotel guests of around \$15, compared to a visitor green fee of \$80. This too would encourage guests to play more rounds than they otherwise would. Green fee rates and inclusive golf packages must be taken into account when scrutinizing annual rounds targets presented in the feasibility studies of new golf developments.

- iv. **Daylight Hours:** The length of daylight affects the number of rounds that can be played in a day.
- v. **Tee Time Intervals:** For courses operating at maximum capacity, the number of rounds played per day will also depend on the official tee time interval which may range from 7-12 minutes for 4-balls.

Economic viability for all-inclusive golf resorts is usually based on the cost of maintenance of the golf course being more than off-set by the growth in hotel revenue from guests who might otherwise choose an alternative hotel or alternative destination. The cost of the golf course construction can either be factored in to the return on investment or occasionally deferred as an initial loss-leader.

Courses which charge commercially levied green fees, naturally need to work harder to attract a similar volume of rounds per year.

2.3.2 Green Fee Sales

Golf courses relying on revenue from green fee paying visitors must compete directly with comparable courses in competitive destinations. Green fees set at golf resorts that derive the bulk of their business from hotel guests are often set at a premium and not at commercially competitive rates. For example, the green fee for non-guests at Le Paradis of \$80 is not commercially competitive with green fees available at comparable resorts in South Africa, Thailand and Malaysia, although more in-line with green fees in Dubai and the Caribbean.

For the reasons provided in section 2.3.1, careful consideration must be given to the levels at which green fees are set at new courses in Mauritius.

Golf tour operators and course directors report that many of their avid golfing guests play daily or every second day. This is unlikely to be the case if the commercial average green fee of approximately \$50 was to apply, and certainly not if rates are set as high as \$75 or above.

Golf tour operators report that free or heavily subsidised golf is an important selling point for a golf resort with a high daily room rate. They also state that whilst golf courses with commercially-set green fees can be accommodated, the operators would need to combine a commercial golf package (e.g. 4 or 5 rounds) with lower priced hotel accommodation.

Pay and play golf courses should therefore also factor in the significant discounts on published rates for multiple-round packages sold by tour operators. They should also consider discounted green fees for multi-course packages which encourage keen golfers to visit Mauritius and play a variety of courses.

2.3.3 Membership Fees

As far as we are aware, Mauritius has no track record as a nation of golf enthusiasts. Currently golf is generally limited to the 18-hole Gymkhana course and three of the four 9-hole courses in the resort areas. Caution must be applied to the consideration of membership fees within a business plan. However, an island population of 1.2 million (725,000 adults) can contribute significantly to the success of individual golf courses, if golf becomes a prime pastime for residents.

Domestic participation in golf is both desirable and achievable. Factors affecting the growth of golf for residents include:

- i. Accessibility of the courses to residents (club regulations), particularly at weekends.
- ii. Physical accessibility – road access and traffic considerations at the appropriate time of day and particularly at weekends.
- iii. Membership fee levels and pay and play green fee prices and availability.
- iv. Academy and practice facilities.
- v. Social activities and food and beverage facilities for members.

2.3.4 Real-Estate Sales and the Integrated Resort Scheme

All projects are looking to the Integrated Resort Scheme (IRS) as a means of justifying their return on investment. This is a dangerous precedent as there is little evidence to support future sales to foreign nationals in the quantities required to sustain all submitted proposals. This maybe exacerbated by the artificial pricing threshold contingent to the IRS scheme, where purchasers must spend a minimum of \$US 500,000.

The financial viability of all golf development projects so far submitted depend to varying degrees on the ability to sell a significant number of on-course properties to foreign nationals. It is unlikely that this strategy will be successful across the board if all 12 projects were to go ahead on this basis. Most projects are projecting sales of between 100 and 250 villas. Collectively this would require sales in the order of 1500-2000 properties all formulated around similar concepts. Whilst some IRS purchasers will be attracted by big resort schemes with golf course frontage, it is unlikely that this overall number will be realisable in this way.

This puts into question the economic sustainability of individual business plans if they are based on unrealistically real-estate sales at inflated prices, or over-optimistic green fee sales.

It is dangerous to base the financial success of golf courses on the sale of real-estate for the following reasons:

- i. Sale of real-estate to foreign nationals is as yet untried.
- ii. There are too many variables to make viable comparisons with other destinations where real-estate sales have been successful.

- iii. A minimum threshold of \$500,000 is likely to be a hindrance to property sales in a new market. Unless market forces are allowed to set the prices, the value of real-estate may be artificially inflated which could act as a deterrent to any potential buyers who may look upon the purchase as a future investment.
- iv. Villa rentals often precede villa purchases, and there are relatively few villa rentals readily available for the affluent European market at present.
- v. The development of all-inclusive deluxe villa accommodation at resorts like Belle Mare Plage (22 villas) may prove more attractive than villa purchases, if the necessary local infrastructure (restaurants, bars, shops) is not also provided.
- vi. Debentures available in competitive destinations are an attractive alternative to all out property purchase and may represent a lower risk investment in a new market.

The price threshold will exclude the vast majority of the South African market which can purchase similar property for one fifth of the price at well established up-market resorts in their own country. The IRS concept has proved to be extremely successful in South Africa, with a number of new schemes having being developed over the past few years (e.g. Sparrebosch in Knysna, Goose Valley in Plettenberg Bay) with prices being attractive due to the weak Rand.

2.3.5 Golf Course Location

Golf tourism dynamics for the add-on, single-centre golf resort and golf-touring market sectors should be married to the 6-region development plan outlined in the TDP, in order to develop a simple but effective mechanism for selecting appropriate locations for different types of golf course project at each phase of the island's golf development.

Location choice for the courses built in each phase of the island's golf course development is paramount to the overall economic viability of this relatively new niche market. The following criteria apply:

- i. **Proximity to Other Courses:** Courses built in proximity to existing successful 18-hole courses benefit for the following two reasons: a) the local destination is already established as a golf centre, and b) an additional course (providing there is open accessibility) makes the destination more attractive to golfers.
- ii. **Over Supply:** Conversely, if too many courses open at the same time in one area, the demand may not be sufficient to meet the supply in the initial stages, which will have a negative impact on the economic viability of the less successful courses.
- iii. **Tourism Catchment Areas:** Courses built in established tourism resort locations will benefit, particularly from add-on golf, from the surrounding tourism catchment area. If there is no hotel on-site at the golf course it is likely that some of the established hotels in the resort area will develop a business relationship with the golf course and help to promote sales through their own recognition as a "golf hotel".
- iv. **Scenic Appeal:** In order to be economically viable, the location of the course must have a scenic appeal. Whilst this is covered in section 2.4, some locations do not possess the characteristics to make a golf course scenically attractive, despite the best attempts of experienced golf course architects.

- v. **Isolation:** All regions of Mauritius are readily accessible from the international airport. Therefore, if all other factors are in favour of development, a golf resort can be established anywhere on the island if the location is strong enough in itself to attract sufficient visitors. Conversely, if the location is considered weak by the standards to which visitors to Mauritius have become accustomed, the provision of a golf course is unlikely to make an isolated resort economically viable until such a time as “golf-touring” on the island becomes established.

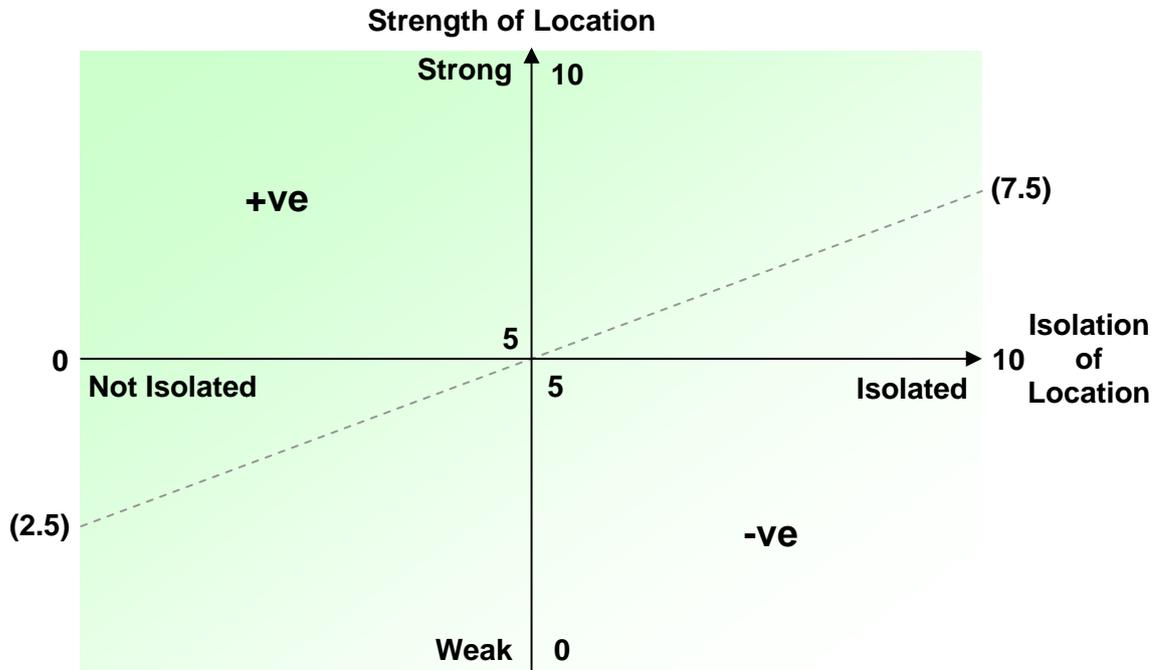


Figure 3: How different combinations of ‘location strength’ and ‘location isolation’ can be a positive or negative factor in the approval of golf course projects. (Source: IAGTO 2002)

2.4 Development of a Quality Product

The perception of Mauritius as an up-market exotic tropical island paradise is its main appeal. The golf product must complement this in order to support and enhance this overall image . Research shows that it is harder to meet the expectations of golfers, regarding the quality of the golf course played, the further they travel the higher their expectations are for the quality of the golf. In tropical island destinations, the attractiveness of the setting and ambience of the course are just as important as the quality of the design and construction. If the new courses do not meet these high expectations, golf development on the island will be restricted to the add-on sector of the market. Remember at all times that avid golfers can find average courses much closer to home.

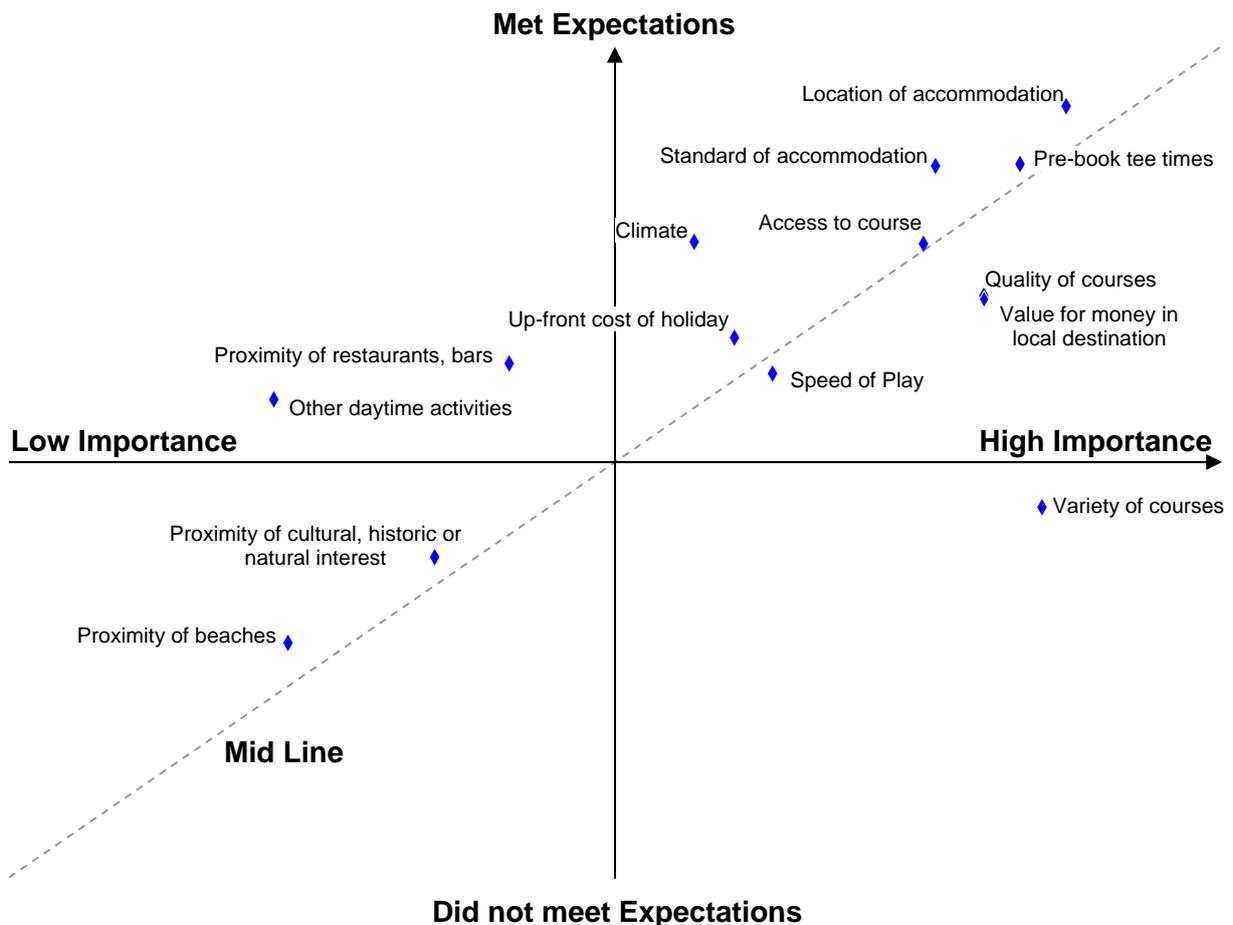


Figure 4: The importance of factors affecting the choice of long-haul destinations for European golfers and the degree to which their expectations were met. (Source: SMS 2000)

Note how the 'Quality of Golf Courses' is a very important factor, but that it does not always meet the high expectations demanded of it by long-haul travellers. The 'Variety of Courses' is the most obvious factor that falls way below expectations, the further golfers travel.

2.4.1 Imperatives of Golf Course Design

The TDP places some credence in the value of signature golf courses by 'Top 30' golf architects. This is a superficial concept that can be very misleading and risks inflating the ambitions and development costs of more than one project. A notional 'Top 30' list of golf architects in the most important terms of 'quality, value for money and adherence to environmental imperatives' does not exist .

Four of the most important conclusions drawn by this report are that, prior to approval, all new golf projects in Mauritius must demonstrate that they will:

- be environmentally sustainable,
- be economically sustainable,
- be of a high quality (both measurable and subjective), and
- deliver value for money that will prove attractive to international visitors.

Every developer must be challenged to produce evidence that the chosen golf course architect, construction company and management company will deliver on all four counts, within the specific context of the parameters set out here for *Golf Destination Mauritius*, regardless of the perceived standing of the companies involved.

2.4.2 The Impact of Golf Course Design on the International Marketing of Golf Destinations

When considering the merits of different golf course projects, Mauritius authorities are likely to be asked to take into account the international marketing importance of 'designer labels'. The most important point to make here is that this should not deflect from strict adherence to the four parameters defined above in paragraph 2.4.1.

Markets must be considered independently. Europe is currently the main supplier of golfers to Mauritius and is likely to remain so for the foreseeable future. Even with only two 18-hole golf resorts, neither with designer labels, Mauritius is already well established in the minds of the golf tour operators as a golf destination (witness its nomination in the top 10 'emerging golf destinations of the year' in 2002 by IAGTO Golf Tour Operators). It is also fairly well known in the minds of golfers because of the extensive coverage it receives in golf tour brochures alongside well established destinations (see Figure 5 overleaf).

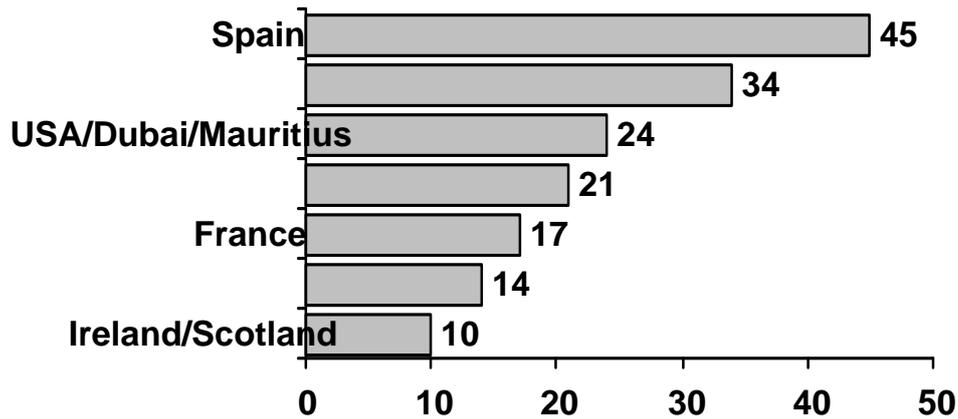


Figure 5: The top 11 destinations featured by 56 specialist golf tour operators in Europe, judged purely by the appearance of each destination in the companies' brochures, not by the extent of the coverage provided. [Source: IAGTO 2000].

Whilst Mauritius does not receive anything like the extensive coverage devoted to Spain, Portugal, the USA, France, Ireland or Scotland, it regularly receives 1 or 2 pages in a wide range of golf tour operators' brochures, giving the island destination high market penetration particularly in comparison to its market position in terms of golf tourist arrivals.

Therefore, from the European perspective, the island does not lack credibility as a golf destination, which means that it does not have to rely on buying in the reputations of 'designer-label' architects. Conversely if Mauritius wishes to position itself in markets in which it is relatively unknown as a golf destination (e.g. the USA), then an architect that inspires confidence in that market may become a priority.

Either way, the prerogative should be for Mauritius to develop its own 'style and signature', which may involve a range of architects from the best known to the lesser known, providing that the four parameters in 2.4.1 are strictly adhered to. Its success will be determined by the intrinsic quality of the golf product and the destination's positioning in relation to the markets that will drive the demand.

Simply, for every project it is essential that the golf courses be designed by qualified and experienced architects working together with equally qualified and experienced resort planners conversant with current best practices regarding environmental and economic sustainability.

In all cases, any increase in project expenditure must be viable within the return on investment feasibility study. If there are any weaknesses or uncertainties regarding a project's ability to meet its financial goals unnecessarily inflating design and construction costs should be avoided.

The following parameters should assist where there is any uncertainty:

Rule of Thumb: If the expenditure can be justified by the business plan, and value for money maintained when compared to competitive markets, then the choice of big name designers can be a positive move for a golf destination, provided that environmental sustainability is strictly adhered to. However, It should be borne in mind that adventurous golf course projects almost always involve large landscape alterations, and extensively irrigated areas, which have a strong tendency towards increasing negative environmental impact, and inflating design, construction and maintenance costs thus lowering the chances of economic sustainability.

Image & Value for Money: In Europe, Mauritius is already perceived by regular golf travellers (from golf holiday brochures, magazine articles, tropical island tour brochures and remarks from

friends, colleagues and relatives) as an up-market tropical island destination with some decent golf. It does not need an image overhaul, but all new courses must contribute to a strengthening of the perception of Mauritius as a great golf destination. Providing that the quality of location, design and construction are always good, then value for money is also important. If higher expenditure on design (and subsequent golf course development costs) is compensated for by inflated green fees, it becomes more important to demonstrate in the feasibility study that the market is prepared to pay the price.

Add-on Golf Courses servicing Popular Tourist Resorts: Golf courses built without on-site hotel accommodation, situated in major tourist resort locations, are primarily designed to take advantage of the relatively high volume of tourists staying within its catchment area. A sizeable proportion of the clientele of such courses are likely to treat golf as an add-on to main holiday objectives. A big name design here is less likely to influence traffic, and the achievement of maximum yield is more likely to be sensitive to green fee levels.

Single-Centre Golf Resorts: Golf resort courses designed primarily for hotel guests, depend less on the design label, and more on the “enjoyment factor”. Note that Mauritius has attained its position so far without a ‘designer-label’ course. A poorly designed championship course that does not meet the needs of high handicap golfers may fail as an attraction to many hotel guests. Similarly care must be taken in ensuring that a challenging course or overly long course does not add greatly to the overall playing time. Many hotel guests choose to play golf in the morning and sunbathe or relax in the afternoon. An arduous or overlong morning round of golf may prove detrimental to the inclusive golf resort package concept. Big name designers can of course meet all these requirements, but appropriate consideration must be taken.

Stand Alone Courses outside of major Tourist Resorts: Courses which do not have the added draw of a) being part of a beach resort hotel complex, and b) being within a large tourist resort catchment area, are more likely to benefit from the added attraction of having a top designer label.

Real-Estate Developments: Using high profile golf pro's as "designers" rather than well known golf course architects in the real-estate market has one advantage. Marketing the real-estate under the banner of a high profile golf professional is often met with initial success in real estate sales, especially if the golfer is undergoing a winning streak at the time. The added cost of using a more expensive design and construction option can be offset by real-estate sales.

2.4.3 Hosting Championship Events

The TDP also recommends the development of 'championship standard' courses in order to attract professional events.

There are many existing golf courses around the world capable of hosting tournaments. There are relatively few major televised tournaments in the golf Tour calendar to go round. Certainly, at this initial stage in the development of Mauritian golf, the focus should be on tourism products and not to aim for the vague notion of potentially hosting championships. International golf championships, such as European Tour events demand substantial investment from sponsors, whilst at the same time severely restricting access to tourists before, during and after competition.

2.4.4 Design, Construction and Quality Considerations

This study has identified several problem areas common to most of the projects currently being proposed. These issues relate to the ultimate quality of proposed projects and must be addressed for each development.

- i. Duplication of similar concepts based on standard models imported from other destinations – i.e. a repetition of existing destinations rather than a distinct, innovative approach to address future market trends and opportunities.
- ii. Professional advice on project feasibility and concept largely coming from similar sources not familiar with the evolution of the European golf market.
- iii. The mix of top level IRS residential plots and large volume tourist facilities within one overall development may be unbalanced, especially where there is already a high density of hotel and other beach front development.
- iv. Over optimistic revenue projections given overall context of number of potential projects on the island.
- v. No project has really examined the environmental component in detail, or related to the assemblage of issues being addressed through the revision of the NPDP. Nor have they recognised the marketing value of environmentally sensitive design.

2.4.5 Overall impact in relation to socio-economic factors

The forecast decline in sugar production from more labour intensive marginal land will result in increased agricultural unemployment. Golf courses and related development offer long-term employment potential for large numbers of people. The golf course maintenance work can also incorporate rural skills, typical of a former agricultural workforce, as well as introduce new skills through training programmes. A well run tourist golf project could employ up to 40 people on the maintenance of the golf course playing area and club house landscaping, most of whom will be drawn from the ranks of semi-skilled agricultural workers. A small proportion however will be skilled or qualified technicians with one or two managerial level employees per course.

Additional employment will be available in the golf teaching facilities and further staff in the food and beverage sectors linked directly to the golf operation. Increases in tourism related

employment opportunities linked to an expanded golf tourism market will arise as new golf resort developments become operational.

Encouraging the local population to play golf whilst at the same time using golf courses for environmental enhancement projects will allow the development of environmental education and awareness programmes to evolve.

2.5 Social and Environmental Sustainability

In striving to become *Golf Destination Mauritius*, it is vital that social issues are properly taken into account. The needs of the 1.2 million Mauritian inhabitants must not be ignored. The resident population's requirement to feel the benefit of these new golf developments will be vital for their ultimate sustainability. Residents must see that the courses are adding to rather than detracting from their leisure and recreation options, as well as providing economic benefits.

In fact, the local population is becoming more and more frustrated that the limited space which is left for their leisure is used for high standard closed/reserved high class resorts/projects. A sociological analysis of the situation should be undertaken in a high population density/limited space context.

Public access to beaches is a major issue on Mauritius. This is more a problem with beach frontage hotel development than golf per se. The Ile aux Cerfs case is not a typical example and should not be used as a basis for assessing future golf projects. Quite simply, all future golf projects should address public access issues in their development plans and demonstrate that the project will not cause problems in this respect.

Environmental issues are dealt with in detail in sections 4 and 5 of this report. Nevertheless, within the context of an economic analysis of golf development on the island, it is essential to remember the need for addressing sustainability issues. These are not simply regulatory obstacles within the formal planning process. Environmental quality goes to the very core of a successful golf resort development. This is particularly critical in Mauritius, first because of it being an island with an inherently fragile ecosystem, and second because much of the appeal for foreign visitors is based around its environmental quality. Over intensification of development is ultimately self-defeating. In this respect the planning system and the relevant environmental protection legislation is a vital check on the type and spread of development to be permitted on the island.

There is also a positive side, frequently ignored in resort development, of utilising the intrinsic environmental quality as part of the promotion and image of the resort. However, this can only work if it is credible and relates to what visitors will experience on the site.

Furthermore, golf courses that are designed, constructed and managed in a way that fully takes into account the environmental dimension, will generally realise significant economic and social benefits. If Mauritius is to develop a distinctive, differentiated golf product aimed at future golf-tourism markets, the environmental question will be central to its success.

2.6 Tri-Purpose Golf Destination

The ultimate goal within grasp of Mauritius is to develop golf on the island in such a way that it supports three of the major golf tourism sectors, namely:

- i. Add-On Tourism Product Market Sector
- ii. Single-Centre Golf Resort Market Sector
- iii. Multi-Course Golf Destination Market Sector

2.6.1 Add-on Tourism Product

These are golf courses which service holiday-makers who will play only occasionally during their leisure holiday. Golf will be most successful as an add-on facility to the existing tourism product in established tourism resorts with a high catchment of tourists who play golf. These can be identified by looking at the number of hotel rooms in each tourism area on the island.

The TDP identified three key tourist locations – the northern, eastern and south-western tourism zones.

The hotel room numbers in Figure 6 below clearly demonstrate that these are the three major catchment areas for high volume tourism. In line with the TDP the three other development areas are also featured.

Tourism Zone	District	Hotels	Rooms	Significant Golf Catchment Area Yes/No
Northern	Total	35	3,421	Yes
	(Pamplemousses)	(18)	(1,990)	
	(Riviere du Rempart)	(17)	(1,431)	
South-West	Black River	19	2,141	Yes
Eastern	Flacq	16	2,110	Yes
Mahebourg	Grand Port	4	520	No
South Coast Heritage	Savanne	1	34	No
South-West Natural	N/A	N/A	N/A	N/A

Figure 6: Accommodation Data for TDP Tourism Zones (2001)

2.6.2 Single-Centre Golf Resorts

Inclusive golf resorts are a proven success in Mauritius and in comparable destinations elsewhere in the world. Tour operators will therefore find the concept of selling new golf resorts (hotels with a golf course on site) relatively easy as it involves repeating an established and fruitful formula.

2.6.3 Multi-Course Golf Destination

Ultimate success will be achieved when visitors choose to “tour” the island to play different courses. New projects must therefore be encouraged to open their doors to green fee visitors. Business plans of proposed developments should reflect this requirement. A successful multi-course destination will mitigate the risks of troughs within tourism “fashion cycles” which single-centre resorts the world-over face.

A multi-course destination will also begin to attract a new market comprising up-scale travellers who rate the quality and variety of the golf product as highly as the exotic appeal of the island itself.

The biggest challenge for Mauritius is to include in the planning from the outset an objective to develop the golf product so that it will attract the third and most stable golf sector – that of the avid golfer seeking a quality golf destination with a variety of excellent courses at affordable prices, with an infrastructure to match and complementary attractions.

2.6.3.1 Golf Course Clusters in Multi-Course Golf Destinations

The typical model for golf destinations requires access to at least three 18-hole courses within a 20-minute drive of the accommodation centre. The average number of different courses played by long-haul golf travellers is shown in Figure 7 below:

Nationality	Av. No. of Courses Played in Shorthaul Destinations	Av. No. of Rounds Played in Shorthaul Destinations	Av. No. of Courses Played in Longhaul Destinations	Av. No. of Rounds Played in Longhaul Destinations
British	3.0	5.1	5.1	9.6
Swedish	2.8	6.4	2.2	7.9
German	2.3	6.6	2.6	8.4
French	3.6	5.5	3.0	7.5

Figure 7: Average number of rounds and courses played whilst on golf vacations by golfers from four major European markets

In general these figures reflect the commonly held views of the golf tourism industry. However, the long haul number of rounds played do seem to be too high by about 30%, so care should be taken in their interpretation.

Research carried out by the International Association of Golf Tour Operators (IAGTO) in 1999 showed that the maximum driving time to a golf course that the clients of golf tour operators would accept was 60 minutes, providing the course was exceptional. The preference was for at least 3 courses within a 20-minute drive, at least a further two courses within 40-minutes and 1 or 2 more within 60 minutes. To determine the proximity of golf courses to an accommodation centre, it is useful to prepare diagrams similar to that presented in Figure 8 for the town of Spa in Belgium’s Wallonia region.

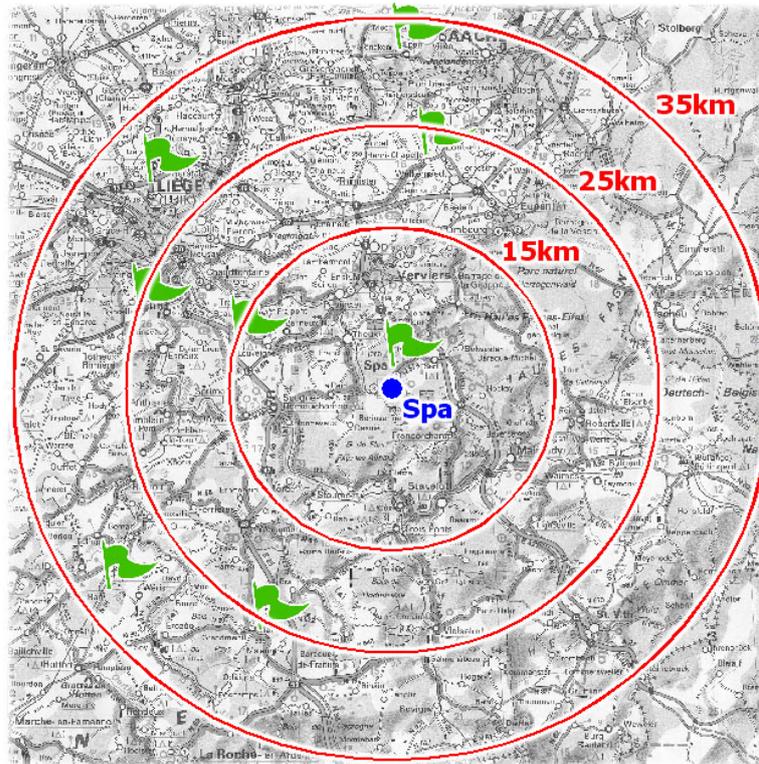


Figure 8: A golf course proximity ‘Accommodation Hub’ diagram for golf destinations (example: the town of Spa in the Wallonia region of Belgium)

However, this classic view of golf destination clusters around an “accommodation hub” where visitors play multiple courses assumes that golfers have access to the different courses within reach. Belle Mare Plage, for example, operates to capacity entirely from its own hotel clients, whilst Le Paradis accepts visitors but at a green fee priced 5 times higher than that for its hotel guests.

Added to this, the current tourism products in Mauritius are centred around single resort stays. The hotels provide inclusive services and do not necessarily encourage clients to seek alternative attractions. Successful multi-course destinations incorporate pro-active cross-selling of golf courses, to ensure that hotel guests, wherever they stay, are encouraged to play the best or most suitable courses within driving distance.

Golf course clusters within a comfortable driving distance of popular accommodation hubs still remain an important concept for the golf development strategy of Mauritius, although Mauritius is at an advantage in that most places on the island can be reached by road without too much inconvenience.

2.6.3.2 Legislating for Accessibility to Courses

With the emergence of all inclusive up-market resorts in popular winter sun destinations, a trend has emerged for new resorts to include a golf course as a facility exclusively for their own guests.

As an island destination with, for example, five all-inclusive golf resorts, available exclusively only to hotel guests, Mauritius would never be able to promote itself as a serious golf destination. All visitors would be limited to playing only one course – the course in the resort at which they were staying.

For Mauritius to develop as a multi-course destination – a very important third stage of the golf development strategy – new golf course projects should be encouraged to make a proportion of their tee times available to pay and play green fee visitors. Attention must also be paid to the proposed green fee rates, as non-competitive pricing can have a similar effect to simple exclusion.

Accessibility to local residents will also encourage good relations with the local community.

2.6.3.3 Investment in Diversity

Some proposed developments in relatively isolated but scenic locations, particularly if there is no proposed beach-fronted golf resort complex, may find it difficult to prove a case for their economic viability. However, such stand-alone courses might represent a spectacular addition to the island's golf inventory, and images from the signature holes of such courses may become synonymous with *Golf Destination Mauritius*. Variety of courses as well as quantity is an important consideration for attracting this third golf tourism sector (see Figure 4).

The return on investment for such stand-alone developments is likely to be longer term, and reliant to a certain extent on the successful evolution of Mauritius as a serious golf destination. Such courses would also benefit from improved infrastructure and the development of additional tourism facilities of a complimentary nature in the vicinity, making a day's golfing to an outlying region of Mauritius a well-rounded, enjoyable and memorable event.

Providing that the long-term nature of the investment is understood, or that external support is provided to offset the financial risk, the development of such stand-alone courses can be a major asset to Mauritius in its ambition to become a complete golf destination.

2.7 Projecting the Potential Growth of Golf in Mauritius

Even if all the above criteria are met by all proposed developments, success will not be achieved if supply vastly outstrips demand. The final objective is to implement a phase by phase golf development strategy that responds to changing situations, anticipates demand, but at no stage overwhelms it.

In order to determine the optimum number of sustainable golf courses, it is necessary to predict the potential for growth of golf in Mauritius, and to quantify this in phases, to facilitate a progressive and responsive development plan.

In identifying the optimal and sustainable number of courses for *Golf Destination Mauritius* there are six key considerations:

- i. The potential for growth of add-on golf tourism to Mauritius
- ii. The potential for growth of dedicated golf tourism to Mauritius
- iii. The potential for real-estate sales and associated golf rounds
- iv. The potential for the development of residential golf market
- v. Indirect factors limiting the rate of growth of golf tourism
- vi. The health of the global golf tourism industry

2.7.1 The Potential for Growth of Add-On Golf Tourism to Mauritius

Three factors will affect growth of this add-on sector more than any others:

- i. The construction of quality 18-hole courses within easy reach of major tourist resorts will attract a “latent” demand, which already exists, but is not currently satisfied either due to lack of nearby facilities or due to the existence of only 9-holes courses in the vicinity.
- ii. The TDP projects a growth from 9,000 hotel rooms to 20,000 by 2020. Much of this expansion will be in existing popular resort areas. Courses servicing these catchment areas will naturally benefit from add-on golf business in proportion to the overall growth of tourism to these regions.
- iii. The green fee levels set at courses servicing major tourism resort areas will be crucial in determining the eventual yield and profitability of each course. Occasional golfers, or regular golfers who do not place a priority on playing golf during their tropical island holiday, are more likely to be deterred by pricey green fees than are golfers who have travelled to Mauritius specifically to play golf.

If the six regions outlined in the TDP take on their own characteristics (e.g. luxury hotels in the East and a much wider range from self-catering and 3-star properties upwards in the North-West), then prices will need to take this into account when considering their yield management. A resort with a higher predominance of self-catering accommodation may well attract just as many holiday-makers who enjoy golf as a predominantly luxury destination.

The percentage of visitors to Mauritius who play golf back in their home country is currently an unknown quantity. To assess this accurately, three questions need to be added to existing tourism questionnaires:

- 1) Do you play golf?
- 2) Do you consider yourself to be:
 - a. An occasional golfer (play once a month or less during the golfing season)?
 - b. A regular golfer (play once every 2-3 weeks during the golfing season)?
 - c. An avid golfer (play once a week or more during the golfing season)?
- 3) If there was a good golf course near to your hotel in Mauritius, how likely would you be to play a round of golf during your vacation:
 - a. Very likely?
 - b. Possibly?
 - c. Not very likely?

Without this data, a rough estimate can be made of the number of tourists currently visiting Mauritius who are also golfers, and therefore potential 'add-on golf tourists'. By making the assumption that every district attracts all visiting nationalities in equal proportions, the number of golfers visiting each tourism zone can be estimated. The results are shown in the Figure 9.

Market	Golfers Visiting Mauritius 2000	Northern Zone	South Western Zone	Eastern Zone	Mahebourg Zone	South Coast Zone
		41.6%	26.0%	25.7%	6.3%	0.4%
France	7,143	2,971	1,857	1,835	450	29
United Kingdom	11,316	4,707	2,942	2,980	713	45
Germany	1,692	704	440	435	107	7
South Africa	2,921	1,215	759	751	184	12
Italy	234	97	61	60	15	1
Switzerland	983	409	256	253	62	4
Belgium	396	165	103	102	25	2
Austria	639	266	166	164	40	3
Australia	1,614	671	420	415	102	6
Spain	303	251	157	155	38	2
Sweden	1,412	587	367	363	89	6
Netherlands	473	197	123	122	30	2
USA	1,156	509	312	266	58	6
Canada	287	119	75	74	18	1
Others	5,117	2,129	1,330	1,315	322	20
Total:	35,686	14,845	9,278	9,171	2,248	143

Figure 9: The number of golfers currently visiting each tourism zone (estimate)

These numbers can make a significant contribution to pay & play golf courses within the catchment areas of the Northern, South-Western and Eastern tourism zones. The numbers of visiting golfers are however not sufficient to support golf courses relying on golf as an add-on tourism product in either the Mahebourg or South Coast zones. See Figure 10 below for the main catchment areas for add-on golf in Mauritius.

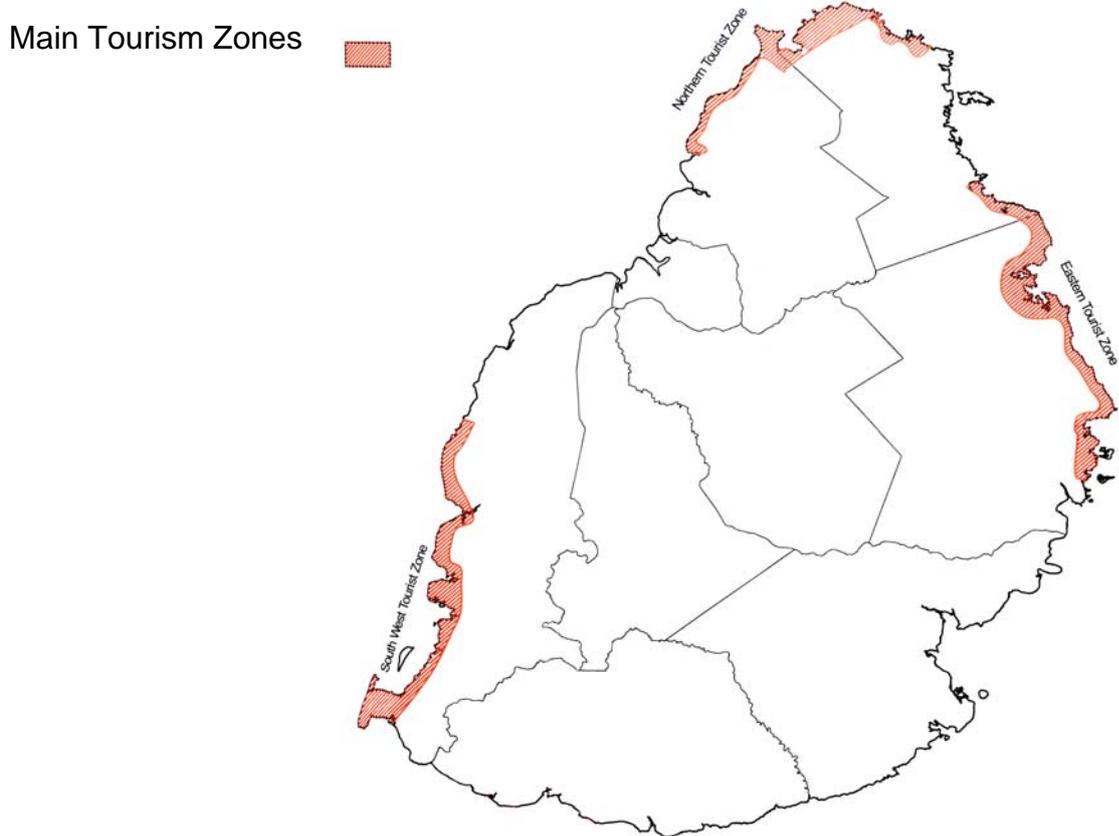


Figure 10: The three main catchment areas for add-on golf tourism in Mauritius

If 15% of these golfers choose to play golf during their stay in Mauritius and if on average they play 2 rounds during their visit, add-on golf will contribute 10,800 rounds to the island's golf courses, providing there is at least one golf course available to pay and play visitors in each major catchment area.

Dividing these up according to the hotel room availability, the distribution would be as depicted in Figure 11 overleaf:

Tourism Zone	District	% of total rooms in Mauritius tourism zones	No. of Golf Rounds Played
Northern	Total	41.6%	4,493
South West	Black River	26.0%	2,808
Eastern	Flacq	25.7%	2,776
Mahebourg	Grand Port	6.3%	680
South Coast Heritage	Savanne	0.4%	43
Total:		100%	10,800

Figure 11: Projected Number of Add-on rounds per District

Please see the Tourism Appendix for a full explanation of the above figures and calculations.

Whilst distances are relatively short on the island, tourists playing golf as an add-on are likely to be less tolerant of long drives or taxi rides to a golf course. Therefore the location of the golf course within the tourism zone is important. The more attractive the golf course, the further tourists are likely to travel even for add-on golf. The catchment area for an average add-on golf product can be considered to be a radius of 10-15 minutes drive from the hotel/resort location. For a high quality and attractive course with fine views, this radius can be increased to 15-20 minutes drive. Although this difference appears minor, an extra 5 minutes leeway can bring more hotels into the catchment area, and is a further argument for only approving high quality golf course projects.

If all other factors remain constant, the number of add-on golf sales will grow at the same rate as the growth in hotel room capacity on the island. The TDP projects room numbers increasing from 9,000 to 20,000 by 2020. If this growth occurs evenly across the ensuing years, and room occupancies do not drop below their current average, then this suggests an annual average growth in tourism arrivals of approximately 6.8% a year.

Over a five year period, the 10,800 add-on golf rounds per year will therefore rise to almost 15,000 due purely to natural growth in tourism arrivals.

Add-on golf sales are affected less than dedicated golf holiday sales by the seasonality associated with the dedicated golf traveller. European golf travellers tend to go on golf holidays in the European autumn, winter and summer months from September to April. However, by definition, add-on golf is played by holiday-makers for whom golf is not a major consideration. Therefore golfers on holiday in Mauritius with their partner or family are just as likely to play an occasional round of golf in August as they are in February. Golf is a game that can be played and enjoyed when the weather is not conducive to other pastimes such as sunbathing or sightseeing.

It will be essential to track the progress of any existing or new courses for which add-on sales form a significant part of their overall revenue.

At present there is no incentive for the management of existing courses to track and make available data that will help take decisions at the right time regarding the development of new courses. This is commercially sensitive information, and it is understandable that as such it would not be made available to possible competitors.

Tracking golf sales and market trends is essential for the efficient and economically successful development of Mauritius as a serious golf destination. Our recommendation is that in return for cooperating with the collection and dissemination of market information, existing golf courses are given the assurance that new courses will only be approved on a phase by phase basis when existing courses are well on the way towards operational capacity.

2.7.2 The potential for growth in dedicated golf tourism to Mauritius

2.7.2.1 How well placed are the markets for expanding the sale of golf holidays to Mauritius?

From a marketing perspective, Mauritius has already achieved recognition as a golf destination way in excess of its standing as far as golf holiday arrivals is concerned. Mauritius is featured by 24 of IAGTO’s European specialist golf tour operators, putting it on a level with both Dubai and the USA and coming behind only Spain and Portugal, Europe’s two leading golf destinations, purely in terms of being featured in golf tour brochures, but not taking into account the extent of the coverage (see Figure 5 earlier in the report). With this level of market exposure, Mauritius is extremely well placed for future expansion amongst the specialist golf tour operator markets of Europe.

2.7.2.2 Is Mauritius a natural match for the golf markets of Europe?

The strength of a golf market is defined by the number of golf holidays taken by its citizens. In this case we have looked purely at non-domestic golf holidays. In order to see whether or not there is a natural match between Europe’s largest golf markets and Mauritius’ largest tourist markets, the strength of each market in terms of non-domestic golf holidays and Mauritius holidays are compared below in Figure 12.

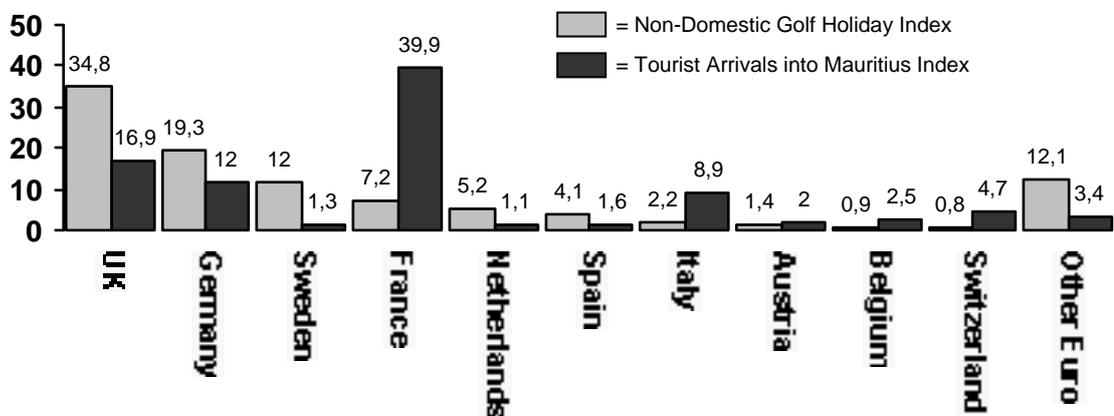


Figure 12: Index comparing the number of non-domestic golf holidays taken by various

European markets and the number of holiday arrivals into Mauritius, as a percentage of the overall European totals.

It can be seen that there are similarities between the two market indicators. However, the one major anomaly is that whilst France is the leading tourism market, responsible for more than twice the number of visitors of any European market, it lies fourth in the league of European non-domestic golf holiday sales.

By combining a market's inherent tourism strength to Mauritius and its size as an outbound golf holiday producer, it is possible to get a more accurate idea of the relative strength's of different markets for the future expansion of golf holiday sales to Mauritius (see figure 13 below).

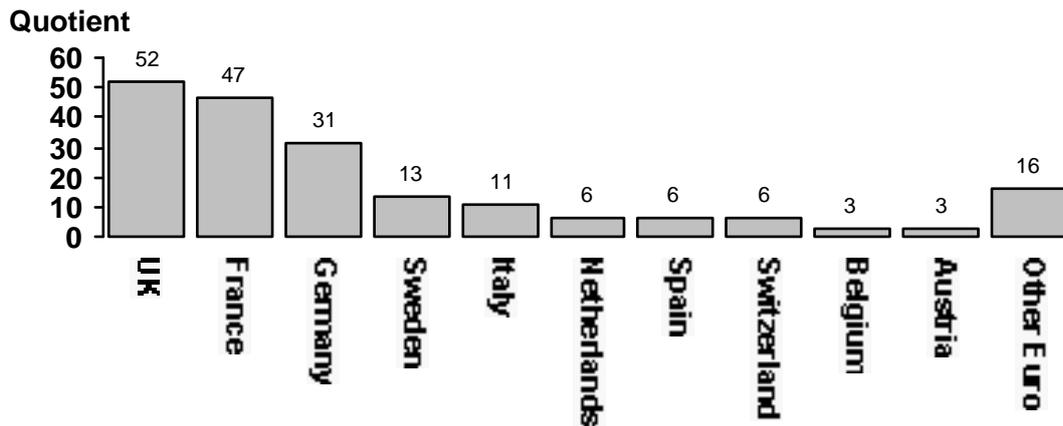


Figure 13: Golf Tourism Quotient for Mauritius – A Market Indicator

The index featured in Figure 13 is calculated by combining the relative strengths of each market as both a non-domestic golf tourism producer and a Mauritius holiday producer. How the index is calculated is shown in Figure 14 below:

Market	Tourist Travel in Mauritius (2000)	% of Euro Market	No. of Non-Domestic Golf Holidays (2000)	% of Euro Market	Golf Tourism Quotient
UK	74,488	16.9	340,000	34.8	52
France	175,431	39.9	70,000	7.2	47
Germany	52,869	12.0	189,000	19.3	31
Sweden	5,694	1.3	117,000	12.0	13
Italy	39,000	8.9	22,000	2.2	11
Netherlands	4,925	1.1	51,000	5.2	6
Spain	7,226	1.6	40,000	4.1	6
Switzerland	20,473	4.7	8,000	0.8	6
Belgium	10,998	2.5	9,000	0.9	3
Austria	8,874	2.0	14,000	1.4	3
Other European	14,936	3.4	118,000	12.1	16
Total Europe	439,989		978,000		

Figure 14: Golf Tourism Quotient Calculation

Whilst France generates more than twice the tourism arrivals of the United Kingdom, the UK's non-domestic golf holiday market is some five times greater than that of France. The golf tourism quotient suggests that therefore the UK will be just as important as France as a golf holiday producer in the future, if not more so. Sweden also requires greater attention than it would be given if only its current tourism arrival figures were to be considered.

Note: Figures 12-14 should be taken as a indicator to the likely behaviour of the various European markets, rather than an absolute guide.

2.7.2.3 Dedicated Golf Tourism Sustainable Growth Projections – Phase 1

Earlier figures showed that approximately 67,000 rounds are currently played each year at the country's two existing golf resorts. Adding to this a few thousand rounds played at the existing 9-hole courses, particularly the St Geran, which can be attributed to dedicated golf holiday makers (as opposed to 'add-on'; rounds) takes the existing total to at least 70,000 rounds per year played by dedicated golf tourists.

All specialist golf tour operators interviewed expected to be able to at least double their existing business to Mauritius, provided that a) there were more golf courses and golf resorts of the right quality, in the right place and in the right price range, and b) flights were not a limiting factor.

A majority expected to do even better than this with sales anticipated to treble or more once all Phase 1 courses become fully operational and marketable by international tour operators.

If, as estimated, golf tour operators are currently responsible for up to 30% of the dedicated golf rounds produced, then golf rounds sales generated by golf tour operators can be expected to climb to 63,000 $((30\% \times 70,000) \times 3)$ once the overall market has trebled in size.

The single-centre golf resort sales of non-specialist leisure operators, estimated to be currently responsible for the remaining 49,000 rounds, can be expected to double over the same period to 98,000.

Accordingly, once Phase 1 courses are all fully established, golf rounds played by golfers visiting Mauritius for whom golf is more than just an add-on, are projected to climb above 161,000 per year.

The natural annual growth projected in paragraph 2.7.1 of 6.8% per year will lead both to more operators selling the destination and to a natural growth in the numbers carried by existing operators, provided that there are no limiting factors such as airline seat availability.

At this rate (6.8% per year) the natural tourism growth factor would see the 161,000 rounds increase to more than 215,000 rounds over five years.

2.7.3 The potential for real-estate sales and associated golf rounds

This is a real unknown quantity. The success of the IRS scheme with an artificial price threshold is yet to be proven. Therefore it is necessary to work with very conservative estimates until IRS golf course real-estate sales become an actuality.

For the purposes of this generating a prediction of rounds played by new property owners, we have projected the development and sale of only 50 on-course properties in the first year with sales increasing by 50 properties per year, every year, over the previous year's sales. The new owners are expected to be regular golfers, although their residence in Mauritius may only be seasonal. An average contribution of 20 rounds per year per property has been used in the projection detailed in Figure 15 below.

Year	Properties Sold During Year	Total Number Of Properties	Rounds Played per Year
1	50	50	1,000
2	100	150	3,000
3	150	300	6,000
4	200	500	10,000
5	250	750	15,000

Figure 15: Projection of Rounds to be Played by Real-Estate Owners

At the end of a successful five year period of real-estate sales, the number of rounds generated by villa owners would therefore be expected to exceed 15,000 rounds per year.

2.7.4 The potential for the development of the local golf market

Experiences of other destinations where golf is not already a popular past-time shows that local residents provide a minimum number of rounds. Even in long-established golf destinations such as Spain and Portugal, participation rates of the local population are low. In markets where golf is already an established participation sport, the opposite is true (e.g. South Africa, Australia, the USA and the United Kingdom).

Figure 16 below shows the percentage participation in golf of the adult population of each country. This is based on those golfers playing regularly and the percentages range from one tenth of one per cent to 3.8% in the UK and over 9% in Australia. These figures can be approximately doubled if occasional golfers are also included.

Market	% Regular Golfers of Adult Population
Australia	9.2%
USA	7.8%
Sweden	6.2%
Canada	3.9%
United Kingdom	3.8%
Netherlands	1.6%
Austria	1.2%
Switzerland	0.8%
Spain	0.7%
France	0.6%
Belgium	0.6%
Germany	0.4%
South Africa	0.4%
Italy	0.1%

Figure 16: Regular Golfers as a % of Adult Population

As a fledgling golfing nation, if we assume that Mauritius starts on a par with Italy with 0.1% of the adult population playing on a regular basis, with an adult population in Mauritius of approximately 725,000 (U.S. Census Bureau), some 725 regular golfers would be expected. As golf can be an all-year-round pastime in Mauritius, 725 regular golfers can generate upwards of 18,000 rounds a year, with occasional golfers generating a further 7,000 rounds.

A conservative estimate, entirely dependent on the opportunity to play golf being there (proximity, access, availability and price), would be that once Phase 1 courses are fully operational, the local Mauritian market could generate approximately 25,000 rounds per year.

From an operational point of view, this is particularly useful because the local market can be targeted during the ‘troughs’ in the international golfing season (see Figure 2 earlier in the report).

2.7.5 Indirect factors limiting the rate of growth of golf tourism

Many golf tour operators have cited the lack of availability of seats of scheduled flights, and the infrequent operation of direct flights as a major limiting factor in their ability to expand their existing operation to Mauritius, particularly if the projected golf developments go ahead.

All agree that Mauritius must remain a dream destination, and they are happy for the flight operations to remain scheduled. This ties in with the TDP recommendations that “continuing with a scheduled service policy is essential to maintaining product standards”.

Lack of frequent flight operations and lack of access to seats at IT (net wholesale) rates to, what are often small specialist operators, is seen to be the main limiting factor to the development of this lucrative market sector.

Golf holiday sales to Mauritius are made by a large number of small to medium size operators rather than a small number of high volume operators. Airlines will therefore need to make a commitment to specialist operators in addition to increasing capacity.

The operators report that access to IT rates and seat availability on Air Mauritius has seen an improvement over the past year, but still has a way to go.

The type of clientele who book golf holidays to long haul tropical island destinations generally avoid destinations which require an indirect flight or a change of aircraft mid-way. This is seen very clearly in the Caribbean: Puerto Rico is an excellent golf destination with the second largest number of golf courses in the Caribbean. However it receives virtually no golf-holiday-makers from the UK because there are no direct flights. However other golf destinations with a smaller range of golf product but with direct scheduled services do attract British golf-holiday-makers (e.g. the Bahamas, Barbados and Jamaica).

In the Caribbean the availability of direct flights (scheduled and charter) has a direct bearing on the strengths of the markets represented within the golf holiday sector on the island. Golf des Trois Ilets on Martinique, serviced by direct flights from France but from no other European markets, therefore attracts a largely French clientele.

In order to estimate the existing spare capacity on direct services to Mauritius from key golfing markets, we have had to make two assumptions:

- 1) That the majority of visitors from markets with direct services choose to travel on these direct services.
- 2) That the weekly airline capacity figures are constant throughout the year, with no seasonal variations.

Additionally, we have no data on the number of Mauritian nationals or travellers from countries other than the direct market served by the airline, who are travelling on these flights. For example there is a flight capacity per year from South Africa of 125,000 seats, yet tourism figures indicate only 48,000 arrivals from South Africa. Seat sales on these flights are no doubt augmented greatly by Mauritians and possibly other nationalities.

However, these figures can be refined if the airlines release spare capacity figures particularly for the months of September through to April.

Current estimations are detailed in Figures 17 and 18 below.

Market Served by Airline	Annual Direct Airline Capacity	Tourism Arrivals of Nationals from Market in 2001	Spare or Non-Nationals Capacity	% Spare or Non-Nationals Capacity
France	229,320	197,595	31,725	13.8%
United Kingdom	116,012	77,888	28,124	24.2%
Germany	53,716	50,866	2,850	5.3%
Italy	35,724	37,343	-1,619	0%
Switzerland	18,096	18,427	-331	0%
Austria	9,048	8,696	352	3.9%
Belgium	9,048	10,398	-1,350	0%
Total:	470,964	401,213	69,751	14.8%

Figure17: Estimated Flight Capacity from Europe

Market Served by Airline	Annual Direct Airline Capacity	Tourism Arrivals of Nationals from Market in 2001	Spare or Non-Nationals Capacity	% Spare or Non-nationals Capacity
South Africa	125,268	47,882	77386	61.8%

Figure 18: Estimated Flight Capacity from South Africa

What Figures 17 and 18 do show however, is that there are severe limitations on market growth, within the existing scheduled services, in the important golf holiday market of Germany and the developing golf holiday markets of Switzerland and Austria, as well as in Italy and Belgium.

Sweden is Europe's second largest outbound golf holiday producer, yet there are no direct services to Mauritius from Sweden. Mauritius is therefore at a disadvantage when competing with other long-haul golf destinations which do have direct flight services from Sweden.

2.7.6 The Health of the Global Golf Tourism Industry

The future health of the golf tourism industry is assured, and for that reason it represents a sensible investment as a niche market within the overall tourism industry.

Of course golf travel, like all other niche markets, is not immune to global changes and trends within the tourism industry as a whole.

In Europe, 50% or more of all golfers have taken a golf holiday at some time. This makes every second golfer a potential golf-holiday-maker.

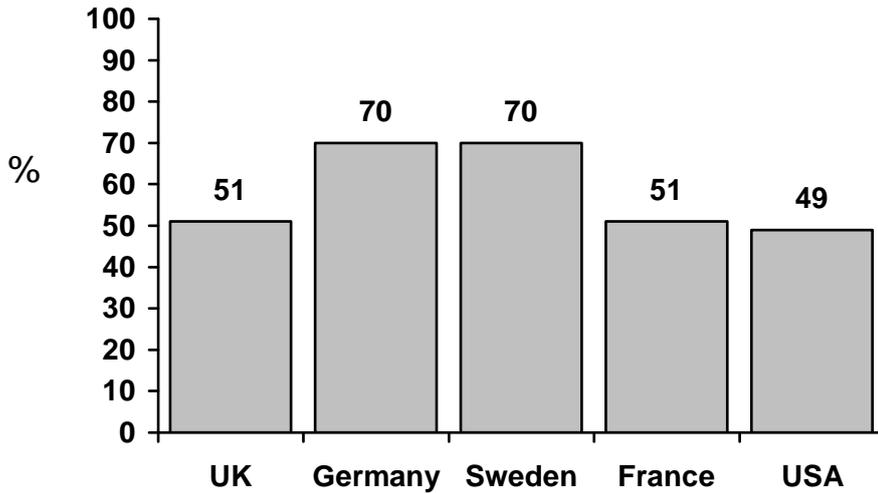


Figure 19: Percentage of Golfers Who Have Ever Taken a Golf Holiday (Source SMS 2000)

A relatively constant proportion of 30% or more of all golfers in Europe, when interviewed, have taken a golf holiday in the past 12 months.

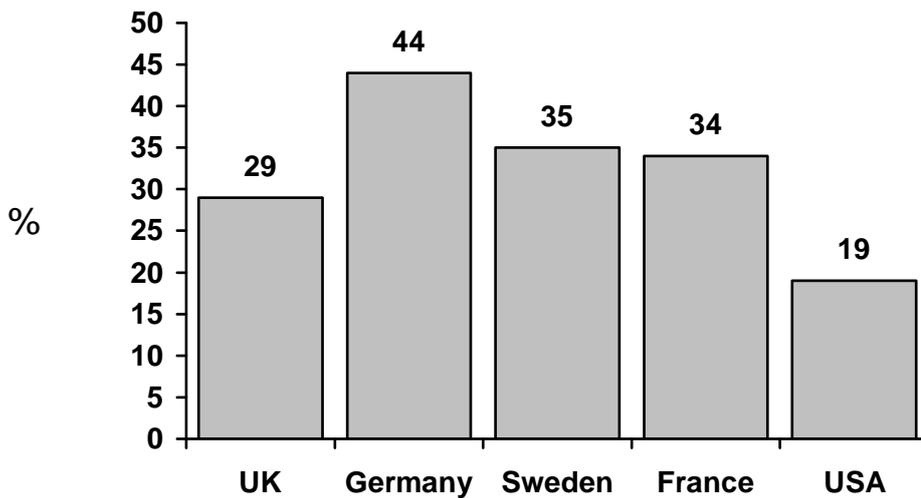


Figure 20: Percentage of Golfers Who Took a Golf Holiday in 2000 (Source SMS 2000)

Because this proportion has remained relatively constant over the past five years, the number of golf holidays taken per year depends on a) the number of golf holidays taken per year per golfer, and b) the growth in golf as a participation sport.

The number of 'multiple' golf holidays taken by golfers is growing each year (see Figure 21 overleaf).

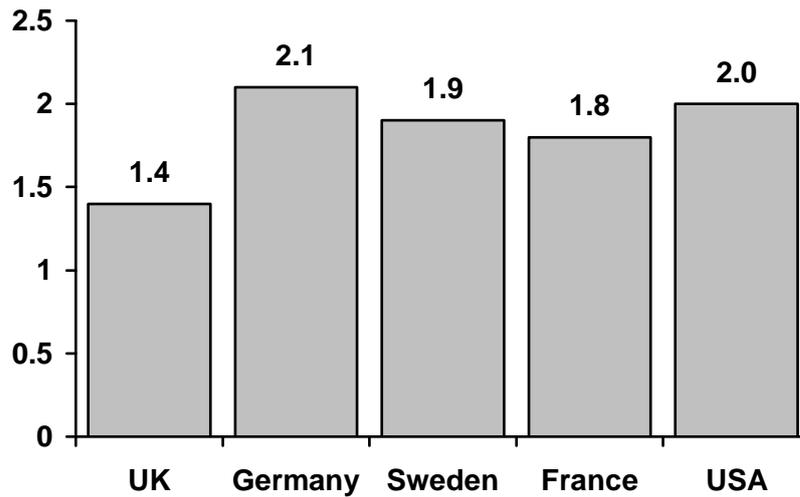


Figure 21: Average Number of Golf Holidays Taken in 2000 by Golf-Holiday-Makers
 (Sources: SMS 2000. National Golf Foundation '98)

The number of people taking up the game of golf is growing at a healthy rate. In the mature markets of the USA and the UK, growth was fairly constant in the early nineties at around 2% a year. However it surged in 1997 by 7% due to a 33% growth in youth golf and a 37% growth in beginner golf. This may be due to the 'Tiger Woods effect', which has seen golf become 'cool' again as access to golf began to extend beyond the 'privileged elite'. Other young and talented golfers such as Sergio Garcia, Adam Scott and Justin Rose do a great deal for attracting more people to play the game, just as Arnold Palmer, Jack Nicklaus, Gary Player and Seve Ballesteros did in their day.

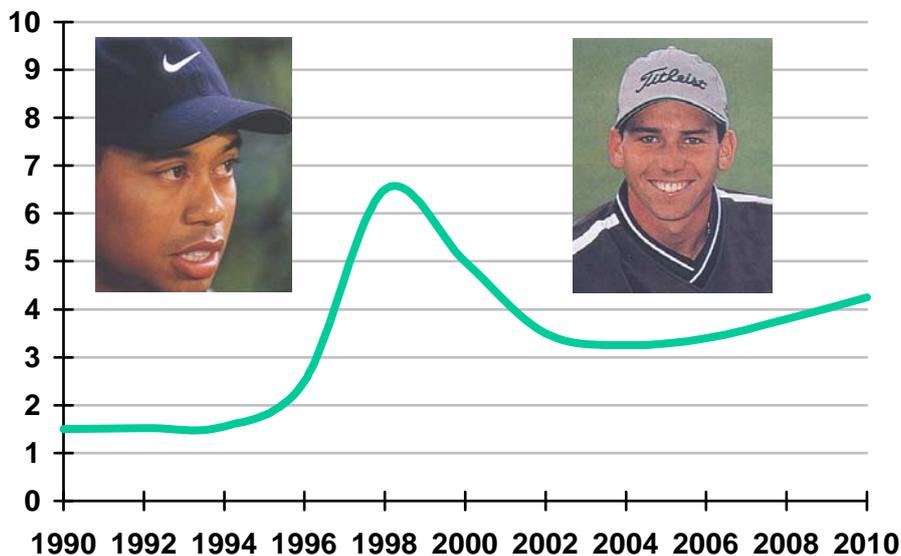


Figure 22: Estimated Global Golf Participation Annual Growth Rate and Forecast
 (Source IAGTO 2002)

Kids who are playing golf today will become the golf-holiday-makers of the future. Golf, unlike many sports, can be played and enjoyed as long as one is still fit enough to travel. Golf travel has been growing in Europe in different countries at rates between 7%-12% a year for the past 5 years, way ahead of the average general leisure tourism rate of growth presented by the World Tourism Organisation (WTO).

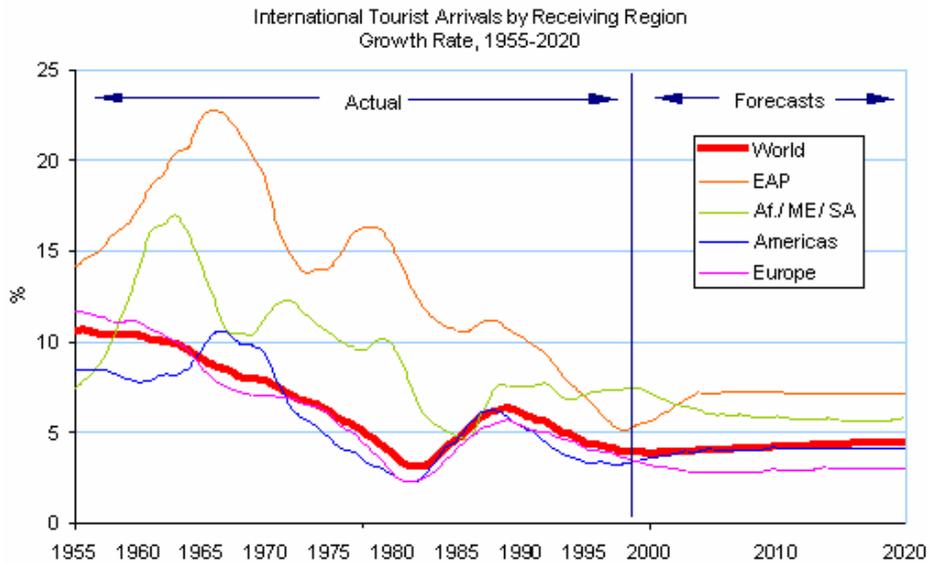


Figure23: WTO’s International Tourist Arrivals Growth Rate Projections

In 1999, a golf tourism projection carried out by Sports Marketing Surveys showed golf travel growing by 11% per year generating some 30,000 rounds of golf every day of the year, and generating 25,000,000 room night sales daily by 2010. IAGTO’s projections are not quite as optimistic as this although European growth rates in 1999 and 2000 were above 8%.

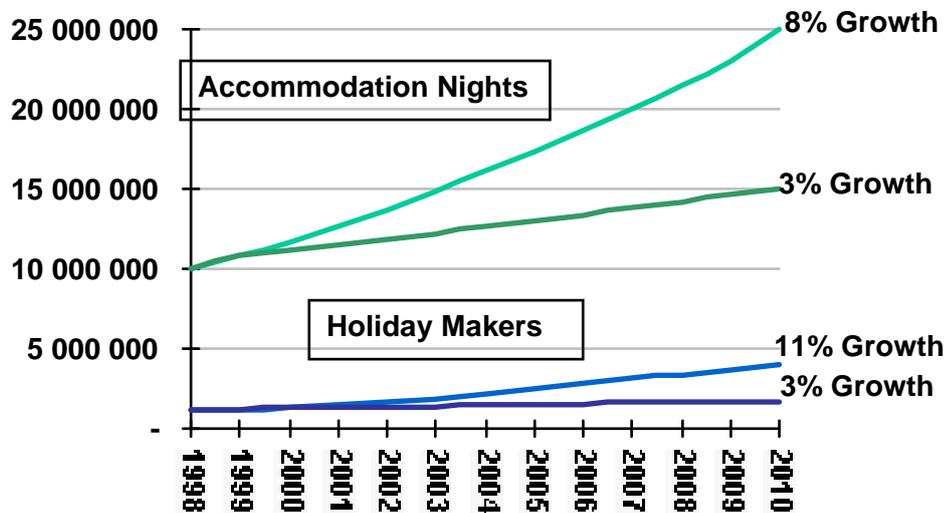


Figure 24: Sports Marketing Surveys’ Projections for European Golf Tourism Growth

Taking all of this together, the long term future for golf tourism looks very bright and investment in this lucrative niche market is viable providing that the business plans and strategies employed are targeted to meet the needs of the dedicated golf traveller.

2.7.7 Conclusions

The calculations in this section project that the number of 18-hole golf rounds that can be generated can reach 270,000 over the coming five years (see Figure 25 below).

Sector	Potential No. Annual 18-hole Golf Rounds Within 5 Years
Add-on Golf Tourism	15,000
Dedicated Golf Tourism	215,000
Real-Estate Rounds	15,000
Resident Golf Rounds	25,000
Total:	270,000

Figure 25: 5-Year Summary of Projected Annual Golf Rounds

2.8 The Sustainable Golf Development required to Meet Projected Demand

Having projected the potential growth in demand, during a first phase of development, for golf rounds from tourists, overseas real-estate owners and Mauritian residents, the golf product required to meet and sustain this demand can be addressed.

2.8.1 Golf Course Capacity Projections for Approved Developments

A golf course capacity refers to the number of rounds played on any given golf course per year. The capacity can also be treated to calculate the number of different individuals who play the course each year – for example one member may play 40 rounds per year, whereas a tourist may play 5 rounds during a 10 day period.

Comparing capacities of existing courses, both in Mauritius and elsewhere, with the projected targets from the business plans of proposed projects enables a determination to be made on the number of new golf tourist arrivals required to reach achieve a viable outcome.

2.8.1.1 Existing Golf Course Capacities

Belle Mare Plage reportedly runs at maximum operational capacity, estimated to be in the region of 40,000 rounds per year. The fact that Belle Mare Plage have invested in the construction of a second “links” course indicates that the business plan employed by Belle Mare Plage has been successful.

The same applies to Le Paradis which estimates 25,000-30,000 rounds being played each year.

2.8.1.2 Target Capacities for New Courses

The most successful commercial 18-hole courses in established year-round destinations (e.g. Algarve, Portugal and Costa del Sol, Spain) run at an operational capacity of between 40,000-50,000 rounds per year.

Taking into account the figures provided by the Belle Mare Plage and Le Paradis and the seasonality of the destination, a reasonable optimum target for new developments to aim for once established would be no more than 30,000 rounds per year. The time and investment required to attain such levels should not be underestimated, and the simultaneous development of a number of golf courses following on from the recent doubling in the island’s 18-hole resort golf capacity, will also have a bearing on this.

Whilst monthly figures are not available, Mauritius is a seasonal destination, and golf tourism is itself a seasonal business with the majority of golf travel from Europe taking place between the months of September and April. This also coincides with the main tourism months, with the exception of July and August which accounts for high VFR (visiting friends and relatives) and family holidays – neither of which are high generators of golf rounds.

Feasibility studies prepared by developers repeatedly show optimistic capacity figures in excess of 40,000 rounds per year, some 25% more than the already optimistic projection of 30,000 rounds made above.

2.8.1.3 Sustainable Capacity Growth

The existing two golf resorts generate approximately 67,000 rounds of golf each year between them. Belle Mare Plage Links and Ile aux Cerfs will double this capacity to approximately 130,000 rounds per year. The 12 new golf development projects so far submitted include 14 x 18-hole courses which would raise total capacity to a minimum of 550,000 rounds per year (based on an annual target of 30,000 rounds per year for each new course).

A rise from 67,000 to 550,000 rounds represents an increase of 821%, which, if scheduled to optimise after 3 years, would require a compound annual growth rate of golf in Mauritius of over 100% per year, which is not realistic.

The projections in section 2.7 of this report suggest a quadrupling of the existing demand over a period of up to 5 years which will generate a demand of up to 270,000 rounds per year. This total capacity would support four new 18-hole developments in addition to the four already operating or under construction (see Figure 26 below).

Golf Course	Estimated Annual Round Targets
Belle Mare Plage Legend	40,000
Le Paradis	27,000
Belle Mare Plage Links	30,000
Ile aux Cerfs	30,000
New Development 1	30,000
New Development 2	30,000
New Development 3	30,000
New Development 4	30,000
Total:	247,000

Figure 26: Estimated annual round targets for existing and new developments

2.9 Phase by Phase Implementation of the Mauritius Golf Development Plan

A Golf Development Plan for Mauritius must comprise two phases. The first phase covers the period of initial growth of golf tourism, real-estate and resident golf as outlined in sections 2.7 and 2.8 of this report.

The second phase is a fluid and continuous period dovetailing in to Phase 1 whereby new golf developments are brought on-line in time to respond to increasing demand.

2.9.1 Phase 1 Development

The recommendation is for up to four new 18-hole developments, in locations consistent with the parameters set out in this report, to be given approval in Phase 1 of the Golf Development Plan. This incremental strategy is certainly the most prudent approach in view of continuing global economic uncertainties.

In addition, a fifth, high quality and spectacular “stand-alone” course could also be developed in Phase 1 (see 2.6.3.3). This could be in a relatively isolated site, possibly inland. The key will be the course’s outstanding quality. The development would have to be seen as an investment in the long-term future of Mauritius as a serious golf destination. This would require an investment in and a commitment to golf course maintenance, accepting that the return on investment will be protracted and subject to market development. In many ways it would represent a major leap of faith to push ahead with such a project before the existing supply has matured further. However, should a project of this type go ahead despite the likelihood that green fee income may be significantly below forecasts, this will help to accelerate the process by which Mauritius becomes recognised as an established golf destination.

2.9.2 Phase 2 Development

Further golf course projects which meet the criteria of the Golf Development Programme can be brought on-line once the demand starts to catch up with the supply generated by the completion of Phase 1 development. Because golf course development can take anything from 18 months to 3 years from the planning stage to its launch, Phase 2 developments should be triggered well ahead of the time at which demand catches up with supply provided by the Phase 1 developments.

The figure will depend on the planning schedules submitted by approved developers, but a general recommendation would be to commence Phase 2 approvals once annual rounds played across the eight established and Phase 1 courses reaches a total of 180,000 rounds, or when six out of the eight 18-hole courses reach 70% capacity. This second option allows Phase 2 to begin earlier than would otherwise be the case if one or two of the Phase 1 courses are under-performing and considered unlikely to reach their targets.

These timing issues can be refined once data on the growth of golf round sales at all courses on the island is monitored and analysed on a regular basis.

2.9.3 Conclusions

Golf in Mauritius will develop in phases. The number of proposed developments will mean that from January 2003 onwards supply is always likely to exceed demand, with the possible exception of a short period of market saturation prior to the next phase of golf courses becoming fully operational.

If demand is continually tracked, new phases can be brought in early enough to ensure that supply keeps slightly ahead of demand. This is not an exact science as the period between planning and opening any golf course or resort can be anything from 18 months to 3 years. Providing that the growth of golf tourism to Mauritius continues in an upward trend, every course should see their annual yields increase year by year until they reach operational capacity.

3 THE FUTURE GOLF MAP OF MAURITIUS

3.1 Development Plan

The Tourism Development Plan for Mauritius (Deloitte & Touche 2002) sets out a framework for the period up to 2020. This identifies six new tourism planning zones, each with a different tourism development focus. Within these are proposed 27 Area Action Plans. Golf development will need to be placed in this context and also factor-in other sectoral constraints being addressed via the current review of the NPDP. The continued building of beach-front hotels and apartments maybe undermining the long-term viability of Mauritius as a quality tourism destination. New proposals within the TDP of a South Coast Heritage Zone and South-West Natural Zone are therefore highly significant in this context.

3.2 Maps

The process for determining potential golf course sites should involve a succession of overlays of different constraint maps:

Physical and natural environment

- ❑ Water resource availability
- ❑ Sensitive coastal and wetland areas
- ❑ Ecologically sensitivity areas
- ❑ High landscape value areas
- ❑ Topography
- ❑ Agricultural land quality
- ❑ Other protected zones unavailable for construction
- ❑ Areas of interest for the public or close to public beaches
- ❑ Areas where other projects will be implemented

The National Physical Development Plan and more specifically the Outline Schemes for each Town or District Council provide a plan for the location of any type of development. For the time being, the NPDP and Outline Schemes which are in force forbid any golf course outside set zones (these zones may change with the new NPDP). Moreover, the local legislation provides that a Land Conversion Permit should be obtained from the Ministry of Agriculture when cane lands are used for other activities.

Golf courses are inherently flexible developments, which given appropriate handling, can be accommodated in a wide variety of situations, often where other types of development (e.g. residential or commercial) would not be suitable. This first level of physical and natural constraints analysis should enable the definition of areas unsuitable for golf (either physically or because of legislative protection), those where golf may be possible provided certain constraints are given priority attention, and other zones where minimal constraints operate.

Socio-economic

- ❑ Infrastructure
- ❑ Employment potential and reconversion
- ❑ Accessibility
- ❑ Involvement of the local communities in the process

These factors are better examined on a case by case, site related basis, in parallel with the natural and physical constraints identified for particular projects.

3.3 The Future Golf Map

Following on from the general golf development strategy outlined in the previous section, it is now possible to consider which areas of the island are most appropriate for golf course development – taking into account the economic, social and environmental aspects.

Three cluster areas can be identified:

- ❑ East (Flacq)– existing cluster with Belle Mare Legend and Links, plus Ile aux Cerfs.
- ❑ South-west (Black River and Savanne) – existing Le Morne Paradis, plus potential for stand alone, high quality scenic golf courses.
- ❑ North-west (Pamplemousses) – to supplement and service existing hotel resorts between Port Louis and Grande Baie.

Outside of these areas, it is possible to envisage a small number of relatively isolated golf courses being developed, provided they offer something extra special in terms of services and environmental quality.

3.4 Inland sites

There are no specific proposals for inland golf projects at present. Nevertheless, given the government policy to take development pressure away from the coastline, more consideration should be given to inland sites. The Government of Mauritius has already committed itself to reduce pressure on the coastal zone and encourage inland eco-tourism or other types of inland tourism activities. There are major inland golf potentials such as the upper Plaines Wilhems, Nicoliere, Valetta, Highlands, Bois Chéri and other suitable sites with high rainfall, wide areas not encroaching on the public beaches and State Lands, a deeper water table instead of near the surface for coastal areas, remoteness from the sensitive lagoon environment, increased possibilities for the development of local golfers population and other advantages.

High quality golf resorts could well work inland provided they have excellent landscape context (mountain and distant sea views), and internal design and landscaping. Agricultural and sprawling urban vistas will not be attractive for such projects.

Several of the current projects, although coastal, do not have good or reliable beach access. It is also questionable whether a dedicated golf clientele will require immediate beach access. Mauritius is not a big island, and well-sited inland facilities will always be close to coastal sites.

In Spain and Portugal, relatively few of the popular golf courses and their associated development have beach frontage. Many are between 1 and 5 km from the coast, which in Mauritian terms would represent inland sites.

In some specific inland areas, therefore, it is likely that a carefully planned golf complex will work. However, this will need to combine a mix of complementary activities and a high degree of attention to environmental quality.

3.5 Sites That Should Not be Developed

Some sites are inappropriate for golf course development and should preferably be left totally undisturbed. These may include:

- ❑ Environmentally sensitive wetlands - mangroves and lagoon
- ❑ Sites with insufficient land area or inappropriate topography
- ❑ Sites with coastal access issues
- ❑ Prime sugar producing land
- ❑ Sites where water resources are insufficient
- ❑ Unspoilt scenic landscape areas
- ❑ Sites which are of socio-economic importance for the public

3.6 Limiting Factors

Any new projects developed from now on must be thoroughly researched and subsequent design and development should reflect the unique status of the Mauritius tourism product in addition to avoiding significant environmental and social conflict. Mauritius cannot afford to allow another Ile aux Cerfs situation to arise.

The main limiting factor must be the land use planning considerations, to ensure that the coastline and other high value natural and landscape areas are adequately conserved. This means placing much more emphasis on the development of an effective Environmental Impact Assessment process within the Environmental Protection Act (2002).

3.7 Concept and Design

The concept and design of most of the proposed golf projects will require substantial revision in order to generally comply with the Mauritius Golf Development Strategy recommendations. Golf course development and resort design should take into account the following issues:

The Developers Business Plan will depend upon

- Project Viability based on
- Market Research which justifies projected returns of
- Investment Capital

The business plan will be essential to the creation of the development product definition.

The Development Product Definition will establish if the golf project will be a

- Stand-alone Course
- Resort Course with hotel
- Residential Course with villas and apartments

It will also define:

- Number of Golf Holes. (9, 18, 27, 36)
- Type of course. (Garden, Executive, Standard, Resort, Championship)
- Practice Facilities. (Driving Range, Training grounds, Teaching areas)
- Hotel (n° of beds)
- Villas (sale or rental, building size, plot size, stories, number,)
- Apartments (sale or rental, size, height of building, number)
- Infrastructure (access and services)
- Additional facilities

Site Specific Conditions will have considerable influence upon the product definition.

These conditions include:

- Location
- Land Bank available for the development
- Configuration of the site (shape and orientation)
- Topography
- Vegetation
- Geology
- Soil type
- Water resources

- External features (views, wind direction, etc)

National and Regional Development Strategies will in turn define the

- Timing
- General location and
- Spread of courses which will condition the
- Interaction between projects at varying stages of development.

Planning Permission Conditions will have to be met.

Construction permits will only be granted for golf course developments once the project has been duly assessed and found to comply with the general conditions laid down by land planning, economic and environmental planning guidelines described in the Mauritius Golf Development Strategy Plan. All golf projects will be subject to identical permit procedures.

The concept and detailed design of any golf course development has to remain flexible until a construction permit has been granted. The final design will be achieved by integrating a varied and dynamic range of interrelated and fluctuating factors into a coherent whole, where seemingly slight alterations may have profound consequences and where substantial modifications may not satisfy all the stakeholders.

A "Vertical " planning process, where the project is approved by one department or administrative level before being assessed by the next is not the most appropriate method. This type of process is conflictual - as all levels of assessment have an effective veto. The developer is required to justify his project repeatedly and perhaps to make a series of alterations in order to pass to the next stage. Like the "Whispering Game "at a child's party, the final version may have made the full circuit, but is likely to have lost all meaning.

A "Horizontal" planning process is far more appropriate to golf course developments in sensitive conditions. An outline project Master Plan is presented simultaenously to all the stakeholders for comment, and subsequent plans are able to take into account the full range of concerns expressed. This results in a more consensual and evolutionary process, which can avoid both costly and lengthy permit approval systems and appeals, whilst at the same time allowing stakeholders to find helpful solutions rather than to just identifying their own specific problems. This horizontal approach is dependent to some degree on goodwill and a general assumption that the project in question already fits into the National or Regional Development Plan.

Detailed design guidelines may be appropriate where there is occasion to apply them frequently and generally. This is not the case on Mauritius, where each of the few projects sites in question are unique and what may be applicable to one project would be unacceptable on another. In this type of situation caution should be applied and generalisations avoided.

A high degree of professional skill is required in order to create an acceptable project design. Likewise interpreting data and assessing project validity. However the result will be a variety of high quality schemes based on intelligent and considered concept planning, leading to cost effective and imaginative design acceptable to all the various stakeholders.

A VISION OF THE FUTURE OF GOLF IN MAURITIUS

Once the first phase of golf development is complete, the golf map of Mauritius will feature:

- ❑ Golf courses servicing popular tourism resorts, attracting both occasional and dedicated golfers as well as local residents.
- ❑ More single-centre golf resorts offering excellent quality golf packages to their hotel guests at inclusive or heavily discounted rates, whilst also offering visitors from other hotels the opportunity to play at commercially competitive rates.
- ❑ One or two spectacular courses, stand-alone or golf resort-based, which will raise the level of golf offered to avid golfers visiting Mauritius, accelerating the transference of Mauritius to a quality, varied and enchanting golf destination.

“...Tourists visiting Mauritius will be pleased to find more 18-hole courses nearby offering the opportunity of an occasional round of golf during their exotic tropical island holiday. Wherever they play they will be delighted with the quality of the course, the ambience that is in keeping with their expectations of a paradise island, and they will be pleasantly surprised at the value for money they receive.

Golfers seeking a relaxing tropical island vacation where they are waited on hand and foot with all activities within ambling distance, will find a wider selection of golf resorts to choose from. Visitors will be able to play in parts of the island they perhaps have not visited before, and they will find that each has its own style and design, making the experience slightly different from the last time they visited the island. Whatever their handicap they will find the course both challenging and enjoyable, and they will complete their round looking forward to the rest of the day on the beach and to playing another round in a day or so.

Keen golfers will be delighted to hear from the golf resort concierge that there are two or three other courses within a comfortable drive, all accessible to visitors from other hotels at surprisingly reasonable rates. They will find that the car rental company provides a map of the island with easy to follow directions to golf courses, and that their journey was made even easier by clear signposts at major junctions, all carrying the “Golf Mauritius” logo. On returning to their hotel they are likely to remark to other guests how enjoyable their round of golf was, but that it was quite different from the previous courses that they played.

Repeat visitors and avid golfers will have seen the photographs in golf magazines and in promotional material of some spectacular holes on a golf course that maybe some distance away offering a promise of spectacular views in a completely natural setting. They will have no hesitation in making a day of this golf excursion because the roads will be well maintained, directions clear and they will have heard that they can end the day at a delightful restaurant or bar with a great vantage point near the golf course.

Back in Europe, golf club members will hear from returning visitors about the variety of good quality golf courses now available in Mauritius. Calling their usual golf tour operator they will discover that they can choose either to stay in a golf resort or in a hotel in one of the major resort areas and that they can buy a “Pink Pigeon Golf Pass” which includes a round of golf at any 6 of the island's 8 courses on the island for the price of only 4 green fees...”

4 THE GENERAL IMPACTS OF GOLF COURSES ON THE ENVIRONMENT PARTICULARLY IN TERMS OF CONFLICTING LAND USE RESOURCES, WATER REQUIREMENTS, USE OF FERTILISERS AND PESTICIDES, PERCOLATION INTO THE AQUIFER AND LAGOONS, LEVEL OF RISKS AND LOSS OF FAUNA AND FLORA.

The greatest challenge for Mauritius is to maintain the areas of high environmental quality that remain, both along the coast and inland, and to take measures to ensure the environmental integrity of the island is enhanced (Halcrow 2002).

Emphasis on Mauritius as a quality "green" destination is central to the TDP policies which are being incorporated into the Draft Revised NPDP. In this regard it is important to understand how golf course development can contribute to this process and how it relates to environmental protection issues.

The general environmental concerns about golf courses in Mauritius have been related to land use and potential pollution from the use of fertilisers and pesticides.

4.1 Conflicting land use and the demand placed on limited resources.

Conversion of agricultural, forest and other undeveloped land into golf projects requires a detailed land planning evaluation conforming to the requirements of the NPDP. These points are being addressed by other studies. This report focuses on the generalities of golf course development.

As individual projects, golf courses do utilise relatively large land areas. This is often a point of public concern, especially where access will be restricted. On large private estates, where there has been no history of public access, this argument would seem to be largely irrelevant.

On an island scale, while the individual golf projects appear large scale – especially when compared with most other tourism developments – even on the most optimistic scenario for developing new golf courses, the land take would be negligible. Say all twelve proposed projects were to proceed, and that each golf course occupied 100 ha. Together with existing courses, this would still only give a total land take of less than 2000 ha., or roughly 1% of the Mauritius land area. In comparison, some 10,000 – 15,000 ha of sugar land is currently being taken out of sugar production.

In environmental terms it is increasingly recognised in Europe that larger, more extensively set out golf courses are in fact better for nature and landscape conservation than smaller, high density developments. These also work better as golf courses, since they allow greater scope for designing around existing topographical and environmental features.

In Mauritius, land resources are particularly sensitive issues. In this respect it may be counter-intuitive to recommend larger land take for individual golf courses. However, if the goal is to create high quality, sustainable tourist facilities, there must be scope for the appropriate level of landscape integration. Within the properties examined, there appeared to be ample scope for allocating sufficient area for sustainable golf course development.

As a general guideline, on suitable sites this would approximate to the order of 75 – 100 hectares for a standard model course (SMC) consisting of an 18 hole golf course (Par 72

6200m), with club house and driving range and assorted practice facilities. Additional land would be necessary for housing and hotel development.

Although land use is at a premium on the island, the realistic level of new golf course development should not impact significantly on agricultural, or protected area policies – five new golf courses in Phase 1, represents a land take of 375-500 hectares. In this respect golf development on marginal sugar land is not in conflict with current and future agricultural policies.

Some general guidelines should also include the use of the golf course itself as a buffer zone between the housing/hotel development and existing natural vegetation, agricultural land use and coastal zones. The positive aspects of a buffering effect will be diminished if the golf course area contains significant and inappropriately designed built development.

4.2 Impacts on water resources availability

Modern golf course development must thoroughly address water resource issues. Unless one can be sure of adequate water supply and appropriate quality – based on a clear understanding of the likely needs of the project over the long-term – it would be ill advised to continue with the development.

Proximity to sensitive aquifers, other critical freshwater supplies, or marine ecosystems, needs to be handled with care. There is a common misperception – both among the public and many professional environmentalists – that chemical fertilisers and pesticides applied to golf courses are likely to leach into ground water or run-off into surface water systems in significant quantities. Such fears are based on a lack of understanding of how turfgrass functions as a form of biological filter and of the quantities and properties of products used on golf courses. Further safeguards can be ensured through intelligent golf course design and effective maintenance schedules, including appropriate turf grass selection, surface water management plans, erosion control, buffer strips, retention ponds, wash pad filters and Integrated Pest Management (IPM) protocols. Nevertheless, public sensitivity is such that even low levels of risk must be handled with utmost care and from a very early stage in the planning process. It would therefore be appropriate to make IPM and related safeguards conditions of planning consent.

There are five potential water sources:

- ❑ Natural freshwater from rivers and aquifers
- ❑ Fresh water from public supply
- ❑ Desalinated water
- ❑ Treated effluent water
- ❑ Sea water

According to the Rivers and Canals Act, the normal flow of any watercourse is shared between land owners according to certain norms and with the prior sanction of the Supreme Court. However, the remaining water before the river meets with the sea can be used provided the ecological flow of the river is left. This flow normally corresponds to 10% of the normal flow. This additional source of water may therefore be tapped for coastal golf course projects.

Concerning aquifers, they constitute the best reserve for the population in case of drought. Moreover, they cannot generally be tapped around the coast due to the higher risk of salt water intrusion.

Desalinated water implies heavy investments for the treatment and discharge of the brine outside the lagoon. It is therefore not recommended to use this source of water for the irrigation of golf courses.

Treated effluent water is a good alternative but only when there is sufficient volume of hotel and resort occupancy to generate the waste water. Obviously much of the initial water usage in the hotels and other facilities must be potable water. Indeed, as marketing assets for the resorts, much of the hotel occupancy may become golf centred, so increasing the demand for drinking water, even if none is directly used on the golf courses.

However, given that several large tourism centres are already in existence or are being developed, there will be significant quantities of waste water produced. These can be treated and recycled for use in landscape irrigation. If the volumes are sufficient to support a golf course as opposed to small areas of passive landscaping, then the golf provides a good option as an economic use of greenspace. This, of course, has to be balanced against higher construction and maintenance costs. Turfgrass is also a good biological filter, so golf courses could perform an additional water quality control before eventual discharge into coastal water systems. However, treated wastewater characteristics will have to be in line with the regulations promulgated under the Environment Protection Act regarding the use of treated wastewater for use in irrigation.

The final possibility is to use sea water directly on the golf courses. This is now conceivable with the modern cultivars of Seashore Paspalum grass. However, this is only possible on established turf. Strong saline water should not normally be applied to young turf during the grow-in phase. Thus, even where alternatives can be considered, the early stages of such projects will still require large quantities of fresh water.

There are also potential long-term concerns about salt accretion in the soil profile. Nobody can be sure how Seashore Paspalum will react over several decades of continual high salinity irrigation, or how this will affect the soil profile and ground water. The best advice currently is to provide regular flushing with non-saline water. In which case, any golf course will have to be able to draw on fresh water supplies from time to time. That means the appropriate related infrastructure will need to be in place, that that will in turn effect the siting of golf courses.

The Mauritian climate does experience periods of extended drought, as well as high rainfall episodes and cyclones. All golf project proposals need to take careful account both of average rainfall and recorded peaks and lows. To be viable, a golf course must be able to access sufficient water during stress periods. It is no good simply assuming water supply will automatically be available. This risk can be minimised by having a variety of water sources available and provision for water storage. Such storage facilities could be integrated into the design of the course, and be designed to create attractive water features. Irrigation management, staff training and turfgrass selection are also critical factors in helping to control one's water requirements.

Case study

Extract from Committed to Green Environmental Statement of Belas Campo de Golf, near Lisbon, Portugal (October 2000)

“Written procedures were compiled for irrigation of the golf course, the main objective being to save water. This also facilitates and benefits the duties of irrigation staff, and avoids mistakes or omissions that would lead to excessive water consumption. Staff adhere strictly to these procedures which include a series of instructions to improve irrigation efficiency, such as: night-time sprinkling; on the spot inspections and daily adjustment of the system if required and in spite of it being modern equipment; detection of leaks; detection of sprinkler breakdowns; manually controlled sprinkling of isolated areas; the timing of irrigation periods and weather conditions, etc. All the staff who operate the system are suitably prepared to carry out their duties effectively.

Monthly water quality analyses are carried out with portable in-house apparatus, of the pH, dissolved oxygen, nitrate, nitrite and ammonia contents. Every six months, or as required, reliable external laboratories are used to provide more complete analyses.

Other measures were taken in order to optimize consumption of water, such as the use of low pressure water pumps and/or air compressors to clean machinery, the planting of trees to reduce losses due to evaporation and wind factors, and the planting of shrubs close to larger trees to be able to use condensation from summer mists that drip from tree foliage. A survey was also made of sprinklers that irrigate unnecessary areas and require replacement. With regard to general water consumption, internal circulars are issued frequently and sent to employees exhorting them to save water at the offices and other areas.”

It is also clear that golf course water management in Mauritius has to be viewed in a wider perspective, integrating the golf development strategy with the overall resort planning. Individual projects cannot satisfactorily address these questions entirely in isolation.

Some comparative figures for golf turf irrigation requirements in a tropical environment and current irrigation of similar areas of sugar cane are given in Appendix 5.

4.3 Turfgrasses and the risk of invasive weeds

The introduction of new plant varieties in Mauritius is a highly sensitive issue, and the National Biodiversity Strategy and Action Plan of the Ministry of Agriculture and Natural Resources should be taken into consideration in this situation. In the case of golf courses in Mauritius the selection of turfgrass types will be of warm season grasses – e.g. *Cynodon spp* (selected cultivars of Bermudagrass), *Paspalum vaginatum* (Seashore Paspalum), *Zoysia spp* (selected cultivars of Zoysiagrass) and eventually *Pennisetum clandestinum* (Kikuyograss) and *Stenotaphrum secundatum* (St. Augustinegrass) for marginal and ornamental area. In this climate, and on the fertile volcanic soils of Mauritius, the inputs required to maintain warm season turf grasses in a suitable condition for high quality golf play, are not high.

Kikuyograss is considered a very invasive weed in most places with the exception of Australia, New Zealand, South Africa, Kenya and a few other countries. In addition it does not form a good quality turf. However, Kikuyograss is already well established in Mauritius, not only on the existing golf courses, park and gardens, but also in the wild. It is likely that common Kikuyograss will be one of the most persistent weeds on future golf course turf.

Among the other grasses: Bermudagrass, Seashore paspalum, Zoysiagrass and St. Augustinegrass show a very good adaptation to soil and climate of Mauritius (especially Zoysia). They are less invasive than Kikuyograss, because they can be managed in a proper

way, but their common types have already colonised the grass vegetation of the island. The varieties selected (named cultivars) are hybrids and propagate by stolons instead by seeds. This means a substantial reduction in their invasive potential.

Appendices 5, 6 and 7 set out detailed tables of agronomic data relating to fertiliser, pesticide and water usage of turfgrasses, the characteristics of warm season grasses and the various environmental benefits of turfgrass in general. Some emphasis is given to Bermudagrass as an example. Due to its overall quality (inter alia density, close mowing, competition, drought tolerance, recuperative potential, fast growth) it is probably the most appropriate turfgrass for use on golf courses in Mauritius. Seashore Paspalum is a good option too, particularly where there are high salt levels in the irrigation water. Seashore Paspalum is, however, a little bit more aggressive than Bermudagrass, so this makes it less suitable from an environmental perspective. Overall the level of risk of Seashore paspalum becoming an invasive weed is very low. In terms of the nutrient, chemicals and water needs there is not much difference between Bermudagrass and Seashore Paspalum.

4.4 Use of fertilisers and pesticides

A typical 18 hole golf course will occupy between 25 and 30 hectares of managed turfgrass, of which only 2 to 2.5 hectares (representing greens, collars and tees) are intensively managed. This represents between 3 and 4% of the overall golf course area.

The chemical inputs on golf turf (fertilisers and pesticides) are significantly less than agricultural uses, both sugar cane and other crops (see Appendix 5).

The apparent high consumption of pesticides on fairways is due to the high rate of Tolclofos metil needed to control *Rhizoctonia* spp diseases (20 kg/ha once a year). This is a worse case scenario and in all probability will not be necessary in most situations. A more reasonable estimate of one treatment per year for just half of the surface area would significantly reduce the chemical consumption. Spot treatments could also be an effective solution to further reduce the amount of chemicals used. The only active ingredient probably necessary is metalaxil because climatic conditions seem to be very favourable to Pythium diseases.

It is important to appreciate that the nature of golf course management is contrary to agricultural production. The aim is not to maximise yield, with high inputs of requisites, it is instead to control growth to a consistent level.

To maintain warm season grasses such as *Cynodon* spp, *Zoysia* spp, *Seashore paspalum* to a high quality standard, a specific strategy to control weeds, disease or insect problems is not necessary. Chemical control will only be done on a curative basis when symptoms are clearly observed, and not as a regular preventive programme. This practice can have a significant effect in reducing the total amount of chemicals delivered on turf.

4.5 The risks of infiltration of fertilizers and pesticides, the possible environmental implications on the surrounding lagoons, impacts on the marine environment and ground water

The lagoon and coastal waters around Mauritius are experiencing pollution from inadequate sewage treatment infrastructure, as well as contamination from agricultural and industrial run-off (chemicals and silt). The greatest on-going threat to the lagoon comes from the built development of tourist facilities – beach frontage hotels and water sports. Golf courses can potentially relieve some of this pressure. In the case of Ile aux Cerfs, this issue became, quite

wrongly, a major focus of attention. The real problem should have been on the matter of natural landscape conservation, golf course quality, access and land use planning.

Turfgrass is a dense vegetative cover, with a complex organic (thatch) layer and root zone. As such, it functions as an effective biological filter, in which the micro-organisms in the thatch and upper soil layers are able to absorb and degrade nutrients and other chemicals applied to the turf. The use of slow release nitrogen sources (which is a standard cultural practice in many golf courses with an environmentally friendly approach to the maintenance) minimises any risk of leaching even on soil very sensitive to this phenomena (e.g. sandy soil).

Thus even intensively managed turf grass areas, which represent only a small fraction of the whole of the golf course area, present negligible threats to ground water systems. A greater risk can be assessed from potential run-off, particularly on steeper sites with high intensity rainfall. Such risks can readily be minimised with a proper golf course design, including the incorporation of buffer zones and retention ponds, drainage, erosion control and surface water management plans. These matters should be highlighted in detailed planning submissions, with provision for long-term monitoring studies to assess any residual impacts of these chemicals on the lagoons, to be carried out at selected locations to take into consideration the specificity of Mauritius.

4.6 Impact of the alteration of land use in respect to changes to habitats, plant diversity and flora and fauna

The globally significant and highly threatened native terrestrial biodiversity of the Republic of Mauritius has been subject to concerted conservation efforts over the last 25 years. Many of these efforts have centred on the management of invasive alien species, which currently pose the greatest threat to Mauritian biodiversity. The National Biodiversity Strategy and Action Plan is being finalised by the Ministry of Agriculture and Natural Resources to address this specific problem in the Republic of Mauritius:

Conservation management in Mauritius can be divided into several categories: Species recovery programmes were initiated because of the desperate state of the populations of particular bird species and have become globally renowned successes, while the programmes for some plants are saving these species from extinction. Weeded and fenced 'conservation management areas' are helping parts of Mauritius' native forest to regenerate and in many cases have been of benefit to native fauna groups. 'Active restoration' techniques, i.e. weeding of areas dominated by alien plants and replanting with native pioneer species, has significantly increased the area of native forest in parts of Mauritius and islet restoration work is securing the precious biodiversity of locations which still contain species and ecosystems no longer found on the Mauritian mainland.

Nevertheless, only 2% of the original indigenous forest cover remains in good condition, while the majority of the island's land area is dominated by sugar cane and other forms of non-indigenous crops and areas of semi-natural vegetation. It is clearly imperative, therefore, that every effort is made to support the conservation of the remaining natural habitats. The future extension of the Black River Gorges National Park area will be a major contribution to this. Beyond the protected areas, there are still significant stretches of secondary forest and scrub, much of it contained within private hunting estates, which has the potential for ecological restoration.

Where courses are proposed for reconverted sugar land ecological impact will be low to non significant. More attention should be given to coastal scrub forests and wetlands as they do

support a range of flora and fauna, even if the majority are non-native to the island. At the very least these areas have landscape value and the wetlands fulfil important hydrological functions.

The Republic of Mauritius is a signatory of the Ramsar Convention on Wetlands. In this context, development on or around wetlands should not in principle be permitted – that includes all types of development, golf course, hotel or other.

Many studies are currently being carried out by the Ministry of Environment concerning the rehabilitation of wetlands in their original pristine state and the acknowledgement of their vital function as filtration systems and areas used by migratory birds which is not normally compatible with major development. There is a presumption against development on wetlands, which will be closely scrutinised by the Ministry of Environment at the EIA level. If a golf project is to get through this stage, it will clearly have to demonstrate that it will not adversely impact on the hydrological and ecological functions of such wetlands.

Other sensitive areas include river mouths, areas near or around Marine Protected Areas (including Marine Parks), areas currently subject to coastal erosion, areas under sugar cane plantation (requiring a land conversion permit), areas subject to land erosion, steep slopes, and areas near the proclaimed National Parks. Likewise the coastal frontage, particularly where mangroves are established, need to be carefully preserved.

It is right and proper that all these environmental concerns are thoroughly examined. In the case of golf courses, there can be a tendency to over-react to perceived impacts and to ignore the capacity of this type of land use to integrate environmental components. Given a sensitive approach to design, construction and long-term management, golf courses can be successfully integrated with these environments and also serve as an ecological buffer from more intensive forms of development. The key, of course, is to ensure such benefits are actually realised, which is not automatically the case. However, in principle, golf courses can be created in a manner that accommodates significant environmental constraints. This general misconception, could easily be catered for by organising meetings with all the stakeholders concerned before a golf project is implemented.

Golf courses, should not have any direct impact on the reefs. The consequential impacts could conceivably be through pollutant discharge, but the risks here are minimal. It is not difficult to install appropriate water quality control points on any outflow from a golf course, to provide a final check and filter. In any case the turf management system should ensure that excess quantities of nutrients are avoided. The Mauritian climate is generally favourable to growing turfgrass without having to resort to significant amounts of chemicals. Most insect pests, for example, can generally be spot treated on a curative basis.

In all other respects, golf courses along the coast can perform useful ecological functions as development buffers in the set-back zone, supplementary habitats for migrant and wintering birds and water quality filters. However, by removing the natural vegetation, there may be some interference with the wind regime in the coastal areas.

Conservation achievements to date have been considerable. However, the size of the areas currently managed is insufficient for sustainable conservation. The challenge is to scale up the level of ecosystem restoration in a way that is technically and financially sustainable. This cannot be done by simply expanding current approaches as hand weeding, which is the major cost of today's restoration activities, would be too expensive if applied alone on a large scale.

If golf courses were to be developed in an extensive, environmentally integrated way, they could become a valuable complement to long-term conservation goals and environmental awareness raising. This is not simply a passive function of golf as a mixed recreational and ecological land

area. There is also the consideration of golf courses being managed environments, with staff and resources on hand to implement and sustain meaningful conservation measures and promote visitor education. Not all golf courses will be suitable for this approach but the opportunity should be seized where appropriate.

4.7 Impact and desirability of landform changes and subsequent damage patterns

While much of the Mauritian landscape is dominated by exotic species, there are nevertheless extensive areas which are undeveloped and which offer a significant natural charm. Their ecological function may be limited but they do have high scenic value.

These areas, notably in the south and south-west, are becoming more and more threatened by encroaching development – tourism and other. This goes to the core of sustainable development, in which the overall appeal of Mauritius as an exotic, tropical island will be successively diminished if it is allowed to be over-developed.

This aesthetic appreciation of landscape value can be hard to regulate, but it must be factored into future planning decisions in the island's remaining undeveloped areas. This should apply to development of any kind, including golf courses. Certainly, golf courses can be the least intrusive form of development in such areas, provided there is sufficient land area within which to accommodate the constraints. But sometimes it is best not to develop at all.

Given the volcanic origins of Mauritius, topography and geology are major considerations in relation to the amount of earth moving (landform changes) possible. European golf course design traditions seek to minimise landform alterations by careful course layout whilst maintaining optimum golfing quality. Some practitioners of the American school tend to seek solutions to topographical difficulties through the use of bulldozer power. This question has to be evaluated on a site specific basis. Availability of experienced contractors and construction specialists together with appropriate construction equipment may have an impact on the quality of the finished product and should therefore be taken into consideration at the design stage. Although the construction of golf courses over the next few years will be limited there is no reason to suppose that they cannot be built by local firms with specialist assistance.

4.8 Impact of atmosphere and noise pollution from vehicles and spraying

Golf is one of the least intrusive forms of activity in this respect. Atmospheric pollution from sugar refining and cane burning far exceeds anything attributable to golf.

5 MEANS OF ACHIEVING SOUND ENVIRONMENTAL PERFORMANCE AND PRACTICES FOR GOLF IN MAURITIUS, TAKING INTO ACCOUNT THE SPECIFIC AND ECOLOGICAL FRAGILITY OF THE COUNTRY.

Golf courses development should take place in a sustainable way in line with the preamble of the Environment Protection Act (2002) and the commitments taken by the Republic of Mauritius at the Johannesburg World Summit on Sustainable Development in 2002.

Depending on how they are set out, golf courses can offer a type of development that accommodates and complements environmental protection policies. Nor do golf courses necessarily have to conform to the same style and character. In this respect, the proposed golf projects should be assessed on a site specific basis, and where necessary modified, in accordance with the differentiated targets of the TDP and NPDP. Thus, in the south and south west, which have been accorded high environmental significance, special emphasis must be given to the landscape and conservation elements of the proposed projects.

Throughout the island particular concern must be accorded to matters of coastal erosion, hydrological function of wetlands and conservation of mangroves. In this regard, sites in Environmentally Sensitive Areas should not be developed at all, or in specific circumstances they could be considered for non-intensive golf course development, whereby the golf courses act as green buffer between the hard development (residential and hotels) and the sensitive coastal and river mouth environments. A study on coastal erosion is currently being carried out by the Ministry of Environment. Moreover, some sites have been identified as wetlands under the Ramsar Convention. The National Biodiversity Strategy and Action Plan (NBSAP) of the Ministry of Agriculture, Natural Resources and Food Technology defines the priorities regarding the wetlands issue. The aforementioned reports, even though fragmented, have to be taken into consideration when projects are set up to avoid them from being rejected at a later stage during the EIA process. In fact, not only the Government, but equally the promoters should be pre-emptive in their approach.

Interestingly, while there are many legitimate concerns about the environmental impacts of golf courses, there are also many corresponding potential environmental benefits from this land use. This is due to the relatively large area of greenspace for any given golf course, the mix of vegetation types, habitats and landscapes that can be integrated into the course, and the inherent flexibility of golf design to accommodate environmental constraints. In addition there is, in mature operation, a permanent, skilled management team looking after the site, who may have the equipment, resources and motivation to ensure the whole site area is maintained in an environmentally responsible manner. First, however, it is essential that the right style of golf course is created in the appropriate sites.

5.1 An environmental framework for locating and assessing new golf projects

In evaluating the environmental impact of golf projects special attention must be given to the following criteria:

- ❑ Current land use and zoning which are described in the National Physical Development Plan (NPDP) and the Outline Schemes for each township and each district.
- ❑ Availability of sufficient, reliable water sources as well as risks of salt water intrusion in the aquifer and surface water courses. Detailed studies must be carried out by the promoters to ensure that there is enough water and that there is no risk of depletion of water resources or salt water intrusion at the operational phase.
- ❑ Protection of undeveloped coastline areas and water courses – buffer zones. Some green areas should be left unspoilt even if predominantly vegetated by scrub and non-indigenous forest. These habitats do have some ecological value.
- ❑ Existing ecological value, both within the site and in a local area context. An ecological assessment of the site should be carried out at the site evaluation stage, prior to embarking on detailed planning and design phase.
- ❑ Existing landscape value, both internally and in a local area context. The high density of population in Mauritius has to be taken into consideration when developments are proposed as the landscape value is of prime importance for leisure purposes as well as to preserve the natural assets of the country.
- ❑ Size of golf course area and amount of naturalised areas to be incorporated – either as existing semi-natural vegetation parcels, or newly landscaped areas
- ❑ Topography and geology - quantity and difficulty of earth moving anticipated and thus erosion potential, landscape modification and cost.
- ❑ Detailed assessment of the soil characteristics and percolation rate as well as the environmental assets and oceanographic characteristics of the adjoining lagoon if applicable.
- ❑ The impacts of the removal of the original vegetation on the scenic value of the original landscape
- ❑ Emphasis on selection of native species groups in areas to be landscaped and/or restored
- ❑ Opportunities for species conservation programmes.
- ❑ Long-term Environmental Management Programme for the golf course and naturalised areas, including provision of appropriate education/training and consultation with specialist environmental advisers (e.g. Forestry Department, Mauritius Wildlife Foundation). N.B. The environment Protection Act (2002) provides for Waste Audits and Waste Management Plans to be implemented for certain type of activities. While not being mandatory; Golf Courses could be subject to this legislation to ensure long term environmental commitment.
- ❑ Sociological aspects and conflicting uses with the local community and the local population. These components of the population should be involved as from the project design stage

This list provides a simplified view of the key environmental aspects to be considered. To ensure that projects are approached in the best manner, more structured guidance is required.

5.2 Golf Course Environmental Impact Assessment

All new golf projects must undergo EIA studies. Under the new Environment Protection Act (2002), these must include details for post-approval monitoring and decommissioning scenarios. To date, the experience of golf project EIAs in Mauritius is limited and sub-standard.

The fundamental criticism of the EIA methodology currently in use is that it is too checklist driven and not at all analytical. EIAs are mostly reactive, primarily to support a project proposal, not independent evaluations. They do little to assess the potential environmental impacts, nor do they help to guide the projects in an iterative way to achieve a higher degree of environmental compatibility.

In respect of ecological issues, EIAs to date tend to underestimate the conservation potential of coastal scrub/forest lands. Although these habitats may be dominated by non-indigenous weed species and introduced fauna, they do have a basic landscape value and have the potential for restoring a more native assemblage of vegetation types. Even in their present state, these sites support large numbers of naturalised bird populations and, notably in wetland areas, attract several migrant species. Golf courses have the scope to rehabilitate parts of these sites and maintain sufficient habitat for naturalised species and restocking of native species.

Landscape, sociological and cultural heritage issues are key components of golf project evaluation, also lacking from rigorous treatment in previous EIAs. It can be too easy simply to collect data and not see the wider context of a given site. The Ile aux Cerfs project had few real technical problems from a strict interpretation of the site data, but in terms of the landscape aesthetics and social amenity value, the site should not have been developed as a golf course. These elements do not appear to have been evaluated and given appropriate weight.

Only part of this omission can be blamed on the project proponents and their consultants. A major difficulty in processing EIAs is in the ability of receiving authorities to assess the reports. It is easy to check, for example, that a list of flora and fauna has been supplied, but harder to assess the significance of the findings.

As golf courses entail specific environmental considerations, there clearly needs to be more detailed guidance specifically for golf course developments. Certainly, the EIA process should be more pre-emptive and form part of the early stage of the projects. Clear guidelines are needed to help promoters and their professional advisers address these issues at the beginning of the development process, and to build environmental criteria into their project plans. At the same time, public officials, including the EIA Committee, need to be better equipped to interpret EIA data and to be able to discuss alternative scenarios on an informed basis.

According to the EPA (2002) Section 18 (o), the EIA should contain “such other information as may be necessary for a proper assessment and review of the potential impact of the undertaking on the environment, people and society”. The Director of Environment may therefore prepare specific Guidelines for the promoters and the EIA Consultants regarding the aspects to be addressed in the EIAs prepared for golf courses. Some initial golf-EIA guidelines are given in Appendix 8.

The new EIA regulations requiring provision for monitoring and Environmental Management Plans are a significant step forward, and need to be used effectively on future golf projects. In particular, golf courses should be considered in the context of the whole development project, and not simply as a playing area. It is essential to take into account the type of housing or hotel development which accompanies the golf layout.

Some general guide lines should also include the use of the golf course as a buffer zone between the housing/hotel development and existing natural vegetation, agricultural land use and coastal zones. The positive aspects of a buffering effect will be diminished if the golf course area contains significant built development. The buffer between the hotels and the natural vegetation should not become a closed restricted area to the local population. Moreover, a detailed vegetation survey should be carried out and included in the EIA to evaluate the environmental impacts of removing this vegetation.

5.3 Environmental restoration projects

The following extracts from a discussion paper by Mauremootoo and Towner-Mauremootoo (2002) illustrate the depth of experience in conservation management present on the island and also their very limited scale to date.

On Mauritius, the remaining native forests are highly fragmented. The majority of remnant patches are situated in the uplands of the south-west of the island, in the 6574 ha. Black River Gorges National Park. Smaller remnants of high biodiversity importance are found in the southeast and the northern mountain ranges. In addition, there are many other small forest remnants which are important for particular rare plants and animals; only a few of these areas are in managed nature reserves. All of the non managed areas of native forest on Mauritius are invaded to some extent by alien invasive woody weeds.

The wide range of activities that make up the conservation programme in Mauritius and Rodrigues can be divided into distinct categories:

- ❑ *Species recovery programmes*
- ❑ *Weeded and fenced conservation management areas (CMAs)*
- ❑ *Active restoration of degraded areas by weeding and planting*
- ❑ *Islet restoration*

After about 25 years of hands-on conservation in Mauritius some of the major achievements can be summarised as follows:

- ❑ *Many of the most endangered plant and vertebrate species have been saved from the brink of extinction*
- ❑ *Most of the endangered plant species of Mauritius and Rodrigues can be propagated*
- ❑ *given sufficient resources most of the remaining endangered species can probably be saved from the brink of extinction,*
- ❑ *The Mauritian forest ecosystems can be restored to something approaching their former state in a relatively short period of time through intensive restoration programmes*
- ❑ *Conservation capacity in Mauritius has increased hugely in recent years*
- ❑ *Mauritius has provided examples of successful conservation efforts which have inspired others in similar 'desperate' circumstances to believe that success is possible*

These conservation achievements are already very impressive, however they are still only working to conserve a very small proportion of the areas that have restoration potential. Currently only 18% of the area of islets that have high restoration potential, and only 2% of mainland areas that have high restoration potential are being actively managed. In the meantime, 'good quality' native forest that is not being managed is very rapidly degrading (Motala, 1999).

It is clear from the evidence of these current achievements, that truly viable populations of endangered plant and animal species can only be assured through scaling up existing efforts. Even if it is agreed that

the scaling up of forest restoration is a desirable goal, it could be argued that this aim is unrealistic given the fact that current approaches to restoration are so labour intensive.

In a limited way the new golf courses proposed in this Golf Development Strategy could contribute to expanding current construction efforts, particularly with regard to restoring areas of native vegetation. By applying the knowledge bank built up by the Mauritian Conservation Foundation, together with the resources available through golf course management, it would be possible to extend habitat restoration projects to a number of new sites. Small sub-populations of key species, notably the Pink Pigeon, could potentially be established within the relative security of golf course natural areas.

Such an approach would have the advantages of spreading the risk of localised extinctions and also spreading awareness of conservation efforts into more accessible areas. Although Mauritius is internationally famous for its endemic wildlife and related conservation efforts, the public is largely excluded from these initiatives. This complementary approach of using golf courses as a form of conservation management areas, could serve to bring these initiatives closer to where people can see them. This could help improve environmental awareness among Mauritian people and tourists.

On all new golf projects, the landscape management planning for the out-of-play areas should evaluate the potential for native vegetation restoration and seek local expert help to implement viable schemes. Moreover, some endemic vegetation schemes could form part of the vegetated areas within golf courses. Golf courses located adjoining to wetlands could be used as a mean for the rehabilitation of the original vegetation cover and therefore attract migratory birds in line with Government Policy of rehabilitating wetlands.

5.4 Agronomic and Environmental research and education

The environmental quality of a golf course over the long-term is dependent on a continual commitment to good management practices. At present Mauritius has no support infrastructure for education and training of greenkeeping staff, nor a research programme for turf grass cultivation and related golf course management issues. Among the key topics to study will be the local adaptation of turfgrass cultivars to the Mauritian climate, and research on the feasibility of using indigenous turfgrasses. Work should be done to make sure no species chosen will become an invasive species problem.

In conjunction with technical schools, research units or the Agricultural faculty of the University of Mauritius a series of training courses should be developed in both environmental and agricultural fields as they relate to various aspects of golf course management. The principal target audiences for these courses should be:

- ❑ Greenkeepers
- ❑ Environmental consultants
- ❑ Public officials

5.5 A golf course Environmental Management Programme

The most effective means of delivering sustained environmental benefits and improvements, is to implement an Environmental Management Programme. This provides a systematic and structured approach to implementing policies, defining priorities, setting targets and monitoring results.

The key management categories to be covered should include:

- ❑ Environmental Management Planning
- ❑ Water resource management
- ❑ Turfgrass management (pollution control)
- ❑ Biodiversity conservation, both terrestrial and marine
- ❑ Landscape and cultural heritage
- ❑ Waste management
- ❑ Energy efficiency
- ❑ Education and the Working Environment
- ❑ Communications and public awareness
- ❑ The involvement of the local communities and the population at large in the process

Details of how this approach works through the European Committed to Green programme for golf courses is given in Appendix 10.

5.6 Green labelling

The Tourism Development Plan aims to for Mauritius to attain certified green destination status by 2020. This is a complex undertaking across the tourism sector as a whole, but it is entirely feasible within the context of golf. Given the market emphasis on Europe, the most appropriate Environmental Management and Accreditation System available in this field is Committed to Green. This would be the best model to adopt, especially as it is recognised by the golf authorities, the environmental community and international agencies, notably the European Union and United Nations Environment Programme.

A further corollary to this ambition for certified green tourism destination is that Mauritius must achieve a quality product across the board. This does not simply mean allowing hotels and similar developments on the basis they are 4 or 5 star plus. There comes a point where over development diminishes the overall environmental quality that is the prime attraction in the first place.

5.7 An environmental-golf pilot project

Creating a pilot project would require the full and enthusiastic support from the project developer and his team, and would have to be designated as a pilot scheme at the pre design phase of the project. A pilot scheme would also require full participation if not co-operation from the planning authorities. A consensual, rather than conflictual approach would be an essential part of the success of a pilot project. The creation of mutually acceptable criteria for development, problem solving and conflict resolution procedures would be required at an early stage together with the appointment of experienced specialists capable of guiding the project through the three main development phases, design, construction and maintenance. The key specialists would be drawn from the developers team, Government Ministries and independent consultants and would include:

Design Phase

- ❑ Management and Tourism specialist to help define the project business plan
- ❑ Golf Course Architect working in close collaboration with environmental specialists
- ❑ Resort Master Planner responsible for the housing and development infrastructure
- ❑ Environmental engineer to take into consideration the environmental prerequisites and constraints at the design stage and for the drawing up of the EIA report (The Environment Protection Act (2002) provides for registered professionals only to be authorised to draw up EIAs)
- ❑ Ecologist to define the ecological value of the site as an input into the EIA report and identification of zones of environmental interest
- ❑ Hydraulic/Irrigation Engineer to source water supply and irrigation design
- ❑ Agronomist to assess turfgrass options and management

Construction

- ❑ Environmental Engineer to monitor conformity to planning permits and EIA
- ❑ Agricultural Engineer to supervise turfgrass sourcing and grow-in period

Maintenance

- ❑ Golf Course Superintendent and trained green keeping staff
- ❑ Agronomist and Ecologist to set up best management practices
- ❑ Environmental accreditation supervisor to establish long term monitoring systems

5.8 Resources and funding

There is considerable experience in Europe and the USA in the field of greenkeeper training, agronomic research and golf-environment management and monitoring programmes. To provide the technical know-how is relatively simple. More problematic is the investment required to fund such programmes. Golf projects are all private sector driven, so it is easy to assume that the funding should come from the projects. However, each project is an individual entity, so does not obviously have an interest in investing on wider issues affecting the golf sector as a whole. This is, of course, a narrow view and in fact each golf course would be well served by having access to good scientific agronomic and environmental advice, qualified green staff and being able to deal with well informed public officials.

In Europe and the USA, where golf is well established, there are significant industry bodies that can support these functions. The governing bodies of the game, the United States Golf Association (in the USA and Mexico) and the Royal and Ancient Golf Club of St Andrews (for the rest of the golfing world) provide considerable funds for research, environmental and educational programmes. In turn their funding derives principally from TV rights for their wholly owned tournaments – the US Open and the British Open.

At national levels this overarching role is normally the responsibility of individual national golf federations. Some countries, such as Sweden, provide a full range of technical support services via the national federation. In smaller countries (in golfing terms), this is not feasible. In the case of Mauritius, there is no well developed indigenous golf culture and the Mauritian Golf Federation is too small a body to take on such responsibilities.

Furthermore, national federations essentially work to support affiliated clubs. In tourism areas, the club structure is especially poorly developed. In this context, Mauritius might best look to the Royal and Ancient Golf Club of St Andrews (R&A) as a possible source of support. However, despite its global governing role within the game, the R&A has only recently begun to extend its technical support beyond the British Isles, and it normally prefers to work in collaboration with the respective national golf organisations. As such the R&A is less likely to support projects aimed at helping the commercial tourism sector.

If, however, the projects were to focus on technical issues such as turf cultivar adaptation, water resource management, environmental restoration on golf courses and educational programmes, each of which could have wider applications, then it would be worth investigating potential support from the R&A and similar grant-giving bodies.

The government of Mauritius also has an interest in supporting these projects. The development of golf is seen as a goal for the tourism economy, and if handled correctly, it can have other important socio-economic and environmental benefits, which are for the general good of the island. So, although individual development projects are all private sector affairs, the long-term health of the golf sector and the related tourism economy, would benefit from some pump-priming support for the government. This might well be matched by institutional funding from bodies such as the European Union, USAID, World Bank, UNEP or UNDP.

In summary, the necessary support services and structures for implementing the Mauritius Golf Development Strategy will need to be sought from a variety of sources:

- ❑ Individual projects – e.g. by way of a levy or bond imposed as part of the planning consent.
- ❑ International golf organisations

- ❑ International funding institutions
- ❑ Government of Mauritius

APPENDICES

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3. BIBLIOGRAPHY
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5. AGRONOMIC DATA
6. WARM SEASON TURFGRASSES – Summary of characteristics
7. TURFGRASS BENEFITS
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APPENDIX 1

Visits, Meetings and Contacts

Project	date of visit	Contact	Questionnaire returned
Wolmar	100902	M Leclezio	Yes
Paradis	100902	M Desvaux de Marigny	
Le Morne	100902	M Taylor	Yes
Bel Ombre	10 & 160902	M D Thomas & M Rey	
Domaine de Chasseur	110902	M O'Reilly	
Belle Mare 1	110902	M Boullé	
Belle Mare 2	110902	M Boullé	
Saint Géran	110902	M Massonat	n/a
Roches Noir	120902	M Piat	
Mont Choisy	120902	M Harel Sr	Yes
Trou aux Biches	120902	M Mamet	Yes
Domaine de Massilia	120902	M Giraud	
Maritim Hotel	120902	M Mohun	n/a
Balaclava: Baie aux Tortues	120902	M Pitot	
Les Salines	130902	M Boullé, M Pilot	
Gymkhana Club	130902	M Blackburn	n/a
Beau Rivage (FUEL)	140902	M de Froberville	Yes
Ile aux Cerfs	140902	M Skinner	
Beau Champ	140902	M Dalais	Yes
Bel Air	140902	M Goldsmith	Yes
Other Meetings or Contacts			
Water Resources Unit	160902	M Pokhun	
Delphinium Consultants	130902	M Kauppamuthoo	
Central Water Authority	130902	M Munbauhal	
Min of Environment	130902	M Ramyard	
MSIRI	130902	M Jhoty	
Mauritian Wildlife Foundation	140902	Dr Mauremootoo et al	
Mauritius Sugar Authority	160902	Dr Rajpati	
Min of Agriculture	160902	Mrs Fong Weng	
Irrigation Authority	160902	M Dabeesing	
Forestry Conservation	160902	M Paupiah	
Min of Housing and Development	090902	Mrs Kim Koo	
Halcrow	09&160902	Ms Porteus	
Black River Gorges National Park	150902	Maut Wildlife Found Staff	
Ile aux Aigrettes Nature Reserve	150902	Maut Wildlife Found Staff	

APPENDIX 2

GLOSSARY OF GOLFING TERMS

APPROACH.	The "approach" is the Fairway area in closest proximity to and in front of the green and which adjoins the collar.
APRON (or COLLAR).	The "apron" is the grassed area (usually approx. 1m in width) immediately surrounding the putting green. The collar is mowed higher than the green and higher or lower than the fairway.
ARCHITECT.	See Golf Course Architect
AUTOMATIC IRRIGATION SYSTEM.	A water application system in which valves are automatically activated either hydraulically, electrically or electronically at times preset by on a controller. The system may or may not be integrated with an automatic sensing unit.
BUNKER.	A bunker is a Hazard consisting of a prepared area of ground, often a hollow, from which turf or soil has been removed and replaced with sand or the like. Grass covered ground bordering or within a bunker is not part of the bunker.
CHAMPIONSHIP COURSE.	A general and often meaningless term used to describe an 18 hole course which is capable of holding a championship tournament, usually associated with longer and more difficult courses (Par 72-4, 6200-6500m, SSS 73-75) and requiring extensive infrastructure, parking and spectator facilities etc. A term often used to give a false and unwarranted impression of quality. Minimum land requirement approx. 70 ha plus infrastructure, and training facilities.
CHIPPING GREEN.	Same as Pitching Green
CLIENT.	The owner, or developer of the Golf Course project.
COLLAR.	See APRON
CONTRACTOR;	The company responsible for the construction of the Golf Course
COURSE.	The course is the whole area within which play is permitted
DOGLEG.	A "Dogleg" hole (or Fairway) is one where the line of play bends to the left or to the right at the "Dog Leg Point".
DOGLEG POINT.	The point at which the line of play turns to the left or right on a dogleg hole usually situated by the course architect in the middle of the Fairway between 220m and 250m in front of the back tee.
DRIVE ZONE.	See LANDING AREA
EXECUTIVE COURSE.	See SHORT COURSE, for which "Executive Course" is a euphemism.
FAIRWAY.	Close cropped grassed area (usually between 30m and 50m wide) between the forward tee and the front of the green, usually mowed at between 12 mm and 30 mm high. No official definition of "Fairway" exists in the "Rules of Golf".
FLIGHT	A "flight" is a number of golfers (between one and four) leaving the first hole and playing the course together at the same time.
GOLF COURSE ARCHITECT.	The designer of all playing areas of the course.
GREEN.	See PUTTING GREEN
GREEN FEE	Cost of a round of golf to a visitor. Used as the basic revenue figure for a commercial golf course. The equivalent of a "fare" or "ticket"

GREENKEEPER.	Usually an employee of the Client responsible for the maintenance of all playing areas of the Golf Course.
HAZARD.	A hazard is any bunker or water hazard.
HOLE.	i. The "hole" is 108 mm in diameter and at least 100 mm deep and is situated on the "Putting Green". By repeatedly striking the ball with a club from the teeing area, the player strives to place it in the hole. ii. The "hole" comprises of all the playing area from the "tee" to the "green". A golf course usually consists of 18 "holes" but 9 hole courses are not uncommon.
LANDING AREA.	The first "landing area" is the area on the Fairway between 150m and 230m in front of the back tee where balls will be expected to land after having been struck from the tee on par 4 and par 5 holes. The second "landing area" is the area where balls will be expected to land following the second shot on par 5 holes, usually between 350m and 430m in front of the back tee.
LINKS.	Level or gently undulating sandy ground near a seashore, usually beside a river estuary with turf covered sand dunes.
GOLF LINKS	A golf course built on links land.
NORMAL COURSE.	A meaningless term, as all golf courses are different. Usually 18 holes. It has come to mean a course that is less difficult than a "Championship Course" and shorter (par 68 to 72, SSS 66 to 73.) Minimum land requirement approx. 50 ha plus infrastructure and training facilities.
OUT OF BOUNDS.	Out of bounds is ground on which play is prohibited, usually indicated with white marker posts
PAR.	Par for each hole shall be fixed by the club (or Golf Course Architect) in relation to the length and playing difficulty of each hole and is fixed within the following ranges: Par 3 (0 - 229m): Par 4 (201 - 457m): Par 5 (402m+)
PITCH AND PUTT COURSE.	Usually a 3, 6 or 9 hole short course with holes up to 75 m long used as a training aid for the short game.
PITCHING GREEN.	A target (green) used as a training facility for the short game.
PRACTICE GREEN.	A Putting green used as a training facility for putting usually situated close to the clubhouse and first tee area.
PUTTING GREEN.	The "putting green" is all the ground of the hole being played which is specially prepared for putting usually mowed between 3 mm and 8 mm and which are usually from 350m ² to 1000m ² in area.
ROUGH.	The "rough" is the area outside the playing area of the hole and is less frequently mown and at a greater height than the semi rough. Usually mown at between 40 mm and 125 mm
ROUND	A "round of golf" refers to the passage of a single person playing the course. Golf course use is calculated in rounds per day, week, month or year.
SEMI-ROUGH.	The "semi-rough" is a grassed area, which is mown, shorter than the rough is but longer than the fairway (between 30 mm and 75 mm) and is a transition zone of approx. 5m to 10m width between fairway and rough.
SHORT COURSE.	A "Short course" consists more usually of only 9 holes, most of which will be par three holes sometimes with one or two par fours and more rarely a par 5 hole. Usually between par 27 and par, 33 Land

	requirement will seldom exceed 15 ha for 9 holes and 30 ha for 18 holes.
SLOPE RATING	Indicates the measurement of relative playing difficulty of a course. The lowest slope rating (USGA) is 55 the highest is 155. A golf course of standard difficulty would have a USGA slope rating of 113.
STANDARD MODEL COURSE (SMC)	Golf Clubs and their courses are very variable in area, length, par and number of holes. The notion of a SMC was developed (J Pern 1999) in order to have a basic comparable yardstick with which to generalise about golf courses. The SMC is an 18 hole, par 72, 6200m long course with a 25 bay driving range, putting green, practice bunker and chipping area on an area of 65 -75 ha.
STANDARD SCRATCH SCORE. (SSS)	The SSS is the score which a scratch player is expected to return in ideal conditions over a measured course.
SUPERINTENDENT	American term for Greenkeeper
TEE.	The tee is a specially prepared grassed area of the hole used for hitting the first shot of each hole. Usually it consists of several areas (or TEEING GROUNDS) usually identified with different coloured markers indicating relative distance from the green. Different tee areas are often also identified by various names- Tiger, Championship, Medal, Men's, Ladies, Beginners etc. Usually mown lower than a Fairway, but longer than the green putting surface.
USGA	United States Golf Association.
WATER HAZARD.	A "water hazard" is any sea, lake, pond, river, ditch, surface drainage ditch, or other open watercourse (whether or not containing water) and anything of a similar nature.
ZONING PLAN.	Local Authority Planning Document

APPENDIX 3

BIBLIOGRAPHY

- ACCOSSATO S., ACUTIS M., CARAMELLINO L. and CROCE P.**, 1988 – Coltivazioni erbacee, Meccanica agraria, Zootecnica – Reda – Roma (Italy).
- BALDONI R. and GIARDINI L.**, 1981 Coltivazioni erbacee – Patron Editore, Bologna (Italy) 1981.
- BALOGH J.C. and WALKER W.J.** (Editors), 1992. Golf course management and construction. Environmental issues, Lewis Publishers MI, U.S.A., 951 pp.
- BEARD J.B.**, 1973. Turfgrass: Science and culture. Prentice-Hall, Englewood Cliffs, N.J., USA.
- BEARD J. B.**, 2002 – Turf Management for Golf Courses – U.S.G.A. Michigan (USA).
- BISHOP D.**, 1990. The dimension of IPM today, Golf Course Management, vol.58 (3).
- BURPEE L.L.**, 1993. A guide to integrated control of turfgrass diseases. I. Cool season turfgrasses. G.C.S.A.A. Press, Lawrence KS, U.S.A., 242 pp.
- BURPEE L.L.**, 1993. A guide to integrated control of turfgrass diseases. II. Warm season turfgrasses. G.C.S.A.A. Press, Lawrence KS, U.S.A., 175 pp.
- CAREW-REID J. et al.**, 1994. Strategies for National Sustainable Development IUCN Earthscan.
- CARPENTER.**, 1995. Limitations in measuring ecosystem sustainability in a Sustainable World. IUCN Gland, Switzerland.
- CARROW R.N., DUNCAN R.R.**, 1998. Salt – Affected Turfgrass Sites – Ann Arbor Press, Michigan, (U.S.A.).
- CEBALLOS-LASCURIAN H.**, 1996. Tourism, Ecotourism and Protected Areas. IUCN Gland, Switzerland.
- CHRISTIANS N.**, 1990. Developing a testing program on the golf course, Golf Course Management, vol. 58 (12).
- COUCH H.B.**, 1995. Disease of turfgrass, Krieger Publishing Company, FL, U.S.A., 421 pp.
- CROCE P.**, 1995. Le essenze da tappeto erboso, Federazione Italiana Golf, 130 pp.
- CROCE P.**, 1995. La costruzione di un percorso di golf, Federazione Italiana Golf, 100 pp.
- CROCE P.**, 1992. Il capitolato d'appalto per la costruzione di un percorso di golf, Federazione Italiana Golf, 53 pp.
- CROCE P.**, 1996. Le pratiche colturali, la manutenzione e la preparazione del budget di un percorso di golf, Federazione Italiana Golf, 133 pp.
- CROCE P., DE LUCA A., et al** , 2000. Tappeti Erbosi – Edagricole, Bologna (Italy).
- CROCE P., DE LUCA A., MOCIONI M.**, 1999. Guidelines for the environment - friendly maintenance of Italian golf courses” Federazione Italiana Golf, Roma (Italy).

CROCE P., DE LUCA A., MOCIONI M., 1999. Guidelines for the environment – friendly construction of Italian golf courses” – Federazione Italiana Golf, Roma (Italy).

CROCE P and MOCIONI M., 2002. Data not published – Torino (Italy).

DE LUCA A., 1997. Le avversità del tappeto erboso, Federazione Italiana Golf, 69 pp.

DELOITTE & TOUCHE 2002. Tourism Development Plan for Mauritius. Ministry of Tourism.

DUNCAN R.R., CARROW R.N. 2000. Seashore paspalum, the environmental turfgrass, Ann Arbor Press, Michigan (U.S.A.).

E.G.A. ECOLOGY UNIT, 1995. An Environmental Strategy for Golf Courses in Europe, Pisces Publications, Newbury.

E.G.A. ECOLOGY UNIT, 1996. An environmental management programme for golf courses, Pisces Publications, Newbury.

E.G.A. ECOLOGY UNIT, 1997. The committed to green handbook, Pisces Publications, Newbury.

ERM, 1999. National Environmental Strategy for the Republic of Mauritius. National Environmental Action Plan for the next decade. Final Report.

HALCROW, 2002. Review of the National Physical Development Plan (NPDP) Sector Working Papers:

- ❑ Agriculture
- ❑ Tourism
- ❑ Physical Infrastructure
- ❑ Environment

Government of Mauritius, Ministry of Housing and Lands.

HAWES K., 1995. The benefits of mixtures and blends. Golf Course Management, vol. 63 (7), 20 – 30

IUCN, 1994. Protecting Nature - Regional Reviews of Protected Areas. IUCN, Gland, Switzerland.

IUCN, 1994. Guidelines for Protected Area Management Categories. IUCN Gland, Switzerland.

IUCN, 1994. Parks for Life. IUCN Gland, Switzerland.

KAHLER K.E., 1991. Responsible strategies for wildlife control, Golf Course Management, vol. 59 (6).

LUCAS P.H.C., 1992. Protected Landscapes. A guide for policy makers & planners. IUCN Gland, Switzerland. Chapman Hall.

MAUREMOOTOO J.R. and C.V. TOWNER-MAUREMOOTOO, 2002. Restoring Paradise: Alien species management for the restoration of terrestrial ecosystems in Mauritius and Rodrigues - current successes and future challenges. Unpublished Discussion paper.

MSIRI, 2001. Annual Report 2001 – Mauritius Sugar Industry Research Institute.

MUIRHEAD D. and RANDO G.L., 1994. Golf Course Development and Real Estate. ULI Washington.

NATIONAL GOLF FOUNDATION. 1998 Golf Tourism Report. USA

NATIONAL PARKS AND CONSERVATION SERVICE, (in preparation). National Biodiversity Strategy and Action Plan for the Republic of Mauritius. Ministry of Agriculture and Natural Resources in collaboration with UNEP and Global Environment Fund.

NUS J., 1995. Potassium. Golf Course Management, vol. 63 (1), 55 – 57.

PEACOCK C.H., SMART M.M., 1995. IPM, Monitoring and management plans – a mandate for the future. U.S.G.A. Green Section Record, May – June 1995.

PERN J., 1999. The Nature of Golf - The conservation role of the golf course in the protection of the European landscape 1999. MSc Research Thesis - University of Wales.

PIRA E., 1997. A Guide to Golf Course Irrigation System Design and Drainage. Ann Arbor Press Michigan USA.

REPUBLIC OF MAURITIUS, 2002. Meeting the Challenges of Sustainable Development. Ministry of Environment.

ROYAL AND ANCIENT GOLF CLUB OF ST. ANDREWS and EUROPEAN GOLF ASSOCIATION, 1997. A course for all seasons. A guide to course management, , 52 pp. R&A St Andrews.

SEVERAL AUTHORS, 1991. State of the Environment Report 1991, Government of Mauritius

SHURTLEFF M.C., FERMANIAN T.W., RANDELL R., 1987. Controlling turfgrass pests, Reston Book, NJ, U.S.A., 449 pp.

SMILEY R.W., DERNOEDEN P.H., CLARKE B.B., 1992. Compendium of turfgrass diseases, APS Press, 98 pp.

SPORTS MARKETING SURVEY. 2000. European Travel Report . UK.

STAUB F. 1993. Fauna of Mauritius and associated flora.

STUBBS D. and J-C Kovacs 1995. Environmental Guidelines for Golf Development in Europe. European Golf Association.

TANI T., BEARD J.B., 1997. Color atlas of turfgrass diseases, Ann Arbor Press, MI, U.S.A., 245 pp.

TASSINARI et al., 1985. Manuale di Agricoltura – Edagricole, Padova (Italy).

TAYLOR R., 2002. Turfgrass Bulletin Ecology Supplement – S.T.R.I. Bingley (U.K.).

VIGGIANI P., 1990. Erbe spontanee e infestanti: tecniche di riconoscimento. Dicotiledoni, Bayer – Edagricole, Bologna (Italy) 271 pp.

WATSCHKE T.L., DERNOEDEN P.H., SHETLAR D.J., 1995. Managing turfgrass pests, Lewis Publishers, Boca Raton, 361 pp

APPENDIX 4

TOURISM DATA

Calculation of the latent demand for add-on golf as a tourism product in Mauritius

Statistics from the year 2000 have been used for population and golf participation calculations. Hotel room and visitor statistics have been taken from the most up-to-date reports for 2001. The table below shows the number of 'regular' golfers in some of the principal markets sending tourists to Mauritius, and the adult population of each country. Using these figures we can calculate the percentage of adults in each market that regularly play golf.

Market	No. of Regular Golfers Aged 20-69* Year 2000	Adult Population Aged 20-69 Year 2000	% Regular Golfers in National Population Year 2000
France	254,000	,000	0.6%
United Kingdom	1,520,000	,000	3.8%
Germany	216,000	,000	0.4%
South Africa	100,000	,000	0.4%
Italy	58,946	,000	0.1%
Switzerland	36,778	,000	0.8%
Belgium	40,074	,000	0.6%
Austria	60,478	,000	1.2%
Australia	1,116,000	,000	9.2%
Spain	174,854	,000	0.7%
Sweden	344,000	,441	6.2%
Netherlands	170,000	,000	1.6%
USA	15,000,000	193,540,000	7.8%
Canada	800,000	20,367,000	3.9%
Total:	19,891,130	491,899,441	4.0%

Sources: U.S. Census Bureau – International Data Base
 PGA Europe
 Sports Marketing Surveys
 National Golf Foundation
 South African Golf Federation

*Where available, the golfers aged under 20 or over 69 were removed from the overall number of golfers in each market.

Addition of Occasional Golfers

It is not only regular golfers who may play the odd round of golf during an tropical island holidays, but also golfers who only play occasionally at home. These numbers are harder to come by and as a general rule of thumb, except where the figures are known, we have said that the number of occasional golfers in a population is equal to the number of regular golfers, therefore doubling the golfing population in each country. For example in the UK it is commonly quoted that 3 million people play golf, but we know that only 1,520,000 adults regularly play golf – so in this case occasional golfers are almost exactly equal in number as regular golfers. The number of occasional golfers has been taken into account in the "weighting factor".

Socio-economic Weighting

Before applying these percentages to the tourist populations visiting Mauritius from each of the above markets, consideration must be given to how representative the tourists are of the overall national adult population, and how similar they might be to the golfing markets in each country.

For example, regular golfers only represent 0.2% of all adult South Africans. However, the socio-economic status of those South Africans holidaying in Mauritius is not representative of South Africa as a whole, and is much more likely to be similar to the average socio-economic status of those South Africans who play golf regularly.

Therefore, we have introduced a 'weighting factor'. Because of the absence in most instances of published socio-economic data for golfers (with the exception of the USA, UK, Germany, France and Sweden), and comparative socio economic data of different nationalities holidaying in Mauritius, this weighting factor has had to be subjective.

Market	% Regular Golfers in National Population Year 2000	Subjective Weighting Factor	Estimated % of Tourists Visiting Mauritius who Play Golf
France	0.6%	6	3.6%
United Kingdom	3.8%	4	15.2%
Germany	0.4%	8	3.2%
South Africa	0.4%	15	6.0%
Italy	0.1%	6	0.6%
Switzerland	0.8%	6	4.8%
Belgium	0.6%	6	3.6%
Austria	1.2%	6	7.2%
Australia	9.2%	2	18.4%
Spain	0.7%	6	4.2%
Sweden	6.2%	4	24.8%
Netherlands	1.6%	6	9.6%
USA	7.8%	4	31.2%
Canada	3.9%	4	15.6%

The Sports Marketing Surveys 2000 European Golf Travel Report showed that the average socio-economic status of golf travellers was significantly different to the norm for golfers in general. Whilst socio-economic figures are not available for tourists visiting Mauritius, this clearly makes golf travellers an even better prospect for tourism to Mauritius. The sample data in the table below shows how golf travellers in Germany differ from German golfers in general.

Criteria	Range	% Swing From the Norm
Socio-Economic Category	AB	+22%
Age	55-64	+26%
Golf Handicap	No Hcp	-56%
Club Membership	Private	+13%
Years Playing Golf	< 2	-89%

We have also had to take into account other factors such as the high percentage of honeymooners visiting Mauritius from, say, the United Kingdom, which may have a reductive effect on the number of add-on rounds played – although this is only speculation.

The weighted percentages can then be applied to the number of tourists who visited Mauritius in 2000 in order to estimate the number of regular golfers within the visiting tourist population.

Market	Estimated % of Tourists Visiting Mauritius Who Play Golf	Number of Tourist Visitors in 2000	Estimated Number of Golfers in Visiting Population – 2000
France	3.6%	198,423	7,143
UK	15.2%	74,448	11,316
Germany	3.2%	52,869	1,692
South Africa	6.0%	48,683	2,921
Italy	0.6%	39,000	234
Switzerland	4.8%	20,473	983
Belgium	3.6%	10,998	396
Austria	7.2%	8,874	639
Australia	18.4%	8,771	1,614
Spain	4.2%	7,226	303
Sweden	24.8%	5,694	1,412
Netherlands	9.6%	4,925	473
USA	31.2%	3,704	1,156
Canada	15.6%	1,812	287
Total:	6.3%	485,900	30,569

This provides a figure of just over 30,000 tourists from these named countries that are likely to play golf either occasionally or more regularly. However, this takes account of only 485,000 out of a total of 656,000 tourist arrivals into Mauritius – the others coming from countries such as Japan, Singapore, Reunion, Seychelles etc. If we assume that only 3% (compared to an average of 6.3% for the previous markets) of the remaining 171,000 visitors play golf, then this adds a further 5,117 golfers amongst the tourist arrivals, taking the total to almost 36,000.

The number of hotel rooms in each tourism zone can be taken as an indicator of the relative size of the catchment area for add-on golf in each region:

Tourism Zone	District	Hotels	Rooms	% of total rooms in Mauritius tourism zones	Significant Golf Catchment Area Yes/No
Northern	Total	35	3,421	41.6%	Yes
	(Pamplemousses)	(18)	(1,990)		
	(Riviere du Rempart)	(17)	(1,431)		
South West	Black River	19	2,141	26.0%	Yes
Eastern	Flacq	16	2,110	25.7%	Yes

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Mahebourg	Grand Port	4	520	6.3%	No
South Coast Heritage	Savanne	1	34	0.4%	No
South West Natural	N/A	N/A	N/A		N/A
Total:		75	8,226	100%	

Whilst it is clear that different nationalities are not equally spread around the island, with some nationalities having preferences for particular regions or hotels, for the purposes of the next treatment we have had to make the somewhat false assumption that each tourism zone attracts different nationalities in equal measure. Differential market preferences can easily be applied to this table if the data becomes available.

Market	Golfers Visiting Mauritius 2000	Northern Zone	South Western Zone	Eastern Zone	Mahebourg Zone	South Coast Zone
		41.6%	26.0%	25.7%	6.3%	0.4%
France	7,143	2,971	1,857	1,835	450	29
United Kingdom	11,316	4,707	2,942	2,980	713	45
Germany	1,692	704	440	435	107	7
South Africa	2,921	1,215	759	751	184	12
Italy	234	97	61	60	15	1
Switzerland	983	409	256	253	62	4
Belgium	396	165	103	102	25	2
Austria	639	266	166	164	40	3
Australia	1,614	671	420	415	102	6
Spain	303	251	157	155	38	2
Sweden	1,412	587	367	363	89	6
Netherlands	473	197	123	122	30	2
USA	1,156	509	312	266	58	6
Canada	287	119	75	74	18	1
Others	5,117	2,129	1,330	1,315	322	20
Total:	35,686	14,845	9,278	9,171	2,248	143

Therefore we estimate that in an average year (2000), approximately 36,000 of the tourism visitors to Mauritius play golf and are therefore potential add-on golf customers.

This is of course ignoring those visitors for whom playing golf is already an important reason for selecting Mauritius – we are referring of course to many of the clients choosing to stay at the Belle Mare Plage Hotel and Le Paradis.

If out of these 36,000 visitors who play golf, 15% elect to play golf during their visit, and if the average number of rounds played by these visitors as an add-on product is 2, then add-on golf can generate 10,800 rounds a year based on current numbers.

If these are then divided up amongst the different tourism zones the numbers are as follows:

Tourism Zone	District	% of total rooms in Mauritius tourism zones	No. of Golf Rounds Played
Northern	Total	41.6%	4,493
South West	Black River	26.0%	2,808
Eastern	Flacq	25.7%	2,776
Mahebourg	Grand Port	6.3%	680
South Coast Heritage	Savanne	0.4%	43
Total:		100%	10,800

A Quick Guide to Golf Tourism Parameters applied to the Golf Development Programme

The parameters are to help determine:

- ❑ what type of golf courses or golf resorts should be built,
- ❑ where they should be built, and
- ❑ when they should be built.

Overall Considerations

All golf course and golf resort developments must be economically viable.

The quality of design and construction must be high and the location and design of each course must complement Mauritius' appeal as an exotic tropical island paradise.

Courses must be environmentally sustainable and must not be approved if they are deemed to degrade an environmentally sensitive area.

Courses must fit into an overall tri-purpose golf development plan designed to maximize revenue from three major golf tourism sectors.

The golf courses must be built in phases to reflect and anticipate the growing demand, but not to overwhelm it.

Business plans of new developments must be tested prior to the accordance of planning permission.

Over-optimistic annual golf round targets in the feasibility studies of golf course developments will lead to the failure to meet return on investment targets. Golf round targets must be scrutinized for financial viability and sustainability.

Business plans must have taken into account the seasonality of golf travel, green fee rates and tee time intervals.

Golf Course Location

Take into account:

- ❑ Proximity to other courses
- ❑ Oversupply
- ❑ Tourism catchment areas
- ❑ Scenic appeal
- ❑ Isolation – where does each project sit on the Strength of Location v. Isolation chart?

Golf Course Design

Four of the most important conclusions drawn by this report are that, prior to approval, all new golf projects in Mauritius must demonstrate that they will:

- ❑ be environmentally sustainable,
- ❑ be economically sustainable,
- ❑ be of a high quality (both measurable and subjective), and
- ❑ deliver value for money that will prove attractive to international visitors.

Are the Courses Addressing one of the Three Key Market Sectors?

The ultimate goal within grasp of Mauritius is to develop golf on the island in such a way that it supports three of the major golf tourism sectors, namely:

- ❑ Add-On Tourism Product Market Sector
- ❑ Single-Centre Golf Resort Market Sector
- ❑ Multi-Course Golf Destination Market Sector

Specifically:

- ❑ Courses must be encouraged to offer an ‘open door policy’ to green fee visitors at competitive rates.
- ❑ Courses depending on ‘add-on’ sales must be well located in one of the 3 tourism catchment areas.

Resident Golf Participation

Domestic participation in golf is both desirable and achievable. Factors affecting the growth of golf for residents include:

- ❑ Accessibility of the courses to residents (club regulations), particularly at weekends.

- ❑ Physical accessibility – road access and traffic considerations at the appropriate time of day and particularly at weekends.
- ❑ Membership fee levels and pay and play green fee prices and availability.
- ❑ Academy and practice facilities.

Social activities and food and beverage facilities for members.

Phase by Phase Development

Even if all the parameters are met by all proposed developments, success will not be achieved if supply vastly outstrips demand. The final objective is to implement a phase by phase golf development strategy that responds to changing situations, anticipates demand, but at no stage overwhelms it.

Annual nutrients on greens (including practice greens):

- N : $0,5 \text{ kg} / 100 \text{ m}^2 \times 10 = 5 \text{ kg} / 100 \text{ m}^2 \times 110 = 550$
- P : $0,2 \text{ kg} / 100 \text{ m}^2 \times 1 = 0.2 \text{ kg} / 100 \text{ m}^2 \times 110 = 22 \times 100 / 44 = 50$
- K : $0,4 \text{ kg} / 100 \text{ m}^2 \times 10 = 4 \text{ kg} / 100 \text{ m}^2 \times 110 = 440 \times 100 / 83 = 530$

Annual nutrients on collars (including practice greens' collars):

- N : $0,5 \text{ kg} / 100 \text{ m}^2 \times 10 = 5 \text{ kg} / 100 \text{ m}^2 \times 32 = 160$
- P : $0,2 \text{ kg} / 100 \text{ m}^2 \times 1 = 0.2 \text{ kg} / 100 \text{ m}^2 \times 32 = 6.4 \times 100 / 44 = 14.54$
- K : $0,4 \text{ kg} / 100 \text{ m}^2 \times 10 = 4 \text{ kg} / 100 \text{ m}^2 \times 32 = 440 \times 100 / 83 = 154.21$

Annual nutrients on tees (including driving range's tee):

- N : $0,5 \text{ kg} / 100 \text{ m}^2 \times 10 = 5 \text{ kg} / 100 \text{ m}^2 \times 121 = 605$
- P : $0,2 \text{ kg} / 100 \text{ m}^2 \times 1 = 0.2 \text{ kg} / 100 \text{ m}^2 \times 121 = 24.2 \times 100 / 44 = 55$
- K : $0,4 \text{ kg} / 100 \text{ m}^2 \times 10 = 4 \text{ kg} / 100 \text{ m}^2 \times 121 = 484 \times 100 / 83 = 583.13$

Annual nutrients on fairways:

- N : $0,3 \text{ kg} / 100 \text{ m}^2 \times 10 = 3 \text{ kg} / 100 \text{ m}^2 \times 1,422 = 4,266$
- P : $0,2 \text{ kg} / 100 \text{ m}^2 \times 1 = 0.2 \text{ kg} / 100 \text{ m}^2 \times 1,422 = 284.4 \times 100 / 44 = 646.36$
- K : $0,2 \text{ kg} / 100 \text{ m}^2 \times 10 = 2 \text{ kg} / 100 \text{ m}^2 \times 1,422 = 2,844 \times 100 / 83 = 3,426.50$

Annual nutrients on semi rough (including driving range's landing area):

- N : $0,2 \text{ kg} / 100 \text{ m}^2 \times 10 = 2 \text{ kg} / 100 \text{ m}^2 \times 1,703 = 3,406$
- P : $0,2 \text{ kg} / 100 \text{ m}^2 \times 1 = 0.2 \text{ kg} / 100 \text{ m}^2 \times 1,703 = 340.6 \times 100 / 44 = 774.09$
- K : $0,15 \text{ kg} / 100 \text{ m}^2 \times 10 = 1.5 \text{ kg} / 100 \text{ m}^2 \times 1,703 = 2,554.5 \times 100 / 83 = 3,077.71$

Source:

Baldoni R. and Giardini L. - Coltivazioni erbacee – Bologna (Italy) 1981

Beard J. – Turfgrass: Science and culture – New Jersey (USA) 1973

Beard J – Turf Management for Golf Courses – Michigan (USA) 2002

Croce P., De Luca A, *et al* – Tappeti Erbosi – Bologna (Italy) 2000

Croce P and Mocioni M. – data not published – Torino (Italy) 2002

Croce P., De Luca A., Mocioni M, – Guidelines for the environment-friendly maintenance of Italian golf courses” Roma (Italy) 1999

COMPARISON OF ANNUAL NUTRIENTS UPTAKE AMONG DIFFERENT CROPS ON A SURFACE OF 100 HECTARES – CROCE P., MOCIONI M. (2002).*				
Crop	Production (mean) in t.	N (kg)	P ₂ O ₅ (kg)	K ₂ O (kg)
Wheat <i>Triticum aestivum</i>	600	17,500	7,200	15,500
Corn <i>Zea mays</i>	1,200	36,000	12,000	24,000
Rice <i>Oryza sativa</i>	650	10,000/13,000	10,000/11,000	10,000/13,000
Soybean <i>Glycine max</i>	350	none	5,000	7,000
Tomato <i>Lycopersicon esculentum</i>	5,000	13,500	5,000	23,000
Potato <i>Solanum tuberosum</i>	2,300	20,000	18,000	18,000
Sugar cane <i>Saccharum officinarum</i>	8,000	10,000/11,000	10,000/12,000	20,000/25,000
Golf course	none	8,987	1,540	7,771

***Source:**

Accossato S, Acutis M., Caramellino L., Croce P. – Coltivazioni erbacee, Meccanica agraria, Zootechnica – 1988 – Roma (Italy)

Baldoni R. and Giardini L. - Coltivazioni erbacee – Bologna (Italy) 1981

Beard J. – Turfgrass: Science and culture – New Jersey (USA) 1973

Croce P. et al. – Tappeti Erbosi – Bologna (Italy) 2000

Croce P and Mocioni M. – data not published – Torino (Italy) 2002

MSIRI – Annual Report 2001 – Mauritius 2001

Several Authors – State of the Environment Report 1991, Government of Mauritius

Tassinari et al. – Manuale di Agricoltura – Padova (Italy) 1985

Taylor R. – Turfgrass Bulletin Ecology Supplement – Bingley (U.K.) 2002

ANNUAL CHEMICALS CONSUMPTION ESTIMATE FOR BERMUDA TURF ON A GOLF COURSE (100 HA) LAYERING ON WELL DRAINED NATURAL SOIL IN A TROPICAL AREA – CROCE P., MOCIONI M. (DATA NOT PUBLISHED) (2002).

Areas	Surface	Herbicides (kg)	Fungicides (kg)	Insecticides (kg)
Greens / Collars	01.42	00.00	61.77	12.78
Tees	01.21	00.00	52.64	10.89
Fairways	14.22	56.88	412.38	42.66
Semi rough	17.03	00.00	00.00	00.00
Rough	12.42	00.00	00.00	00.00
Natural areas	53.70	00.00	00.00	00.00
TOTAL		56.88	526.79	66.33

ANNUAL CHEMICALS CONSUMPTION FOR BERMUDA TURF ON GOLF COURSE PUTTING GREENS AND COLLARS (1.42 HA) IN A TROPICAL CLIMATE – CROCE P., MOCIONI M. (DATA NOT PUBLISHED) (2002)

<u>Trade product</u>	<u>Active ingredient</u>	<u>Herbicides</u> (kg)	<u>Fungicides</u> (kg)	<u>Insecticides</u> (kg)
Tilt 25 EC	Propiconazole (25%)		12.78	
Ridomil gold	Metalaxil (48%)		06.39	
Rovral	Iprodione (50 %)		14.20	
Agrigolf	Tolclofos metil (50%)		28.40	
Carbaryl 50	Carbaryl (49.5 %)			12.78
TOTAL			61.77	12.78

ANNUAL CHEMICALS CONSUMPTION FOR BERMUDA TURF ON GOLF COURSE TEES (1.21 HA) IN A TROPICAL CLIMATE – CROCE P., MOCIONI M. (DATA NOT PUBLISHED) (2002)				
Trade product	Active ingredient	Herbicides (kg)	Fungicides (kg)	Insecticides (kg)
Tilt 25 EC	Propiconazole (25%)		10.89	
Ridomil gold	Metalaxil (48%)		05.45	
Rovral	Iprodione (50 %)		12.10	
Agrigolf	Tolclofos metil (50%)		24.20	
Carbaryl 50	Carbaryl (49.5 %)			10.89
TOTAL			52.64	10.89

ANNUAL CHEMICALS CONSUMPTION FOR BERMUDA TURF ON GOLF COURSE FAIRWAYS (14.22 HA) IN A TROPICAL CLIMATE – CROCE P., MOCIONI M. (DATA NOT PUBLISHED) (2002)				
Trade product	Active ingredient	Herbicides (kg)	Fungicides (kg)	Insecticides (kg)
Tilt 25 EC	Propiconazole (25%)		85.32	
Ridomil gold	Metalaxil (48%)		42.66	
Agrigolf	Tolclofos metil (50%)		284.40	
Carbaryl 50	Carbaryl (49.5 %)			42.66
Turfene L	Dicamba (2.53 %) Mecoprop (40.2 %)	56.88		
TOTAL		56.88	412.38	42.66

*Source:

Baldoni R. and Giardini L. - Coltivazioni erbacee – Bologna (Italy) 1981

Beard J. – Turfgrass: Science and culture – New Jersey (USA) 1973

Beard J – Turf Management for Golf Courses – Michigan (USA) 2002

Croce P., De Luca A, *et al* – Tappeti Erbosi – Bologna (Italy) 2000

Croce P and Mocioni M. – data not published – Torino (Italy) 2002

Croce P., De Luca A., Mocioni M, – Guidelines for the environment-friendly maintenance of Italian golf courses” Roma (Italy) 1999

ANNUAL WATER CONSUMPTION ESTIMATE FOR BERMUDA TURF ON A GOLF COURSE (100 HA) LAYERING ON WELL DRAINED NATURAL SOIL IN A TROPICAL AREA – CROCE P., MOCIONI M. (DATA NOT PUBLISHED) (2002).

Areas	Surface (ha)	Total
Greens and collars	01.42	35,784
Tees	01.21	21,780
Fairways	14.22	337,500
Semi rough	17.03	
Rough	(12.42)	
Natural areas	(53.70)	
Total irrigated areas	33.88	303,102

Greens = 7 mm / day (70 m³ / ha x 1.42 x 360 days = 35,784 m³
 Tees = 5 mm / day (50 m³ / ha x 1.21 x 360 days = 21,780 m³
 Fairways = 3 mm / day (30 m³ / ha x 14.22 x 360 days = 153,576 m³
 Semi rough = 1.5 mm / day (15 m³ / ha x 17.03 x 360 days = 91,962 m³

ANNUAL WATER BALANCE HYPOTHESIS FOR BERMUDA TURF ON A GOLF COURSE (100 HA) IN A TROPICAL CLIMATE ON EAST, SOUTH AND NORTH COASTS IN MAURITIUS – CROCE P., MOCIONI M. (DATA NOT PUBLISHED) (2002)

Water	Input	Output	Balance
Rainfall on 33.88 ha	474,320		474,320
Collected rainfall on 66.12 ha*	92,568		566,888
Effluent water, other sources**	240,000		806,888
E.T. losses		142,296	664,592
Run off losses***		71,148	593,444
Bermuda needs		303,102	230,342
TOTAL			290,342

ANNUAL WATER BALANCE HYPOTHESIS FOR BERMUDA TURF ON A GOLF COURSE (100 HA) IN A TROPICAL CLIMATE ON WEST COAST IN MAURITIUS – CROCE P., MOCIONI M. (DATA NOT PUBLISHED) (2002)			
Water	Input	Output	Balance
Rainfall on 33.88 ha	271,040		271,040
Collected rainfall on 66.12 ha*	52,896		323,936
Effluent water, other sources**	240,000		563,936
E.T. losses		142,296	421,640
Run off losses***		71,148	350,492
Bermuda needs		303,102	47,390
TOTAL			138,380

Source: Ministry of Public Utilities – Water Resources Unit:

Rainfall: 800 mm (west coast); 1,400 mm (east coast); 1,200 / 1,400 mm (northern coast); 1,000 / 1,400 mm (southern coast).

E. T. rate: losses equal to 30 % of rainfall

Run off: losses equal to 60 % of rainfall

* Lakes and basins, but also hydraulic work to collect water (drainage system, proper shaping,...) (about 10 % of total rainfall)

** Effluent water is estimated in a very cautious amount of 800 m³ / day x 300 days. Other sources could include river, groundwater and occasionally seawater.

*** On turf areas constructed in a proper way the run off losses can be estimated very low (ranging from 10 / 20 % of rainfall)

Source:

Baldoni R. and Giardini L. - Coltivazioni erbacee – Bologna (Italy) 1981

Beard J. – Turfgrass: Science and culture – New Jersey (USA) 1973

Beard J – Turf Management for Golf Courses – Michigan (USA) 2002

Croce P., De Luca A, *et al* – Tappeti Erbosi – Bologna (Italy) 2000

Croce P and Mocioni M. – data not published – Torino (Italy) 2002

Croce P., De Luca A., Mocioni M, – Guidelines for the environment-friendly maintenance of Italian golf courses” – Roma (Italy) 1999

Croce P., De Luca A., Mocioni M., - Guidelines for the environment – friendly construction of Italian golf courses” – Roma (Italy) 1999

COMPARISON OF ANNUAL WATER CONSUMPTION AMONG DIFFERENT CROPS ON A SURFACE OF 100 HECTARES – CROCE P., MOCIONI M. (2002).*		
Crop	Production (mean) in t.	Water consumption (m ³)
Wheat <i>Triticum aestivum</i>	600	450,000 / 650,000
Corn <i>Zea mays</i>	1,200	500,000
Rice <i>Oryza sativa</i>	650	1,300,000 / 3,250,000
Soybean <i>Glycine max</i>	350	150,000 / 500,000
Tomato <i>Lycopersicon esculentum</i>	5,000	500,000 / 700,000
Potato <i>Solanum tuberosum</i>	2,300	375,000 / 525,000
Sugar cane <i>Saccharum officinarum</i>	8,000	750,000 / 850,000
Golf course	none	303,102

*Source:

Accossato S, Acutis M., Caramellino L., Croce P. – Coltivazioni erbacee, Meccanica agraria, Zootechnica – 1988 – Roma (Italy)

Baldoni R. and Giardini L. - Coltivazioni erbacee – Bologna (Italy) 1981

Beard J. – Turfgrass: Science and culture – New Jersey (USA) 1973

Beard J – Turf Management for Golf Courses – Michigan (USA) 2002

Croce P. et al. – Tappeti Erbosi – Bologna (Italy) 2000

Croce P and Mocioni M. – data not published – Torino (Italy) 2002

Croce P., De Luca A., Mocioni M, – Guidelines for the environment-friendly maintenance of Italian golf courses” – Roma (Italy) 1999

MSIRI – Annual Report 2001 – Mauritius 2001

Tassinari et al. – Manuale di Agricoltura – Padova (Italy) 1985

Taylor R. – Turfgrass Bulletin Ecology Supplement – Bingley (U.K.) 2002

APPENDIX 6

WARM SEASON TURFGRASSES – SUMMARY OF CHARACTERISTICS

Cynodon spp. (Bermudagrass) – Hybrid bermudagrass (Cynodon dactylon x Cynodon transvaalensis)	
IDENTIFICATION	
Vernation	Folded
Ligule	A fringe of hairs (0,5 – 3 mm)
Leaf sheath	Flattened, split with overlapping
Auricles	Absent
Collar	Continuous, narrow to medium broad
Leaf blade	Flat, < 1 mm wide (transvaalensis) ; flat > 1 mm wide (dactylon)
Growth habit	Stoloniferous and rhizomatous
DESCRIPTION	
Leaf width	Medium to fine
Density	Medium to high
Color	Pale green to dark green
Establishment	Stolons (hybrids); seeds (common bermuda)
CHARACTERISTICS	
Type of soil	Well drained, fine texture, good content of nutrients
pH	6.5 / 7.5
Salinity tolerance	Excellent
Recuperative potential	Excellent
Rate of establishment	Very fast
Wear tolerance	Excellent
Heat resistance	Excellent
Cold hardiness	Poor
Drought resistance	Superior
Shade adaptation	Very poor
Tolerance to waterlogged soils	Good
Diseases tolerance	Medium to low
Insects tolerance	Poor
Water needs	Medium
CULTURAL REQUIREMENTS	
Cutting heights	From 5 to 40 mm
Nitrogen need	N = 0,15 / 0,75 Kg / 100 m ² / 30 days of growing
Evapotranspiration	Low
Thatch control	Necessary

<i>Paspalum vaginatum</i> (Seashore paspalum)	
IDENTIFICATION	
Vernation	Rolled
Ligule	Very small, membranous (0,5 mm)
Leaf sheath	Large compressed, with overlapping
Auricles	Small
Collar	Broad
Leaf blade	Smooth, 2 - 4 mm wide
Growth habit	Stoloniferous and rhizomatous
DESCRIPTION	
Leaf width	Medium to fine
Density	High
Color	Dark green
Establishment	Stolons
CHARACTERISTICS	
Type of soil	Coarse texture, also with poor content of nutrients
pH	6.5 / 8.3
Salinity tolerance	Superior
Recuperative potential	Excellent
Rate of establishment	Excellent
Wear tolerance	Excellent
Heat resistance	Good
Cold hardiness	Poor
Drought resistance	Superior
Shade adaptation	Poor
Tolerance to waterlogged soils	Medium low
Diseases tolerance	Good
Insects tolerance	Medium good
Water needs	Medium
CULTURAL REQUIREMENTS	
Cutting heights	From 6 to 25 mm
Nitrogen need	N = 0,3 0 / 0,45 Kg / 100 m ² / 30 days of growing
Evapotranspiration	Medium
Thatch control	Not necessary

<i>Pennisetum clandestinum</i> (Kikuyugrass)	
IDENTIFICATION	
Vernation	Folded
Ligule	A fringe of hairs (2 mm)
Leaf sheath	Flattened, very hairy
Auricles	Absent
Collar	Continuos, broad, hairy
Leaf blade	Flat, 4 – 5 mm wide
Growth habit	Stoloniferous and rhizomatous
DESCRIPTION	
Leaf width	Medium to coarse
Density	Medium to high
Color	Pale green
Establishment	Stolons
CHARACTERISTICS	
Type of soil	Not well drained, medium texture, good content of nutrients
pH	5.5 / 7.5
Salinity tolerance	Good
Recuperative potential	Excellent
Rate of establishment	Good
Wear tolerance	Excellent
Heat resistance	Excellent
Cold hardiness	Very poor
Drought resistance	Excellent
Shade adaptation	Good
Tolerance to waterlogged soils	Medium low
Diseases tolerance	Medium
Insects tolerance	Medium
Water needs	Quite high
CULTURAL REQUIREMENTS	
Cutting heights	From 20 to 50 mm
Nitrogen need	N = 0,10 / 0,35 Kg / 100 m ² / 30 days of growing
Evapotranspiration	High
Thatch control	Necessary

<i>Stenotaphrum secundatum</i> (St. Augustinegrass)	
IDENTIFICATION	
Vernation	Folded
Ligule	A fringe of hairs (0,3 mm)
Leaf sheath	Flattened, with fringe of hairs
Auricles	Absent
Collar	Continuos, broad, smooth
Leaf blade	Flat, short, 5 - 10 mm wide
Growth habit	Stoloniferous
DESCRIPTION	
Leaf width	Very coarse
Density	Medium
Color	Pale green
Establishment	Stolons
CHARACTERISTICS	
Type of soil	Not well drained, medium texture, good content of nutrients
pH	6.5 / 7.5
Salinity tolerance	Excellent
Recuperative potential	Good
Rate of establishment	Good
Wear tolerance	Medium
Heat resistance	Excellent
Cold hardiness	Very poor
Drought resistance	Good
Shade adaptation	Excellent
Tolerance to waterlogged soils	Medium low
Diseases tolerance	Medium
Insects tolerance	Medium
Water needs	Quite high
CULTURAL REQUIREMENTS	
Cutting heights	From 35 to 75 mm
Nitrogen need	N = 0,20 / 0,50 Kg / 100 m ² / 30 days of growing
Evapotranspiration	Medium high
Thatch control	Necessary

<i>Zoysia spp.</i> (Zoysiagrass). <i>Zoysia matrella</i> (Manilagrass); <i>Zoysia japonica</i> (Japanese lawgrass) ; <i>Zoysia tenuifolia</i> (Mascarenegrass)	
IDENTIFICATION	
Vernation	Rolled
Ligule	A fringe of hairs (0,2 mm)
Leaf sheath	Round somewhat flattened
Auricles	Absent
Collar	Continuos, broad
Leaf blade	Flat, 2 – 4 mm wide
Growth habit	Stoloniferous and rhizomatous
DESCRIPTION	
Leaf width	Medium to fine
Density	Medium to high
Color	Pale green to dark green
Establishment	Stolons (hybrids); seeds (common zoysia)
CHARACTERISTICS	
Type of soil	Well drained, fine texture, good content of nutrients
pH	6 / 7
Salinity tolerance	Good
Recuperative potential	Excellent
Rate of establishment	Very poor
Wear tolerance	Superior
Heat resistance	Good
Cold hardiness	Medium to poor
Drought resistance	Excellent
Shade adaptation	Good
Tolerance to waterlogged soils	Poor
Diseases tolerance	Medium
Insects tolerance	Medium
Water needs	Quite high
CULTURAL REQUIREMENTS	
Cutting heights	From 6 to 25 mm
Nitrogen need	N = 0,20 / 0,4 Kg / 100 m ² / 30 days of growing
Evapotranspiration	Low
Thatch control	Necessary

APPENDIX 7

TURF BENEFITS

1 - Comparative turf use in a golf course (USA)

Turf use	Surface (ha)	% of total surface
Rough, water, woodland	52.65	72.2
Fairways	16.20	22.2
Buildings, parking lots	2.11	2.9
Putting greens, collars	1.01	1.4
Tees	0.93	1.3
TOTAL	72.9	100.0

2 – Soil erosion control

Turf can offer one of the most efficient methods to control wind and water erosion of soil. Menzel (1991) and Gross et al. (1991) reported sediment losses of 10 to 60 kg / ha from turfgrass during a 30 minutes storm that produced 76 mm of rainfall. Under the same storm soil loss for bare soil plots averaged 223 kg / ha.

Other studies (Gross et al. 1990, Morton et al. 1988, Petrovic 1990, Watschka and Humma 1989) have concluded that quality turfgrass stands modify surface water flow so that runoff is insignificant in all but the most intense rainfall events.

The reason of this erosion control provided by turf is the combined result of a high shoot density and root mass for soil surface stabilisation. Mowed turfgrasses have a dense ground cover matrix, with a high shoot density ranging from 75 million to 20 billion shoots /ha (Beard 1973; Lush 1990). Regular mowing, as practised in turf culture, increases the shoot density because of enhanced tillering when compared to ungrazed grassland (Beard 1973).

3 – Enhanced ground water recharge and protection of surface water quality

A mowed turfgrass possesses a leaf stem biomass from 1,000 to 30,000 kg / ha, depending on the type of species, season and cultural practices (Lush 1990). This biomass is composed by a matrix of fine textured stems and narrow leaves with a great number of open spaces. So the matrix is porous in terms of the water infiltration capability. Also turfgrass ecosystems often have a big population of earthworm (*Lumbricidae*) in the range of 200 / 300 /m² (Potter et al. 1985, 1990). Earthworm activity increases the amount of macropore space within the soil, which results in a higher soil water infiltration rate and water retention capacity (Lee, 1985).

A large number of studies have shown the ability of a grass cover to reduce run off, and therefore enhance soil water infiltration and ground water recharge (Bennett 1939, Gross et al. 1991, Jean and Juang 1979, Morton et al. 1988, Watschke and Mumma 1989). In the table a comparison between tobacco and turfgrass (Angle 1985, Gross et al. 1990).

Crops	Water run off losses (per ha, per month)	N run off losses (per ha per month)	P run off losses (per ha per month)
Tobacco (<i>Nicotiana tabacum</i>)	6.7 mm	2.34 kg	0.48 kg
Turfgrass	0.6 mm	0.012 kg	0.002 kg

The reduced run off volume, due to a turfgrass cover, may decrease costly storm water management structural requirements for urban tract development (Schuyler 1987).

4 – Improved bio-degradation of organic chemicals and ground water protection

Because the very big population of soil micro-organisms (due to the composition of turfgrass roots and rhizomes) turf can be considered one of the most active biological systems for degradation of organic chemicals and pesticides. No other crop has a bacterial, fungi and actinomycetes population greater than turfgrass (Smith and Paul 1990).

Type of land	Average microbial biomass (kg / ha)
Arable	700
Forest	850
Grassland	1,090

Microbial biomass values of mowed turfgrasses are not yet available, but are probably even higher because of the high carbon biomass contained in the senescent leaves and grass clipping accumulated near soil and the more favourable soil moisture regime due to irrigation (Smith and Paul 1990).

The material related with turf that can have the potential to occasionally contaminate water supplies are nitrates, pesticides, leachate from landfills and underground storage tanks. A research conducted at Cape Cod in 1989 by EPA (Environmental Protection Agency of U.S.) showed that no currently registered pesticides were detected in groundwater at toxicologically significant levels. In addition the study was conducted under worst conditions with sandy soils, groundwater near the surface and high aquifer permeability. Also the research showed that lower nitrate concentrations in ground water occurred when less nitrogen, slow release nitrogen or both were used. It concluded that good turf management practices can minimise the potential for nitrate movement into groundwater.

Other researches at Pennsylvania State University Environmental Resources Research Institute also found that turfgrass allows water to infiltrate and promote the metabolism of solutes. This support the growing use of golf courses as water quality disposal and treatment sites for effluent water.

So a turfgrass cover can be considered one of the most important filtering systems to protect ground water (Beard 1994).

5 – Soil improvement and restoration

Because of the organic matter additions derived from the turnover of roots and other plant tissues, turfgrasses have a fundamental function in soil improvement. A high proportion of the world's most fertile soils has been developed under a vegetative cover of grass (Could 1968). Falk (1976) estimated the annual root system turnover rate at 42 % for a turf. On this basis 6,761 kg/ ha of root bio-mass would be turned over into the soil each year. This amount of organic matter has a great positive influence on soil structure in terms of fertility and water and nutrients retention.

Accelerated soil restoration of environmentally damaged areas by planting turfgrass (i.e. Perennial Ryegrass, *Lolium perenne*) is employed effectively on highly eroded rural landscapes, burned over lands, garbage dumps, mining operations and steep timber harvest areas. These areas may then be developed as golf courses and recreational areas (Beard 1994).

6 – Enhanced heat dissipation – temperature moderation

Through the cooling process of transpiration, turfgrasses dissipate high levels of radiant heat in urban areas (Johns and Beard, 1985).

Diurnal temperature of four surfaces on an August day in College Station, Texas (Johns and Beard 1985)		
Type of surface	Max. temperature in °C	% temperature increase over green turf
Growing <i>Cynodon spp</i> turf	31.1	--
Dry, bare soil	38.9	16
Dormant <i>Cynodon spp</i> turf	52.2	43
Synthetic turf	70.0	80

7 – Noise and glare reduction

Studies have shown that turfgrass surface absorb harsh sounds as well light reflection, significantly better than hard surfaces (Cook and Van Haverbeke, 1971; Robinette, 1972) or other crops with less density. These benefits are maximised by an integrated landscape of turfgrasses, trees and shrubs.

8 – Favourable wildlife habitat

More than 70 % of a golf course surface is occupied by rough and non play areas. Rough is usually composed by a mix of turfgrass, trees, water, shrubs, flowers. In this habitat a diverse wildlife population can be achieved (Green and Marshall 1987; Maffei 1978, EGA Ecology Unit 1995, 1996 and 1997).

9 – Enhanced physical health of golf participants

The enjoyment and benefits of improved physical and mental health derived from golfing activities on turfgrasses are important. In the U.S. 24 million of golfers can spend more than 2.4 billion hours of healthy outdoor recreation (Beard 1994).

APPENDIX 8

ENVIRONMENTAL GUIDELINES FOR GOLF DEVELOPMENT

[Adapted from Stubbs and Kovacs 1995)

Golf course development is a complex multi-disciplinary process. While technological advances have enabled golf courses to be built and managed virtually anywhere, there are increasingly questions about the environmental, social and economic viability of new projects. These three elements are central to the concept of *Sustainable Golf Course Development*.

A fourth criterion can be added to the list: golfing quality. If a development does not work properly as a golf course, providing a good quality playing surface and a layout appropriately challenging for the intended users, it will fail as a business. Any such failure will have knock on consequences for the environment and the local community.

Thus, the four pillars of sustainable golf course development are all closely interrelated. If any one of these is out of line, it puts into question the entire project. In assessing the suitability of any given project, therefore, one has to be satisfied that all four criteria have achieved a sufficient critical threshold of compatibility.

These guidelines focus on the environmental aspects of this equation. It is not a question of one element being more important than the others, although, clearly, different interests will have their particular priorities. The purpose here is simply to define the environmental criteria and processes necessary for a sustainable golf course development. In the final evaluation these guidelines must be used alongside social, economic and golfing analyses for any given project, or group of projects.

The purpose of Environmental Assessment is to facilitate a more efficient and pertinent permitting process for golf course developments in Mauritius. Golf courses are a special kind of development, and it is appropriate that they are examined on the relevant environmental aspects.

The Environmental Assessment can work at two levels split into four parts. First there is an Appraisal stage, comprising a Project Outline (part 1) and a Site Evaluation (part 2). These provide a simple initial examination, to weed out unsuitable projects before too much investment of time and resources has been committed. Projects successfully passing through this first stage will then be required to submit a Detailed Project Description (part 3) as the basis for a full Environmental Impact Review (part 4). For non-contentious projects this can be a rapid exercise to help identify positive solutions for environmental integration of the golf course.

This same format is suitable for use in formal Environmental Impact Assessment purposes as required for all new golf projects under the Environmental Protection Act (2002).

The longer term goal is that all golf courses developed in Mauritius will be built and managed according to environmental best practice, as part of a wider initiative to promote sustainable tourism in the island. By following these guidelines, the eventual golf courses will be eligible to attain the Committed to Green label of recognition. This is an environmental accreditation system widely used in the European golf sector, and being adapted for other regions of the world.

Environmental Aspects

The term environment encompasses a wide range of disciplines. In relation to golf course development the key environmental impact categories to address are:

- ❑ Environmental planning context - protected areas and other statutory designations, zoning, land use;
- ❑ Water - availability and requirements, water quality and impact on hydrological cycle, including drainage and erosion;
- ❑ Biodiversity - effects on sensitive natural habitats and wild flora and fauna, nature conservation issues and management opportunities
- ❑ Pollution - potential effects from the use of fertilisers and pesticides and waste disposal;
- ❑ Landscape and heritage - visual effects, archaeology and historical context, amenity and cultural values.

It is fundamental that to build a golf course one must first understand the environmental attributes of the site. Golf and the environment can have a strong positive relationship but this is not an automatic consequence of development and the margin between benefit and impact can be slight. It is a key principle of these guidelines that in some circumstances golf course development is inappropriate due to its potential environmental impact, and should therefore not take place. Equally, these guidelines recognise that in many situations golf development can be environmentally beneficial, provided these issues are accorded due care and attention.

The golf course development process typically follows three main stages:

APPRAISAL

- ❑ Understanding the site – this corresponds to parts 1 and 2 of the Environmental Screening Form.

PLANNING AND DESIGN

- ❑ Defining environmental components of project – corresponding to parts 3 and 4 of the Environmental Screening Form.
 - Impact avoidance
 - Detailed environmental design

CONSTRUCTION AND ESTABLISHMENT

- ❑ Site safeguards
- ❑ Implementing initial Environmental Management Programme

1 APPRAISAL

This is the vital first step in the development process and must precede the design stage. Appraisal is not a detailed investigation. There are three primary requirements.

- i) Assess suitability of site
The Appraisal study will provide an initial evaluation of the environmental sensitivity of the proposed development site. Major potential constraints and enhancement opportunities will be identified.
- ii) Identify the key issues requiring further study
The Appraisal study will be able to prioritise the environmental constraints relating to a particular site and identify issues likely to provoke local opposition.
- iii) Scoping of further works
Having identified and evaluated the key issues the Appraisal study will provide a detailed brief for the further environmental studies required.

Environmental appraisal studies should as a minimum cover the following aspects:

Environmental context	Statutory/planning context, protected areas and designations General characteristics and land use Information sources available
Physical environment	Climate, hydrology, soils, topography and land area
Water	Water availability and quality Potential sources of supply Site hydrology
Biodiversity	Natural habitats Flora and fauna Species of conservation concern Nature conservation issues
Landscape and heritage	Landform character Visual constraints Amenity; e.g. public access History and archaeology
Conclusions	Summary of; level of environmental sensitivity of the site in both local and wider contexts; compatibility with golf land use; potential opposition; enhancement opportunities; further studies required.

The value of appraisal is considerable. It is a quick and low cost method of determining project feasibility. The topics listed above provide an essential checklist of factors to be considered. Obviously, none can be treated in depth at this stage but this approach will provide a secure basis for taking a project forward, or in some cases abandoning the development before major cost commitments have been incurred. This type of study requires a high level of expertise and must be undertaken by appropriately qualified personnel.

Site Evaluation

To ensure a more consistent and thorough approach to site evaluation, a checklist and qualitative scoring system has been produced (Appendix 9). This is Part 2 of the Environmental Screening process.

The checklist covers all the criteria necessary to assess the potential environmental compatibility of a proposed golf course development against a series of site specific criteria. It will identify constraints limiting the potential size, configuration and type of golf development. The conclusions will also determine whether a full Environmental Impact Assessment is necessary, or whether a more basic environmental statement can be accepted. If a site is unsuitable for golf course development, this screening process will provide early warning and allow project proponents the chance to abandon, or substantially modify their plans before major expenses have been incurred.

All golf course development should be an iterative process. One cannot examine a site without some idea of the type of development proposed, yet detailed project plans should not be produced until one has clearer information on the site's suitability. Accordingly, the Site Evaluation Checklist should be used in parallel with the *Project Outline* description (part 1).

2 PLANNING AND DESIGN

The appraisal studies (environmental, social, economic and golfing) will have helped formulate the overall golf development concept for the site. The next stage is to define a much more detailed project description, based on the knowledge that there are either no major environmental constraints, or at least that potential problems have been factored in to the project planning process.

From an environmental perspective, the first priority is to avoid unnecessary and significant impact to ecosystems, the landscape and heritage features. Mitigation measures to accommodate environmental constraints need to be described. Impacts that cannot reasonably be avoided must be compensated, and finally, thought should be given to environmental enhancement opportunities. There are many cases where golf courses can achieve net environmental benefits but quite often these opportunities are not fully appreciated.

Impact avoidance

All projects, no matter how minimally constructed, involve modification of land use and management. This inevitably has some environmental effects which need to be understood and taken into account. The precise scope and level of detail required of an environmental assessment will be a function of site sensitivity, its size and the scale and nature of the proposed golf project. These points should have been assessed in the Appraisal phase.

At the simplest level a basic assessment is adequate. As sites and projects become more and more complex, effectively rising up a sensitivity gradient, the level of detail required becomes more substantial. There is no cut-off point between a basic and a detailed study, since each case is unique. A single format for such studies has been defined, which provides a consistent basis for an environmental assessment at whatever level of detail is appropriate to the circumstances of the golf project under examination.

<u>Recommended sequence of specialist environmental input</u>		
1	Scoping (analysis of appraisal)	Define and agree brief for environmental assessment Determine initial design briefs
2	Field survey and research	Most variable aspect in terms of time and cost and relates to level of detail required
3	Outside consultations (to evaluate site)	Planning authorities, statutory agencies and Non-Governmental Organisations as appropriate
4	Initial findings	Draft environmental statement
5	Project team liaison	Consideration of impact amelioration and mitigation measures
6	Masterplan	Agreed project details for planning submission
7	Impact assessment	Analysis of residual impact of proposals balanced with environmental management proposals
8	Enhancement proposals	Outline environmental management proposals
9	Planning submission	Environmental Statement submitted as planning support document

This procedure is applicable at all levels including where a statutory Environmental Assessment is required. It must be stressed that Environmental Assessment is not a negative exercise merely focusing on problems and constraining development opportunities. Correctly used it is an invaluable planning tool and an integral component of the design process. Instead of being considered as an external exercise, a well-planned development will have factored-in the cost of such studies. Even in situations where very detailed studies are required, they represent a small fraction of the overall development cost. Moreover, if properly followed through, the environmental management recommendations should provide significant cost savings. The essential rule is that if the project is economically viable, then the environmental components will not be a cost problem. If, however, the cost of environmental aspects become too great, one should question the overall feasibility of the project.

Environmental expertise

Two further issues need to be raised here. First, the lack of relevant golf project experience among environmental consultants, particularly in relation to the ecological aspects of golf courses. Secondly, the difficulty of interpreting environmental data in respect of golf courses, both by consultants and the competent planning authorities.

It is obvious that the golf course design should be done by a professionally qualified and experienced golf course architect. By the same token, the golf development project must have as part of the professional team, experienced golf-environment experts, who can assess the real environmental constraints and express the potential opportunities. It is not sufficient simply to commission a local environmental consulting firm to do a standard Environmental Assessment. There must also be the ability to interpret the data in relation to golf courses.

It may be that the standard professional Environmental Assessment report does the limited job of advancing the planning consent process. However, few such reports go beyond this to offer realistic solutions to the environmental issues encountered, and to give developer clients the added value of achieving a more sustainable project.

In commissioning environmental studies during the project planning phase, developers should, therefore, take care to be clear on the precise brief of the studies and their longer-term application. Emphasis should be put on golf project experience, especially a demonstrable knowledge of the environmental aspects of golf course construction and operational management.

As golf development is new in Mauritius, this form of expertise is lacking. Initially it can be overcome by using international consultants but a better long-term solution would be to train locally based environmental scientists to carry out these functions. Given the significance and complexity of environmental aspects in the development and management of tourist resorts around the island, it would be logical for the Ministry of Tourism and the Ministry of Environment to work together to support such a training programme.

[N.B. Mauritius is part of the Secretariat of the East African Coastal Area Management (SEACAM) initiative, who's focus is on capacity building in environmental management along the coastline - see www.seacam.mz. This might be a further source of support for training programmes.]

Environmental Assessment Review

The Site Evaluation provides a first stage screening of projects. The next stage in this process is to carry out an Environmental Impact Review of projects which have passed through the first stage. This aims to assist developers and their consultants to identify and address relevant issues, and also to assist competent authorities in the evaluation of the overall environmental impact potential of a proposed golf course development project.

The checklist (Part 4) covers all the potential environmental impact categories associated with golf course development. Many of the points included here relate to operational management issues. This is deliberate. One of the commonest faults of golf development is where courses are designed and built without sufficient thought to future maintenance. The eventual environmental performance of a new golf course will be judged on its operational management – e.g. in terms of consumption of water, energy, fuel, materials and the generation of waste, as well as ecological integration. To maximise the environmental benefits and to minimise waste of resources, it is important to assess these aspects during the planning phase.

This should also ensure that a Head Greenkeeper/Superintendent is employed on the project team from an early stage, while the plans and decisions are still being discussed. Items such as the choice of turfgrass, which are fundamental to the eventual quality of the golf course, are frequently made without sufficient consideration of the maintenance budget, or the levels of play that can be sustained. The location and design of the maintenance facilities are another critical choice for the efficient and safe operation of the golf course.

Some developers may seek to avoid or minimise this component of the project planning. This should be resisted because it represents a false economy. If these aspects are not addressed correctly at the beginning it becomes very expensive and environmentally disruptive to change things later. From the point of view of planning authorities and the general public, one can have greater confidence in a project that is able to answer this checklist fully, and conversely one should question projects that are unable or refuse to supply such information.

An Environmental Assessment is not a major additional burden on the development process. Having followed the Site Evaluation Checklist through the Appraisal stage, the project will have been screened for environmental sensitivity. Difficult projects will obviously have to pay close attention to environmental aspects in order to proceed any further. In which case, this format will contribute to a formal Environmental Impact Assessment.

In the case of environmentally compatible projects on less sensitive sites, these will be virtually assured of proceeding. Here the interest is to ensure appropriate environmental benefits and to maximise the quality and cost-effectiveness of the future golf course. In all situations it is clearly sensible to give thought to long-term management well in advance.

Detailed environmental design

An Environmental Management Plan should be prepared to provide the basis for the future integrated golf, ecology and landscape management of the site. This is essential for ensuring the correct assimilation of the environmental enhancement opportunities into the project.

However, this is not an additional requirement on the golf course development process. It essentially replaces the traditional landscape architecture approach with a more environmentally acceptable, holistic process. Furthermore, ecological management processes derive from the natural ecology of the site and do not impose artificiality. The wider

environmental issues, such as waste and energy conservation, will be key parts of the overall sustainability and cost-effectiveness of the project.

An Environmental Management Plan is a responsive and adaptable tool, which will benefit from advisory input from the landscape architect, agronomist, golf architect and head greenkeeper. In this way it will form an integrated golf course management programme following the principles of 'Best Management Practice'.

An Environmental Management Plan covering the period from pre-construction site preparation to mature operation, should provide details on the following points:

<u>Context</u>	Site description, priority environmental issues, regulatory framework
<u>Aims</u>	Environmental Policy Statement, with priorities and targets
<u>Management responsibilities</u>	Establishing management supervisory structure and green staff training programme
<u>Recording and monitoring</u>	Documentation of progress of management programme, and revisions to plan on basis of results and any agreed policy changes.
<u>Reporting requirements</u>	Feedback to local authority and accountability to public
<u>Timing of works</u>	Schedule of management tasks: short-term task list and long-term phasing of programme
<u>Technical categories</u>	Water resource management Nature conservation Landscape and cultural heritage Turfgrass management Waste management Energy efficiency
<u>Environmental Performance Indicators</u>	Measurable benchmarking tools

The format and technical categories listed above follow the Committed to Green system. Any new golf project following this approach would automatically be eligible to apply for full Committed to Green recognition, once the golf course becomes fully operational.

3 CONSTRUCTION AND ESTABLISHMENT

This is the critical stage during which any mistakes will cause actual environmental damage and long term management difficulties. The key here is to ensure continuity of environmental input so that the safeguards and anticipated gains will be implemented correctly.

Environmental input during Construction and Establishment phases

Effective implementation of environmental safeguards and management proposals will depend on the following points being undertaken:

- Briefing:** The site engineer and contractors must be fully briefed by the golf architect and environmental consultant to ensure that the objectives of the construction programme are understood.
- Staking out:** The golf architect and environmental consultant must review together the full staking plan on the ground to agree any final adjustments before construction work commences.
- Clearance:** All vegetation to be cleared must be marked in advance and checked by the golf architect and environmental consultant.
- Tracking:** A routeing system for all site vehicles must be agreed and enforced. No-go areas identified in the environmental assessment must be clearly marked and explained to contractors.
- Earthworks:** Spoil heaps must be limited to designated sites.
- Before earthworks on slopes and adjacent to wetlands can be undertaken, appropriate erosion controls and silt traps must be in place.
- Management:** Environmental consultant to oversee all ecological management operations;
- continual protection of sensitive areas;
 - landscape planting;
 - any operations in wetland areas;
 - implementation of landscape maintenance programme
- Environmental consultant, Agronomist and Head Greenkeeper to liaise over implementation of full Environmental Management Programme
- Liaison:** There should be regular project team meetings throughout the construction and establishment phase.
- Reporting** Information on progress of the environmental programme should be communicated to the local authority at regular intervals and made publicly available.

APPENDIX 9

FORMAT FOR A GOLF PROJECT ENVIRONMENTAL ASSESSMENT

The preceding sections of these guidelines have set out the general principles and procedures for integrating environmental considerations into the golf development process. The specific tool for achieving this is set out in the in four numbered sections below.

Part 1: Project Outline

This provides an initial overview of the concept of the proposed project: its overall scale, feasibility data relating to the intended market, development costs and revenue projections, a project justification and timescale.

Part 2: Site Evaluation

This follows a checklist of key, site-specific physical, environmental and socio-economic parameters, and an evaluation of alternatives. A qualitative scoring system has been developed to help identify priority issues and constraints. In this way, the site evaluation results will determine the scope for further environmental studies related to the project. Where major environmental constraints are flagged up at this stage, the project may require substantial modification, or possibly be abandoned.

Part 3: Detailed Project Description

Drawing on the site evaluation results the project moves into the detailed design phase. The Detailed Project Description format seeks precise information on a wide range of issues, such as: land use areas, the golf course construction specification, water use, irrigation, turfgrass, waste treatment, flood risk evaluation and anticipated employment numbers. All well-planned projects should be capable of providing this information.

Part 4: Review of Environmental Impact Categories

This is the critical Environmental Impact Assessment section. Instead of following the usual descriptive checklist approach of EIAs, this format is based around potential impact categories, such as: water pollution, ecosystem disturbance, soil contamination, noise... In this way the project environmental consultants have to evaluate the project content against relevant impact categories and demonstrate that these issues have been properly addressed.

To comply with good Environmental Assessment practice, this review also contains sections on methodology, environmental management planning, enhancement measures and decommissioning.

The following sections have been numbered, so they can be replicated in a standard EIA form if required. These notes can therefore be used as guidance for completing each section of the form. They should also inform the receiving authorities about the type of information they should be seeking.

PART 1 PROJECT OUTLINE

This first section aims to flesh out the basic concept of the proposed project. The information will be preliminary and more details will be required in section 3. Here the purpose is to understand the main components of the project, to be able to match them with the site evaluation in Part 2.

1.1 GOLF CONCEPT

Main attributes of the proposed golf course(s).

1.1.1 Number of holes

1.1.2 Length of course (m) and par

1.1.3 Practice facilities

1.1.4 Total golf course area (ha)

There are no strict rules here but a general guideline for a standard 18 hole golf course (with club house, driving range and maintenance facilities) should be a minimum of 75 hectares. The greater the land area, the more scope there is for accommodating environmental constraints and realising ecological and landscape enhancement opportunities.

1.1.5 Total turfgrass area (ha)

This figure, compared with the total golf course area will indicate how much scope there is for landscaping and natural environmental features to be incorporated into the project.

1.1.6 Style of golf course

There are many types of golf course. They may variously be described as: 'standard' golf course for beginners and/or club golfers; resort course; championship course; urban parkland (i.e. within existing or new residential areas); natural style (integrated into existing rural landscape), links (coastal, primarily dune landscape); heathland; forest; upland; wetland; or a combination of these.

1.1.7 Intended level of usage

Anticipated number of rounds per annum. Indicate starting level for first years and expected time to reach desired level.

1.1.8 Open to public?

Will green fees be available to non-members/non-residents? If so what level of availability and pricing is anticipated?

1.2 ANCILLARY DEVELOPMENT

Many golf projects are associated with tourist resort facilities, real estate and/or commercial developments. In such cases it is important the Environmental Assessment encompasses the entire project site and does not just look at the golf course element, even if the hard development is planned for later stages.

Outline details of the number and dimensions of each type of planned development.

1.1.9 Other sports and leisure facilities

1.1.10 Hotel and restaurants

Include self-catering apartments, other short-term accommodation rentals

1.2.3 Residential

1.2.4 Commercial

1.2.5 Other

1.3 MARKET

Sections 1.3 to 1.5 provide an overview of the economic feasibility of the project.

1.3.1 Local

1.3.2 Tourism

Hotel, rental villas and/or day guests. Indicate proportion of international visitors and key originating countries to be targeted.

1.3.3 Private membership

How many club members will be accepted? What playing rights will they have?

1.3.4 Tournaments

Many new golf projects purport to be of championship golf courses. Realistically there are few opportunities to attract significant professional tournaments. If that is the intention, how will such expectations be realised?

1.3.5 Mixture

Indicate proportion of different customers to be attracted.

1.4 GOLF DEVELOPMENT BUDGET

1.4.1 Land purchase/lease

1.4.2 Planning (surveys, EIAs, permits...)

1.4.3 Golf course design

1.4.4 Golf course construction

1.4.5 Club house

1.4.6 Ancillary development

1.4.7 Estimated annual golf course maintenance budget

1.5 FINANCIAL PROJECTIONS

Provide estimates of the following, indicating where possible the basis for these projections.

1.5.1 Membership fees

1.5.2 Green fees from real estate owners

1.5.3 Green fees from apartment/villa/condominium renters

1.5.4 Green fees from hotel guests

If the golf course is part of a golf hotel resort, what percentage of guests (and what percentage of room night sales) are expected to be generated from the golf tourism industry, where golf is the main reason for the visitor choosing to stay at the resort?

1.5.5 Green fees from local residents pay and play

1.5.6 Green fees from international visitors

1.5.7 Percentage of annual golf operational and development costs to be covered by direct golf course revenues

These include green fees, membership fees, retail sales, food & beverage sales.

1.5.8 Percentage of real estate sales to be generated as a result of the accessibility to an on-site golf course

1.6 PROJECT JUSTIFICATION

This section examines how the proposed project fits into existing planning policy frameworks, local/regional/national strategic plans, and how it will benefit the wider community.

1.6.1 Compatibility with land use zoning

1.6.2 Compatibility with government policies

1.6.3 Community benefits

These could include improved recreational facilities, increased accessibility, trade, local asset values, employment, retraining, landscape and environmental quality, protection of land against further development. It is important to state which benefits will be most significant and how they will be sustained. The potential environmental benefits of golf courses, such as habitat conservation and restoration, erosion control, improved air and water quality, should be explained in the context of the site in question. They are not automatic benefits in all cases.

1.7 TIMESCALE

1.7.1 Intended construction start time and anticipated duration works

Assuming planning consent is achieved, when is it planned to start construction? Are there any seasonal factors which may affect timing and duration of construction? Indicate timing of each phase if project to be developed in phases.

PART 2 SITE EVALUATION

This section corresponds with the appraisal stage of the project development process. It provides for a simple analysis of the site conditions to determine the basic environmental compatibility of the proposed project and to highlight key issues to be addressed. As such, this exercise will identify the scope of further Environmental Assessment work to be carried out. In this way Environmental Impact Assessment reports can be tailored more accurately to the prevailing circumstances, and contribute to a more streamlined and cost-effective process.

There are many categories included here but it is not intended to be a detailed and exhaustive study at this stage. It should be treated as an annotated checklist covering all key areas.

2.1 ENVIRONMENTAL PLANNING CONTEXT

It is important to establish whether there are any statutory or land use related obstacles to golf course development. While a site may intrinsically be appropriate for golf development, and potentially beneficial to the environment, politically the project could be a non-starter, or much more time consuming and expensive, due to planning classifications.

2.1.1 Land classification

Is there any formal land use planning classification for the site? Does this cover part, or all of the site, and does it extend over a larger area. Are there any related planning policies that would preclude or limit golf course development?

2.1.2 Existing land use(s)

What is the present occupancy and use of the land?

2.1.3 Neighbouring land use(s)

What is the land use on neighbouring properties?

2.1.4 Site history

How has the site been used/managed previously?

2.1.5 Contaminated land

Is there any evidence of hazardous materials being present on the site? If so, how would golf course development deal with this issue?

2.2 PHYSICAL ATTRIBUTES

Here the primary question is whether the site is practical for golf course development. The physical constraints of size, shape, soil, geology, topography and aspect, will have a significant bearing on the feasibility of golf course construction.

2.2.1 Site area and configuration

Total area (in hectares) and shape of site. A conventional 18-hole golf course and related facilities would be expected to require in the order of 75 – 85 hectares. Areas approaching 100 hectares would be preferable and still realistic.

2.2.2 Soil characteristics

Soil type, average depth, pH, chemical composition, electro-conductivity and drainage characteristics, are vital considerations for the long-term management and viability of the golf course.

2.2.3 Geology

Underlying rocks and stability of site. This will have a strong bearing on construction costs and methods.

2.2.4 Topography and range in elevation

Degree of undulation will considerably affect design and construction costs, risk of erosion and direct impacts on vegetation/habitats. Totally flat sites are uninspiring but can be remodelled into more appealing golf landscapes, but at some considerable cost.

2.2.5 Aspect

How does the site relate to prevailing winds. This has a major bearing on water use and design of irrigation systems.

2.3 CLIMATE

2.3.1 Rainfall

Annual and seasonal averages and variation.

2.3.2 Flood risk

What frequency of flash flooding occurs and how much of the site is likely to be affected?

2.3.3 Prevailing wind

Is wind a major feature of the local weather pattern? How frequent and with what strength?

2.3.4 Evapo-Transpiration values

Peak values and over what period?

2.4 WATER

Each Golf Course Site Evaluation audit should examine the following points:

2.4.1 Hydrology

Occurrence and flow of water through site. Here attention needs to be given to potential flash floods across the site and proximity to aquifers and/or the sea. What is the periodicity, severity and extent of flooding? Describe natural drainage patterns, catchments and outlets.

2.4.2 Water supply

What is the main intended source of irrigation water? Initially and over time. How will this be guaranteed and will there be seasonal fluctuations?

2.4.3 Potential for alternative water supplies

Can the project utilise a mix of treated waste water, desalinated water, sea water or other supplies?

2.4.4 Potential for water storage

How and in what quantity will irrigation water storage be provided?

2.4.5 Existing water quality

Have there been chemical analyses of the intended water supplies for the golf course irrigation? If so how might the results affect turf management practices?

On coastal sites there should also be a test of marine water quality. This is important if the course drainage discharges to the sea, or if seawater is used for irrigation, or coastal lagoons are constructed. Key parameters include salinity, DO, pH, turbidity, SS, BOD, Total N, PO₄-P, E-coli, TP, and Chlorophyll-a (a biomass indicator for algae).

2.5 BIODIVERSITY

The Site Evaluation Checklist covers the following points in this category:

2.5.1 Existing habitats/vegetation on site

Is there any natural vegetation on the site? Are there any coastal habitat features of note – mangroves, sand flats, cliffs...

2.5.2 Surrounding habitats/vegetation

Does the site abut onto sensitive areas?

2.5.3 Conservation/protected area designations

Is the site partly or wholly protected by any form of official nature conservation designation? Are any such areas adjoining or close to the site boundaries? Would golf course development be capable of maintaining favourable conservation status in these areas?

2.5.4 Presence of protected/sensitive species

Is the site known to support any rare or statutorily protected species? Are they resident or seasonal? How sensitive are they likely to be to the anticipated land use change and related disturbances? Although the desert environment is generally sparse, there are some species particularly associated with arid habitats. These are not likely to tolerate tourism development.

2.5.5 Position in a bio-geographic unit

The entire Red Sea Coastline lies along a major bird migration route. Within this, there may be particular sites which already serve as stopping-off points during the migration season, or are noted vantage points.

2.6 LANDSCAPE AND HERITAGE

This is a largely subjective category with strong cultural influences on how the 'look' of a golf course can affect the appearance and appreciation of a landscape. Existing vegetation and variations in landform and aspect impart a particular character to any given site. These aspects need to be noted and put into context. Likewise, Mauritius has many artefacts of early settlement and agricultural activities. These can have a cultural heritage significance.

2.6.1 Landscape context – internal and external

What are the landscape types within and around the site? How would a golf course development integrate within this setting? Would the golf course be distinctly visible from neighbouring areas?

2.6.2 Historical artefacts

Are there any historical features on the site: e.g. buildings, roads/paths, traditional agricultural, cultural or landscape features. How can they be accommodated within a golf course setting?

2.7 SOCIAL ENVIRONMENT

It is important to look at the human environment affected by a proposed golf course, how the site and the new land use would be perceived by the local community.

2.7.1 Public access

Is the site fenced or currently open to public access, either informally or along designated paths? Do people use the site itself, or as a means to access other areas, such as a shoreline or to see some heritage feature. Potential closing off of open areas is one of the commonest and most critical sources of local objection to golf course development.

2.7.2 Local employment potential

Golf courses can generate employment but how much of this can be drawn from the local area, and how many staff will need to be brought in from outside?

2.7.3 Local availability of supplies and materials

Can the construction and eventual management of the golf course be achieved using local sources of supplies and materials? The less transporting of goods the better from an environmental perspective. However, local origin should not necessarily override better quality products from further afield if their overall durability and cost-effectiveness is better.

2.7.4 Proximity to other golf courses

The presence of other golf courses and proposals for new courses in the area needs to be taken into account. There may be concerns over cumulative impact of a series of projects, which might not be apparent from individual projects. This could cause wider socio-economic and environmental impacts.

2.8 SERVICES AND INFRASTRUCTURE

These are important questions for the economic viability of a project but also relate to the potential disturbance during construction, both on and off-site.

2.8.1 Roads and services, crossing or adjoining site

Major services and infrastructure could cause safety issues and problems with design and construction.

2.8.2 Availability of power supplies

Is there a readily available power supply or will the development require additional power infrastructure to be installed? What scope is there for self generating renewable energy?

2.8.3 Sewage treatment

How will sewage waste be dealt with? Is there a local sewer system to plug into, or will the development include its own sewage treatment plant?

2.8.4 Distance from aggregate and sand quarries

Over what distance will construction materials have to be transported?

2.8.5 Road access

Accessibility is a key part of a project's viability. This also leads to questions of air and noise pollution from additional/longer vehicle movements.

2.8.6 Public transport

Is there scope for staff and visitors to use public transport? This may include shuttle buses from hotels and transport hubs.

2.9 ALTERNATIVES

It is important to consider these questions at an early stage, as this may avoid more complex arguments further along the planning process.

2.9.1 Options for other forms of development

How else might the site be realistically developed? Have other projects ever been proposed? On what criteria have the different alternatives been assessed and rejected?

2.9.2 Most environmentally friendly solution

Which alternative offers the best environmental fit, even if this is not the current project?

2.9.3 Likely fate of site without development

If the project does not proceed, will the site continue to be managed as at present or left abandoned? Are there non-development related alternative land uses: e.g. recreation areas.

PROJECT ENVIRONMENTAL COMPATIBILITY RATING

A simple qualitative scoring system can be used to evaluate each point on the checklist.

<u>Verdict</u>	<u>Symbol</u>	<u>Comment</u>
Good	+++	Fully compatible with golf course development.
Adequate	++	Generally compatible but more detail required.
Weak	+	Low compatibility with golf course development but without significant environmental impacts.
No	X	Inappropriate for golf course development. Major environmental impacts likely.
Not applicable	N/A	

It is important to treat these as a guide only. Not all points on the checklist are of equal significance. It would therefore be wrong to try to sum the respective evaluation scores. The best approach is to use the checklist as a ready visual means to identify major potential impact concerns. From this it may be possible to decide to continue with the project, but with appropriate caution, or to modify the whole concept, or even to abandon the scheme.

Taking account of all the responses to the preceding checklist:

- Does the site appear to be capable of supporting golf course development?
- If so, does the present project proposal fit the site profile?
- Is there sufficient detail known about the project to make a confident assessment of its environmental compatibility?
- Should there be a full EIA provided with the detailed planning application, or will a more basic environmental report suffice?
- What are the critical issues highlighted in this appraisal study?
- What are the anticipated environmental benefits?

In this way key issues can be screened out at an early stage before irreversible commitments have been made.

PART 3 DETAILED PROJECT DESCRIPTION

This section is largely self-explanatory and descriptive. It sets a detailed framework against which to assess the environmental impact categories covered in section 4.

3.1 LAND USE AREAS

Describe golf course layout – routing plan, location of infrastructure and related facilities. Provide figures in hectares, metres or square metres as appropriate for the following:

3.1.1 Golf course dimensions

Length of course, driving range size (area and number of bays), bunkers (total area and number), practice green.

3.1.2 Turfgrass areas

Distinguish the area of intensively managed turfgrass (greens, tees and fairways) and extensively managed turfgrass (semi-rough and rough).

3.1.3 Irrigated area

Distinguish total area of irrigated turfgrass and irrigated landscaping areas.

3.1.4 Lakes/reservoirs

Note how many water bodies, their surface area and capacity (m³). Indicate what type of water (fresh, saline, treated) will be held in each water body and how they will be supplied. Also mention any temporary (seasonal) water bodies and covered reservoirs.

3.1.5 Buildings

Provide dimensions for club house, maintenance compound, other buildings and structures (e.g. bridges).

3.1.6 Roads and parking

Indicate roads to be built or incorporated into the project and size and location of parking facilities.

3.1.7 Formal landscaping

Areas to be directly planted.

3.1.8 Undeveloped/natural

Areas to be left undeveloped. Indicate whether and how much these will be undisturbed during construction and operation, or whether they will constitute natural landscaping areas as part of a habitat restoration programme.

3.1.9 Total site area (100%)

The overall project area. Indicate whether the golf course is considered all or part of this. This will enable a check on the relative proportions of different project elements.

3.2 FLOOD CONTROL AND STORMWATER DRAINAGE

3.2.1 Flood control

How will flood events be managed and what affect will they have on the golf course?

3.2.2 Stormwater drainage

How and to where will stormwater be discharged? Rationalise the locations of the golf holes in relation to the drainage areas and potential flood risk.

3.3 GOLF COURSE CONSTRUCTION SPECIFICATION

3.3.1 Volume of earth movement

The quantity of cut and fill is often a good indication of the likely environmental impact of a golf course. Minimal earth moving reduces risk of erosion, loss of vegetation, soil structure damage and landscape impact. Where high quantities are proposed, these need to be justified against such environmental criteria.

3.3.2 Source and quantities of materials

Provide description and quantities for root zone medium (greens and tees); sand (greens, tees and bunkers); gravel; topsoil; grass (seed or stolon)

3.3.3 Green construction type

USGA specification or variant?

3.3.4 Use of non-peat alternatives

3.3.5 Drainage

3.3.6 Configuration and lining of constructed water bodies

Describe bank profile and depth of constructed water bodies and lining and bank materials to be used.

3.3.7 Type and length of cart paths

What surface materials will be used? How do these blend into the landscape?

3.4 WATER USE INFORMATION

3.4.1 Requested volumes

Water consumption is a critical issue. All project proposals will be closely assessed on their anticipated water requirement. This should be presented in terms of peak average and peak maximum usage, and the overall annual total volume required. This should be further broken down to show the proportion of recycled, treated or saline water to be used. For new facilities, where there is little existing infrastructure, the proportion of treated waste water is likely to be low to start with and increase over time as the development matures.

3.4.2 Length of peak period

Show clearly which weeks/months are considered peak period for water consumption. Can the envisaged supply sources cope with the peak demand over an extended period?

3.5 SEWAGE LOAD AND USE OF TREATED WASTE WATER

While it is increasingly common practice to use treated waste water on golf courses, this cannot be assumed automatically. The feasibility of recycling waste water depends on the amount of waste initially being generated, the quality of the treated water (level of treatment) and how much treated water will be available at given times. In hot climates, the peak irrigation requirement may coincide with a dip in visitor numbers (because it is too hot), so it may be unwise to rely too much on this source.

3.5.1 Estimated sewage load from development

3.5.2 Level of treatment

3.5.3 Volumes of treated waste water to be provided

Indicate likely seasonal variations.

3.6 IRRIGATION SYSTEM

The design and specification of the irrigation system will be crucial in determining the ultimate water use efficiency of the project. Key factors include the spacing, number and type of sprinklers, the type of materials used (i.e. are they prone to malfunction in hot, dusty, saline conditions?), the level of control to provide differential irrigation across the site and having an appropriate pumping system.

3.6.1 Type and configuration

3.6.2 Materials to be used

3.6.3 Control systems

3.6.4 Pumping plant

3.7 TURFGRASS SELECTION

Describe type and provenance of turf cultivars to be used on different areas of the golf course. Indicate special attributes of each turf grass (e.g. disease resistance, salinity tolerance, nutrient and water requirements...) that have guided this selection.

3.7.1 Greens

3.7.2 Collars

3.7.3 Tees

3.7.4 Fairways

3.7.5 Semi-rough

3.7.6 Rough

3.7.7 Other (e.g. practice ground)

3.8 MAINTENANCE FACILITY

This is an aspect frequently overlooked in golf course design. Functionally it is best to have the maintenance compound equi-distance from all corners of the site, thereby reducing travelling time for greenstaff and wear and tear on machinery.

A good maintenance compound must also have a filter and trap system for washpad run-off and to contain any spills or leaks from fuel tanks and pesticide handling. Attention should be paid to bunding of fuel tanks, sealed, yet ventilated storage of chemicals and other hazardous products, adequate sheltered storage space for greens equipment and workshop facilities.

As a central workplace, staff changing rooms, shower facilities and common room/canteen need to be incorporated. medical and emergency equipment must be provided. By paying attention to such details in the design stage, significant long-term cost savings can be made.

3.8.1 Specification for maintenance facility

3.9 EMPLOYMENT

Provide following data on anticipated employment numbers and recruiting policies.

3.9.1 Total full-time

3.9.2 Total part-time/seasonal

3.9.3 Greenkeeping staff (FT/PT)

3.9.4 Number from local area

3.9.5 Number previously employed in agriculture or related rural jobs

3.10 ACCREDITATION

There is no obligation for golf courses to subscribe to one or more accreditation systems but they can be a good tool for improving management efficiency, identifying cost-savings and gaining PR and marketing advantages. There are two golf-specific programmes, in Europe Committed to Green, and in North America the Audubon Cooperative Sanctuary Programme. Both of these have wider international applications. Other systems such as ISO14001 and the European Commission's EMAS are widely recognised as general industry standards.

3.10.1 Green label system to be followed

State which, if any, system is to be applied, and give target timescale for achieving accreditation.

PART 4 REVIEW OF ENVIRONMENTAL IMPACT CATEGORIES

This section provides the detailed environmental assessment. Rather than being a descriptive checklist of a project proposal, the focus here is on examining each golf project according to relevant impact categories.

Against each impact category the proponent should indicate all anticipated impacts, including whether they are likely to be long or short term, strategic or local, direct, indirect or cumulative, reversible or irreversible. The first phase (Site Evaluation) of the process should have identified likely priority issues to be assessed. These should be given prominence, while lesser impacts should be mentioned but only given space in proportion to their perceived importance. Impacts due to construction should be distinguished from those anticipated in normal operation. Any uncertainty in prediction should be made clear.

For each identified impact there must be a statement on proposed mitigation measures, including steps taken first to avoid impact, then how impacts will be minimised and the likely effectiveness of these methods.

Despite mitigation, some residual impacts and/or unavoidable impacts may occur. These must be justified against anticipated benefits of the project and compensatory enhancement measures.

4.1 ASSESSMENT METHODOLOGY

4.1.1 Baseline data

Literature reviewed.

Field surveys and data collection methods – note duration, timing and methodology of field survey.

Highlight limiting factors – uncertainties, omissions, out of season or out of date material.

What further studies will be conducted to remedy limitations?

4.1.2 Consultations

Who has been contacted about the project – statutory bodies, NGOs, local community.

Means of contacting relevant interests – leaflets, public display, questionnaires, letters, direct meetings.

Provide a summary of responses, including issues raised, evaluation of relevance and how they are being addressed within the project.

4.2 ENVIRONMENTAL MANAGEMENT PLANNING

4.2.1 Environmental Policy Statement

The Owner and/or Development Company should provide an Environmental Policy Statement. This should highlight priority issues and form a credible long-term commitment to sound environmental management.

4.2.2 Environmental Management Plan

An Environmental Management Plan (EMP) should be documented for the facility to include establishment phase and mature operation. It should cover all the relevant environmental management categories over a specified timescale. Ensure there will be sufficient resources to implement the programme.

4.2.4 Monitoring and review procedures

The EMP must provide for regular monitoring, specifying how and when this will be carried out. Allow for a full review of the EMP every 3 years in mature operation.

4.2.5 Environmental training programme

What measures are being taken to ensure that greenkeeping staff are competent for the tasks they have to perform? How will continuing professional development be assured?

4.2.6 Environmental reporting

Will environmental performance data and an evaluation of progress be communicated in a publicly available format? At what frequency? Is there any provision for independent verification? Environmental reporting is part and parcel of any good accreditation system. It can also be undertaken in its own right, but its value depends on transparency and credible verification.

4.3 WATER RESOURCE CONSUMPTION

4.3.1 Anticipated water consumption

How does the requested volume of water to be used (see 3.4) relate to supply availability, other demands on water supplies, the total area to be irrigated and choice of turfgrass?

4.3.2 Water supply source(s)

Are the intended water supplies the most appropriate ones for golf course irrigation on this site? How reliable year round are these supplies?

4.3.3 Water storage provision

What provision is to be made for storing irrigation water? How and when will this water be collected?

4.3.4 Recycling provision

Will surface runoff and subsurface drainage water be recycled into the irrigation system?

4.3.5 Irrigation system

Is the proposed irrigation system appropriate for the site, climate, the intensity of use and water quality? The configuration of sprinklers must ensure efficient irrigation coverage.

4.3.6 Turfgrass

Is the choice of turfgrass appropriate for the climate, the quality of water to be used, maintenance budget and the levels of play envisaged.

4.4 WATER POLLUTION AND EUTROPHICATION

4.4.1 Fertiliser programme

Provide details of proposed turfgrass management programme for quantity, type and frequency of application of fertilisers. Estimate absolute quantities and rates per unit area. This should cover establishment and operational phases.

4.4.2 Pest management programme

Provide details of proposed pest management programme, noting: scouting, tolerance thresholds, cultural methods, biological methods and chemical use. On latter note policy regarding type of pesticide (including toxicity and solubility), application methods and whether preventative or curative.

4.4.3 Buffer zones

Give details of presence and width of buffer zones (no-spray zones) around water features and sensitive areas.

4.4.4 Water quality monitoring provision

What type and frequency of water quality control methods are to be used?. These should apply both to irrigation water supply and any outflow from the golf course into water systems.

4.4.5 Potential impacts of utilising treated waste water

How will the golf course management accommodate variable quantities and differential qualities of water made available from treatment plants?

4.4.6 Potential impacts on marine and coastal systems

Risk evaluation for nutrients and pesticides to contaminate marine systems, noting safeguards to be applied.

4.5 ECOSYSTEM/BIODIVERSITY DISTURBANCE

4.5.1 Impact on existing habitats

How will the golf course modify/affect existing habitats? This should take account of the site location with respect to nearby sensitive habitats, as well as internal details of proposed golf course layout and construction methods. What proportion of site will be left undisturbed?

4.5.2 Impacts on key species

Are there any protected, rare or sensitive species known to inhabit the project site or its immediate surrounds? If so how does the project take account of these?

4.5.3 Habitat continuity

How will habitat continuity be maintained/achieved? The preservation of open space is an important consideration within golf courses.

4.5.4 Sensitive areas: buffer zones and sanctuaries

What provision is there to safeguard sensitive areas during construction phase and in mature operation?

4.5.5 Habitat management, creation/restoration

How will habitats be managed, including creating new habitats or restoring existing or previous habitats, either on site or elsewhere?

4.6 LANDSCAPE AND HERITAGE IMPACTS

4.6.1 Integration into local landscape

What measures have been taken to minimise the visual impact of the golf course? This should include assessment of existing landscape character – landform, vegetation, structure, aesthetic quality etc. – and landscape design component of project (spatial relation of project elements, utilisation of existing landscape features, vegetation and topography). Emphasise selection native plants whose water and nutrition requirements are appropriate for the site.

4.6.2 Historic features safeguards

Are there any historical features on the site? If so, how will they be protected and preserved?

4.6.3 Use of local natural materials

To what extent will local materials – stone, wood, sand etc. – be used in construction and fitting out the golf course?

4.6.4 Light spill

How will light pollution be minimised?

4.7 SOIL CONTAMINATION

4.7.1 Erosion safeguards

Is there a risk of soil erosion? If so how will it be minimised? This is normally most acute during construction and early establishment phases. Key safeguards may include minimising earth moving, vegetation clearance and installing silt fences and terraces.

4.7.2 Construction controls

What safeguards will be in place to ensure that construction work does not impact on areas and features that are supposed to be protected? This can be determinant in the eventual environmental success of a project. Strict control on vehicle tracking routes and top soil dumps will be essential. The site manager should be fully versant with the Environmental Management Programme and be in regular liaison with the environmental consultant.

4.7.3 Spill containment facilities

How will fuel and chemical spillages be contained: during construction and in mature operation? Have any accident protocols been defined?

4.7.4 Storage of hazardous products

How will hazardous products be stored securely? Who will have access to these materials?

4.8 NOISE POLLUTION

4.8.1 During construction

What is anticipated duration of construction phase, how many days per week and which hours will be worked? How many heavy plant will be used – include haulage trucks coming and going from site? Is this likely to affect residential areas or ecologically sensitive areas?

4.8.2 During operational management

Is any provision being made for using quieter maintenance machines and limiting times of activity near residential areas?

4.9 AIR POLLUTION

4.9.1 Dust control

How will dust be minimised?

4.9.2 Pesticide application methods

How will spray drift and volatilisation be avoided?

4.9.3 Fuel types used

Does the maintenance equipment specification state preference for machines using cleaner fuels?

4.9.4 Emissions

Do all heating, air-conditioning and refrigeration appliances conform with air emission standards: e.g. using non-ozone depleting and 'greenhouse' gases?

4.10 SOLID AND HAZARDOUS WASTE PRODUCTION

4.10.1 Fate of construction waste

What type and proportion of construction waste will be reused/recycled? Include material from site clearance and building material waste

4.10.2 Provision for waste separation

What waste separation streams will be provided during construction and in mature operation? Is there a target for recycling of construction waste?

4.10.3 Waste minimisation policy

How will waste generation be minimised at source?

4.10.4 Clippings policy

How will grass clippings be disposed, or composted?

4.11 ENERGY RESOURCE CONSUMPTION

4.11.1 Bio-climatic architecture

What energy saving features are being incorporated into building design and/or renovation related to the golf course?

4.11.2 Golf course maintenance efficiency

Is the maintenance compound located conveniently for accessing all parts of the golf course?
Is the maintenance facility a new build, or conversion of former agricultural building or similar?

4.11.3 Materials and purchasing policy

Is there a green procurement policy and how will this be applied during construction and operation?

4.11.4 Use of renewable energy sources

What opportunities are there for using renewable energy supplies?

4.12 SOCIAL IMPACTS

4.12.1 Access issues

Is there any existing public access on the site and how will the development affect this? Has account been taken of safety issues?

4.12.2 Traffic generation

Will the project cause local traffic congestion?

4.12.3 Local employment opportunities

How many local people will be employed overall and what proportion of senior staff will be from the local area?

4.12.4 Use of traditional skills

Will the golf course promote the use of traditional rural skills?

4.13 ENHANCEMENT MEASURES

Enhancement measures should be distinguished from mitigation measures which are integral to the project and form part of the proposal.

4.13.1 Outline of proposed enhancement measures

Provide details of scale and nature of the enhancement works, their duration and how they will be sustained in the long term.

4.14 DECOMMISSIONING

Golf courses are typically intended as permanent facilities. However, fashions and business cycles do vary over time and it is possible that some golf courses may become redundant. Or, there may be other pressing needs to reconvert the land to agricultural use. In this context, how reversible is the development likely to be? This is a particular concern on agricultural land. The more complex the infrastructure and the greater the amount of landform modification, the less revertible the land is likely to be.

4.14.1 Potential for restoration of site to original state at end of project life cycle

How may the site be restored, or converted to other uses if necessary?

OVERALL GOLF COURSE ENVIRONMENTAL IMPACT RATING

Environmental evaluation is not a hard science. There are many subjective elements and this rating system has to be treated as guidance, not as a fixed scoring method. Different situations will lend priority to particular issues. The overall Environmental Impact Rating, will therefore demand careful judgement. It cannot be a sum of the individual ratings, but these will help form an overall impression. The presence of any categories scored as 'Bad' should alert decision makers to be aware of severe problems. Any decision to allow development in such circumstances would need to be justified in this context.

<u>Verdict</u>	<u>Symbol</u>	<u>Comment</u>
Good	+++	Positive environmental effects.
Adequate	++	Generally positive but some points need to be considered in more detail.
Neutral	o	No discernible environmental effects
OK	x	Minor environmental effects.
Concern	xx	Significant impacts can be mitigated.
Bad	XXX	Major environmental impacts. Changes required.
Undetermined	?	Insufficient detail given.
Not applicable	N/A	

ANNEXES

A full golf project planning submission, complete with its Environmental Assessment should provide the following supplementary information as annexes to the main report.

1 Bibliography

- Reference material used in compiling the Environmental Assessment

2 Consultees

- Contact details of organisations and individuals consulted

3 Plans

- Topographic Plan (Scale 1/1000 or 1/2000 with 1 metre contours)
- Vegetation Plan
 - Existing
 - Clearance (trees and other vegetation) - surface areas
 - Planting (trees and other vegetation)
- Ecological Zones – Conservation areas and habitat restoration
- Golf Course (location of holes and surfaces areas of: greens, tees, fairways, semi-rough, rough and bunkers)
- Earthmoving (areas and approximate (+-10%) quantities of cut and fill)
- Water Management
 - Surface (ditches, gully pots etc)
 - Drainage
 - Irrigation zones
 - Lakes -surface areas, lining, overflows
 - Erosion control

4 Supplementary data sets

- Water source quality analyses (+ marine water quality analysis for coastal projects)
- Water Consumption (peaks and averages -daily, monthly and annual projections)
- Evapo-Transpiration rates
- Soil analysis
- Trees - species and quantities to be planted (indicate native/exotic)
- Grass - cultivars (greens, collars, tees, fairways, rough)

5 Ecological survey data

- Vegetation – annotated list of flora including conservation status and evaluation
- Fauna – annotated species lists of key taxonomic groups including conservation status and evaluation

APPENDIX 10

ENVIRONMENTAL MANAGEMENT SYSTEM FOR GOLF COURSES

The basis for effective environmental management of golf courses is built around the concept of Environmental Management Systems. These are well established tools enabling companies and organisations to develop appropriate policies, procedures and measures to integrate environmental considerations into their day-to-day operational management. When implemented properly, an EMS can be a very cost-effective contribution to the running of a business or organisation.

The Committed to Green system, developed by the European Golf Association Ecology Unit is a golf specific Environmental Management Programme. It was based on the same structure as official international systems such as EMAS and ISO14001, but was tailored to the particular circumstances of golf courses. Committed to Green is more than just a management system, it provides for measurable improvements in environmental performance. It has the following attributes:

- ❑ Voluntary participation
- ❑ Commitment to continual improvement of environmental performance
- ❑ Independent verification
- ❑ Public reporting of results

Although developed within a European context, Committed to Green is perfectly adaptable to golf courses in other parts of the world. This is, therefore, a suitable model for golf courses in Mauritius

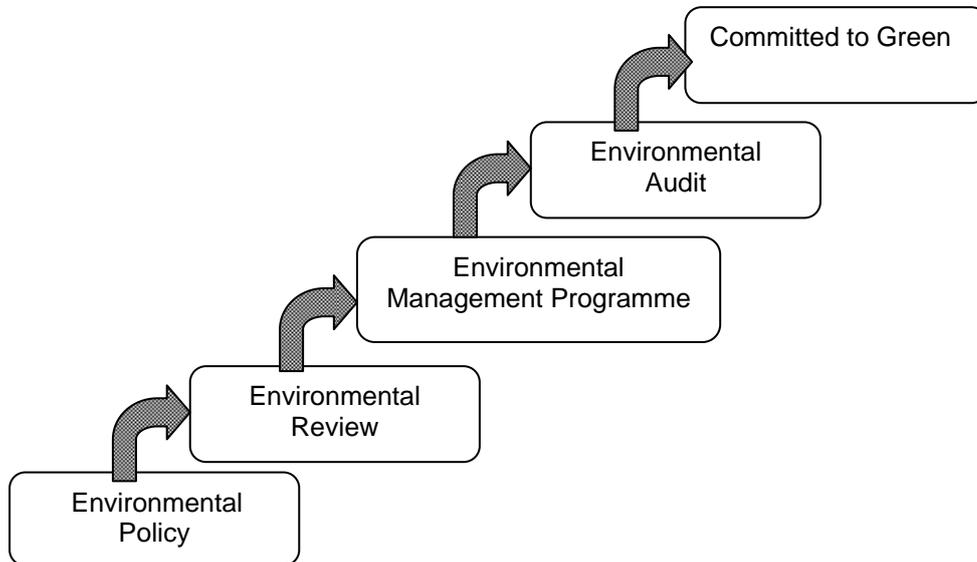
- ❑ To encourage all Mauritian golf courses to adopt an Environmental Management System approach
- ❑ To achieve a measurable improvement in their environmental performance
- ❑ To be able to monitor the long-term sustainability of Mauritian golf courses
- ❑ To encourage all Mauritian golf resorts to achieve certification by a competent body and to report publicly on their achievements

An EMS does not automatically imply that an organisation is good for the environment but it does mean that the organisation is actively aware of the issues and with a fully functional system it has the capacity to improve its environmental performance. Certification goes one step further and allows for performance benchmarking as a measure of progress.

The following guidelines set out how Red Sea, or other Egyptian golf courses, can adopt the Committed to Green approach and render themselves eligible for accreditation under this programme. This approach is increasingly popular in the competitive tourism market. It is especially important for new destinations to find any extra angle with which to distinguish themselves. Often, a considerable part of the appeal of a destination is its setting: i.e. its environmental situation. To be able to feature this and to demonstrate that the environmental quality is a special concern of the resort managers, will be a positive selling point, as well as a good management choice in the first place.

Setting up an Environmental Management System

The structure of the Committed to Green programme is built on five basic steps



Environmental Policy

In EMAS and ISO 14001 the first stage is to carry out the environmental review. However, in the case of golf clubs it is best to start first with a statement of commitment: i.e. the Environmental Policy. It is important first of all that the club management and membership are supportive of the initiative and have the chance to be involved in the process. Not only will the policy set out some key principles regarding environmental responsibility but it also provides the opportunity to establish a 'Green Team' within the organisation.

Few golf clubs have the resources to engage professional consultants or in house environmental specialists. Therefore they need to build a team from within – also drawing in external help if possible – and the policy statement gives that team the mandate to carry out a thorough environmental review.

This simple first step is psychologically important: it provides an 'early win' which can be seen by all stakeholders and forms the basis for future steps. The policy should of course be reviewed periodically.

The environmental policy should include the following commitments:

- ❑ to continuous improvement;
- ❑ to compliance with relevant regulations;
- ❑ to minimise the impact on the environment of all activities within the golf course conforming the most up to date Best Management Practices;
- ❑ to minimise resource consumption;
- ❑ to provide appropriate environmental training for all employees;
- ❑ to improve communication with employees, members and stakeholders in general;
- ❑ to periodically monitoring of the environmental performance;
- ❑ to increase environmental awareness among the users of the golf course..

Environmental review

This provides the baseline picture of the current environmental performance of a golf facility. It should serve as a 'gap analysis' enabling the club's Green Team to identify priority issues, areas of deficiency and opportunities for improvement. The results of the review will determine how the Environmental Management Programme is defined and implemented.

The specific technical categories to be addressed by golf clubs in this system should be:

- ❑ Environmental management planning
- ❑ Communications and public awareness
- ❑ Education and the working environment
- ❑ Nature conservation
- ❑ Landscape and cultural heritage
- ❑ Water resource management
- ❑ Turfgrass management (pollution control)
- ❑ Waste management
- ❑ Energy efficiency and purchasing policies

These are not ranked in any order of priority. To complete a full Environmental Management System will mean a fully integrated approach to each of these component parts. Ultimately there is much overlap between the categories and these divisions are essentially labels of convenience for defining the structure of the programme.

Environmental Management Programme

This is the specific action plan for carrying out environmental management within the golf course operation. It should embrace:

- ❑ Specific technical measures to improve environmental performance
- ❑ Priorities, targets and timescales
- ❑ Responsibilities
- ❑ Monitoring, recording and reporting systems

Audit

There should be a regular process of internal review and progress checking. This is essential in order to get the best value out of the programme and to understand how well the system is working. The audit process provides a closed-loop feedback to the policy, review and management programme steps.

Beyond this internal exercise is the question of independent audit by an external verifier. This only becomes necessary if the club/organisation is seeking to gain certification under whichever scheme it is following.

Certification

This is the formal accreditation procedure by which clubs/organisations may achieve public recognition for their environmental achievements. There are a number of programmes within

tourism and other sectors that offer accreditation. The example of Committed to Green is given below because it is specifically golf-related and has a good basis within the European golf sector.

How to achieve Committed to Green Recognition

To attain full Committed to Green recognition, applicant clubs must submit an *Environmental Statement*. This summarises the Environmental Management Programme in a standardised format, based on three principal levels:

- i. **Basic requirements:** These provide both a qualitative and quantitative checklist of essential environmental management data across each category. They also establish a baseline of environmental performance against which future progress can be assessed.
- ii. **Description of achievements:** A statement of actions undertaken. This provides scope for describing many different and innovative measures, which will draw out your understanding, commitment and enthusiasm. The aim is to reinforce the basic requirements to gain a sense that you are really making a difference in key areas and thinking about environmental stewardship beyond mere compliance with minimum specifications.
- iii. **Future targets:** Specific goals for the next review period – i.e. over 3 years. Wherever possible these should comprise distinct, measurable aims, backed with specific actions with which to achieve the targets.

A good Environmental Statement will be much more than a simple checklist of actions and measurements. It should convey a clear sense that you have achieved the following:

- ❑ An understanding of how golf course management activities relate to the environment
- ❑ Identification of priority environmental protection and/or management issues
- ❑ Undertaken a range of relevant practical measures across each category
- ❑ Evaluated results and benefits – to the environment, the club and the local community
- ❑ Identified appropriate future actions within a given timeframe

Committed to Green aims to reward those who demonstrate a considered approach to management appropriate to their circumstances. It is not based on rigid and costly standards that only the larger facilities could achieve.

Verification

Committed to Green recognition is subject to external verification, as it is important to provide a high level of public confidence that the achievements claimed really have been made. This is a crucial part of ensuring the credibility of the programme, so that the effort you have made is genuinely recognised and worthwhile. This applies to all applicants seeking full recognition.

Verification should be undertaken by a qualified expert, or team of specialists, who understand environmental management, the regional environmental conditions and golf course issues. In Mauritius, this could best be achieved through a National Expert Panel, drawing on external support to being with but aiming to be self sufficient in the long-term.

International Advisory Commission

The Committed to Green Foundation is the body responsible for issuing Committed to Green Recognition. It will do so based on the Environmental Statements and supporting submissions (verification reports) via the National Expert Panels. In addition, from time to time the Foundation may refer to its International Advisory Commission (IAC).

The IAC will not duplicate the work of the National Expert Panel. It serves as an independent advisory commission to the Committed to Green Foundation. It provides technical and strategic guidance to reinforce the credibility of the programme and to ensure a reasonable balance of standards across the different participating countries.

The Advisory Commission comprises experts in golf course management, turfgrass science, environmental management and other disciplines as required. There are also representatives from international public bodies such as the European Commission and United Nations Environment Programme.

The award

Once it is satisfied that all conditions of application have been met, the Committed to Green Foundation or its national counterparts will confirm the award of recognition in writing, together with a Certificate of Environmental Excellence.

The terms and conditions of Committed to Green recognition are as follows:

- ❑ Recognition is valid for three years from the date of the award as specified on the certificate.
- ❑ Recognised clubs are entitled to use the Committed to Green logo on materials and promotions related specifically to the site that has been recognised. The logo cannot be used on commercial merchandise.
- ❑ Notification of each award will be announced on www.committedtogreen.org together with summary information and links to national project web sites and the individual club web sites as applicable.
- ❑ The Environmental Statement must be made publicly available.

An annual summary report will be issued by the Committed to Green Foundation, detailing all the awards made during the year. In addition, national batches of awards may be announced at different times to coincide with particular events likely to attract most publicity.

Renewal

After three years all fully recognised clubs need to reapply to renew their recognition. This will require an updated Environmental Statement, highlighting changes and progress over the intervening three years. Again it will be verified as in the original application.

APPENDIX 11

PHOTOGRAPHS

Sheet 1	Existing Courses (Martim, Saint Géran, Belle Mare Plage Legend, Le Paradis)
Sheet 2	Turf Grass
Sheet 3	Sugar Production
Sheet 4	Golf Course Construction (Belle Mare Plage Links, Île aux Cerfs)
Sheet 5	Proposed Development Sites i (Belle Ombre, Wolmar, Domaine de Chasseur)
Sheet 8	Proposed Development Sites ii (Massilia, Salines, Beau Champ, Beau Rivage)
Sheet 7	Proposed Development Sites iii (Le Morne, Mont Choisy, Bel Ombre)
Sheet 8	Mangrove and Wetlands (Roches Noire, Wolmar)
Sheet 9	Flora and Fauna i (Echo Parakeet, Pink Pigeon, Giant Tortoise, Screw Palm)
Sheet 10	Flora and Fauna ii (Black River Gorge National Park)
Sheet 11	Île aux Cerfs
Sheet 12	The Authors

1. EXISTING COURSES



MARTIM HOTEL



BELLE MARE PLAGE LEGEND



SAINT GERAN

LE PARADIS



2. TURF GRASS



TURF NURSERY
LE PARADIS GOLF COURSE

NATIVE GRASSES
GROWING BESIDE
THE SALT WATER
LAGOON AT
ROCHES NOIRE



NATIVE GRASS SPECIES GROWING
IN THE SALT PANS AT LES SALINES

3. SUGAR PRODUCTION



CANE FIELDS AT MONT CHOISY

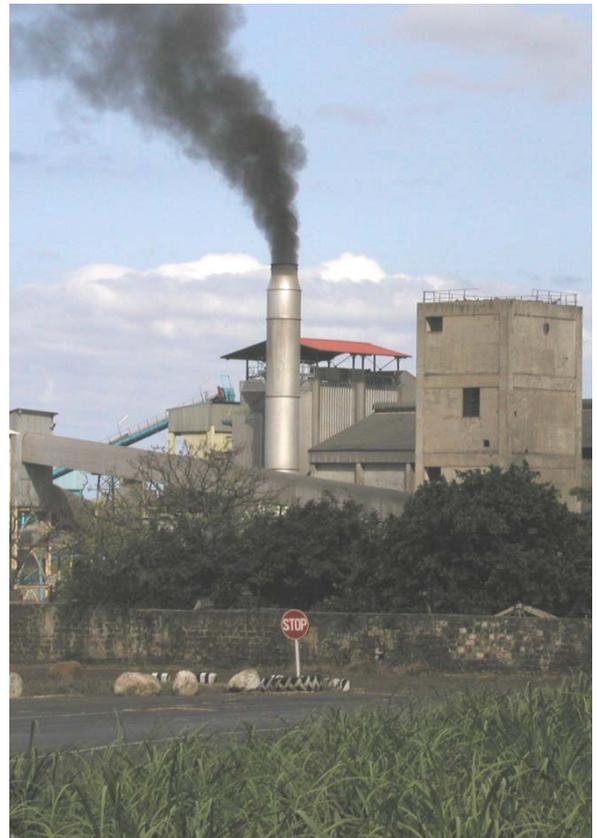
HARVESTING SUGAR CANE - BAIE AUX TORTUES



ELECTRICITY GENERATION FROM SUGAR CANE WASTE
BEAU CHAMP



IRRIGATION CHANNEL
BAIE AUX TORTUES



4. GOLF COURSE CONSTRUCTION



Crushed basalt makes an excellent turf grass growing medium. The topsoil respread operation during construction of the new course at Belle Mare.(left)



The driving range at Belle Mare Plage Links being prepared for grassing. (right)



This hole was sprigged only a few weeks before this photo was taken at Belle Mare Plage Links.



Construction in progress at Île aux Cerfs

5. PROPOSED DEVELOPMENT SITES I



BEACH FRONT AT BEL OMBRE (above)

BACK DROP AT WOLMAR (right)



THE PROPOSED SITE AT BEL AIR (below)



DOMAINE DE CHASSEUR (below)
Note silt in estuary.



6. PROPOSED DEVELOPMENT SITES II



DOMAINE DE MASSILIA (above)

LES SALINES (below)



BEAU CHAMP



BEAU RIVAGE



7. PROPOSED DEVELOPMENT SITES III



LE MORNE (above and below)



MONT CHOISY (below)



BEL OMBRE



8. MANGROVE AND WETLANDS

MANGROVE.

Young shoots growing in the lagoon at Beau Rivage (right)



Conservation of this mangrove coast at Roches Noires is preferable to tourism development. (below)



WETLANDS AT WOLMAR.
(left and below)

Good golfing potential
but is it compatible with
Ramsar Convention status?



9. FLORA AND FAUNA I



MAURITIUS ECHO PARAKEET AND
RED WHISKERED BULBUL



PINK PIGEON



SCREW PALM

GIANT TORTOISE



10. FLORA AND FAUNA II

BLACK RIVER GORGES NATIONAL PARK



Guava shrubs stifle indigenous forest trees. (above)

Once the Guava trees are removed the native species have a chance to develop. (below)



An ebony tree encased by a strangler fig.
A salutary metaphor for uncontrolled tourism.

ÎLE AUX CERFS

1. LAKE UNDER CONSTRUCTION.
Coral sand stockpiles (background)
for use as topsoil.



2. IRRIGATION TRENCH
Sandy soil and high water table on this
low part of the site. Limited sea views
behind the trees.

3. EXISTING POND IN BASALT AREA OF
THE ISLAND.
All surrounding vegetation cleared.



4. EDGE OF CLEARANCE AREA, (marked with
yellow tape on trees). The lack of a transition
zone between the flat
foreground and the steep, densely
covered rocky ground is due to insufficient
surface area for golf.

APPENDIX 12

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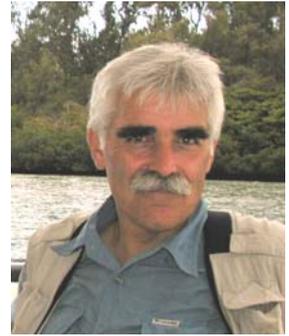
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JEREMY PERN
GOLF COURSE ARCHITECT



Jeremy Pern has been working in golf course design and construction since 1975 in England, Austria, Belgium, Norway, Hungary, Croatia, Switzerland, France, Germany, Iran, Dubai, and Morocco. He established an independent golf design practice in 1990 and to date he has designed over twenty five 18 hole golf courses. He is a qualified Agronomist and has a post graduate degree in Protected Landscape Management. He is a member of the European Institute of Golf Course Architects and was Vice-President of the British Institute of Golf Course Architects.



DAVID STUBBS
ENVIRONMENTAL SPORT LTD



David Stubbs is Europe's leading Golf Course Environmental consultant responsible for the management of the European Golf Association Ecology Unit (1994-2000), the Director of Europe's principal golf course environmental accreditation scheme "Committed to Green" and is the Environmental Advisor to the Royal and ancient Golf Club of St Andrews, golf's governing body. He is also a widely respected conservation biologist and was for many years a member of the Species Survival Commission of the IUCN and a Research Associate at the Durrell Institute of Conservation Ecology.



PETER WALTON



Peter Walton is the Chief Executive of the International Association of Golf Tour Operators, the global trade association of the golf tourism industry, and has been instrumental in the development of golf tourism policies for national and local government bodies world wide (inc Cuba, Dominican Republic, South Africa, Algarve, Puerto Rico, Tenerife, Greece, etc). He is also a qualified Zoologist and has undertaken tourism research in Mauritius since 1990.



PAOLO CROCE
TURF GRASS CONSULTANT



Paolo Croce is a warm season turf grass agronomist and researcher with post graduate training at the Texas A&M University. Croce has been the Agronomic Consultant to the Italian Golf Federation since 1984. He is Europe's leading specialist in warm season turf grass management and has been closely associated with the work of the European Golf Association Ecology Unit and the development of the Committed to Green Environmental Management Programme for golf courses.



INTERNATIONAL ASSOCIATION OF GOLF TOUR OPERATORS (IAGTO).

IAGTO was established in 1997 as a representative body for a number of the world's leading golf tour operators. IAGTO is now well established as the global trade association of the golf tourism industry, with over 640 members companies in 56 countries.

The dynamic growth of this organization is testament to the unrivalled importance of this \$10 billion dollar industry within the global arena of sports travel.

In its first year, IAGTO established the International Golf Travel Market (IGTM) which has become the industry's annual trade show, owned and operated by Reed Exhibition Companies, a world leader in travel and golf exhibitions. IGTM attracts over 750 delegates each December as it moves around the world in its roving tour of emerging and established golf destinations.

For such an important niche market, the lack of applicable tourism data was immediately apparent, which led IAGTO in 1998 to commission Sports Marketing Surveys to carry out a wide-ranging golf tourism survey. In 2000, IAGTO purchased the rights to the Millennium European Golf Tourism Survey and commissioned a new USA Golf Travel Survey published by Sports Marketing Surveys in December 2001.

Aware that the majority of golfers actively seek the delights and challenges of golf travel, the world's leisure and golfing publications have long understood both the aspirational and practical attraction of golf travel features. For decades, serious golf writers have enjoyed the accreditation of recognized golf writer associations. In 2000 IAGTO remedied the situation for golf travel writers by establishing the Golf Travel Writers Association (GTWA) - the only global association of its kind.

Again in 2000, IAGTO sought to reward the wonderful achievements of many undiscovered, emerging and established golf destinations by launching the IAGTO Golf Travel Awards. The success of the golf travel industry will forever be dependent on the overall popularity of the game, and the highlight of the first Awards ceremony in Florida's First Coast of Golf was the presentation of IAGTO's *Most Inspirational Golfer of the 20th Century* Award to Arnold Palmer. In the 2001 Awards IAGTO honoured Gary Player as *Golf's Greatest Ambassador*.

One of IAGTO's most important roles is to raise and maintain standards throughout the golf travel industry. In 2001 IAGTO published the first in a series of *IAGTO Guides* designed as a benchmark for standards within the golf tourism industry. The *IAGTO Guide to Improving Speed of Play* is a practical guide for golf courses as is the *IAGTO Golf Course Check List*. In 2002 IAGTO also published its first annual directory which is destined to the golf tourism industry's reference manual for years to come.

IAGTO provides a focus for the golf tourism industry, and will continue into the 21st Century to help further develop a niche market that provides endless enjoyment to millions of golfers every year in all corners of the globe.