

**Establishing Guidelines for  
Environmental Management Plans  
for Golf Course Developments  
in Gauteng Province**

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## **i) Abstract**

The impacts of golf courses and golf estate developments are great and definite. Proof of this can be seen in several Environmental Impact Assessments (EIA), that have been submitted to the Gauteng Department of Agriculture and Conservation (GDACE) in terms of the Environmental Conservation Act (ECA) (1989) and the National Environmental Management Act (NEMA) (1998). The question is how to limit these impacts on the environment. Guidelines on how to manage and mitigate these impacts are of fundamental importance, to ensure the conservation of the environment. These guidelines should set principles for the management of the environment from cradle to grave, for future golf course and golf estate developments.

The main objective of this study was to develop guidelines for Environmental Management Plans (EMP) specifically focused on golf course developments in the Gauteng Province. To achieve this, a comprehensive study was conducted on the factors pertaining to the environmental process by evaluating previous EIA reports and the associated EMP's as well as the supporting documentation.

The EMP's were evaluated and several shortfalls were identified. The EIA scoping reports were then appraised and ranked accordingly. The scoping reports assess the impacts on the environment. These impacts must be mitigated in the development process. These impacts and mitigation measures must be documented in an EMP. Hence, the connection between the EIA scoping reports and the EMP's. Several inadequacies were recognized with respect to the inclusion of all the mitigatory measures for all the impacts as identified in the EIA scoping reports. The conclusions drawn in the evaluations were used to develop the guidelines for EMP's. The guidelines given here will assist in future compilations of EMP's for golf courses. It is *highly recommended* that GDACE and environmental consultants adopt this standard in preparing and evaluating applications.

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## **ii) Glossary of Terms**

**DEAT** – National Department of Environmental Affairs and Tourism

**ECA** – Environmental Conservation Act No. 73 of 1989

**EIA** – Environmental Impact Assessment

**EMP** – Environmental Management Plan

**EMPr** – Environmental Management Programme

**EMS** – Environmental Management System

**ESO** – Environmental Site Officer

**GAPA** – Gauteng Agricultural Potential Atlas

**GCSAA** – Golf Course Superintendents Association of America

**GDACE** – Gauteng Department of Agriculture, Conservation and Environment

**GDP** – Gross Domestic Product

**GIS** – Geographic Information Systems

**Ha** – Hectares

**IAIA** – International Association for Impact Assessors

**IAIASa** – International Association for Impact Assessors South African branch

**IEM** – Integrated Environmental Management

**IPM** – Integrated Plant Management

**ISO** – International Standards Organization

**ISO 14000** – International Standards for EMS

**ISO 14001** – Series of environmental standards for EMS

**ISO 14004** – General guidelines on EMS

**ISO 14010** – Principles of auditing

**ISO 14011** – Audit procedures for EMS

**ISO 14012** – Auditor qualifications

**NEMA** – National Environmental Management Act No. 107 of 1998

**RoD** – Record of Decision

**RSA** – Republic of South Africa

**SEA** – Strategic Environmental Assessment

**SIA** – Social Impact Assessment

**USGA** – United States Golf Association

## Chapter 1: Introduction

Integrated Environmental Management (IEM) in South Africa has undergone significant changes since the 1970's (Mafune *et al.*, 1997). The evolution, since the modest beginnings as a voluntary process, of IEM in South Africa reached a milestone in 1997 with Environmental Impact Assessment (EIA) becoming mandatory. Despite IEM being conceptualised as a toolbox and promoting the concept of “cradle-to-grave” environmental management (DEAT, 2004a), EIA received greater attention than the other tools. Since EIA's became a regulated process in South Africa in 1997 under the Environmental Conservation Act (ECA) (1989) as amended, most of the focus was directed at the scoping and assessment stages of the EIA process. The mitigation, monitoring and management component of EIA's received much less attention. Attention is now being focused on the need to demonstrate that impacts can be monitored, mitigated and managed. The Environmental Management Plan (EMP) is recognised as the tool that can provide the assurance that the project proponent has made suitable provision for mitigation (DEAT, 2004b).

The EMP provides a description of the methods and procedures for mitigating and monitoring of impacts as identified in the scoping and assessment stages of the EIA process. The EMP also addresses environmental objectives and targets which the project proponent or developer need to achieve in order to reduce or eliminate negative impacts. The EMP document must be used throughout the project life cycle. It should be regularly updated to remain aligned with the project as it progresses from pre-construction to construction through to operation and, finally to decommissioning. Developing countries have been slow to use and implement EMP's (George, 2000).

Ira *et al.* (2000) and Parkes *et al.* (2001), attribute the slow utilisation of EMP's to the following:

- EIA policy systems in general focus on the assessment part of the process;
- the lack of guidelines for the compilation and implementation of EMP's;
- the lack of legal enforcement of EMP's;

- the failure of EMP's to take into account the financial implications of environmental controls; and
- Governments not focusing on, and building the, institutional capacity for monitoring and enforcing compliance.

However, there is now a growing recognition that EMP's can be effective environmental management tools by linking their implementation to project authorisation.

Urban planners consider golf courses as physical features that can provide much needed green open space for wildlife habitat as well as public recreation (Tatnall, 1991; Schwanke, 1997; Terman, 1997). Environmentalists on the other hand are concerned about the rapidly growing numbers of golf courses worldwide and the resulting changes to land use in often sensitive habitats (Pleumarom, 1992; Pearce, 1993; Platt 1994). The need for EMP's to reduce and mitigate these impacts on the environment is becoming even more important.

Gauteng Province, with its mild climate and affluent population, makes an ideal location for these golf courses. Gauteng is the smallest and most densely populated of South Africa's provinces. Therefore, land for development in the province is scarce. Large pieces of land suitable for golf course estates are limited. This has led to environmentally sensitive land being used for these golf course developments. In the past, this has led to the environmentally sensitive land being degraded to such an extent that no sign of the original environment is visible, and instead, an artificial, sterile environment remains which provides no ecological services. With the advent of EIA regulations more environmentally sensitive developments were enforced, which required more imaginative golf course estate design where indigenous sensitive open space areas were incorporated into the design. The EIA's specifically examined the impact of the golf course estates on the environment.

The impacts of golf courses and golf estate developments are great and definite. Proof of this can be seen in several EIA's that have been done in terms of the ECA and the National Environmental Management Act (NEMA) (1998) (IAIA, 1996). The question is how to limit these impacts on the environment to a minimum (Klein, 1996). Guidelines



on how to manage and mitigate these impacts are of fundamental importance, to ensure the conservation of the environment (GDACE, 2005a). These guidelines should set principles for the management of the environment from cradle to grave, for future golf course and golf estate developments (Teurlings, 2005).

## **1.1. Motivation**

There are currently no guidelines available for golf course developments or similar activities in Gauteng. The only province with available guidelines is the Western Cape, with guidelines for golf courses, golf estates, polo fields and polo estates.

The EIA is regulated by the strict regulations under the Environmental Conservation Act (ECA) and the National Environmental Management Act (NEMA). The EMP's are not regulated under these strict laws. The EMP's are required by GDACE in their Record of Decision (RoD). Thus no regulated guidelines exist for EMP's.

It is extremely important to develop and implement guidelines that would lay down principles for the conservation of the environment with regard to the development of these golf courses and golf course estates. This will ensure the conservation of sensitive ecosystems and the enhancement of the management of activities related to these developments.

GDACE has expressed the need for such guidelines to assist in their evaluation and decision making process with respect to future golf courses and golf course estate developments. These guidelines would not only assist GDACE in their decision making process but would also set a standard for environmental consultants in their compilation of EMP's for future golf courses and golf course estate developments.

The co-operation of the staff from GDACE, together with the permission to use previous EIA scoping reports and related EMP's, and the associated Records of Decision (RoD) for previous golf courses and golf course estate developments that were reviewed or are currently under review, made this research possible.

## **1.2. Problem Statement**

The main problem is that there are no strict and rigid guidelines for developers and environmental consultants to use as guiding principles in the developing of these golf courses and golf course estates, in a manner that would guarantee the conservation of the environment (GDACE, 2005a).

The research problem is to use certain environmental principles as obtained from various EIA scoping reports for the formulation of guidelines that can be employed in compiling guidelines for EMP's for future golf course developments in Gauteng Province.

The problem will be considered to be solved when these guidelines, which outline the principles to be followed in the development of future golf courses and golf course estate developments, are set and are practically implemented in similar, future developments.

## **1.3. Main Objective of the Study**

The main objective of the study is to develop guidelines for EMP's by assessing a representative sample of existing EMP's developed in conjunction with the scoping reports.

A second objective is to assess the impacts of golf course residential developments on the environment by reviewing past EIA reports (scoping reports) on golf courses with respect to biophysical components, socio-economic components, other significant issues, project timing and other environmental components and possible effects on human health.

The overall objective of these assessments is to create a means of determining what is required in an EIA and in an EMP for golf courses. This will assist in the development of the guidelines for EMP's to assist in future management of the environment with respect to golf courses.

These guidelines will help to set constraints and boundaries as well as targets towards which developments should strive. The current shortcomings create situations where the

environment and fundamental ecosystems are negatively impacted upon, because there are no principles to work towards (Hendricks, 2005).

This study will focus on the legal framework under which these EIA's for golf course developments are done, the impacts that these developments have on the environment, the assessing of ten EIA scoping reports and their EMP's, and will then address aspects that will enhance the effectiveness of the EMP's to finally establish guidelines for EMP's of future golf course developments in Gauteng Province.

#### **1.4. Study Methodology**

- Literature phase. The Literature phase included, but was not limited to, research in libraries, the internet and several personal discussions with parties concerned or involved with environmental management and golf course developments, to establish the achievability and need for this research. The author consulted current legislation and with the GDACE in this respect.
- Several visits to GDACE were undertaken to obtain cooperation and permission to use and review EIA scoping reports and related EMP's and the associated Records of Decision (RoD) for previous golf courses and golf course estate developments that were reviewed or are currently under review.
- A comparative evaluation and assessment of ten golf course developments' EMP's and EIA scoping reports and related EIA's documentation were carried out.
- Synthesis: The compilation of guidelines for future EMP's and setting principles forthcoming from the evaluation and assessment of the EMP's and EIA's and associate documentation.

#### **1.5. Legal Framework**

The development of land must be governed to ensure the sustainable development thereof. This can only be done if it is enforceable. Thus, legislation pertaining to the development of land plays a critical role in the quest for sustainable development.

The South African constitution makes provision for the enforcement of this right to sustainable development. Furthermore several acts are in place to facilitate specific activities that are associated with development of land. Generally, associated with golf course developments, are the acts that encompass the conservation of the environment and the activities associated with degrading the environment and the assessment and management thereof.

Second to the acts are the policies that the provincial and local authorities institute and which form part of their regulations. These are sometimes more specific and localised, which contribute to the sustainability of the environment.

The most important and commonly used legislation pertaining to golf course developments in Gauteng will be discussed below.

### 1.5.1. The South African Constitution

The Constitution of the Republic of South Africa Act no. 108 of 1996, Chapter 2 titled The Bill of Rights, Section 24 a-b, reads as follows:

#### **“Environment**

24. Everyone has the right -
- (a) to an environment that is not harmful to their health or well-being; and
  - (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -
    - (i) prevent pollution and ecological degradation;
    - (ii) promote conservation; and
    - (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development” (RSA Constitution as amended, 2002).

### 1.5.2. Environmental Conservation Act

The Environmental Conservation Act no. 73 of 1989 (ECA) was constituted to provide for the effective protection and controlled utilisation of the environment and for matters incidental thereto (ECA, 1989). The act addresses issue pertaining to the environment with specific reference to protection of the natural environment; control of environmental pollution; control of activities which may have detrimental effect on the environment; regulations; offences, penalties and forfeiture; as well as general provisions (ECA, 1989; DEAT, 1998).

In South Africa, an EIA is legally required prior to the start of an activity listed in the EIA Regulations (Reg.1182 and 1183), under Section 21, 22 and 26 of the ECA. These activities can be split into two sections, the first of which are discrete activities. These include the stages of construction, operation and decommissioning and are listed as activities 1 a-o and 3-9. The second section describes process driven activities, such as land use changes where there is a long administrative process involved and where the EIA is used as a town planning tool. These are listed as activities 2a-e (ECA, 1989).

### 1.5.3. National Environmental Management Act

The National Environmental Management Act No 107 of 1998 (NEMA) was constituted to provide for co-operative environmental governance, by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.

The act addresses issue pertaining to the environment with specific reference to national environmental management principles, institutions, procedures for co-operative governance, fair decision-making and conflict management, Integrated Environmental Management, international obligations and agreements, compliance and enforcement, environmental management co-operation agreements, administration of the act and the general and transitional provisions (NEMA,1998; DEAT, 1998).

#### 1.5.4. Gauteng Environmental Policies

The GDACE is the authority at provincial level that oversees all aspects related to agriculture, conservation and environmental issues in this province. Thus GDACE are the decision makers with respect to same. GDACE developed several policies to assist them in their decision making. The policies that are most frequently used, in specific with reference to golf course developments, is the Gauteng Red Data Policy, the Gauteng Ridges Policy, Gauteng Conservation Plan and the Gauteng Agricultural Potential Atlas.

These policies are of importance to ensure sustainable development. These policies provide GDACE with a strict and rigid guide for their decision making. To further enhance their decision making these policies are linked with Geographic Information Systems (GIS). These GIS provide GDACE with a spatial decision making tool. Maps for Gauteng depicting the specific spatial aspects for each policy are used in the decision making process.

Based upon these policies the conservation status, agricultural potential etc., of the land can be determined. These policies are thus used to base decisions upon, for activities such as the changes in land use for golf course developments and others.

##### 1.5.4.1. Gauteng Red Data Policy

The GDACE have Red Data Policy in place which assists in the department's decision making processes. This policy plays a vital role in the EIA process. The data are linked to the Gauteng Conservation Plan (GIS spatial data set). The data are available from the GDACE with special permission. The Red Data information include data for fauna and flora and each have their own policies (GDACE, 2006a).

The Red Data Policy GIS spatial data set indicates whether a specific species is found in the quarter degree square of the location of the site that is assessed. Should this indicate that a specific species is found in the area or on the site, specialist investigations must be conducted to determine the concentration of the species and the impacts that a development such as a golf course, would have on the future ecological functioning of the species.

This policy is very important to ensure the conservation of endangered species and sustainable development.

#### 1.5.4.2. Gauteng Ridges Policy

A ridge is a geomorphic feature that features a continuous elevated crest for some distance. Ridges are usually termed “hills” or “mountains”, depending on their size. Ridges have an essential role in ecosystem processes and have great value for sustainability of biodiversity, as well as importance on socio-cultural level.

Ridges are “biodiversity hotspots” and will serve as future refuges for numerous species. Varied topography is recognized as one of the most powerful influences contributing to the high biodiversity of Southern Africa. The interplay between topography and climate over a long period of time has led to the evolution of a rich biodiversity (Samways & Hatton, 2000).

Ridges provide habitat for Red Data/threatened species. Many Red Data of fauna and flora inhabit ridges. Due to their threatened status, Red Data species require priority conservation efforts in order to ensure their future survival. As such, the conservation of ridges in Gauteng will contribute significantly to the future persistence of these species (Pfab, 2001).

Ridges are important for invertebrates as they are reliant on hilltops for thermal refuge from winter cold air drainage (Samways, 2006). Some invertebrate species utilize ridges for survival (Roos, 2006). Due to of the variety of micro-topographies that are found on ridges, insects can thermoregulate by moving in and out of the shade that rocks cast. They can also seek shelter from predators and fire (Samways & Hatton, 2000).

Ridges of Gauteng serve as important wildlife or natural migration corridors, which are present in unfragmented landscapes, such as rivers, riparian zones and topographic features. They should be retained to ensure corridors for migration of wildlife (Loney & Hobbs, 1991).

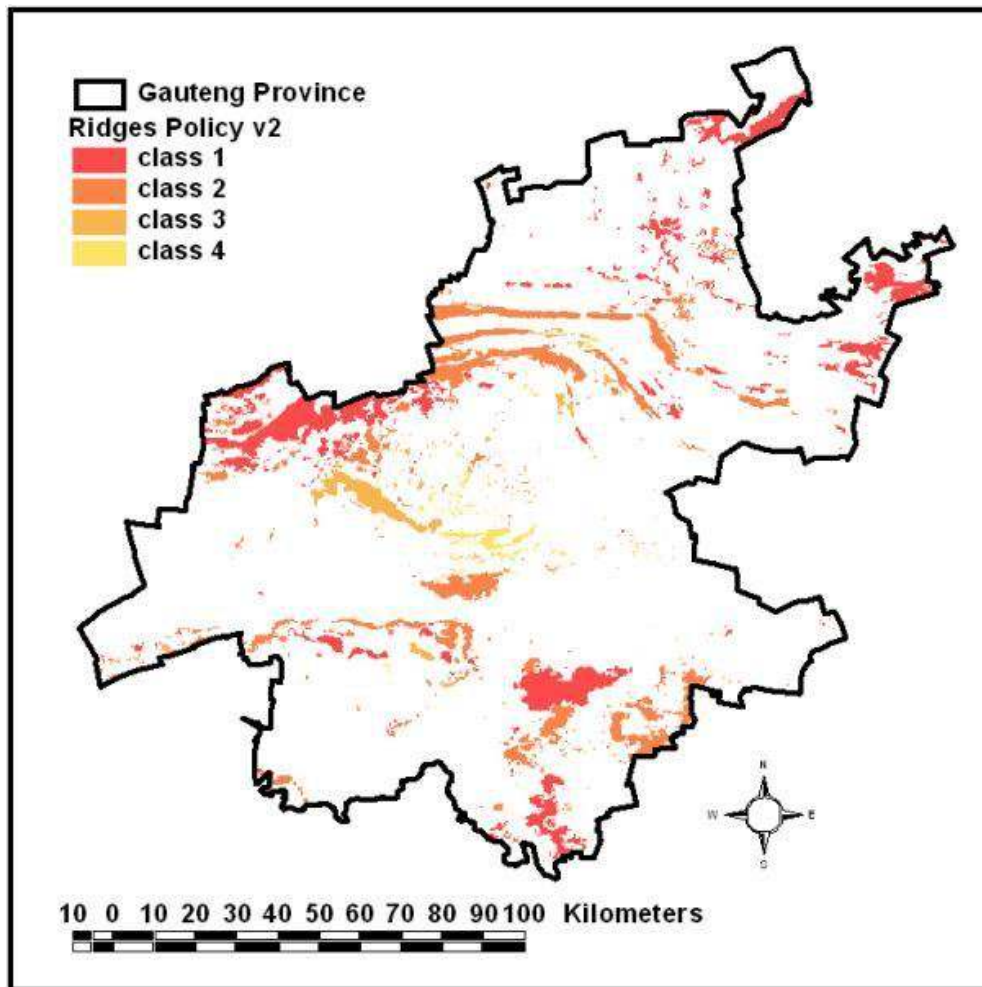
The role of ridges in ecosystem processes is of high importance. Ridges may have a direct effect on temperature/radiation, surface airflow/wind (Samways, 1994), humidity and soil types. Ridges also influence the patterns in which fires move, offering protection for those species that can be described as “fire-avoiders” (Lowrey & Wright, 1987).

Ridges have socio-cultural value in that they provide aesthetically pleasing environments for the surrounding inhabitants and attract tourists and recreational users. Natural areas in the urban environment often provide opportunities for human recreation, relaxation and education. Many surveys of urban areas have indicated that urban residents attach high value to natural environment and wildlife around the home (Bredenkamp & Brown, 1998).

The quartzite ridges of Gauteng are extremely limited in distribution. They are characterized by a unique plant species composition that is found nowhere else in South Africa or the world. As the Witwatersrand is considered to be transitional between the grassland and savanna biome, floristic elements from both these biomes contribute to the floristic richness of Gauteng ridges. Contributing to this richness is a third Drakensberg element in the flora. The Gauteng ridges, together with the Drakensberg escarpment, should be regarded as one of the most important natural assets in the entire region of the northern provinces of South Africa (Bredenkamp & Brown, 1998).

According to the GDACE policy for ridges, the ridges in Gauteng are classified and typed as Class 1 to 4 ridges where Class 1 is the most sensitive and least developed and Class 4 is least sensitive and most developed. (Refer to Figure 1). Golf course developments engage large areas of land and the interaction with sensitive areas such as ridges are inevitable. The ridge policy assists in the protection of these areas from developments such as golf course estates.

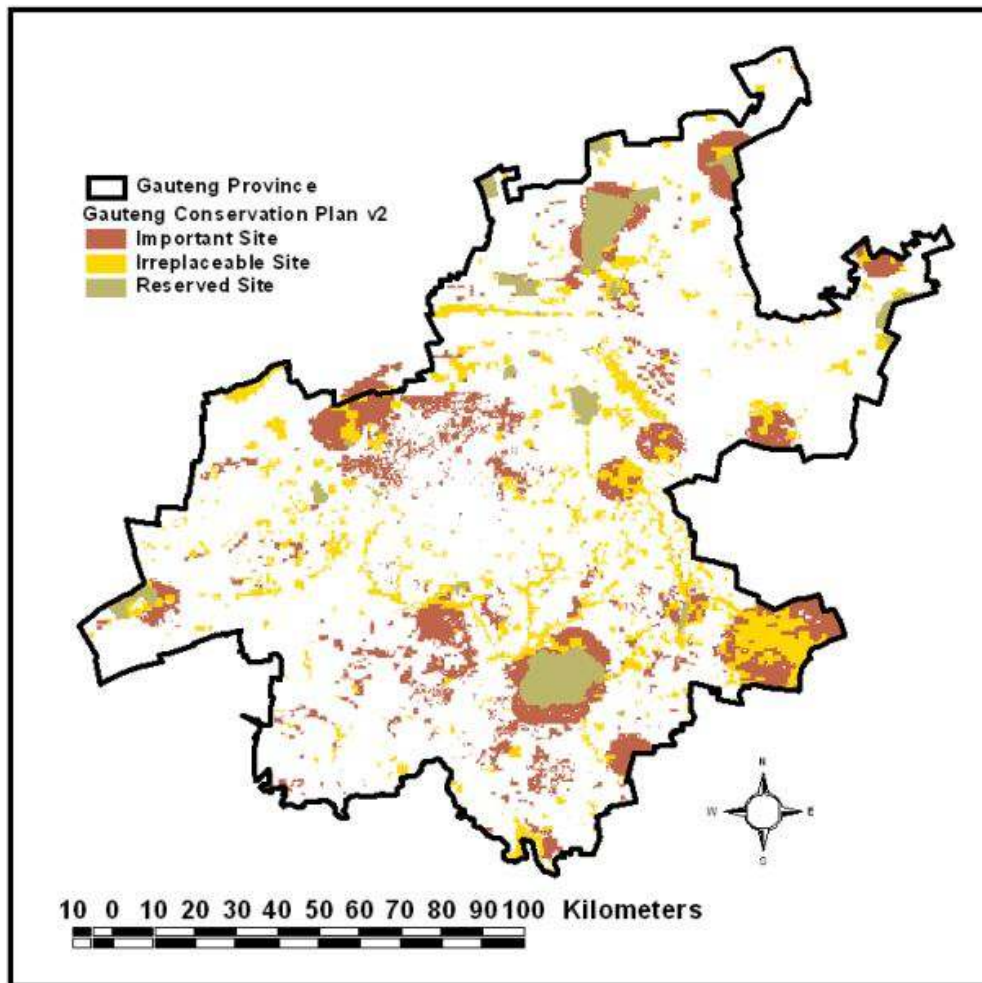




**Figure 1: Gauteng Ridges Policy (version 2) (GDACE, 2004)**

#### 1.5.4.3. Gauteng Conservation Plan

The Gauteng Conservation Plan is a plan where the conservation status of land in Gauteng province is classified. This plan is derived from biodiversity data collected for the Gauteng province as part of the Gauteng Biodiversity Gap Analysis project and have been analysed. This data have subsequently been used for spatial data analyses to produce a Geographic Information Systems (GIS) layer classifying the Biodiversity of Gauteng. The data analysis followed the systematic conservation planning protocol developed by Margules and Pressey (2000).



**Figure 2: Gauteng Conservation Plan Version 2 (GDACE, 2005a)**

The Biodiversity in Gauteng, according to the Gauteng Conservation Plan is classified under three categories namely, “Important”, “Irreplaceable” and “Reserved” areas (Refer to Figure 2) (GDACE, 2005a).

The importance of the Gauteng Conservation Plan is to maintain sustainable development and the conservation status of land in Gauteng. Golf course developments occupy large areas of land and their mere existence impact on the status of land and thus impact on the conservation status of that specific portion of land.

#### 1.5.4.4. Gauteng Agricultural Potential Atlas

The Gauteng Agricultural Potential Atlas (GAPA) is a policy where land in Gauteng is classified in terms of its agricultural potential. GAPA is derived from soil type and

potential data collected for the Gauteng province and have been analysed. This data have subsequently been used for spatial data analyses to produce a Geographic Information Systems (GIS) layer classifying the Agricultural Potential of soil in Gauteng. The data analysis followed the systematic conservation planning protocol developed by Margules and Pressey (2000).

The Agricultural Potential in Gauteng, according to GAPA is classified under four categories namely, “High”, “Moderate”, “Low” and “Very Low” (Refer to Figure 3) (GDACE, 2005b).

According to the GDACE the soils in Gauteng provide for high capability to practise agricultural activities, hence the development of GAPA by the department.

Golf course developments usually span over large areas of land. In most cases this land is zoned as agricultural land before the development takes place. Thus the loss of agricultural land proves to be significant. GAPA assists decision making with regard to whether high potential soils will be lost or not and provide alternative options to the layout of the development.

## **1.6. Description of the Gauteng Province Environment**

Gauteng is the smallest of the nine provinces in South Africa. Despite this factor, Gauteng is the economic fore-runner in South Africa and the African continent. Gauteng is situated on the elevated plateau of the interior of South Africa, called the Highveld. Gauteng covers approximately 17 000 km<sup>2</sup>, which represents only 1.4 % of South Africa’s surface area. The North-West, Limpopo, Mpumalanga and Free State Provinces border Gauteng from the west, north, east and south respectively.

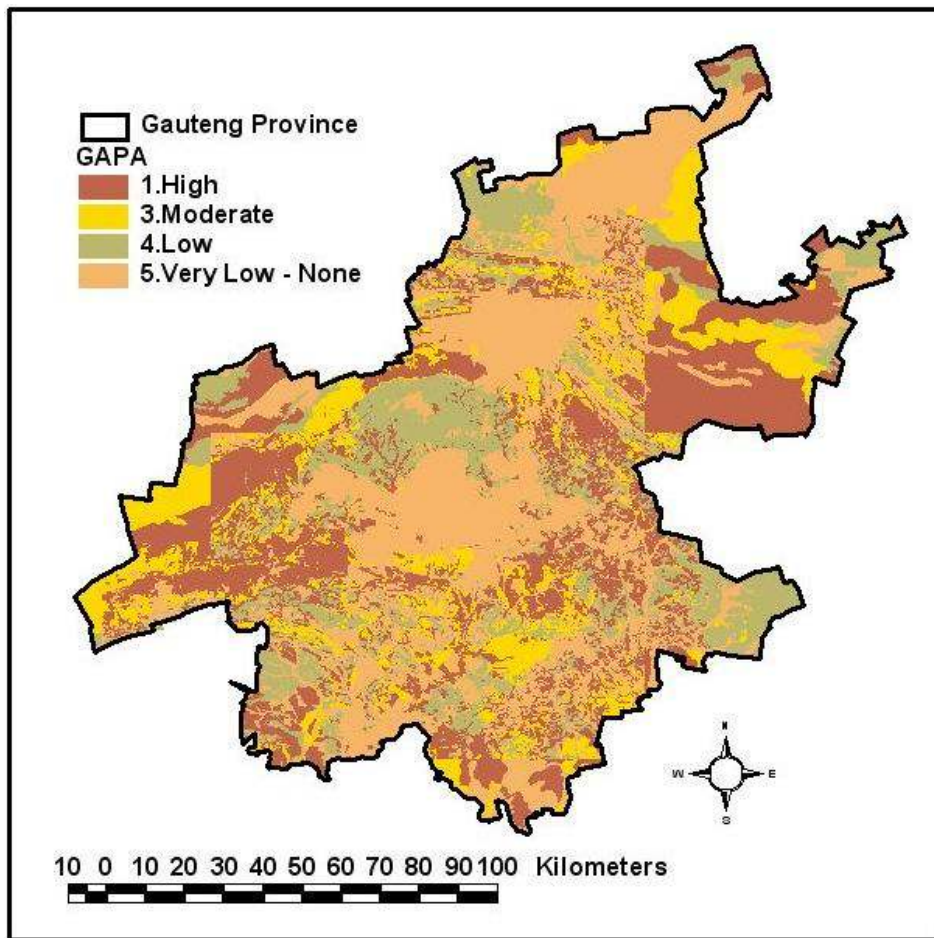


Figure 3: Gauteng Agricultural Potential Atlas (GDACE, 2005b)

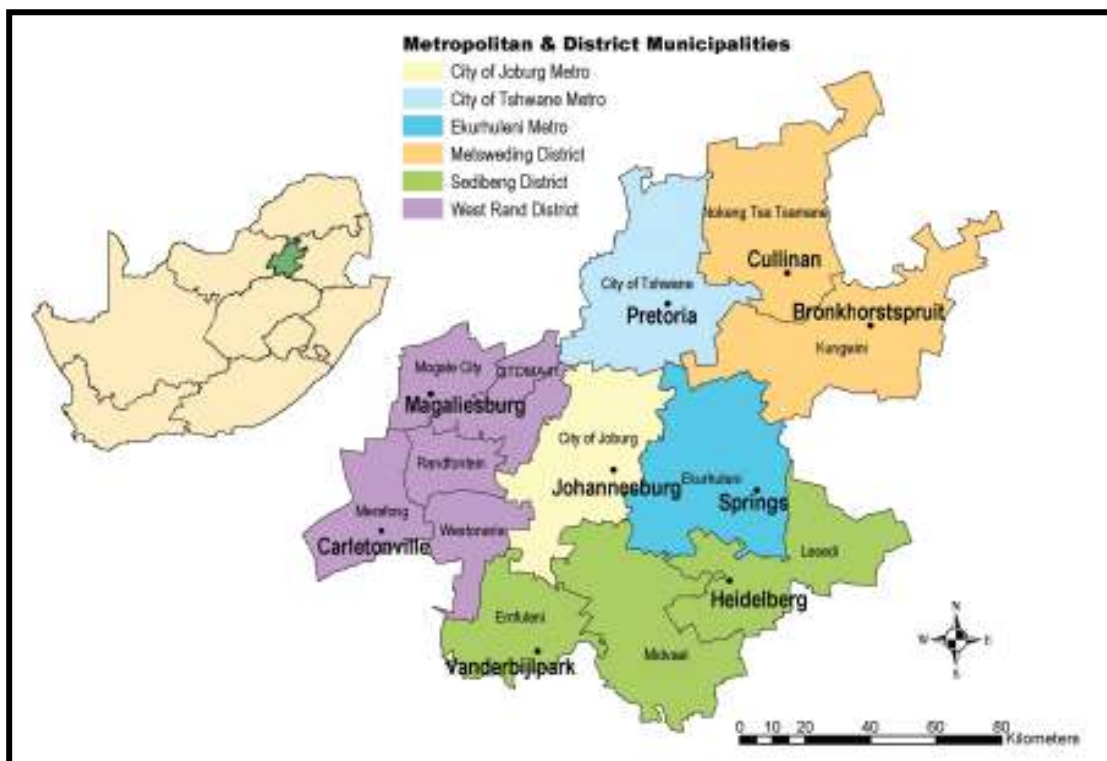


Figure 4: Gauteng Province (GDACE, 2004b)

Gauteng contains three of South Africa's six metropolitan municipalities, including the cities of Johannesburg, Tshwane and Ekurhuleni, and three district municipalities and their local municipalities, which form the remainder of the province (GDACE, 2004b) (Refer to Figure 4).

### 1.6.1. Climate

Gauteng has a mild climate, characterised by warm, moist summers and cool dry winters. The highest rainfall occurs from October to March, with a mean annual precipitation of 668mm (Dent *et al.*, 1989). This varies from 900mm in the central higher lying areas to 556mm in the lower lying northern and southern areas of the province.

The mean annual temperature varies from approximately 19.3°C in the north of Gauteng to 16.0°C in the south. The eastern and central areas, however, experience a lower mean annual temperature of around 15.0°C. There is large variation between summer and winter temperatures, with Gauteng experiencing a daily mean temperature of 21.2°C in January and 9.8°C in July (Schulze, 1997).

Due to the long clear winter nights, with little wind and dry air, the occurrence of frost is common in the province. Gauteng experiences on average 30 days of frost per year (Schulze, 1997). Winter atmospheric conditions result in temperature inversions, which have the effect of keeping polluted air close to the surface, so that winter air quality over the Highveld is generally poor.

### 1.6.2. Geology

South Africa's mining heritage is attributed to the diversity and richness of its mineral deposits, and the geology of the Gauteng area has played a major role in its development. The present landscape is a visible manifestation of the strong relationship between past earth processes and geological features (Viljoen & Reinold, 2002).

“The oldest rock formation in Gauteng is the Johannesburg Granite Dome, situated between Pretoria and Johannesburg. This formed in the Archaean period (3500 – 2500



million years ago), and forms the basement on which the younger sedimentary and volcanic rocks of the Transvaal and Witwatersrand Supergroups are deposited. A large area of Gauteng contains the Proterozoic era (2500-570 million years ago) formations of the Transvaal Supergroup, notably containing the gold-bearing “Black Reef” quartz-pebble conglomerate, which has been mined on the East and West Rands. The outcrops of conglomerate of the Witwatersrand basin (the major gold-bearing rock type), just south of the Johannesburg Dome and in the Heidelberg region, have made the area world famous. These outcrops give rise to east-west ridges on resistant quartzite.

The Ventersdorp volcanic lavas outcrop in the Klipriviersberg hills south of Johannesburg and to the east and west of Heidelberg. The dissolving carbonates of the Malmani dolomites of the Transvaal Supergroup are significant from both an archaeological and a safety perspective. The world famous fossil deposits at the Cradle of Humankind (CoH) occurs within the dolomites, while sinkholes and subsidence of the dolomites occur on the East and West Rand” (GDACE, 2004b).

### 1.6.3. Vegetation

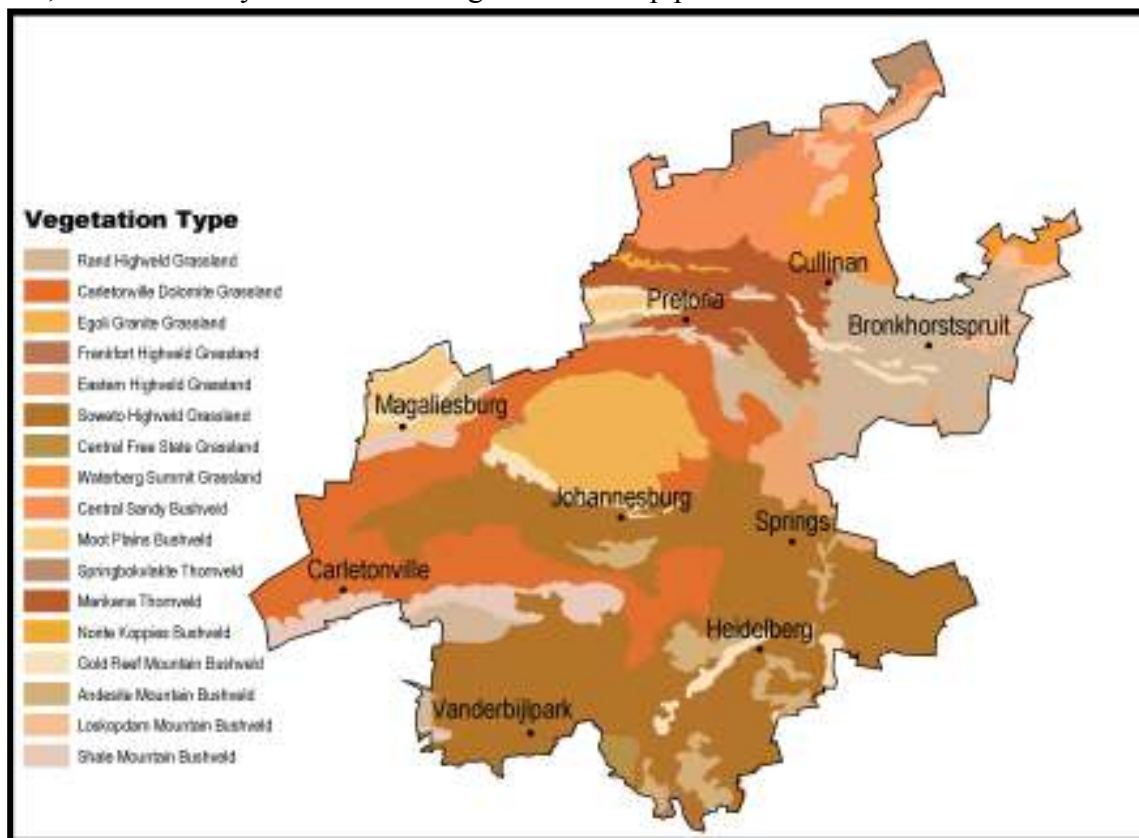
Two of South Africa’s plant biomes fall within Gauteng i.e. the Grassland and Savanna biomes, which comprise 71 % and 29 % respectively of Gauteng’s area. In South Africa savannas support more than 5 700 plant species, only surpassed by the Fynbos biome. Nine different vegetation types comprise the Gauteng Savanna. The Central Sandy Bushveld and Marikana Thornveld are the most common. (Refer to Figure 5) (GDACE, 2004b). Savannas are richer than any other biome, with respect to animal biodiversity. The savanna biome serves as the core of wildlife, ecotourism and meat production industries in South Africa (Bredenkamp, 2002).

However, the large savanna fauna of South Africa is confined largely to game reserves. The Grassland biome is one of the most threatened in South Africa. A large percentage is irreversibly transformed, while only 25 % is formally conserved (Bredenkamp, 2002). Gauteng grassland consists of eight different vegetation types, of which the Soweto Highveld Grassland, Carleton Dolomite Grassland and Rand Highveld Grassland cover the greatest areas.

The Egoli Granite Grassland type is one of the vegetation types that are endemic to Gauteng and thus a national conservation priority. It is considered to be critically endangered since at least 61% has been transformed and of the remaining 31% much is in a severely degraded state (GDACE, 2006).

#### 1.6.4. Land and Soils

Gauteng is the most urbanised province in South Africa, with 17 % of its land area classified as being in ‘urban’ land use. Surveys and analyses of the remaining areas indicate complex soil and land capability patterns. “The deep, well drained, apedal soils of the Hutton type give rise to the 23.1 % of the province with arable potential. Another 25.3 % is deemed “marginally” arable, with the remainder suitable for grazing and wildlife. The soils of the province are dominated by plinthic, duplex and hydromorphic soils, which all carry limitations for agricultural crop production.



**Figure 5: Gauteng Vegetation Types (Mucina *et al.*, 2005).**

Further analysis of the potential for irrigation-fed crop production reveals that over 50 % of the province is not suitable for irrigated crops, but the analysis yields a map of areas to be protected for agricultural use, areas which comprise 19% of the land area of the

province” (SEF, 2002). The large sections of good potential agricultural land lie in the south-west, between Carletonville and Magaliesburg, in the south-east, around Heidelberg, and in the north-west of the province, south of Bronkhorstspuit (Refer to Figure 3).

### 1.6.5. Population and Economics

Gauteng has a population of approximately 8.8 million people, which represents nearly 20% of the South African population (Statistics South Africa, 2002). There is a diverse array of cultures in the province, with major languages spoken isiZulu, Afrikaans, seSotho and English.

Gauteng is South Africa’s economic powerhouse, and economic growth and output in the province surpasses the rest of the country and indeed leads the whole African continent (GEDA, 2004). The economy grew at an average of 3.3% per year from 1995 to 2002, which is above the national average of 2.7%, and slightly below other developing countries. Its contribution to the national Gross Domestic Product (GDP) grew from 32,6% in 1995 to 33,9% in 2002. The Gauteng economy is diverse, ranging from a thriving informal sector to a high-tech manufacturing and industrial sector (GEDA, 2004).



## **Chapter 2: The Impact of Golf Course Residential Developments on the Environment**

The impact of golf course residential developments on the environment must be investigated to determine the impacts that are associated with such developments. This must be done to ultimately develop and implement mitigatory actions to minimise the impact on the environment. The minimisation of impacts on the environment ensures that development is done sustainably, as agreed on at the Rio Conference for Sustainable Development in 1992.

Several factors need to be investigated to determine the impact on the environment. These factors and impacts must be addressed and evaluated in the EIA process, which is regulated by the laws and regulations of the country, as well as dictated by the policies of the provincial and local government (Refer to section 1.1 Legal Framework).

### **2.1 Biophysical components**

#### **2.1.1 Water**

The construction of a new golf course has the potential to create adverse impacts on the aquatic environment. To begin with, a typical 18-hole golf course can convert on average approximately 55 hectares of rural land into a highly “terra-formed” environment of fairways, greens, tees, sand traps, and water obstacles. As such, golf courses are often an attractive part of the urban landscape. Haphazardly designed golf courses, however, can disrupt and degrade the wetlands, floodplains, riparian zones, and grassland that contribute to ecological systems.

A second recurring concern in respect of golf courses is the large inputs of fertiliser, pesticides, fungicides, and other chemicals that are required to maintain vigorous and attractive greens throughout the year. In many cases, chemical application rates can rival and even exceed those used in intensive agriculture. Table 1 shows a side by side comparison of chemical application rates for a coastal plain golf course and cropfield in Maryland (USA), as reported by Klein (1990).

**Table 1: Comparative Chemical Application Rates for a Maryland Golf Course and Corn/Soybean Rotation Reported in Pounds/Acre/Year (Klein, 1990).**

| Chemical         | Cropland | Fairway | Greens | Tees  |
|------------------|----------|---------|--------|-------|
| Nitrogen         | 184.0    | 150.0   | 213.0  | 153.0 |
| Phosphorus       | 80.0     | 88.0    | 44.0   | 93.0  |
| Herbicides       | 5.8      | 10.4    | 10.2   | 11.4  |
| Insecticide      | 1.0      | 2.0     | 2.0    | 2.0   |
| Fungicide        | 0.0      | 26.9    | 34.9   | 26.9  |
| Total Pesticides | 5.8      | 37.3    | 45.1   | 38.3  |

Golf courses are also intensive water consumers, particularly in drier regions of the country. This need for irrigation water can place strong demands on local groundwater and/or surface water supplies, which in turn, can cause base flow depletion. The volume of water golf courses use varies greatly depending on the region, but on average about 10800 kilolitres of water per year is utilized. In essence, each golf course consumes enough water to provide at least 1 200 people with their basic water needs for a year. South Africa is a dry country and many people still do not have access to running water (Environment, 2005).



Land care and catchment managers, particularly in arid or semi-arid environments, find it difficult to justify the allocation of a relatively large proportion of their scarce freshwater resources to turf irrigation, rather than for agricultural use (Brissaud, *et al.*, 1991; Pearce 1993). In terms of impacts, the greatest concern is pollution of ground and surface water from nutrients and pesticides (Balogh *et al.*, 1992).

To date, research could not demonstrate that concern about export of agrochemicals to areas peripheral to the specific courses is unjustified. Initial studies on experimental lawn plots supported views about nitrogen (N) and phosphate (P) losses and pesticide and herbicide flows from treated grass areas into surrounding environments (Geron *et al.*, 1993; Linde *et al.*, 1995). The highest losses were observed after simulated and actual heavy rainfall events, particularly if precipitation occurred shortly after fertiliser or pesticide application (Linde & Watschke, 1997). Fewer studies have been conducted on actual golf courses. Results varied substantially due to differences in local climate, soils, grass species and turf management. However, prolonged peaks in nutrient and pesticide concentrations over and beyond regulatory environmental standards for runoff and

leachate were rarely observed (Wan *et al.*, 1996; Ryals *et al.*, 1998). More research is needed in order to accurately quantify annual N, P, and pesticide losses from golf courses, but it seems likely that most pollution from actual courses occurs at rather steady rates with outputs below pollution control standards (Miles *et al.*, 1992; Cohen *et al.*, 1999), which otherwise would require some form of licensing.

### 2.1.2 Soil

Golf courses are only as sustainable as their weakest component. Often the largest impact is on soil quality. The extent of locating a site, constructing, developing, and using a golf course influences soil properties that will ultimately determine both the inherent sustainability of the course and the level of management necessary for day-to-day operations (USGA, 2002).

Researchers at Kansas State University are using Colbert Hills Golf Course near Manhattan, Kansas, to quantify indicators of soil quality and follow how those indicators change during the construction and establishment of the golf course. This research was initiated to document pre-construction conditions, as well as conditions during and after construction. Extensive modification of the original soil occurred in all of the fairways. Researchers identified critical functions of an ecosystem and selected appropriate indicators to evaluate these functions. They also measured indicator status through sampling and analysis and established acceptable ranges for indicators. Finally, they transformed multiple indices into environmental quality evaluation graphs and evaluated which indicators, to indicate, which ecosystem functions, lie outside their sustainable limits and are contributing towards the degradation of the ecosystem (USGA, 2002).

### 2.1.3 Air and Flora

The ambient air quality and associated change or degradation with respect to golf course developments is estimated to have no great impact on the long run. The air quality does deplete with the increase in vehicular traffic and associated emissions as well as with the use of fertilisers that influence the air quality. The increase in “green” vegetation, especially the addition of trees to the environment counters the effect that the above

mention aspects have. Golf courses have a positive impact on the environment in that they provide large open areas or “green” areas that are rich in flora, especially trees that function as the lungs of earth, absorbing the carbon mono/di-oxides that are produced in urban areas to provide the much needed oxygen in these areas. Extensive studies have yet to be done on this particular impact by golf course residential developments, pertaining to the air quality (Botha, 2005).

Much less is known about the actual effects of golf courses on animal populations following replacement of their natural habitats (Terman, 1997). Reports on occasional waterfowl kills demonstrated problems with turf maintenance, i.e., pesticide spraying, and provision of habitat for avian wildlife (Kendall *et al.*, 1992). On the other hand, golf facilities can preserve habitat for protected species (Pearce, 1993). While tees, greens and fairways often replace existing habitat with habitat of a much lesser ecological value, golf courses hardly contain impermeable obstructions to animal movement. Therefore they are unlikely to restrict population mixing.

Furthermore, recent developments in integrated turf grass and best management practice (Balogh *et al.*, 1992; Schumann *et al.*, 1997) demonstrated ways to reduce fertiliser applications and pesticide spraying, and therefore toxicity problems with habitat use. Provided courses are planned as more naturalised link-type facilities, thus designed and maintained to ensure high environmental standards, environmental impacts can be mitigated (Terman, 1997; Salvesen, 1996). If managed accordingly, impacts will remain rather small and invisible to the untrained eye. It is therefore unlikely that a single standalone golf course that is well managed will have a major adverse effect on the fauna and flora environment. More problematic is a concentration of golf courses in particular areas or regions (Priestley, 1995).

In addition, plants on golf courses absorb carbon dioxide, release oxygen, and filter pollutants from runoff. Golf courses can also support endangered wetlands and offer habitat to many species of wildlife (Ceikot, 2000).

#### 2.1.4 Habitat

A significant development in golf course management is to create more natural landscapes. Not only are these areas beneficial to wildlife, but they are also often very cost-effective in the long-run. Once established, natural golf courses can be maintained with far less effort than conventional golf courses, requiring smaller quantities of pesticides, herbicides, and water (Santiago & Rodewald, 2005).

Seventy percent of the area that is considered “rough or out-of-play” has the potential for creating significant wildlife benefits (Tilly, 2000). More golf courses are developed each year, with a typical golf course comprising 54 hectares of land and what ever size additional for the residential components (Terman, 1997). Some of these sizeable developments have recently played an important role in some conservation efforts (Tilly, 2000). Golf course developments can also provide suitable nesting sites for several bird species, for example owls and other endangered species.

## 2.2 Social components

The impacts on the social components, which golf course developments have, are in most instances neglected in comparison with the physical impacts that these developments have on the total environment. The lack of assessment of these impacts constitutes a lack of mitigation and thus an increase in the total impact on the environment. Vanclay and Bronstein (1995), for example, argue that sustainable development ‘Post-Rio’ clearly has both an environmental and social dimension associated to it.

They argue that methods of Social Impact Assessment (SIA) have to be developed as a natural adjunct to EIA, to address the wider social and economic impact of development. They stress the need for public participation in this process. While many would agree, SIA is rarely incorporated into the regulations covering the need for EIA, and rarely are they voluntarily undertaken by developers as part of the decision making process.

Other authors have gone further in their critique of EIA. Mayda (1996), for example, argues that traditional tools such as EIA and even more wide-ranging Strategic

Environmental Assessments (SEA) (Therivel & Partidario, 1996) are now redundant, and what is now needed in the context of planning for sustainability, is Integrated Planning and Assessment (IPA) (Petts, 1999). That is an evaluation of developments, which fully incorporates environmental, social and economic factors within the one assessment.

Large developments can change the lifestyle of local communities. The impact of golf course developments on society is not quantified and needs consideration, particularly in rural areas where development takes place on previously agricultural zoned land. Local community members cannot always participate effectively in public participation processes and they do not always benefit from golfing developments. Usually, employment is generated from such developments, but it does not always improve the quality of life for the surrounding community (Botha, 2005). When golf courses are developed on land that needs to be rehabilitated, like old mine sites or quarries, the development is of great benefit.

The Sparrebosch Estate development was used to investigate the social commitments and have been closely monitored. During the project, 100% of the unskilled labour was obtained from the local community, and with the overall job creation, the targeted percentage of local jobs was exceeded and averaged at 77 % (Avierinos, 2004). This is not always the case, as mentioned above. The job creation does not necessarily mean that the quality of life will increase. Most jobs that are created attract people who already have jobs, depleting the skill base from other areas (Environment, 2005). At the Leopard Creek Estate, many opportunities were brought to the local communities. At the peak of development, 800 employment opportunities were provided, many of which were offered to the local community (Garner, 1996). According to Knoll (2002), the construction team at the Kasane Course in Botswana comprised largely of local people. It seems like most job opportunities at new developments are available during the construction phase, but not much is done in terms of job creation when the development is up and running.

“Golf courses seem to cater for the elite and are in isolation from the surrounding communities” (Mbeki, 2005). Communities often feel land is taken from them, without them benefiting from new developments. The governments’ concerns about Lagoon-Bay

Lifestyle Estate development seem to be based on the perception that golf estates are only for the elite and that such developments have little or no benefit to the local community.

The impact of developments on local communities is important, and social-structure, tradition and cultural norms need to be assessed. The social well-being of a community does not rely on job creation alone. Should golf courses contribute to the local communities the relationship between the two will be much stronger (Botha, 2005). The impact of golf course developments, specifically the impact on the social components thereof, must be more regulated. These can only be enforced when legislated. As mentioned in section 1, there is no focus on the social assessment aspects in the legislation as currently implemented. This aspect also trickles through to the Environmental Management Programmes, which are falling short in mitigating social impact.

### **2.3 Economic components**

According to the Rapid Review Report (DEADP, 2005), money flows from golf courses to the local economy by construction, employment, tourism and tournaments. Tourism and tournaments fluctuate in frequency and are thus not regular sources of income. There is very little information on these factors and a detailed economic impact assessment is needed. Many golf course operators for new developments feel that golf courses need to be combined with other aspects of development, for instance residential development, in order to be financially viable (DEADP, 2005).

Golf as a sport represents a significant economic activity and the economic value of golf courses does not only include golfing fees on the course, but also the purchasing of golf equipment, travelling and accommodation. What does raise concern however, is the fact that money spent by international tourists visiting South Africa, is collected by tourism companies outside of South Africa, and thus the amount of money that actually enters South Africa as a result of tourism, may be limited (Botha, 2005). With the factors discussed in this section in mind, a comparative evaluation and assessment of ten golf course developments can be conducted.

## **Chapter 3: Brief Description of the Golf Course Developments used in the study**

In this study ten golf course residential developments were assessed. These were selected to fulfil the following criteria:

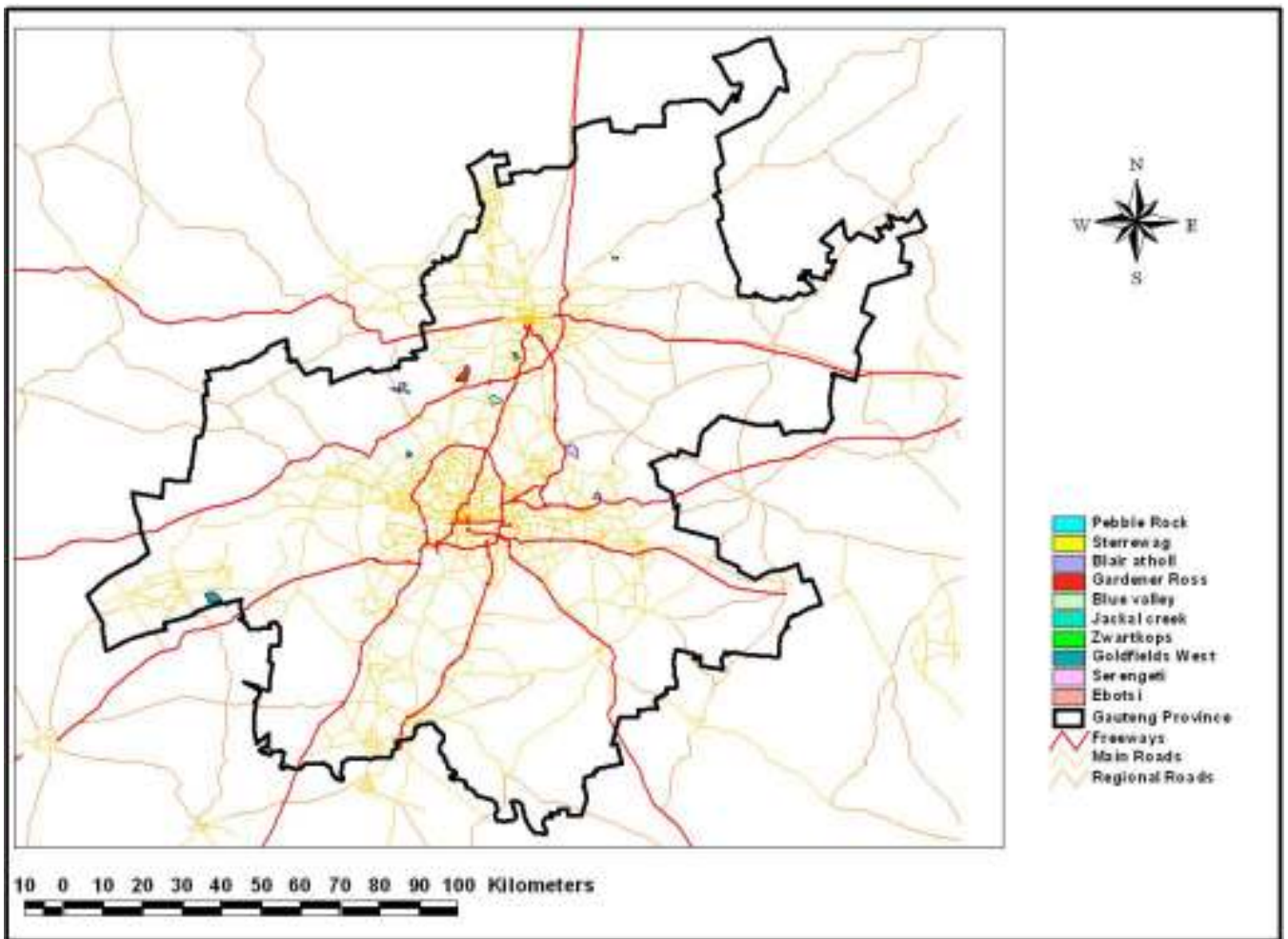
- The environmental studies had to be conducted after the implementation of the 1998 Amended EIA Regulations.
- The studies had to include EMP's.
- The studies had to be done on golf course residential development within the Gauteng provincial boundaries.
- An even spread over the province was essential to represent the province as a whole as best as possible (Refer to Figure 6).
- The EIA had to be conducted by a variety of environmental consultation companies.

The ten golf course residential developments that were assessed are as follows:

### **3.1 Ebotse Golf and Country Estate**

Ebotse Golf and Country Estate is located around Rynfield Dam, Sarel Cilliers and Simons Streets, in Rynfield, Benoni (Refer to Figure 6). More specifically, the proposed development is situated on the remainder of Portion 37 and Portions of Portions 39 and 40 of the farm Vlakfontein 69 I.R. as well as Holdings 41, 71 and Portions of Holding 72 Rynfield Agricultural Holdings. The site is approximately 218 hectares in extent. The EIA scoping report was submitted to the GDACE for their evaluation and decision making process in August 2003. The GDACE reference for this project is Gaut002/02-03/213. Index Environmental Consultants conducted the EIA for Ebotse Golf and Country Estate (Index, 2003).





**Figure 6: Locality Map of the ten Golf Residential Developments that were assessed**

### **3.2 Serengeti Golf and Wildlife Estate**

Serengeti Golf and Wildlife Estate is located east of the R21 Freeway with part of the western boundary bordering on the Freeway, south of the R25 (Bronkhorstspuit) road, north of the R23 (Benoni) road and west of 9<sup>th</sup> Road, extending through to Bredell (Refer to Figure 6). More specifically, the site is situated on Portion 3, the remaining extent of Portion 4 and Portion 7 of the farm Witfontein 161 I.R. The size of the property is approximately 608 hectares (Rock Environmental Consultants, 2004). The EIA scoping report was submitted to the GDACE for their evaluation and decision making process. The GDACE reference for this project is Gaut002/04-05/430. Rock Environmental Consulting conducted the EIA for the Serengeti Golf and Wildlife Estate (Rock Environmental Consultants, 2004).

### **3.3 Blue Valley Golf and Country Estate**

Blue Valley Golf and Country Estate is located on Portions 251 and 252 of the farm Olievenhoutbosch 389 J.R. The site is situated on the western side of the N1, close to the Ben Schoeman Ultra City (Refer to Figure 6). The size of the site is approximately 87 hectares in extent. The GDACE reference for this project is Gaut002/04-05/410. Van Riet and Louw Landscape Architects conducted the EIA for the Blue Valley Golf and Country Estate (Van Riet and Louw Landscape Architects, 1998).

### **3.4 Monument Golf Course and Sterrewag Extension 2 Township**

Monument Golf Course and Sterrewag Extension 2 Township is situated on a Portion of Portion 114 of the farm Groenkloof 358 J.R. The development is located directly north and adjacent to the R21 Highway (Nelson Mandela Drive) and east of the Groenkloof Nature Reserve (Refer to Figure 6). The size of the site is approximately 94 hectares. The GDACE reference for this project is Gaut002/02-03/215. KWP Landscape Architects & Environmental Consultants conducted the EIA for the Monument Golf and Sterrewag Ext. 2 Township (KWP, 2003).

### **3.5 Pebble Rock Golf Village**

Pebble Rock Golf Village is located 1km northwest of the Roodeplaat Dam Nature Reserve, on the Remainder of Portion 2 of the farm Roodeplaat 393 J.R. (Refer to Figure 6). The site is 110 hectares in extent and the firm African EPA conducted the EIA for the proposed Golf Estate. The GDACE reference for this project is Gaut002/02-03/535 (African EPA, 2005a).

### **3.6 Gardener Ross Golf and Country Estate**

Gardener Ross Golf and Country Estate is located in the Centurion Area of the City of Tshwane Metropolitan Municipality. The site lies to the south of the Gerardsville Agricultural Holdings, to the west of Mnandi Agricultural Holdings, to the north of the Timsrand Agricultural Holdings and to the east of the Laezonia Agricultural Holdings. More specifically, the site is situated on Part of Portion 322 of the farm Knopieslaagte

385 J.R. (Refer to Figure 6). The size of the site is approximately 690 hectares. The GDACE reference for this project is Gaut002/02-04/244 and Bohlweki Environmental Pty (Ltd) conducted the EIA for the Gardener Ross Golf and Country Estate (Bohlweki, 2004).

### **3.7 Goldfields West Golf Estate**

Goldfields West Golf Estate is situated on the portions of land located on the Goldfields West Golf Course which is approximately 10km southwest of Carletonville. Specifically the site is situated on the farm Driefontein 113 I.Q., with possible extension into the farm Oog van Elandsfontein 114 I.Q. (Refer to Figure 6). The site is approximately 300 hectares in extent. The GDACE reference for this project is Gaut002/03-04/389 and the firm Environmental Impact Management Services (Pty) Ltd conducted the EIA for the Goldfields West Golf Estate (EIMS, 2004).

### **3.8 Jackal Creek Golf Estate**

Jackal Creek Golf Estate is located to the northwest of Beyers Naude Drive and Northumberland Avenue intersection. The proposed PWV5 will form the north-western boundary of the site with Boundary Road forming the eastern border of the site. More specifically, the site is situated on Holdings 49 to 53 and 55 Sonnedal Agricultural Holdings and the Remaining extent of Portion 19 and 111, Portions 15, 18, 124, 125 and 146 of the farm Zandspruit 191 I.Q. (Refer to Figure 6). The area is approximately 169,329 hectares in extent. The firm Bokamoso Landscape Architects attended to the compilation of the EIA for the site and the GDACE reference for the project is Gaut002/03-04/209 (Bokamoso, 2004).

### **3.9 Zwartkops Golf Estate**

Zwartkops Golf Estate is situated on Holdings 222, 226, 227, 228 and 230 Lyttelton Agricultural Holdings X1, as well as Portions 627, 439, 440, 441 and 489 of the farm Zwartkop 356 J.R. The sites are located on the southwest corner of the M10 (Sunderland Ridge-Garsfontein Road) and Ashwood Street and the north-east corner of the Zwartkops

Country Club in Clubview, Centurion (Refer to Figure 6). The size of the site is approximately 10, 8361 hectares. The GDACE reference for this project is Gau002/02-03/233 and Landscape Dynamics compiled the EIA for the site (Landscape Dynamics, 2003).

### **3.10 Blaire Atholl Golf and Country Estate**

Blaire Atholl Golf and Country Estate is located north of Lanseria Airport, north-west of Diepsloot Nature Reserve, north-east of the Cradle of Humankind and south of the Hartebeestpoort Dam. The Renosterspruit Conservancy is situated on the north-eastern boundary of the site. More specifically, the site is situated on the Remaining Extent of Portion 2 of the farm Vlakfontein 494 J.Q, Portions 70, 107 and 126 of the farm Lindley 528 J.Q., Portions 16 to 21 of the farm Riverside Estate 497 J.Q. and Portion 11 of the farm Mooiplaats 524 J.Q. (Refer to Figure 6). The total size of the site is approximately 550 hectares. The firm Ecological Management Services conducted the EIA on the site and the GDACE reference for this project is Gau002/03-04/208 (EMS, 2004a).



## **Chapter 4: Description of Environmental Management Plans (EMP)**

EMP's are in essence plans drafted to mitigate the negative impacts and prevention of possible impacts of the activities on the receiving environment. These plans should be developed with reference to the impact assessment that was conducted for a specific activity in the scoping report or the EIA report. The EMP must address the impacts and provide the necessary mitigation actions applicable, as well as provide the roles and responsibilities of the roles players associated. The EMP must also address preventative action to be taken to protect the environment. The EMP's for the assessed golf course developments will be summarised to indicate the motivation for the EMP, the basic scope and to give a general evaluation of each EMP.

### **4.1 Ebotse Golf and Country Estate**

The EMP for Ebotse Golf and Country Estate was incorporated into the scoping report conducted to obtain environmental authorisation for the project from the GDACE.

The Scope of the EMP was to ensure that proper controls were in place to address the environmental impacts during the construction of roads and infrastructure and to set out the methods by which the environmental controls were to be implemented by the contractor. The duration over which the contractor's controls were to be in place covered the construction period of the project as well as the limited time after contract completion, defined by the General Conditions of Contract, and the project specification (Index, 2003).

The provisions of the EMP were binding on the contractor during the life of the contract. They were to be read in conjunction with all the documents that comprised the suite of documents for this contract. In the event that any conflict occurred between the terms of the EMP and the project specification or Record of Decision, the terms of the EMP were to be subordinate (Index, 2003).

The objective of this EMP was to highlight specific requirements that would be monitored during the project and the document therefore had to be seen as a guideline to assist in minimising the potential environmental impact of activities. The EMP aimed to, *inter alia*, identify construction activities that could impact on the environment, detail mitigation measures and specifications with which the contractor had to comply in order to minimise the extent of environmental impacts during construction by providing procedures for their implementation, define corrective actions to be taken in the event of no-compliance, and prevent long term environmental degradation (Index, 2003).

The EMP for Ebotse Golf and Country Estate was a generalised document, not site specifically developed. The EMP did not distinguish between the residential component and the golf course component. The aspects that were identified in the scoping report were also not specifically addressed except for a few critically important aspects, such as the archaeological sites and graves that were identified. The EMP made for fairly easy reading with some unclear aspects. No specifications were made in respect of the responsible parties. There was also no map incorporated into the EMP that could point out sensitive areas. The EMP made provision for alterations with respect to the RoD to be issued by GDACE. It also stipulated that an ESO must attend to the EMP and its implementation.

## **4.2 Serengeti Golf and Wildlife Estate**

The EMP for Serengeti Golf and Wildlife Estate was incorporated into the scoping report conducted to obtain environmental authorisation for the project from the GDACE. It was not specifically referred to as an “EMP”, but took the form of “preliminary environmental impact management recommendations”.

The intention of the Environmental Consultant, in only discussing the preliminary environmental impact management recommendations, was for the EMP to be developed closer to the final approval and commencement of the activities associated with this application, based upon this impact management recommendations. The recommendations were developed with specific reference to the environmental aspects identified in the scoping report.

“Actions required to prevent and reduce negative environmental impacts will be applicable mainly during the detail design and construction stages. It is important to acknowledge the fact that only preliminary recommendations can be made at this stage, but these measures are acting as the core points of departure” (Rock Environmental Consulting, 2004, p76).

Furthermore, environmental conditions may change to a limited extent between now and the time when the project enters into a construction phase. However, certain mitigation measures have been formulated based on this scoping exercise and the results it revealed. It is further acknowledged that GDACE may require a detailed EMP to be compiled just prior to the commencement of construction (Rock Environmental Consulting, 2004).

The recommendations for Serengeti Golf and Wildlife Estate were developed site specifically. The recommendations did not distinguish between the residential component and the golf course component. Aspects of both the wildlife estate and the golf course were individually addressed under specific sections. The notable impacts and aspects that were identified in the scoping report were specifically addressed. The recommendations made for fairly easy reading with some unclear aspects. No indications were made to who the specific responsible parties were. There were also no maps incorporated into the recommendations which could point out sensitive areas, but photographs were included. The recommendations made provision for alterations with respect to the RoD that was to be issued by GDACE as well as alterations with respect to environmental and other changes. It neither stipulated that an ESO had to attend to the EMP and its implementation, nor that a qualified wildlife specialist was required for the management of the wildlife estate and associated activities.

### **4.3 Blue Valley Golf and Country Estate**

The EMP for Blue Valley Golf and Country Estate was attached as an Annexure to the scoping report conducted to obtain environmental authorisation for the project from the GDACE.



The scope of the EMP was to address the management of environmental impacts, which would be expected as a result of the construction and operation of the proposed development. Included were an account of the expected environmental impacts and measures to be taken to prevent or limit the mentioned impacts, given as design, construction and operational guidelines (Van Riet & Louw Landscape Architects, 1998).

The EMP for Blue Valley Golf and Country Estate was a generalised document that was not site specifically developed, although it addressed some specific aspects pertaining to the said development. The EMP was developed in 1998 in conjunction with a scoping report. However the final scoping report was only completed and submitted during 2004, accompanied by the EMP as finalised in 1998. Thus, the specific impacts that were identified in the final scoping and environmental assessment process could not specifically be discussed in the EMP. The EMP did not distinguish between the residential component and the golf course component. The EMP was structured to identify environmental impacts in a particular section and address same in a different section with reference to policy, management and guidelines for design and operation. The EMP made for structured yet complicated reading. No mention was made to who the specific responsible parties would be. There were also no maps incorporated into the EMP that could point out sensitive areas and no provision was made for alterations with respect to the RoD to be issued by GDACE. It did not stipulate that an ESO must attend to the EMP and its implementation.

#### **4.4 Monument Golf Course and Sterrewag Extension 2 Township**

The EMP for Monument Golf Course and Sterrewag Extension 2 Township was attached as an Annexure to the scoping report conducted to obtain environmental authorisation for the project from the GDACE.

The scope of the EMP was to address the environmentally related issues that were identified in the initial checklist and scoping report. The EMP stated, amongst others, the mitigation measures for the potential impacts, ways to minimise negative impacts to enhance the developments' benefits and protect public and individual rights. It also set



out, in clear terms, what the minimum environmental requirements would be which had to be adhered to by all parties (KWP, 2003).

The EMP for Monument Golf Course and Sterrewag Extension 2 Township was a dedicated document pertaining to the site specific environmental aspects of the development. The EMP made a clear distinction between the residential component and the golf course component, as well as specific distinction between the design, construction and operational phases. The notable impacts and aspects that were identified in the scoping report were distinctly addressed. The EMP was very structured with table format clarification of environmental issues addressed in the document. This made the document extremely functional and easily readable and understandable. No specifications were made to who the specific responsible parties were to be, but clear instructions were given regarding the role of the ESO and thus covered the aspect of responsibility regarding the implementation of the EMP. There were no maps incorporated into the EMP that could point out sensitive areas. The EMP made provision for alterations with respect to the RoD to be issued by GDACE.



#### **4.5 Pebble Rock Golf Village**

The EMP for Pebble Rock Golf Village was submitted as a separate document to the scoping report for environmental authorisation of the project by the GDACE.

The scope of the EMP was to guide the planning and design, construction and operation phases of the development. The EMP was developed parallel with the planning and design phase, which enabled environmental guidelines and criteria to be incorporated into the detailed design. Extracts from the Services Report, the Traffic Impact Study, Red Data Flora Assessment and the Red Data Fauna Report were included into the EMP. Mitigating measures were set out in the EMP and these were updated according to the conditions as set out in the RoD (Africa EPA, 2005).

The EMP for Pebble Rock Golf Village was a generalised document pertaining to the site-specific environmental aspects of the said development. The EMP made distinction between the residential component and the golf course component as well as specific

distinction between the construction and operational phases. No mention was made with respect to the design phase. The notable impacts and aspects that were identified in the scoping report were only generally addressed. The document was structured in table format, describing environmental issues to be addressed, mitigation measures and responsible persons under specific sections and phases of the development. The EMP also included several sketches to illustrate the specific mitigation measures. This made the EMP very functional and easily readable and understandable. The document could also effortlessly be implemented as an on-site document which made it more valuable. A dedicated section pertaining to the roles and responsibilities of involved persons was incorporated into the EMP and specific mention of the ESO was included in this section. There were no maps incorporated in the EMP that could point out sensitive areas. The EMP did however make provision for alterations with respect to the RoD to be issued by GDACE.

#### **4.6 Gardener Ross Golf and Country Estate**

The EMP for Gardener Ross Golf and Country Estate was submitted as a separate document to the scoping report for environmental authorisation of the project by the GDACE. The EMP could not be obtained from GDACE or from Bohlweki Environmental consultants for the purpose of this study. The scoping report however included several specialist reports relative to the environmental management of the development, i.e. Aesthetic and Architectural Guidelines, Irrigation Water Report, Environmentally Sensitive Areas Identified and others.

#### **4.7 Goldfields West Golf Estate**

The EMP for Goldfields West Golf Estate was submitted as a separate document to the scoping report for environmental authorisation of the project by the GDACE. The EMP could not be obtained from GDACE or from EIMS Environmental consultants for the purpose of this study.

## **4.8 Jackal Creek Golf Estate**

The EMP for Jackal Creek Golf Estate was submitted as an annexure to the scoping report, for environmental authorisation of the project by the GDACE.

The scope of the EMP was to ensure that precautions were taken to minimise environmental damage during activities related to the rehabilitation of the quarry and construction of the proposed development on the site (Bokamoso, 2004).

The EMP for Jackal Creek Golf Estate was a generalised document pertaining to the site-specific environmental aspects of the said development. The EMP made distinction between the residential component and the golf course component as well as the rehabilitation of the quarry on a section of the site. A clear key was used to indicate this. Specific distinction was also made between the design, construction and operational phases. The notable impacts and aspects that were identified in the scoping report were only broadly addressed. The EMP made for fairly easy reading with some unclear areas. Specific mention of the ESO was made in the EMP. A clear aerial photograph with overlaid diagrams/layers indicating several important areas pertaining to the EMP was included. The EMP made provision for alterations with respect to the RoD to be issued by GDACE.

## **4.9 Zwartkops Golf Estate GDACE**

The EMP for Zwartkops Golf Estate GDACE was included in the scoping report for environmental authorisation of the project by the GDACE.

The scope of the EMP was mainly to ensure that the developer, construction workers and the operational- and maintenance staff were well acquainted with their responsibilities in terms of the environment, that mitigating measures were implemented and to ensure the availability of communication channels for reporting of environment related issues. (Landscape Dynamics, 2003).

The EMP for Zwartkops Golf Estate GDACE was a generalised section pertaining to the site specific environmental aspects of the said development. The EMP did not make distinction between the residential component and the golf course component. It did however make clear distinction between the pre-construction, construction and post-construction phases. Brief mention was made of the design aspects in the pre-construction phase. The notable impacts and aspects that were identified in the scoping report were only briefly addressed. The EMP was structured and fairly easy to read with some unclear aspects. There were no maps incorporated into the document that could point out sensitive areas. The EMP made provision for alterations with respect to the RoD to be issued by GDACE, but did not stipulate that an ESO must attend to the EMP and its implementation. The objectives of the EMP as stated by Landscape Dynamics, in particular the section referring to the responsibilities of the persons involved, was not met by the content of the EMP.

#### **4.10 Blaire Atholl Golf and Country Estate**

The EMP for Blaire Atholl Golf and Country Estate was attached as a separate document to the scoping report, submitted for environmental authorisation for the project by the GDACE.

The initially submitted EMP was an adapted copy of the scoping report prepared for the development. This document did not focus on any impact mitigation and was sub-standard. GDACE rejected the EMP prepared by Ecological Management Services (EMS) and an amended EMP was submitted by Strategic Environmental Focus (SEF). This amended document will be used for the purposes of this study.

The aim of SEF's EMP was to provide management responses that would ensure that the impacts of the development were minimised. The onus set out in the EMP rested with the developer, the main- and subcontractors, which promoted responsibility and commitment. The purpose of the EMP was to formulate mitigating measures that would be made binding on all contractors during the construction phase as well as measures that would be implemented during the operational phase (SEF, 2005).

The EMP made clear distinction between the planning, construction and operational phases of the development. The document addressed the specific responsibilities of the persons involved and made detailed reference to the need for, and responsibilities of, the ESO. The EMP did however, not distinguish between the residential component and the golf course. The notable impacts and aspects identified in the scoping report were only broadly addressed. The layout of the document was structured, in table format, describing environmental issues to be addressed, mitigation measures and responsible parties and the frequency of required actions. This made the EMP functional, easily readable and understandable. It could therefore easily be implemented as an on-site document which made it more valuable. There were no maps incorporated into the EMP which could point out sensitive areas, but the document did make provision for alterations with respect to the RoD to be issued by GDACE.



## Chapter 5: Assessment of Scoping Reports

The abovementioned scoping reports were assessed taking cognisance of the main aspects that should be addressed in a scoping report, with the aim of developing residential units, a golf course and associated buildings on a site. A ranking system was designed whereby the reports were individually assessed (Table 2). The scoping reports were scored and descriptions of the assessment quality for each aspect covered in the scoping report were provided (Refer to Addendum A). This assessment provides for a baseline evaluation of the reports and their quality per aspect addressed. The purpose of an assessment was to highlight the shortcomings that were identified in the EMP's. Clarification of this nature is of great importance with respect to fulfilling the quest to develop a guideline for future EMP's related to golf course developments (Refer to chapter 6).

**Table 2: Ranking of Assessment Quality**

| ASSESSMENT QUALITY | SCORE |
|--------------------|-------|
| Inadequate         | 1     |
| Poor               | 2     |
| Fair               | 3     |
| Good               | 4     |
| Excellent          | 5     |

### 5.1 Ebotse Golf and Country Estate

The scoping report for Ebotse Golf and Country Estate was assessed and the different factors ranked as set out in Table 3 to establish the quality of the scoping report (Refer to Table 3). The assessment of the scoping report as a whole scored a total of 62 out of a possible 105. This equates to 59.05%. The assessment of the Biophysical factors scored 21 out of a possible 35, equating to 60%. The assessment of the Socio-Economic factors scored 41 out of a possible 70, equating to 58.57%. In overview, the scoping report was rated “fair” on the assessment table (Refer to Table 3). There were definite shortcomings in the report and some areas lacked the input of specialists. The GDACE considered the scoping report to be adequate and approved the application.

**Table 3: Assessment table for Ebotse Golf and Country Estate**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Thorough assessment with some shortcomings</b>                   | <b>3</b>     |
| WATER                         | Thorough assessment with some shortcomings                          | 3            |
| <i>Surface Water</i>          | <i>Thorough assessment with some shortcomings</i>                   | 3            |
| <i>Ground Water</i>           | <i>Thorough assessment with some shortcomings</i>                   | 3            |
| SOIL                          | Assessment, including specialist study where necessary              | 4            |
| AIR                           | Vague description with several shortcomings                         | 2            |
| FAUNA                         | Detailed assessment, with specialist listings                       | 4            |
| FLORA                         | Thorough assessment with some shortcomings                          | 3            |
| ECOLOGICAL                    | Thorough assessment with some shortcomings                          | 3            |
| TOPOGRAPHY                    | Vague description with several shortcomings                         | 2            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Fairly documented</b>  | <b>3</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Comprehensively documented  | 4            |
| TRAFFIC                       | Comprehensively addressed, specialists study for specific site only | 4            |
| SAFETY                        | Reasonable documented, but vague on details                         | 3            |
| SENSE OF PLACE                | Well documented, with specific details                              | 4            |
| CULTURAL SITES                | Vague description with several shortcomings                         | 2            |
| HISTORICAL SITES              | Thorough assessment with some shortcomings                          | 3            |
| RSDF                          | Vague description with several shortcomings                         | 2            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                         | 3            |
| JOB CREATION                  | Not satisfactory, questionable or not addressed                     | 1            |
| LOSS OF OPEN SPACE            | Vague description with several shortcomings                         | 2            |
| LOSS OF AGRICULTURAL LAND     | Vague description with several shortcomings                         | 2            |
| SERVICE PROVISION             | Comprehensively addressed, specialists input for specific site only | 4            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                              | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>FAIR OVERALL ASSESSMENT</b>                                      | <b>3</b>     |

## 5.2 Serengeti Golf and Wildlife Estate

The scoping report for Serengeti Golf and Wildlife Estate was assessed and the different factors ranked as indicated in Table 4, to establish the quality of the scoping report. The assessment of the scoping report as a complete document scored a total of 78 out of a possible 105. This equates to a 74.29%. The assessment of the Biophysical factors scored 26 out of a possible 35, equating to 74.29%. The assessment of the Socio-Economic factors scored 52 out of a possible 70, equating to 74.29%. The scoping report was evaluated to be a good overall report (Refer to Table 4). There were some shortcomings in the report but satisfying input from specialists. The GDACE considered the scoping report to be adequate and approved the application.

**Table 4: Assessment table for Serengeti Golf and Wildlife Estate**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Detailed assessment, but no specialist study</b>                 | <b>4</b>     |
| WATER                         | Detailed assessment, but no specialist study                        | 4            |
| <i>Surface Water</i>          | <i>Detailed assessment, but no specialist study</i>                 | 4            |
| <i>Ground Water</i>           | <i>Detailed assessment, but no specialist study</i>                 | 4            |
| SOIL                          | Assessment, including specialist study where necessary              | 4            |
| AIR                           | Vague description with several shortcomings                         | 2            |
| FAUNA                         | Detailed assessment, with specialist listings                       | 4            |
| FLORA                         | Comprehensively addressed including specialists study               | 5            |
| ECOLOGICAL                    | Detailed assessment, with basic specialist study where necessary    | 4            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                          | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Comprehensively documented</b>                                   | <b>4</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Fairly documented   | 3            |
| TRAFFIC                       | Comprehensively addressed, specialists study for specific site only | 4            |
| SAFETY                        | Reasonable documented, but vague on details                         | 3            |
| SENSE OF PLACE                | Reasonable documented, but vague on details                         | 3            |
| CULTURAL SITES                | Comprehensively addressed, specialists study for specific site only | 4            |
| HISTORICAL SITES              | Comprehensively addressed, specialists study for total area         | 5            |
| RSDF                          | Well documented, with specific details                              | 4            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                         | 3            |
| JOB CREATION                  | Well documented, with specific details                              | 4            |
| LOSS OF OPEN SPACE            | Comprehensively addressed, specialists study for specific site only | 4            |
| LOSS OF AGRICULTURAL LAND     | Comprehensively addressed, specialists study for total area         | 5            |
| SERVICE PROVISION             | Thorough assessment with some shortcomings                          | 3            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                              | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>GOOD OVERALL ASSESSMENT</b>                                      | <b>4</b>     |

### 5.3 Blue Valley Golf and Country Estate

The scoping report for Blue Valley Golf and Country Estate was assessed and the different factors ranked as set out in Table 5 to establish the quality of the scoping report. The assessment of the scoping report as a whole scored a total of 64 out of a possible 105. This equates to a 60.95%. The assessment of the Biophysical factors scored 22 out of a possible 35, equating to 62.86%. The assessment of the Socio-Economic factors scored 42 out of a possible 70, equating to 60%. In its entirety, the scoping report was rated “fair” on the assessment table (Refer to Table 5). There were definite shortcomings in the report with some input of specialists. The GDACE considered the scoping report to be adequate and approved the application.



**Table 5: Assessment table for Blue Valley Golf and Country Estate**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Thorough assessment with some shortcomings</b>                   | <b>3</b>     |
| WATER                         | Thorough assessment with some shortcomings                          | 3            |
| <i>Surface Water</i>          | <i>Thorough assessment with some shortcomings</i>                   | 3            |
| <i>Ground Water</i>           | <i>Thorough assessment with some shortcomings</i>                   | 3            |
| SOIL                          | Assessment, including specialist study where necessary              | 4            |
| AIR                           | Vague description with several shortcomings                         | 2            |
| FAUNA                         | Vague description with several shortcomings                         | 2            |
| FLORA                         | Comprehensively addressed including specialists study               | 5            |
| ECOLOGICAL                    | Thorough assessment with some shortcomings                          | 3            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                          | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Fairly documented</b>  | <b>3</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Vaguely documented  | 2            |
| TRAFFIC                       | Comprehensively addressed, specialists study for specific site only | 4            |
| SAFETY                        | Reasonable documented, but vague on details                         | 3            |
| SENSE OF PLACE                | Reasonable documented, but vague on details                         | 3            |
| CULTURAL SITES                | Comprehensively addressed, specialists study for specific site only | 4            |
| HISTORICAL SITES              | Comprehensively addressed, specialists study for total area         | 5            |
| RSDF                          | Vague description with several shortcomings                         | 2            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                         | 3            |
| JOB CREATION                  | Vague description with several shortcomings                         | 2            |
| LOSS OF OPEN SPACE            | Vague description with several shortcomings                         | 2            |
| LOSS OF AGRICULTURAL LAND     | Vague description with several shortcomings                         | 2            |
| SERVICE PROVISION             | Thorough assessment with some shortcomings                          | 3            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                              | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>FAIR OVERALL ASSESSMENT</b>                                      | <b>3</b>     |



#### **5.4 Monument Golf Course and Sterrewag Extension 2 Township**

The scoping report for Monument Golf Course and Sterrewag Extension 2 Township was assessed and the different factors ranked as set out in Table 6 to establish the quality of the scoping report. The assessment of the scoping report in general, scored a total of 68 out of a possible 105. This equates to a 64.76%. The assessment of the Biophysical factors scored 28 out of a possible 35, or 80%. The assessment of the Socio-Economic factors scored 40 out of a possible 70, or 57.14%. In total, the scoping report was rated “good” on the assessment table (Refer to Table 6). There were some shortcomings in the report but good input from specialists. The Biophysical aspects were well addressed, but the socio-economic factors fell short. The GDACE assessed the scoping report to be adequate and approved the application.

**Table 6: Assessment table for Monument Golf Course and Sterrewag Extension 2 Township**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>   | <b>SCORE</b> |
|-------------------------------|--|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Detailed assessment, but no specialist study</b>              | <b>4</b>     |
| WATER                         | Comprehensive including specialists study where necessary        | 5            |
| <i>Surface Water</i>          | <i>Detailed assessment, but no specialist study</i>              | 4            |
| <i>Ground Water</i>           | <i>Comprehensive including specialists study where necessary</i> | 5            |
| SOIL                          | Assessment, including specialist study where necessary           | 4            |
| AIR                           | Thorough assessment with some shortcomings                       | 3            |
| FAUNA                         | Detailed assessment, with specialist listings                    | 4            |
| FLORA                         | Comprehensively addressed including specialists study            | 5            |
| ECOLOGICAL                    | Detailed assessment, with basic specialist study where necessary | 4            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                       | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Fairly documented</b>   | <b>3</b>     |
| NOISE                         | Fairly documented  | 3            |
| VISUAL                        | Comprehensively documented                                       | 4            |
| TRAFFIC                       | Thorough assessment with some shortcomings                       | 3            |
| SAFETY                        | Reasonable documented, but vague on details                      | 3            |
| SENSE OF PLACE                | Vague description with several shortcomings                      | 2            |
| CULTURAL SITES                | Thorough assessment with some shortcomings                       | 3            |
| HISTORICAL SITES              | Thorough assessment with some shortcomings                       | 3            |
| RSDF                          | Reasonable documented, but vague on details                      | 3            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                      | 3            |
| JOB CREATION                  | Vague description with several shortcomings                      | 2            |
| LOSS OF OPEN SPACE            | Vague description with several shortcomings                      | 2            |
| LOSS OF AGRICULTURAL LAND     | Vague description with several shortcomings                      | 2            |
| SERVICE PROVISION             | Thorough assessment with some shortcomings                       | 3            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                           | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>GOOD OVERALL ASSESSMENT</b>                                   | <b>4</b>     |

## 5.5 Pebble Rock Golf Village

The scoping report for Pebble Rock Golf Village was assessed and the different factors ranked as set out in Table 7 to establish the quality of the scoping report (Refer to Table 7). The assessment of the scoping report in general scored a total of 71 out of a possible 105. This equates to a 67.62%. The assessment of the Biophysical factors scored 27 out of a possible 35, or 77.14%. The assessment of the Socio-Economic factors scored 44 out of a possible 70, or 62.86%. In its entirety, the scoping report was rated “good” on the assessment table (Refer to Table 7). There were some shortcomings in the report but high-quality input from specialists. The GDACE assessed the scoping report to be sufficient and approved the application.

**Table 7: Assessment table for Pebble Rock Golf Village**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Detailed assessment, but no specialist study</b>                   | <b>4</b>     |
| WATER                         | Thorough assessment with some shortcomings                            | 3            |
| <i>Surface Water</i>          | <i>Thorough assessment with some shortcomings</i>                     | 3            |
| <i>Ground Water</i>           | <i>Thorough assessment with some shortcomings</i>                     | 3            |
| SOIL                          | Assessment, including specialist study where necessary                | 4            |
| AIR                           | Thorough assessment with some shortcomings                            | 3            |
| FAUNA                         | Detailed assessment, with specialist listings                         | 4            |
| FLORA                         | Comprehensively addressed including specialists study                 | 5            |
| ECOLOGICAL                    | Comprehensively addressed including specialists study where necessary | 5            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                            | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Fairly documented</b>  | <b>3</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Comprehensively documented  | 4            |
| TRAFFIC                       | Comprehensively addressed, specialists study for specific site only   | 4            |
| SAFETY                        | Reasonable documented, but vague on details                           | 3            |
| SENSE OF PLACE                | Reasonable documented, but vague on details                           | 3            |
| CULTURAL SITES                | Thorough assessment with some shortcomings                            | 3            |
| HISTORICAL SITES              | Thorough assessment with some shortcomings                            | 3            |
| RSDF                          | Reasonable documented, but vague on details                           | 3            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                           | 3            |
| JOB CREATION                  | Vague description with several shortcomings                           | 2            |
| LOSS OF OPEN SPACE            | Thorough assessment with some shortcomings                            | 3            |
| LOSS OF AGRICULTURAL LAND     | Vague description with several shortcomings                           | 2            |
| SERVICE PROVISION             | Comprehensively addressed, specialists input for specific site only   | 4            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                                | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>GOOD OVERALL ASSESSMENT</b>  | <b>4</b>     |

## 5.6 Gardener Ross Golf and Country Estate

The scoping report for Pebble Rock Golf Village was assessed and the different factors ranked as set out in Table 8 to establish the quality of the scoping report. The assessment of the scoping report scored a total of 80 out of a possible 105. This equates to a 76.19%. The assessment of the Biophysical factors scored 29 out of a possible 35, or 82.86%. The assessment of the Socio-Economic factors scored 51 out of a possible 70, or 72.86%. In overview, the scoping report was rated “good” on the assessment table (Refer to Table 8). There were a few short-comings in the report but expert input from specialists was included. The Biophysical factors were superbly dealt with in respect to specialist input were necessary. The socio-economic factors could have had more detailed descriptions. The GDACE evaluated the scoping report to be satisfactory and approved the application.

**Table 8: Assessment table for Gardener Ross Golf and Country Estate**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Detailed assessment, but no specialist study</b>                 | <b>4</b>     |
| WATER                         | Comprehensive including specialists study where necessary           | 5            |
| <i>Surface Water</i>          | <i>Comprehensive including specialists study where necessary</i>    | 5            |
| <i>Ground Water</i>           | <i>Comprehensive including specialists study where necessary</i>    | 5            |
| SOIL                          | Assessment, including specialist study where necessary              | 4            |
| AIR                           | Thorough assessment with some shortcomings                          | 3            |
| FAUNA                         | Comprehensively addressed including specialists study               | 5            |
| FLORA                         | Comprehensively addressed including specialists study               | 5            |
| ECOLOGICAL                    | Detailed assessment, with basic specialist study where necessary    | 4            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                          | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Comprehensively documented</b>                                   | <b>4</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Comprehensively documented  | 4            |
| TRAFFIC                       | Comprehensively addressed, specialists study for total area         | 5            |
| SAFETY                        | Reasonable documented, but vague on details                         | 3            |
| SENSE OF PLACE                | Reasonable documented, but vague on details                         | 3            |
| CULTURAL SITES                | Comprehensively addressed, specialists study for specific site only | 4            |
| HISTORICAL SITES              | Comprehensively addressed, specialists study for total area         | 5            |
| RSDF                          | Reasonable documented, but vague on details                         | 3            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                         | 3            |
| JOB CREATION                  | Reasonable documented, but vague on details                         | 3            |
| LOSS OF OPEN SPACE            | Comprehensively addressed, specialists study for specific site only | 4            |
| LOSS OF AGRICULTURAL LAND     | Thorough assessment with some shortcomings                          | 3            |
| SERVICE PROVISION             | Comprehensively addressed, specialists input for specific site only | 4            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                              | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>GOOD OVERALL ASSESSMENT</b>                                      | <b>4</b>     |

## 5.7 Goldfields West Golf Estate

The scoping report for Goldfields West Golf Estate was assessed and the different factors ranked as set out in Table 9 to establish the quality of the scoping report. The assessment of the scoping report scored a total of 68 out of a possible 105. This equates to a 64.76%. The assessment of the Biophysical factors scored 26 out of a possible 35, or 74.29%. The assessment of the Socio-Economic factors scored 42 out of a possible 70, or 60%. In totality, the scoping report was rated “good” on the assessment table (Refer to Table 9). There were some shortcomings in the report but the skilful input from specialists was satisfactory. The GDACE assessed the scoping report to be adequate and approved the application.

**Table 9: Assessment table for Goldfields West Golf Estate**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Detailed assessment, but no specialist study</b>                   | <b>4</b>     |
| WATER                         | Thorough assessment with some shortcomings                            | 3            |
| <i>Surface Water</i>          | <i>Thorough assessment with some shortcomings</i>                     | 3            |
| <i>Ground Water</i>           | <i>Thorough assessment with some shortcomings</i>                     | 3            |
| SOIL                          | Assessment, including specialist study where necessary                | 4            |
| AIR                           | Thorough assessment with some shortcomings                            | 3            |
| FAUNA                         | Detailed assessment, with specialist listings                         | 4            |
| FLORA                         | Detailed assessment, with specialist listings                         | 4            |
| ECOLOGICAL                    | Comprehensively addressed including specialists study where necessary | 5            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                            | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Fairly documented</b>  | <b>3</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Fairly documented   | 3            |
| TRAFFIC                       | Comprehensively addressed, specialists study for specific site only   | 4            |
| SAFETY                        | Reasonable documented, but vague on details                           | 3            |
| SENSE OF PLACE                | Reasonable documented, but vague on details                           | 3            |
| CULTURAL SITES                | Thorough assessment with some shortcomings                            | 3            |
| HISTORICAL SITES              | Thorough assessment with some shortcomings                            | 3            |
| RSDF                          | Reasonable documented, but vague on details                           | 3            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                           | 3            |
| JOB CREATION                  | Reasonable documented, but vague on details                           | 3            |
| LOSS OF OPEN SPACE            | Vague description with several shortcomings                           | 2            |
| LOSS OF AGRICULTURAL LAND     | Vague description with several shortcomings                           | 2            |
| SERVICE PROVISION             | Thorough assessment with some shortcomings                            | 3            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                                | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>GOOD OVERALL ASSESSMENT</b>  | <b>4</b>     |

## 5.8 Jackal Creek Golf Estate

The scoping report for Jackal Creek Golf Estate was assessed and the different factors ranked as set out in Table 10 to establish the quality of the scoping report. The assessment of the scoping report in general scored a total of 75 out of a possible 105. This equates to a 71.43%. The assessment of the Biophysical factors scored 27 out of a possible 35, equalling 77.14%. The assessment of the Socio-Economic factors scored 48 out of a possible 70, equalling 68.57%. In its entirety, the scoping report was rated “good” on the assessment table (Refer to Table 10). There were a few shortcomings in the report but adequate input from specialists was included. The Biophysical aspects were well addressed, but the socio-economic factors fell short. The GDACE assessed the scoping report to be satisfactory and approved the application.

**Table 10: Assessment table for Jackal Creek Golf Estate**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Detailed assessment, but no specialist study</b>                 | <b>4</b>     |
| WATER                         | Detailed assessment, but no specialist study                        | 4            |
| <i>Surface Water</i>          | <i>Detailed assessment, but no specialist study</i>                 | 4            |
| <i>Ground Water</i>           | <i>Detailed assessment, but no specialist study</i>                 | 4            |
| SOIL                          | Assessment, including specialist study where necessary              | 4            |
| AIR                           | Vague description with several shortcomings                         | 2            |
| FAUNA                         | Comprehensively addressed including specialists study               | 5            |
| FLORA                         | Comprehensively addressed including specialists study               | 5            |
| ECOLOGICAL                    | Detailed assessment, with basic specialist study where necessary    | 4            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                          | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Fairly documented</b>  | <b>3</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Comprehensively documented  | 4            |
| TRAFFIC                       | Comprehensively addressed, specialists study for specific site only | 4            |
| SAFETY                        | Reasonable documented, but vague on details                         | 3            |
| SENSE OF PLACE                | Well documented, with specific details                              | 4            |
| CULTURAL SITES                | Thorough assessment with some shortcomings                          | 3            |
| HISTORICAL SITES              | Thorough assessment with some shortcomings                          | 3            |
| RSDF                          | Well documented, with specific details                              | 4            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                         | 3            |
| JOB CREATION                  | Reasonable documented, but vague on details                         | 3            |
| LOSS OF OPEN SPACE            | Thorough assessment with some shortcomings                          | 3            |
| LOSS OF AGRICULTURAL LAND     | Thorough assessment with some shortcomings                          | 3            |
| SERVICE PROVISION             | Comprehensively addressed, specialists input for specific site only | 4            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                              | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>GOOD OVERALL ASSESSMENT</b>                                      | <b>4</b>     |

## 5.9 Zwartkops Golf Estate

The scoping report for Zwartkops Golf Estate was assessed and the different factors ranked as set out in Table 11 to establish the quality of the scoping report. The assessment of the scoping report scored a total of 72 out of a possible 105. This equates to a 68.57%. The assessment of the Biophysical factors scored 27 out of a possible 35, or 77.14%. The assessment of the Socio-Economic factors scored 45 out of a possible 70, equalling 64.29%. As a whole, the scoping report was rated “good” on the assessment table (Refer to Table 11). There were numerous shortcomings in the report but adequate input from some specialists was incorporated. The GDACE assessed the scoping report to be adequate and approved the application.

**Table 11: Assessment table for Zwartkops Golf Estate**

| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Detailed assessment, but no specialist study</b>                   | <b>4</b>     |
| WATER                         | Comprehensive including specialists study where necessary             | 5            |
| <i>Surface Water</i>          | <i>Comprehensive including specialists study where necessary</i>      | 5            |
| <i>Ground Water</i>           | <i>Detailed assessment, but no specialist study</i>                   | 4            |
| SOIL                          | Assessment, including specialist study where necessary                | 4            |
| AIR                           | Vague description with several shortcomings                           | 2            |
| FAUNA                         | Detailed assessment, with specialist listings                         | 4            |
| FLORA                         | Detailed assessment, with specialist listings                         | 4            |
| ECOLOGICAL                    | Comprehensively addressed including specialists study where necessary | 5            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                            | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Fairly documented</b>  | <b>3</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Fairly documented   | 3            |
| TRAFFIC                       | Comprehensively addressed, specialists study for specific site only   | 4            |
| SAFETY                        | Reasonable documented, but vague on details                           | 3            |
| SENSE OF PLACE                | Reasonable documented, but vague on details                           | 3            |
| CULTURAL SITES                | Comprehensively addressed, specialists study for specific site only   | 4            |
| HISTORICAL SITES              | Comprehensively addressed, specialists study for total area           | 5            |
| RSDF                          | Reasonable documented, but vague on details                           | 3            |
| PROPERTY VALUE                | Reasonable documented, but vague on details                           | 3            |
| JOB CREATION                  | Reasonable documented, but vague on details                           | 3            |
| LOSS OF OPEN SPACE            | Vague description with several shortcomings                           | 2            |
| LOSS OF AGRICULTURAL LAND     | Vague description with several shortcomings                           | 2            |
| SERVICE PROVISION             | Thorough assessment with some shortcomings                            | 3            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                                | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>GOOD OVERALL ASSESSMENT</b>  | <b>4</b>     |

## 5.10 Blaire Atholl Golf and Country Estate

The scoping report for Blaire Atholl Golf and Country Estate was assessed and the different factors ranked as set out in Table 12 to establish the quality of the scoping report. The assessment of the scoping report scored a total of 82 out of a possible 105. This equates to a 78.10%. The assessment of the Biophysical factors scored 28 out of a possible 35, or 80%. The assessment of the Socio-Economic factors scored 54 out of a possible 70, or 77.14%. In entirety, the scoping report was rated “good” on the assessment table (Refer to Table 12). There were a few shortcomings in the report but expert input from specialists. The Biophysical factors were comprehensively dealt with in respect to specialist input where necessary and the socio-economic factors were thoroughly documented. The GDACE assessed the scoping report to be satisfactory and approved the application.



**Table 12: Assessment table for Blaire Atholl Golf and Country Estate**

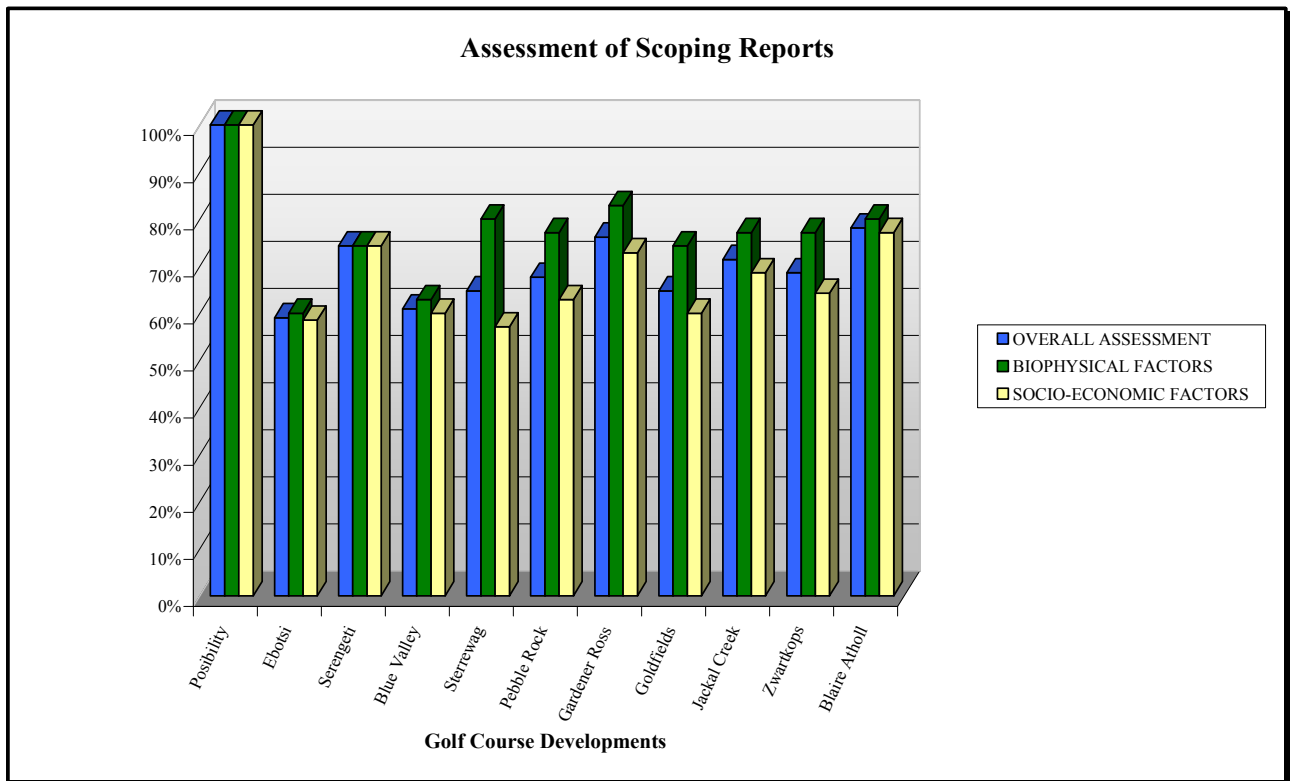
| <b>FACTOR</b>                 | <b>DESCRIPTION</b>  | <b>SCORE</b> |
|-------------------------------|---|--------------|
| <b>BIOPHYSICAL FACTORS</b>    | <b>Detailed assessment, but no specialist study</b>                 | <b>4</b>     |
| WATER                         | Comprehensive including specialists study where necessary           | 5            |
| <i>Surface Water</i>          | <i>Comprehensive including specialists study where necessary</i>    | 5            |
| <i>Ground Water</i>           | <i>Comprehensive including specialists study where necessary</i>    | 5            |
| SOIL                          | Assessment, including specialist study where necessary              | 4            |
| AIR                           | Thorough assessment with some shortcomings                          | 3            |
| FAUNA                         | Comprehensively addressed including specialists study               | 5            |
| FLORA                         | Detailed assessment, with specialist listings                       | 4            |
| ECOLOGICAL                    | Detailed assessment, with basic specialist study where necessary    | 4            |
| TOPOGRAPHY                    | Thorough assessment with some shortcomings                          | 3            |
| <b>SOCIO-ECONOMIC FACTORS</b> | <b>Comprehensively documented</b>                                   | <b>4</b>     |
| NOISE                         | Fairly documented   | 3            |
| VISUAL                        | Comprehensively documented  | 4            |
| TRAFFIC                       | Comprehensively addressed, specialists study for specific site only | 4            |
| SAFETY                        | Reasonable documented, but vague on details                         | 3            |
| SENSE OF PLACE                | Well documented, with specific details                              | 4            |
| CULTURAL SITES                | Comprehensively addressed, specialists study for specific site only | 4            |
| HISTORICAL SITES              | Comprehensively addressed, specialists study for total area         | 5            |
| RSDF                          | Well documented, with specific details                              | 4            |
| PROPERTY VALUE                | Well documented, with specific details                              | 4            |
| JOB CREATION                  | Well documented, with specific details                              | 4            |
| LOSS OF OPEN SPACE            | Comprehensively addressed, specialists study for specific site only | 4            |
| LOSS OF AGRICULTURAL LAND     | Thorough assessment with some shortcomings                          | 3            |
| SERVICE PROVISION             | Comprehensively addressed, specialists input for specific site only | 4            |
| PUBLIC PARTICIPATION          | Well documented, with specific details                              | 4            |
| <b>OVERALL ASSESSMENT</b>     | <b>GOOD OVERALL ASSESSMENT</b>                                      | <b>4</b>     |

All ten of the golf course developments scoping reports have been evaluated. The findings were considered and have been tabulated. Clear indications of the results can be seen in Figure 7 and Figure 8.

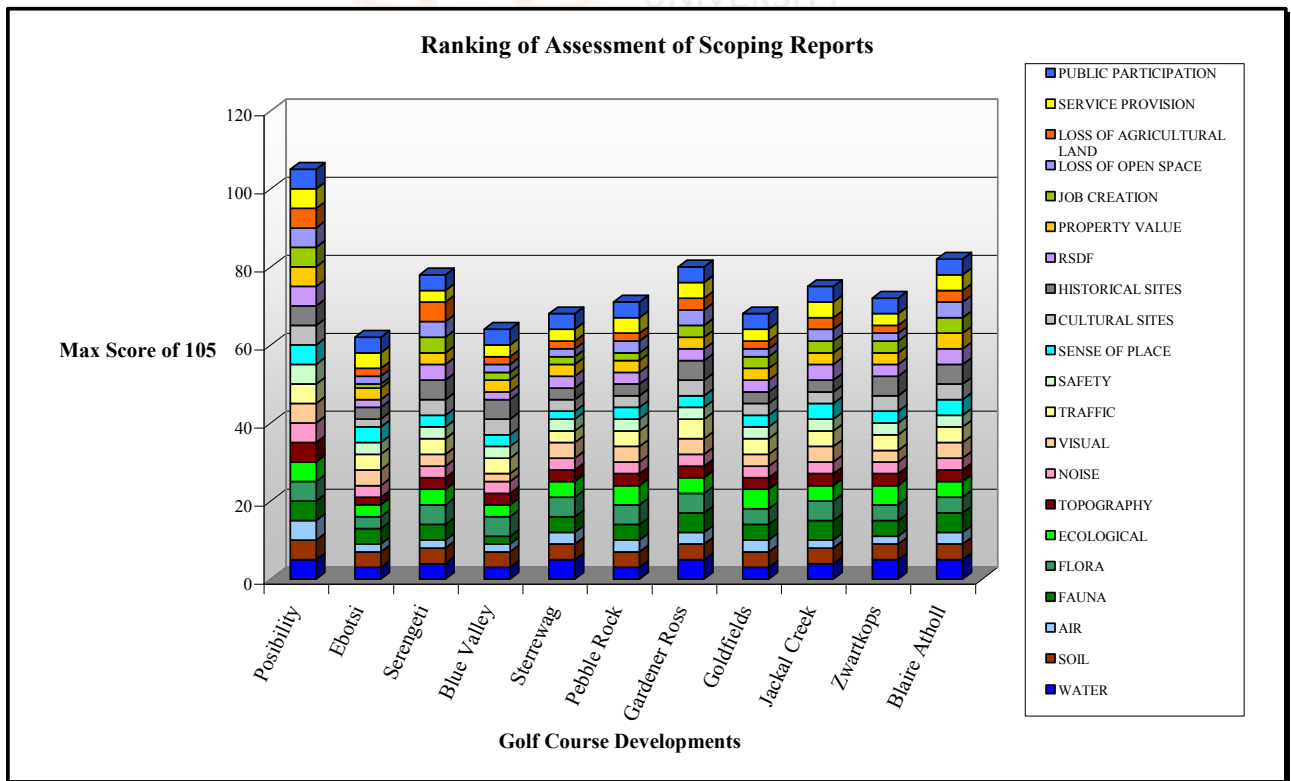
Figure 7 depicts the assessment quality of the ten scoping reports for the overall evaluation, as well as the biophysical and socio-economic factors. It can clearly be seen to what percentage the assessment was rated at.

Figure 8 depicts the ranking of the assessment quality of the ten scoping reports per factor evaluated. The bar-graph is a cumulative graph that shows the various factors judged for the scoping reports and their cumulative rating. The maximum score that was achievable was 105.





**Figure 7: Bar-chart depicting the assessment quality of the 10 scoping reports**



**Figure 8: Stacked Bar-graph depicting the ranking of the assessment quality of the 10 scoping reports per factor assessed.**

## **Chapter 6: Environmental Management Guidelines for Environmental Management Plans**

Integrated Environmental Management (IEM) is a continuous process which ensures that environmental impacts are avoided or mitigated throughout the project life cycle from design, to implementation, operation and decommissioning (DEAT, 2004a). After the feasibility and design stage of a project, the project proposal is usually subjected to an EIA. The resultant EIA report normally specifies mitigation and management actions.

One of the IEM tools that practitioners use for managing environmental impacts at the project implementation stage is the Environmental Management System (EMS). EMS provides a systematic framework and approach to minimise risks and control environmental aspects (i.e. activities that cause impacts) and impacts (i.e. effect or change to the environment resulting from an activity). EMS is a cyclical process aimed at assisting an organisation to achieve continuous improvement in environmental performance (EPA Australia, 1995).

Companies use the EMS framework to achieve continuous improvement in environmental performance. The International Standards Organization has issued the international standard ISO 14001, to provide an agreed definition of a sound EMS (George, 2000). ISO 14001 is one of a series of environmental standards, covering areas such as the environmental management of operations. Among the series of standards, ISO 14004 (general guidelines on EMS), ISO 14010 (principles of auditing), ISO 14011 (audit procedures for EMS) and ISO 14012 (auditor qualifications) provide guidance and support for the Environmental Management Systems framework described in the ISO 14001 document (DEAT, 2004b).

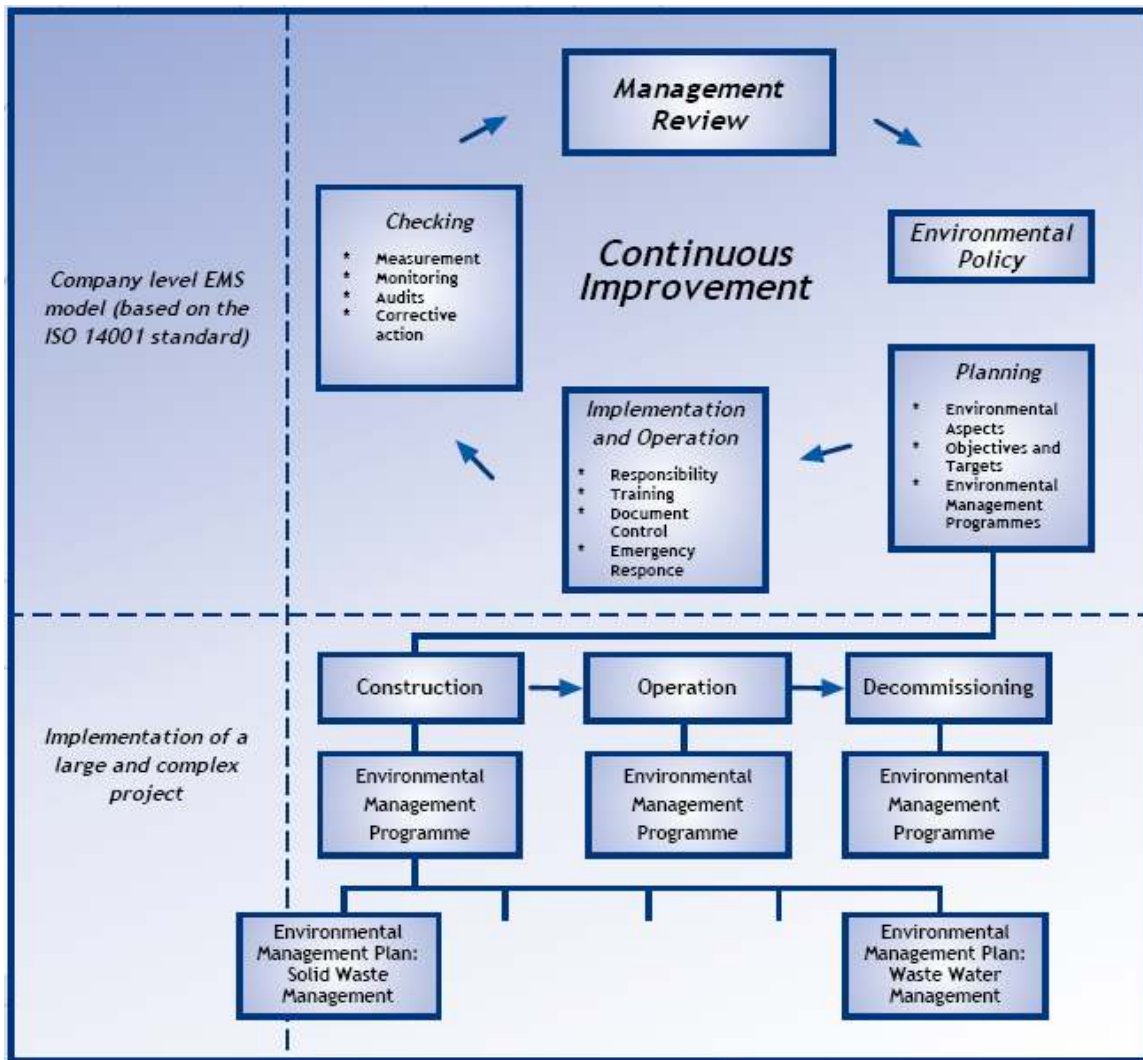
As well as defining what constitutes a sound EMS, ISO 14001 makes it possible for operators to obtain independent certification to prove that their Environmental Management System meets the requirements of the standard (George, 2000).

According to George (2000) the basic elements of an EMS complying with ISO 14001 are:

- a list of potential environmental impacts;
- a set of operational procedures for monitoring, controlling and reducing impacts, and recording the results; and
- a procedure for internal audits of the procedures.

An important feature of ISO 14001 is its requirement that impacts should not only be controlled, but reduced, with specific targets and action plans defined by the operator (George, 2000). The components of an EMS consist of policy, planning, operational procedures, checking and review (DEAT, 2004b). In the implementation of projects there is the tendency to refer to an Environmental Management Programme (EMPr), which provides the overall framework for environmental management. In the implementation of large, complex projects EMP's fit within the overall EMPr. EMP's may be prepared for specific areas or management functions such as solid waste management (DEAT, 2004b). Figure 9 provides an illustration of the link between EMS's, EMPr's and EMP's. Figure 9 provides a conceptual framework for the location and function of EMP's for complex projects such as aluminium smelters, petrochemical plants and large mining operations. It is acknowledged that in practice and where EMP's are used may differ from the way Figure 9 illustrates the concept. The context and the need will determine whether EMPr's or EMP's are developed. In practice EMP's may be consolidated into an integrated document, describing all facets of the development activities. In Figure 9, EMP's are illustrated as being prepared for isolated and distinct functions (DEAT, 2004b).

Figure 9 illustrates of the hierarchical link between an EMS for an organisation and the EMPr which fits within the EMS and the EMP as it fits within the EMPr (DEAT, 2004b).



**Figure 9: Adapted (Lochner & Rossouw, 2004) illustration of the hierarchical link between an Environmental Management System (EMS), the Environmental Management Programme and the Environmental Management Plan (DEAT, 2004b).**

For small to medium sized projects of the type which are implemented frequently and where the impacts are known and the mitigation measures are standard, EMP's for construction are the most appropriate tool. Generic construction EMP's can be developed for projects such as road infrastructure, electrical power lines, petrol filling stations, golf courses and cellular phone infrastructure. These small projects normally have standard construction and implementation specifications. Standard EMP format, therefore, can be applied to them (DEAT, 2004b).

EMP's provide a link between the impacts predicted and mitigation measures specified within the EIA report, and the implementation and operational activities of the project. EMP's outline the environmental impacts, the mitigation measures, roles and responsibilities, timescales and cost of mitigation (World Bank, 1999).

As can be seen from the discussion above, EMP's are crucial in the management of the environment and the conservation thereof. Golf course developments have definite impacts on the environment, because it changes the natural environment over a large area. These impacts must be prevented and/or mitigated to ensure sustainability. Thus EMP's play a distinct role in the prevention and mitigation of impacts associated with golf course developments. Hence the importance of developing EMP's that will cover all aspects of these developments and be able to assist the role players in mitigating the possible impacts of these developments.

## **6.1 Development of Environmental Management Plans (EMP)**

EMP's should cover three broad phases. These are the pre-construction, construction and operational phases. The EMP must cover the management of the environment for the project lifecycle. Thus a cradle to grave approach must be adopted. The objectives of the EMP throughout the different phase must be to:

- identify the possible environmental impacts of the proposed activity; and
- develop measures to minimise, mitigate and manage these impacts.

The difference between the phases of the EMP is related to the difference in mitigation actions required for the different stages of the project cycle. This also relates to the specific impacts to be mitigated and the particular aspects that must be addressed in the EMP. Thus the EMP is required to be site specific.

### 6.1.1 Administrative aspects

The EMP will be a guide to the planning and design and be used as a basis for managing, mitigating and monitoring the environmental impacts associated with the construction and operation of the golf course development. The EMP must be available on site at all times and is binding on all contractors.

- The proponent is responsible for ensuring that all contractors comply with the EMP.
- It will be the responsibility of the contractor to convey all information to all employees, subcontractors or whoever else gains access to the development area during the construction phase.
- During the operations phase – or during occupation by the owners, the responsible legal body will manage and maintain the public areas of the property as well as the maintenance and management of the golf course.

The EMP should be flexible, and subject to modification and improvement when deemed necessary as further information is obtained. As ‘gaps’ in the EMP – including concerns raised by interested and affected parties – are filled, the EMP will be revised appropriately. Any changes made must be communicated to the client, the contractor and the authorities immediately. Deadlines ought to be set for specific instructions, where applicable, which will be implemented in conjunction with the Environmental Site Officer (ESO).

GDACE will be responsible for approving the EMP, as well as any amendments to it.

The roles and responsibilities of the role players must be identified and qualified. Specific mention must be made of the roles and responsibilities of the key role players. In specific detail the functions pertaining to the ESO.

## 6.1.2 Pre-construction phase

### 6.1.2.1 Design

The design of a golf course development is of utter importance when one has to keep environmental conservation in mind. The design must run parallel with the EIA process. In this way the design of the development could be done in such a way that the natural features are incorporated in the development and that sensitive areas remain intact and conserved.

According to the principles for golf courses set out by the United States Golf Association (USGA) several aspects need to be looked at in the design phase of a golf course development. Some of these include:

- “1. When designing a golf course, it is important to identify existing ecosystems.
2. A site analysis and feasibility study should be conducted by experienced professionals.
3. Cooperative planning and informational sessions with community representatives, environmental groups and regulatory agencies should be part of the initial design phase.
4. Native and/or naturalized vegetation should be retained or replanted when appropriate in areas that are not in play.
5. Emphasis should be placed upon the design of irrigation, drainage and retention systems that provide for efficient use of water and the protection of water quality.
6. Water reuse strategies for irrigation should be utilized when economically feasible and environmentally and agronomically acceptable.
7. Buffer zones or other protective measures should be maintained and/or created, if appropriate, to protect high quality surface water resources or environmentally sensitive areas.
8. Design the course with sustainable maintenance in mind.
9. The design of the course should enhance and protect special environmental resource areas and when present, improve or revive previously degraded areas within the site

through the use of plants that are well adapted to the region.” (USGA, 2006; GCSAA, 2006).

All of these factors mentioned must be addressed in the EIA phase of the application of a golf course development. These factors must accordingly be addressed in the EMP. Mapping must be an integral part of the EMP in this phase, where sensitive areas can be identified, delineated and mapped. This will assist in the managing of the design with an ecological focus as well as to achieve sustainability with respect to all factors identified in the EIA phase. Aspects such as ecological corridors must be incorporated in the total design of these developments.

The EMP must also address the architectural designs with respect to the designs, plans and recommendations made by the appropriate specialist. The sense of place and character of the area must be preserved within these designs.

#### 6.1.2.2 Social Plan

The EMP must address the management of all social aspects determined in the EIA phase and Social Impact Assessments (SIA) that was conducted for the development. All the recommendations from these assessments must be incorporated in the EMP and mitigatory actions must be addressed in the EMP.

The social management plan within the EMP must address the identified impacts, issues and mitigation actions with respect to the social factors pertaining to the development. A formal plan of action must be in place to assist in the management process of the social attributes from commencement of activities to decommissioning.

#### 6.1.2.3 Other

Other factors that need to be addressed in this phase of the EMP are factors pertaining to the town planning aspects of the development. These are essential aspects of the pre-construction phase of the development. The provision, installation and maintenance of services are crucial and must be covered in the EMP.



The sourcing of materials must also be comprehensively addressed. Health and safety options should be predetermined and documented prior to the construction phase commencing.

The EMP should also make provision for any other aspects that might be identified and require to be incorporated in the pre-construction phase.

### 6.1.3 Construction phase

The construction phase section of the EMP provides specific environmental guidance for the implementation and construction phase of a project. It is intended to facilitate the management and mitigation of construction activities so that environmental impacts are steered clear of or minimised. These impacts vary from those incurred during commencement of the construction phase, for example, site clearing, erection of the construction camp etc., to impacts associated with construction activities, for example, erosion, pollution of watercourses, noise, dust pollution and other. These impacts would have been identified in the EIA phase and must thus be addressed in the EMP. The section of the EMP focussed on the construction phase must be a structured and well documented. The impacts identified, mitigation measures, the responsible parties as well as the monitoring thereof must be addressed. The National Department of Environmental Affairs and Tourism (DEAT) give guidelines in this regard.

“Information presented in the EMP is typically categorised as follows:

- identify the specific activity or potential impact that requires management;
- determine the mitigation measures to be implemented;
- identify the performance indicator;
- identify who would be responsible for implementation; and
- identify who would be responsible for monitoring” (DEAT, 2004b, p7).

According to the principles for golf course developments set out by the United States Golf Association (USGA) several aspects needs to be looked at in the construction phase of a golf course development. Some of these include:

- “1. Use only qualified contractors who are experienced in the special requirements of golf course construction.
2. Develop and implement strategies to effectively control sediment, minimise the loss of topsoil, protect water resources, and reduce disruption to wildlife, plant species and designed environmental resource areas.
3. Schedule construction and turf establishment to allow for the most efficient progress of the work while optimizing environmental conservation and resource management.
4. Retain a qualified golf course superintendent/project manager early in the design and construction process(es) to integrate sustainable maintenance practices in the development, maintenance and operation of the course.” (USGA, 2006; GCSAA, 2006).



#### 6.1.4 Operational phase

The operational phase EMP provides specific guidance related to the operational activities associated with a particular development. The roles and responsibilities for mitigation, monitoring and performance assessment for the operational life of the development must be specified in the EMP. The structure must be in accordance with the construction phase and must follow the same guidelines as set out by DEAT (Refer to 6.1.3 Construction phase).

The activities and impacts as identified in the scoping phase and EIA process of the development must be addressed. Some guidelines are provide with respect to maintenance but should not be limited to the following guidelines as provided by the United States Golf Association (USGA) and Golf Course Superintendents Association of America (GCSAA).

#### 6.1.4.1 Maintenance according to USGA and GCSAA

##### *Plant Protection and Nutrition*

1. Employ the principles of Integrated Plant Management (IPM).

When chemical and nutrient products need to be applied the following practices should be utilized:

2. Always read and concur with the label directions when using any plant protection products.
3. Store and handle all pest control and nutrient products in a manner that minimises worker exposure and/or the potential for point or non-point source pollution.
4. Use nutrient products and practices that reduce the potential for contamination of ground and surface water.
5. Test and monitor soil conditions frequently and adapt practices accordingly.
6. All plant products should only be applied by or under the supervision of a qualified applicator or as dictated by law.
7. Maintain excellence in continues education of contractors and employees.
8. Facilities should inform golfers and guests about golf course chemical applications (USGA, 2006; GCSAA, 2006).

##### *Water Usage*

1. Use indigenous, naturalised or specialised drought-tolerant plant materials wherever possible.
2. Plan irrigation patterns and/or program irrigation control systems.
3. Water at appropriate times to minimise evaporation and reduce the potential for disease.
4. Consider converting to effluent irrigation systems when available, economically feasible and agronomically and environmentally acceptable.
5. Manage water use efficiently to prevent unnecessary depletion of local water resources (USGA, 2006; GCSAA, 2006).

### *Waste Management*

1. Leave grass clippings and other organic materials in place whenever agronomically possible or recycle where feasible.
2. Dispose of chemical rinsate in a manner that will not increase the potential for point or non-point source pollution.
3. Dispose of chemical packaging according to label directions.
4. Other waste products, such as used motor oil, electric batteries and unused solvents, should be recycled or disposed of according to the law and available municipal disposal regulations.
5. Seek to reduce waste by purchasing products that minimise unnecessary packaging (USGA, 2006; GCSAA, 2006).

### *Wildlife Management*

1. Habitat for wildlife species that help control pests should be protected.
2. Manage habitat to maintain healthy populations of wildlife and aquatic species (USGA, 2006; GCSAA, 2006).

### *Facility Operations*

1. Facilities should conduct an environmental assessment in order to develop and implement an overall environmental policy and/or long-range plan that reflects or expands on these principles.
2. Maintain ongoing records to measure and document progress towards environmental improvement.
3. The environmentally responsible practices adopted for the maintenance of the golf course should extend to all areas of the overall facility grounds.
4. Facilities should adopt practices and technologies that conserve natural resources, including water and energy.
5. Facilities should develop and initiate comprehensive programs for recycling, reuse and waste reduction.
6. Facilities should properly store and dispose of solvents, cleaning materials, paints and other potentially hazardous substances.

7. Facilities are urged to join programs that help to further effective environmental management and policies.
8. Facilities should take active steps to educate golfers, neighbours and the general public about their environmental policies and practices (USGA, 2006; GCSAA, 2006).

### 6.1.5 Decommissioning phase

As the final phase in the project cycle, decommissioning may present positive environmental opportunities associated with the return of the land for alternative use and the cessation of impacts associated with operational activities. However, depending on the nature of the operational activity, the need to manage risks and potential residual impacts may remain well after operations have ceased. Examples of potential residual impacts and risks include contamination of soil and groundwater, stock that has been abandoned and old or unserviceable structures. The decommissioning phase EMP provides specific guidance with respect to the management of the environmental risks associated with the decommissioning phase of a project. The decommissioning phase of EMP's are typically encountered within extractive industries such as minerals mining and oil and gas exploration and extraction (DEAT, 2004b). Decommissioning of golf courses very rarely happen. However the provision must be made for a clause in the EMP that states that a decommissioning EMP will be developed and implemented should it be required for any decommissioning of any activities of the golf course.

## 6.2 Environmental Management Plan (EMP) evaluation checklist

The evaluation of EMP's is most important to ensure the quality of the EMP which constitutes to the quality of environmental management that would be made possible when applying the mitigatory actions as set out in the EMP. The evaluation of EMP's should be done by the environmental consultant(s) that prepared the EMP. This will ensure that there are minimal "gaps" in the EMP and that the impacts identified in the scoping phase and EIA process are all incorporated and addressed in the EMP. The

evaluation of EMP's is done by the authorities in the process of authorisation of applications such as those associated with golf course developments. The EMP must thus be thoroughly assessed to establish if the EMP would be sufficient in managing the environment and that the impacts established in the scoping phase and EIA process are all addressed. The EMP can only be approved by the authorities if the EMP is found to be sound and would be implemented and overseen by a competent person in the form of a suitable qualified environmental officer.

The evaluation of the EMP's can be done by having a standardised checklist that could be adapted to evaluate EMP's associated with golf course developments. This checklist could be used by the environmental consultant to ensure the quality of the EMP and by the authorities in their decision making process.



**Table 13: EMP evaluation checklist**

| Section or Phase    | Required information or Activity or Impact          | Yes                                      | No | Comment |
|---------------------|---|--|----|---------|
| General information | Project description                                 |  |    |         |
|                     | Consultant details                                  |  |    |         |
|                     | Applicant details                                   |  |    |         |
|                     | Outline of EMP contents                             |  |    |         |
|                     | Roles and responsibilities                          |  |    |         |
|                     | Details on Environmental Site Officer (ESO)         |  |    |         |
|                     | Details on audits                                   |  |    |         |
|                     | Standards of monitoring                             |  |    |         |
|                     | Timeframes  |  |    |         |
|                     | Two different EMP's for Residential and Golf course |  |    |         |
|                     | Is it implementable for proponent                   |  |    |         |
|                     |   |  |    |         |
| Pre-construction    | EIA (scoping report, EIA report)                    |  |    |         |
|                     | Design  | Maps (Locality, sensitivity, layout etc) |    |         |
|                     | Design  | Storm water management plan              |    |         |
|                     | Design  | Irrigation plan                          |    |         |
|                     | Design  | Pre-determined buffer zones (Map)        |    |         |
|                     | Design  | Course design (Maps)                     |    |         |
|                     | Design  | Residential layout                       |    |         |
|                     | Design  | Services structure layout                |    |         |
|                     | Design  | Architectural design plan                |    |         |
|                     | Design  | Sense of place                           |    |         |
|                     | Social plan   | SIA (report + recommendations)           |    |         |
|                     | Social plan   | Social management plan                   |    |         |
|                     | Other   | Sourcing of material                     |    |         |
|                     | Other   | Waste management plan                    |    |         |
|                     | Other   | Site preparation plan (pre-construction) |    |         |
|                     | Other   | Education plan for workers/contractors   |    |         |
|                     |   |  |    |         |

| Section or Phase | Required information or Activity or Impact           | Yes | No | Comment |
|------------------|--|-----|----|---------|
|                  |  |     |    |         |
| Construction     |  |     |    |         |
|                  | Structure of EMP according to DEAT/GDACE regulations |     |    |         |
|                  | Binding to all contractors                           |     |    |         |
|                  | Open liaison channels                                |     |    |         |
|                  | Construction camp                                    |     |    |         |
|                  | Safety and Security                                  |     |    |         |
|                  | Pollution  |     |    |         |
|                  | Noise  |     |    |         |
|                  | Dust suppression                                     |     |    |         |
|                  | Erosion  |     |    |         |
|                  | Vegetation and Habitat                               |     |    |         |
|                  | Fire controls  |     |    |         |
|                  | Soil management                                      |     |    |         |
|                  | Vegetation and Landscaping plan                      |     |    |         |
|                  | Traffic  |     |    |         |
|                  | Sourcing of materials                                |     |    |         |
|                  | Cultural & Historical protection plan                |     |    |         |
|                  | Service installation plan                            |     |    |         |
|                  | Storage of hazardous materials (i.e. diesel)         |     |    |         |
|                  | Waste management plan (Solid & Liquid)               |     |    |         |
|                  | Sanitation plan                                      |     |    |         |
|                  | Water management (Surface & ground water)            |     |    |         |
|                  | Impacts as per EIA phase                             |     |    |         |
|                  |  |     |    |         |
|                  |  |     |    |         |
| Operation        |  |     |    |         |
|                  | Impacts as per EIA phase                             |     |    |         |
|                  | Roles and Responsibilities                           |     |    |         |
|                  | Maintenance plan                                     |     |    |         |
|                  | Water usage plan                                     |     |    |         |
|                  | Waste management                                     |     |    |         |
|                  | Wildlife management                                  |     |    |         |
|                  | Facility operations                                  |     |    |         |
|                  |  |     |    |         |



## **Chapter 7: Conclusion**

The main objective of this study was to develop guidelines for EMP's specifically focused on golf course developments in the Gauteng province. To achieve this, a comprehensive study was conducted on the factors pertaining to the environmental process by evaluating previous EIA reports and the associated EMP's as well as the supporting documentation.

The legal framework was looked at, but as there is no specific legislation focussing on the EMP's exclusively, a shortfall in the total process of environmental management was found. Thus, the need from the GDACE, for guidelines towards EMP's, initiated this study.

In the description of the Gauteng environment it could clearly be seen that there is a definite need to conserve the environment. This can only be done if the EIA process is in totality focussed on conserving the environment and development with the aim to be sustainable.

With the cooperation of GDACE, ten approved golf course development application were selected based on numerous criteria. The EIA scoping reports, EMP's and other supporting documentation such as specialist studies conducted were made available for evaluation to establish the strong points and shortcomings of the environmental assessment and management of these.

The EMP's were evaluated and several short falls were identified. The EIA scoping reports were then appraised and ranked accordingly. The scoping reports assess the impacts on the environment. These impacts must be mitigated in the development process. These impacts and mitigation measures must be documented in an EMP. Hence the connection between the EIA scoping reports and the EMP's. Several inadequacies were recognised with respect to the inclusion of all the mitigatory measures for all the impacts as identified in the EIA scoping reports. The conclusions drawn in the

evaluations were used to develop the guidelines for EMP's. The guidelines given here will assist in future compilations of EMP's for golf courses, and it is *highly recommended* that GDACE and consultants adopt this standard in preparing and evaluating applications.

The development and implementation of a successful EMP has benefits beyond merely meeting legal obligations. It contributes to the environmental awareness of the workforce. It can facilitate the prevention of environmental degradation, and minimise impacts when they are unavoidable (DEAT, 2004b).

Given the current focus on the assessment stage of EIA's, EMP's add value to decision-making by signifying commitment to implementation of mitigation actions. An EMP must cover all site activities, from pre-construction to operation to decommissioning. An EMP can ensure good environmental performance and improve community relations. The EMP facilitates progress towards environmental targets and provides a tool for continuous improvement of a development's environmental status. The key to a successful EMP is commitment by all levels of management and the workforce. The integration of the EMP into daily operations is fundamental.

Continual improvement in the EIA process must be strived for to ensure sustainable development. The enforcement from the authorities and the commitment from the developers in implementing comprehensive EMP's can guarantee conservation of the environment.

## References

- African EPA, 2005a: Environmental Impact Assessment Scoping report for Pebble Rock Golf Village. Unpublished. African EPA, Environmental Consultants.
- African EPA, 2005b: Environmental Management Plan for Pebble Rock Golf Village. Unpublished. African EPA, Environmental Consultants.
- Avierinos, C. 2004: Sparrebosch Environmental Controls at Golf Course Estate. Urban Green File, 8, 24-27.
- Balogh, J. C., V. A. Gibeault, W. J. Walker, M. P. Kenna, & J. T. Snow 1992: Background and overview of environmental issues. 355–439. In J. C. Balogh & W.J. Walker (eds.): Course management and construction. Environmental issues. Florida. Lewis Publishers.
- Bredenkamp, G.J. & L.R. Brown 1998: A vegetation assessment of open spaces in the Western Metropolitan Local Council Area. A report commissioned by the Western Metropolitan Local Council.
- Bredenkamp, G.J. 2002: The Savanna Ecoregion. The Biodiversity of South Africa, Indicators, Trends and Human Impacts. Cape Town. Struik Publishers.
- Brissaud, F., C. Rodier, M. Lasala, & M. Salgot 1991: Wastewater reuse. A sanitation strategy for the Mediterranean coastal areas. Toxicology and Environmental Chemistry 31, 549–557.
- Bohlweki, 2004: Environmental Impact Assessment Scoping report for Gardener Ross Golf and Country Estate. Unpublished. Bohlweki, Environmental Consultants.
- Bokamoso, 2004: Environmental Impact Assessment Scoping report and Environmental Management Plan for Jackal Creek Golf Estate. Unpublished. Bokamoso Landscape Architects & Environmental Consultants.
- Botha, P. 2005: An Investigation of the Environmental Sensitivity of Golf Courses in Southern Gauteng. Unpublished MSc thesis. University of the Free State. Centre for Environmental Management.
- Ceikot, D. 2000: A tale of transformation. Golf Course Management. 10. 38-42.
- Cohen, S., A. Svrjcek, T. Durborow & N. LaJan Barnes 1999: Water quality impacts by golf courses. Journal of Environmental Quality, 28, 798–809.
- DEADP, 2005: Rapid Review of Golf Course and Polo Field Developments. Western Cape. Department of Environmental Affairs & Development Planning.
- DEAT, 1998: Environmental Impact Management Guidelines. Pretoria. Government Printer.
- DEAT, 2004a: Overview of Integrated Environmental Management. Integrated Environmental Management Information Series 0. Pretoria. Department of Environmental Affairs and Tourism (DEAT).
- DEAT 2004b: Environmental Management Plans. Integrated Environmental Management. Information Series 12. Pretoria. Department of Environmental Affairs and Tourism (DEAT).
- Dent, M.C., S.D. Lynch & R.E. Schulze 1989: Mapping Mean Annual and Other Rainfall Statistics over Southern Africa. WRC Report, 109/1/89. Pretoria. Water Research Commission.
- ECA, 1989: Environment Conservation Act, 1989 (Act 73 of 1989). Pretoria. Department of Environment Affairs and Tourism.

- EIMS, 2004: Environmental Impact Assessment Scoping report for Goldfields West Golf Estate. Unpublished. Environmental Impact Management Services.
- EMS, 2004a: Environmental Impact Assessment Scoping report for Blaire Atholl Golf Estate and Country Estate. Unpublished. Ecological Management Services, Environmental Consultants.
- EMS, 2004b: Environmental Management Plan for Blaire Atholl Golf Estate and Country Estate. Unpublished. Ecological Management Services, Environmental Consultants.
- Environment, 2005: Golf Courses, Polo Fields and their effects. The Impact of Golf Estates. [http://www.environment.co.za/topic.asp?TOPIC\\_ID=74](http://www.environment.co.za/topic.asp?TOPIC_ID=74)
- EPA Australia 1995: Environmental Monitoring and Performance. Best Practice Environmental Management in Mining. Environment Protection Agency, Commonwealth of Australia. <http://www.epa.vic.gov.au/Publications/>
- Garner, G. 1996: New Down for Leopard Creek. Environmental Planning and Management, 7, 10-17.
- GCSAA, 2006: Principles for golf courses. <http://www.gcsaa.org/resources/facts/principles.asp>
- GDACE, 2004: Gauteng Ridges Policy. Johannesburg. Gauteng Department of Agriculture, Conservation and Environment.
- GDACE, 2004b: Gauteng State of the Environment Report. Johannesburg. Gauteng Department of Agriculture, Conservation and Environment.
- GDACE, 2005a: Gauteng Conservation Plan Version 2. Johannesburg. Gauteng Department of Agriculture, Conservation and Environment.
- GDACE, 2005b: Gauteng Agricultural Potential Atlas. Johannesburg. Gauteng Department of Agriculture, Conservation and Environment.
- GDACE, 2006: Gauteng Red Data Policy. Johannesburg. Gauteng Department of Agriculture, Conservation and Environment.
- GEDA 2004: Gauteng Overview. <http://www.geda.co.za/default.asp?Index=24>
- George, C. 2000: Environmental monitoring, management and auditing In Lee, N. and C. George (eds.): Environmental Assessment in Developing and Transitional Countries. Principles, Methods and Practice. Chichester. John Wiley and Sons.
- Geron C. A., T. K. Danneberger, S. J. Traina, & J. R. Street 1993: The effects of establishment methods and fertilization practices on nitrate leaching from turfgrass. Journal of Environmental Quality, 22, 119 –125.
- Hendricks, J.M. 2005: Personal communication. Principle Environmental Practitioner, Prism Environmental Management Services.
- IAIA. 1996: Principles of Environmental Impact Assessment Best Practice. [www.iaia.org](http://www.iaia.org).
- Index, 2003: Environmental Impact Assessment Scoping report and Environmental Management Plan for Ebotsi Golf and Country Estate. Unpublished. Index Environmental Consultants.
- Ira, S.J.T., S.E. Reid, A.C. Spinks & L.A. Blaine 2000: Environmental Management Programmes for Civil Engineering Construction Activities. Proceedings of the IAIA Conference in Goudini. International Association for Impact Assessment – South African Affiliate, 164 – 175.

- Kendall, R. J., L. W. Brewer, R. R. Hitchcock & J. R. Mayer 1992: American widgeon mortality associated with turf application of Diazinon AG500. Journal of Wildlife Disease, 28, 263–267.
- Klein, R.D. 1990: Protecting the Aquatic Environment from the Effects of Golf Courses. Community and Environmental Defense Association. Maryland. Maryland Line.
- Klein, B.S. 1996: The Responsibility Challenge. Golf Week, 11, 45-50.
- Knoll, C. 2002: Golf Course Sensitive to Bushveld Environment. Urban Green File, 7, 34-37.
- KWP, 2003: Environmental Impact Assessment Scoping report and Environmental Management Plan for Monument Golf Course and Sterrewag Ext 2 Township. Unpublished. KWP Landscape Architects & Environmental Consultants.
- Landscape Dynamics, 2003: Environmental Impact Assessment Scoping report and Environmental Management Plan for Zwartkops Golf Estate. Unpublished. Landscape Dynamics Landscape Architects & Environmental Consultants.
- Linde, D. T., T. L. Watschke, J. A. Jarrett & J. A. Borger 1995: Surface runoff assessment from creeping bentgrass and perennial ryegrass turf. Agronomical Journal, 87, 176–182.
- Linde, D. T. & T. L. Watschke 1997: Nutrients and sediment in runoff from creeping bentgrass and perennial ryegrass turfs. Journal of Environmental Quality, 26, 1248–1254.
- Loney, B. & R.J. Hobbs 1991: Management of vegetation corridors: maintenance, rehabilitation and establishment. In Saunders, D.A. & R.J. Hobbs (eds): Nature Conservation 2: The role of corridors. Sydney, Surrey Beatty & Sons (Pty) Ltd, 299-311.
- Lowrey, T.K. & S. Wright 1987: The Monocotyledonae. The Flora of the Witwatersrand. Johannesburg. Witwatersrand University Press.
- Mafune, I., B. Mclean, H. Rodkin & R.C. Hill, 1997: The early years of EA in South Africa: A review of case studies from 1971 to 1986. Proceedings of the IAIAasa Conference in Pilanesberg Park. International Association for Impact Assessment South African Affiliate, 199 - 204.
- Margules, C.R. & R.L. Pressey 2000: Systematic conservation planning. Nature. 405, 43-53.
- Mbeki, 2005: Mbeki, Boom gate fiasco. The Star. 5 Oct 2005.
- Miles, C. J., G. Leong & S. Dollar 1992: Pesticides in marine sediments associated with golf course runoff. Bulletin Environmental Contamination and Toxicology, 49, 179 – 185.
- Mucina, L., M.C. Rutherford & L.W. Powrie 2005: National Vegetation Map of South Africa, Lesotho and Swaziland.(Shape file) National Botanical Institute. <http://www.sanbi.org/products/publications/saveg&flora.htm>
- Mayda, J. 1996: Reforming impact assessment: issues premises and elements. Impact Assessment. 15, 87–96.
- NEMA, 1998: National Environmental Management Act, 1998 (Act 107 of 1998). Pretoria. Department of Environmental Affairs and Tourism.
- Parkes, L., M. Solomons, A. Spinks & M. Luger 2001: Are EMPs facilitating environmentally responsible development, or just window dressing? Proceedings of

- the IAIAsa Conference in White River. International Association for Impact Assessment - South African Affiliate, 223 - 224.
- Pearce, F. 1993: How green is your golf? New Scientist, 139, 30–35.
- Petts, J. 1999: Handbook of Environmental Impact Assessment, 1, 60–73.
- Pfab, M. 2001: Departmental Policy. Development Guidelines for Ridges. Johannesburg: Government Printer.
- Platt, A. E. 1994: Toxic green: The trouble with golf. World watch Magazine. World watch Institute. <http://www.worldwatch.org/pubs/mag/1994/73/>
- Pleumarom, A. 1992: Course and effect. Golf tourism in Thailand. The Ecologist, 22, 104–110.
- Priestley, G. K. 1995: The case of golf. Sports tourism. 205–224.
- Rock Environmental Consulting, 2005: Environmental Impact Assessment Scoping report and Environmental Management Plan for Serengeti Golf and Wildlife Estate. Unpublished. Rock Environmental Consulting.
- Roos, P. 2006: Personal communication. Specialist Entomologist. P. Roos & G. Hatting cc, Butterfly Conservation Research.
- RSA Constitution as amended, 2002: 2002-BILL-016a-e. Constitution of RSA Amendment Bill [http://www.gautengleg.gov.za/Publish/Parliament%20Documents/2002\\_Legislation%20before%20Parliament/](http://www.gautengleg.gov.za/Publish/Parliament%20Documents/2002_Legislation%20before%20Parliament/)
- Ryals, S. C., M. B. Genter & R. B. Leidy 1998: Assessment of surface water quality on three eastern North Carolina golf courses. Environmental Toxicology and Chemistry, 17, 1934–1942.
- Salvesen, D. 1996: Greening up the greens. Planning, 62, 4–8.
- Samways, M. & M. Hatton 2000: Palmnut Post 3, 2, 9-11.
- Samways, M.J. 2006: Insect Extinctions and Insect Survival. Conservation Biology, 20, 245-246.
- Santiago, M.J., A.D. Rodewald 2005: Considering Wildlife in Golf Course Management. Unpublished. Ph.D. The Ohio State University. School of Natural Resources.
- Schulze, R.E. 1997: South African Atlas of Agrohydrology and Climatology. WRC Report TT82/96. Pretoria. Water Research Commission.
- Schumann, G. L., P. J. Vittum, M. L. Elliott & P. P. Cobb 1997: IPM handbook for golf courses. Michigan. Ann Arbor Press. p263.
- Schwanke, D. 1997: Resort development handbook. Washington D.C. Urban Land Institute.
- SEF 2002: Gauteng Agricultural Potential Atlas. Report by SEF. Pretoria. Strategic Environmental Focus (SEF).
- SEF, 2005: Environmental Management Plan for Blaire Atholl Golf Estate and Country Estate. Unpublished. Strategic Environmental Focus, Environmental Consultants.
- Statistics South Africa 2002: Stats in brief. Pretoria. Stats SA.
- Tatnall, T. 1991: How ‘green’ is your golf course? Parks and Recreation, 26, 30 –32.
- Terman, M. R. 1997: Natural links, Naturalistic golf courses as wildlife habitat. Landscape and Urban Planning, 38, 183-197.
- Teurlings, P. 2005: Personal communication. Private consultant, Corporate Ecological Solutions International.
- Therivel, R., M.R Partidario 1996: The Practice of Strategic Environmental Assessment. London. Earthscan.

- Tilly, D. 2000: Golf course program produces many birds. The Journal of the North American Bluebird Society. 3, 24-31.
- USGA, 2002: The Impact of Golf Courses on Soil Quality. Kansas. Kansas State University.
- USGA, 2006: Principles for golf courses. [http://www.usga.org/turf/articles/environment/general/environmental\\_principles.html](http://www.usga.org/turf/articles/environment/general/environmental_principles.html)
- Vanclay, F., D.A. Bronstein 1995: Environmental and Social Impact Assessment. Chichester. Wiley.
- Van Riet & Louw Landscape Architects, 2004: Environmental Impact Assessment Scoping report and Environmental Management Plan for Blue Valley Golf and Country Estate. Unpublished. Van Riet & Louw Landscape Architects.
- Viljoen, M.J. & W.U. Reinold 2002: An Introduction to South Africa's Geological and Mining Heritage. (1<sup>st</sup> Ed.) Pretoria. Geological Society of South Africa.
- Wan, H. B., M. K. Wong & C. Y. Mok 1996: Pesticides in golf course waters associated with golf course runoff. Bulletin Environmental Contamination and Toxicology, 56, 205–209.
- World Bank 1999: Environmental Management Plans. Environmental Assessment Sourcebook. Washington D.C. Environment Department, World Bank.





## Addendum A

Assessment ranking table for the EIA scoping reports.

| ELEMENTS ASSESSED  | ASSESSMENT QUALITY | DESCRIPTION OF ASSESSMENT QUALITY                         | SCORE |
|--|--------------------|---|-------|
| <b>BIOPHYSICAL FACTORS</b>                                       |                    |   |       |
|  | Inadequate         | Not satisfactory, questionable or not addressed           | 1     |
|  | Poor               | Vague description with several shortcomings               | 2     |
|  | Fair               | Thorough assessment with some shortcomings                | 3     |
|  | Good               | Detailed assessment, but no specialist study              | 4     |
|  | Excellent          | Comprehensive including specialists study where necessary | 5     |
| <b>WATER</b>   |                    |   |       |
| Water aspects include surface water and ground water components. | Inadequate         | Not satisfactory, questionable or not addressed           | 1     |
|  | Poor               | Vague description with several shortcomings               | 2     |
|  | Fair               | Thorough assessment with some shortcomings                | 3     |
|  | Good               | Detailed assessment, but no specialist study              | 4     |
|  | Excellent          | Comprehensive including specialists study where necessary | 5     |
| <b>Surface Water</b>   |                    |   |       |
|  | Inadequate         | Not satisfactory, questionable or not addressed           | 1     |
|  | Poor               | Vague description with several shortcomings               | 2     |
|  | Fair               | Thorough assessment with some shortcomings                | 3     |
|  | Good               | Detailed assessment, but no specialist study              | 4     |
|  | Excellent          | Comprehensive including specialists study where necessary | 5     |
| <b>Ground Water</b>  |                    |   |       |
|  | Inadequate         | Not satisfactory, questionable or not addressed           | 1     |
|  | Poor               | Vague description with several shortcomings               | 2     |
|  | Fair               | Thorough assessment with some shortcomings                | 3     |
|  | Good               | Detailed assessment, but no specialist study              | 4     |
|  | Excellent          | Comprehensive including specialists study where necessary | 5     |
| <b>SOIL</b>  |                    |   |       |
|  | Inadequate         | Not satisfactory, questionable or not addressed           | 1     |
|  | Poor               | Vague description with several shortcomings               | 2     |
|  | Fair               | Thorough assessment with some shortcomings                | 3     |
|  | Good               | Assessment, including specialist study where necessary    | 4     |
|  | Excellent          | Comprehensive assessment including specialists study      | 5     |



| ELEMENTS ASSESSED | ASSESSMENT QUALITY | DESCRIPTION OF ASSESSMENT QUALITY                                     | SCORE |
|-------------------|--------------------|---|-------|
| <b>AIR</b>        |                    |   |       |
|                   | Inadequate         | Not satisfactory, questionable or not addressed                       | 1     |
|                   | Poor               | Vague description with several shortcomings                           | 2     |
|                   | Fair               | Thorough assessment with some shortcomings                            | 3     |
|                   | Good               | Detailed assessment, but no specialist study                          | 4     |
|                   | Excellent          | Comprehensive including specialists study where necessary             | 5     |
| <b>FAUNA</b>      |                    |   |       |
|                   | Inadequate         | Not satisfactory, questionable or not addressed                       | 1     |
|                   | Poor               | Vague description with several shortcomings                           | 2     |
|                   | Fair               | Thorough assessment with some shortcomings                            | 3     |
|                   | Good               | Detailed assessment, with specialist listings                         | 4     |
|                   | Excellent          | Comprehensively addressed including specialists study                 | 5     |
| <b>FLORA</b>      |                    |   |       |
|                   | Inadequate         | Not satisfactory, questionable or not addressed                       | 1     |
|                   | Poor               | Vague description with several shortcomings                           | 2     |
|                   | Fair               | Thorough assessment with some shortcomings                            | 3     |
|                   | Good               | Detailed assessment, with specialist listings                         | 4     |
|                   | Excellent          | Comprehensively addressed including specialists study                 | 5     |
| <b>ECOLOGICAL</b> |                    |   |       |
|                   | Inadequate         | Not satisfactory, questionable or not addressed                       | 1     |
|                   | Poor               | Vague description with several shortcomings                           | 2     |
|                   | Fair               | Thorough assessment with some shortcomings                            | 3     |
|                   | Good               | Detailed assessment, with basic specialist study where necessary      | 4     |
|                   | Excellent          | Comprehensively addressed including specialists study where necessary | 5     |
| <b>TOPOGRAPHY</b> |                    |   |       |
|                   | Inadequate         | Not satisfactory, questionable or not addressed                       | 1     |
|                   | Poor               | Vague description with several shortcomings                           | 2     |
|                   | Fair               | Thorough assessment with some shortcomings                            | 3     |
|                   | Good               | Detailed assessment, but no specialist study                          | 4     |
|                   | Excellent          | Comprehensive including specialists study where necessary             | 5     |

| ELEMENTS ASSESSED             | ASSESSMENT QUALITY | DESCRIPTION OF ASSESSMENT QUALITY                                   | SCORE |
|-------------------------------|--------------------|---|-------|
| <b>SOCIO-ECONOMIC FACTORS</b> |                    |   |       |
|                               | Inadequate         | Not satisfactory, questionable or poorly addressed                  | 1     |
|                               | Poor               | Vaguely documented  | 2     |
|                               | Fair               | Fairly documented   | 3     |
|                               | Good               | Comprehensively documented  | 4     |
|                               | Excellent          | Comprehensively addressed including specialists study               | 5     |
| <b>NOISE</b>                  |                    |   |       |
|                               | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                               | Poor               | Vaguely documented  | 2     |
|                               | Fair               | Fairly documented   | 3     |
|                               | Good               | Comprehensively documented  | 4     |
|                               | Excellent          | Comprehensively addressed including specialists study               | 5     |
| <b>VISUAL</b>                 |                    |   |       |
|                               | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                               | Poor               | Vaguely documented  | 2     |
|                               | Fair               | Fairly documented   | 3     |
|                               | Good               | Comprehensively documented  | 4     |
|                               | Excellent          | Comprehensively addressed including specialists study               | 5     |
| <b>TRAFFIC</b>                |                    |   |       |
|                               | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                               | Poor               | Vague description with several shortcomings                         | 2     |
|                               | Fair               | Thorough assessment with some shortcomings                          | 3     |
|                               | Good               | Comprehensively addressed, specialists study for specific site only | 4     |
|                               | Excellent          | Comprehensively addressed, specialists study for total area         | 5     |
| <b>SAFETY</b>                 |                    |   |       |
|                               | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                               | Poor               | Vague description with several shortcomings                         | 2     |
|                               | Fair               | Reasonable documented, but vague on details                         | 3     |
|                               | Good               | Well documented, with specific details                              | 4     |
|                               | Excellent          | Comprehensively addressed   | 5     |

| ELEMENTS ASSESSED       | ASSESSMENT QUALITY | DESCRIPTION OF ASSESSMENT QUALITY                                   | SCORE |
|-------------------------|--------------------|---|-------|
| <b>SENSE OF PLACE</b>   |                    |   |       |
|                         | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                         | Poor               | Vague description with several shortcomings                         | 2     |
|                         | Fair               | Reasonable documented, but vague on details                         | 3     |
|                         | Good               | Well documented, with specific details                              | 4     |
|                         | Excellent          | Comprehensively addressed   | 5     |
| <b>CULTURAL SITES</b>   |                    |   |       |
|                         | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                         | Poor               | Vague description with several shortcomings                         | 2     |
|                         | Fair               | Thorough assessment with some shortcomings                          | 3     |
|                         | Good               | Comprehensively addressed, specialists study for specific site only | 4     |
|                         | Excellent          | Comprehensively addressed, specialists study for total area         | 5     |
| <b>HISTORICAL SITES</b> |                    |   |       |
|                         | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                         | Poor               | Vague description with several shortcomings                         | 2     |
|                         | Fair               | Thorough assessment with some shortcomings                          | 3     |
|                         | Good               | Comprehensively addressed, specialists study for specific site only | 4     |
|                         | Excellent          | Comprehensively addressed, specialists study for total area         | 5     |
| <b>RSDF</b>             |                    |   |       |
|                         | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                         | Poor               | Vague description with several shortcomings                         | 2     |
|                         | Fair               | Reasonable documented, but vague on details                         | 3     |
|                         | Good               | Well documented, with specific details                              | 4     |
|                         | Excellent          | Comprehensively addressed   | 5     |
| <b>PROPERTY VALUE</b>   |                    |   |       |
|                         | Inadequate         | Not satisfactory, questionable or not addressed                     | 1     |
|                         | Poor               | Vague description with several shortcomings                         | 2     |
|                         | Fair               | Reasonable documented, but vague on details                         | 3     |
|                         | Good               | Well documented, with specific details                              | 4     |
|                         | Excellent          | Comprehensively addressed   | 5     |

| ELEMENTS ASSESSED                       | ASSESSMENT QUALITY               | DESCRIPTION OF ASSESSMENT QUALITY                                   | SCORE  |
|---|----------------------------------|---|--------|
| <b>JOB CREATION</b>                     |                                  |   |        |
|   | Inadequate                       | Not satisfactory, questionable or not addressed                     | 1      |
|   | Poor                             | Vague description with several shortcomings                         | 2      |
|   | Fair                             | Reasonable documented, but vague on details                         | 3      |
|   | Good                             | Well documented, with specific details                              | 4      |
|   | Excellent                        | Comprehensively addressed   | 5      |
| <b>LOSS OF OPEN SPACE</b>               |                                  |   |        |
|   | Inadequate                       | Not satisfactory, questionable or not addressed                     | 1      |
|   | Poor                             | Vague description with several shortcomings                         | 2      |
|   | Fair                             | Thorough assessment with some shortcomings                          | 3      |
|   | Good                             | Comprehensively addressed, specialists study for specific site only | 4      |
|   | Excellent                        | Comprehensively addressed, specialists study for total area         | 5      |
| <b>LOSS OF AGRICULTURAL LAND</b>        |                                  |   |        |
|   | Inadequate                       | Not satisfactory, questionable or not addressed                     | 1      |
|   | Poor                             | Vague description with several shortcomings                         | 2      |
|   | Fair                             | Thorough assessment with some shortcomings                          | 3      |
|   | Good                             | Comprehensively addressed, specialists study for specific site only | 4      |
|   | Excellent                        | Comprehensively addressed, specialists study for total area         | 5      |
| <b>SERVICE PROVISION</b>                |                                  |   |        |
|   | Inadequate                       | Not satisfactory, questionable or not addressed                     | 1      |
|   | Poor                             | Vague description with several shortcomings                         | 2      |
|   | Fair                             | Thorough assessment with some shortcomings                          | 3      |
|   | Good                             | Comprehensively addressed, specialists input for specific site only | 4      |
|   | Excellent                        | Comprehensively addressed, specialists input for total area         | 5      |
| <b>PUBLIC PARTICIPATION</b>             |                                  |   |        |
|   | Inadequate                       | Not satisfactory, questionable or not addressed                     | 1      |
|   | Poor                             | Vague description with several shortcomings                         | 2      |
|   | Fair                             | Reasonable documented, but vague on details                         | 3      |
|   | Good                             | Well documented, with specific details                              | 4      |
|   | Excellent                        | Comprehensively addressed   | 5      |
| <b>OVERALL POTENTIAL</b>                | <b>COMBINED SCORE</b>            |   |        |
| Combined analyses of the above criteria | Overall inadequacy of assessment | OVERALL INADEQUACY OF ASSESSMENT                                    | 1-20   |
|   | Poor overall assessment          | POOR OVERALL ASSESSMENT   | 21-40  |
|   | Fair overall assessment          | FAIR OVERALL ASSESSMENT   | 41-60  |
|   | Good overall assessment          | GOOD OVERALL ASSESSMENT   | 61-80  |
|   | Excellent overall assessment     | EXCELLENT OVERALL ASSESSMENT  | 81-105 |