BUYING INTO RESIDENTIAL ECO-ESTATES: PERCEPTION AND REALITY OF “GREEN LIVING” IN ECO-ESTATES IN GAUTENG, SOUTH AFRICA

by

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DEDICATION

For Ross, this is especially for you.
Declaration

I, Roselle Danette Sherriff-Shüping, hereby declare that the dissertation/thesis, which I hereby submit for the degree of Master of Arts at the University of South Africa, is my own work and has not previously been submitted by me for a degree at this or any other institution.

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Date: 16/10/15
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ABSTRACT

With few studies focusing on the construction of green buildings in South Africa, there is a need to understand the reasoning behind the development of residential estates that have classified themselves as “eco”. The aim of this study was to establish whether or not residential estates that market themselves as “eco” are in fact sustainable. This study looks at the environmental sustainability of residential eco-estates (n=7) and compares them to non-eco-estates (n=7) in the Gauteng Province of South Africa. The study used content analysis to evaluate the marketing material of the 14 estates sampled for the study.

The data gathered through content analysis was then used to determine the environmental sustainability for each estate using an adapted version of the Sustainable Building Assessment Tool. The findings indicate that although the residential eco-estates had higher environmental sustainability scores when compared with non-eco-estates, the overall score for many of the eco-estates was too low for them to be classified as sustainable. The results of the study also highlight that a number of the eco-estates use greenwashing methods to attract potential homeowners. By selling nature, these estates are able to attract homeowners who may be interested in protecting the environment.

When looking at these findings, it is possible to assume that the development of residential eco-estates has less to do with the sustainability of nature and has more to do with a desire to increase profits. In order to achieve environmental sustainability, it is therefore important to provide guidelines for developers to use if they are genuinely interested in creating estates that focus on the protection of the environment and natural resources. These guidelines can be developed through frameworks that exist to evaluate the sustainability of developments. Although much of the focus of this research is placed on the developers of each estate, it is important to acknowledge that the individuals who live within these estates are just as responsible for achieving sustainability.
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List of abbreviations

“Eco” Ecological
ASA Advertising Standards Authority
BREEAM Building Research Establishment Environmental Assessment Methodology
CASBEE Comprehensive Assessment System for Built Environmental Efficiency
CFL Compact Fluorescent Lightbulb
CSIR Council for Scientific and Industrial Research
DEAT Department of Environmental Affairs and Tourism
EL Estate Living
EMP Environmental Management Plan
LED Light Emitting Diode
LEED Leadership in Energy and Environmental Design
NEMA National Environmental Management Act
SAEP South African Education and Environment Project
SAPOA South African Property Owners Association
SBAT Sustainable Building Assessment Tool
WCED World Commission on Environment and Development
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Eco-building</td>
<td>The development of a building in such a way that it does not cause harm to the environment</td>
</tr>
<tr>
<td>Eco-estate</td>
<td>A development that is designed to minimise impacts of the houses built in that particular area on the surrounding environment by using materials and processes that are considered to be environmentally friendly.</td>
</tr>
<tr>
<td>Estate</td>
<td>A development containing a number of residential houses, contained within a secured perimeter. These estates are often governed by a body corporate, which includes residents who act as trustees. Some of estates contain various on-site amenities, such as gyms, clubhouses, and Wi-Fi.</td>
</tr>
<tr>
<td>Green washing</td>
<td>Marketing that uses green imagery and terminology to promote a perception that the establishment and its aims and policies are environmentally friendly.</td>
</tr>
<tr>
<td>Green-building</td>
<td>Also known as green construction, it is the process of building as well as the actual built structure that are environmentally responsible and resource-efficient.</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Supporting long-term ecological balance to ensure that the environment is protected and that natural resources are not depleted.</td>
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Chapter One: Introduction

1.1 Introduction

One of the greatest challenges faced by the contemporary world is the contrast in the need to provide for current human welfare, while at the same time preserving the environment and its resources for future generations (Adams, 2009). Global leaders are required to address environmental issues such as climate change, biodiversity depletion, and pollution, while simultaneously tackling inequality and poverty and ensuring that the global economy does not suffer (Adam, 2009). There is thus a need to achieve sustainable development, a process of balancing human development with ecological sustainability.

In order to have effective sustainable development, there needs to be an appreciation of the value of natural resources, since current and future development depend on a wealth of resources. To ignore this relationship between the environment and development is self-defeating (Emas, 2015). The connections between the environment and development thus provide a powerful rationale for environmental protection (Dernbach, 1998). Essentially, sustainable development refers to development that must remedy social inequities and environmental damage and at the same time maintain a sound economic base (Harris, 2000). These principles, when looked at as a system of interconnected components, suggest that new guidelines for the development process are required (Harris, 2000). The creation of new guidelines would ensure that development practices that have existed over the last half-century improve to reduce economic imbalances, as well as reduce growing negative environmental impacts, especially since development will continue indefinitely (Harris, 2000).

Globally, there is an ever increasing demand for infrastructural development, which is particularly driven by high rates of urbanisation and the growth of the middle class. As the need for infrastructure continues, greenfield sites are exploited for residential and business developments (Kearney, 2006). Many of these sites are specifically developed for the unique and significant natural characteristic they have and housing developers want to market their newly developed properties as existing in nature. However, that which make these areas so valuable (in terms of development), such as nature and wildlife, recreational opportunities, rural character, and air quality, are most likely to be negatively impacted as development occurs and the existing landscape is fragmented or altogether lost (Kearney, 2006).

Although population and urban development are factors that are considered to be responsible for the concept of sustainability, there needs to be a change from the use of greenfield sites to brownfield redevelopment, such as urban re-densification,
for this type of development to be truly sustainable (Roosa, 2010). These concepts are interrelated since growing populations result in changes in urban development, especially where there is an influx of people migrating to urban areas in search of employment and other amenities provided in an urban environment (Roosa, 2010). Most population growth takes place in the suburban areas, which results in greater construction of housing in this area (Roosa, 2010). This increased development has several unintended consequences, including greater resource consumption, which in turn results in more significant environmental damage (Kahn, 2000).

This need for development can particularly be seen in the global south, such as South Africa, where, with a growing population, the country is seeing an increase in the number of new residential developments. This increase in development means that areas that were previously undeveloped are now sought after by developers, especially since residential properties in South Africa are increasing in value (Montagu-Pollock, 2015). As a result, property developers are targeting this market, owing to its steady growth and high economic returns (du Toit, 2006). Although lucrative, the development of residential property is challenging as a result of constant change (Motshegwa, 2015). These challenges faced by property developers are compounded by the increasingly relevant issue of environmental sustainability within the property industry (South African Property Owners Association (SAPOA), 2013). Environmental sustainability can be achieved through the use of green building requirements for new developments, energy management on new and existing properties, and increased utility costs, which are at times complicated by the constant stream of new regulations (SAPOA, 2013).

The need to develop environmentally sustainable housing has seen a growth in the real estate market where housing estates differentiate themselves from other developments by choosing to focus on the environment. A key way in which to differentiate a particular housing estate in a competitive market is to market it as an eco-estate (Ballard & Jones, 2011). Since there are widespread concerns about environmental degradation, resource shortages, and human health impacts caused by human activities (especially activities connected to built environment design and construction) in the environment (Kibert, 2013), this study aims to determine whether or not residential developments that are marketed as eco-estates have less of an impact on the environment than non-eco-estate developments.

It is apparent that developers are trying to achieve sustainability through the development of eco-estates. This is especially true in South Africa where there are now more than 50 estates that are marketed as “eco”. These developments look set to increase in their numbers over the years, since eco-estates provide potential investors with a profitable investment, such as unique natural surroundings with secure, well-organised management structures, while at the same time professing to
be sustainable developments (Landman & Badenhorst, 2012). It is therefore necessary to determine their exact role in environmental sustainability, since in many cases, the benefits of development are unevenly distributed, with income inequality remaining persistent or increasing over time (Harris, 2000). Globally, the numbers of those living in poverty and those who are malnourished remain high, despite the global middle class reaching relative affluence (Harris, 2000).

Demand is crucial to economic development and, as such, where demand leads, supply will follow (McKay, 2011). As such, developers worldwide are constructing buildings that are built with greener products as well as adapting operations to appear more environmentally friendly (McManus, 2008). However, this commitment to environmental protection has more to do with a desire to sell their product, thus these developers are greenwashing (McManus, 2008). Greenwashing is global concern that sees companies marketing their products as green when they are not (Pindela, 2014; Delmas & Burbano, 2011; Furlow, 2010; Alves, 2009; Gillespie, 2008; Ramus & Montiel, 2005; Greer & Bruno, 1996).

Greenwashing is a term that has been used to describe companies that mislead consumers (both intentionally and unintentionally) regarding the environmental practices of the company, or the environmental benefits of the product or service the company offers (Le Roux & Viljoen, 2012). Greenwashing has significantly increased along with the increased demand for green products by consumers (Le Roux & Viljoen, 2012).

1.2 Sustainability and Construction

The last decade has seen a shift from a focus on specific environmental issues to the broader concept of sustainable development (Gibberd, 2008; Roosa, 2010). This shift has occurred as a result of environmental degradation and resource depletion, as well as the need to focus global efforts on social, environmental, and economic sustainability (Gibberd, 2008). Notably, sustainability developed from multiple sources and evolved with the realisation that problems and potential solutions may be interrelated across systems, rather than existing individually (Roosa, 2010).

Sustainable construction addresses the ecological, social, and economic issues of a building in the context of its community (Kibert, 2013; Ortiz et al, 2009). The need for sustainability within the construction sector is to reach a point where there is a contribution to the improved environment as well as advancement within society (Shen, et al, 2010). In the quest to achieve sustainability within the construction industry, there is a need for developers to address specific questions that relate to the approaches used to handle environmental problems within the overall design process, the materials that are most suitable for use, environmentally benign
practices, as well as other issues and aspects that contribute to the environment (Ball, 2002).

The building and construction industries play an important role in achieving sustainability as well as in addressing basic human needs in the provision of housing and social infrastructure (Gibberd, 2008). In 1994, the Conseil International du Bâtiment (CIB) put forward that sustainable construction is the creation and operation of a healthy built environment based on resource efficiency and ecological design (Kibert, 1994). It is therefore crucial to develop and use tools that can measure whether or not sustainability is being achieved.

There is also, however, a need to ensure that the tool used to assess sustainability is applicable to this specific context. It is a widely accepted fact that the average standard of living in developing countries is far lower than that of developed countries, and as such many basic human needs are not met. Therefore, in a developing country, the emphasis for sustainability should be on development that addresses these basic needs while avoiding negative environmental impacts (Gibberd, 2008).

One method used to assess sustainability in the construction sector is through the use of environmental building assessment methods. Globally, there are more than 20 environmental building performance assessment methods, including, but not limited to, LEED, Green Star, CASBEE, BREEAM, and GBTool. The primary role of an environmental assessment method is to provide comprehensive assessment of the environmental characteristics of a building (Cole, 2005). This assessment is done through the use of common and verifiable criteria, which enable both owners and designers of buildings to achieve environmental standards (Ding, 2008).

With a shift towards environmental protection and sustainability, environmental building assessment both enhances the environmental awareness of building practices as well as lays down the fundamental direction for the building industry (Ding, 2008). Yet even though environmental building assessment methods assist in developing an understanding of the relationship between buildings and the environment, there are limitations (Ding, 2008). These limitations may hamper their future usefulness and effectiveness in the context of assessing environmental performance of buildings (Ding, 2008).

Sustainability is thus revolutionising the way that buildings are being constructed, as well as the way that resources are being allocated (Roosa, 2010). This shift has seen the emergence of greenwashing tactics to garner favour among consumers who feel inclined to participate in the “green” movement.
1.3 Green Building

The last two decades have seen an increase in the adoption of the terms “sustainable design” and “high performance buildings”, which in turn has led to the development of assessment tools (Todd et al, 2001). These tools have helped design this emerging field by providing ways for building owners and managers, architects, builders, community planners, and other interested parties to communicate with one another about the built environment and how to construct a environmentally sustainable building (Todd et al, 2001).

At present, high performance green buildings are defined as such by the assessment systems that are used to rate and to certify them (Kibert, 2013). Using the principles and methodologies of sustainable construction, green buildings refer to the qualities and characteristics of the actual structure (Kibert, 2013). Green building aims to provide people with healthy, comfortable, and safe spaces to live and work, while at the same time promoting efficient use of resources throughout the entire building lifecycle (Liu & Xu, 2015; Samer, 2013). The driving factor in the development of green buildings is sustainable development, which calls for a change in not only the physical structures of the built environment, but a shift in the way that companies, organisations, and individuals think about and act in the environment (Kibert, 2013).

The purpose of green buildings is therefore to transform fundamental human assumptions of wastefulness and inefficiency and replace them with a paradigm of responsibility towards present and future generations (Kibert, 2013). Green building is important as it encourages the minimisation of environmental degradation caused by building practices in an attempt to ensure that future generations have a cleaner and more energised planet (Kamana & Escultura, 2011).

Since green building allows for sustainable development to occur, many countries have adopted this approach as the best way forward in preserving resources and sustaining the environment (Al-Kaabi et al, 2009). The situation in South Africa reflects this move to more sustainable building practices, with the country now positioned as the fastest growing sustainable building country in the world (Mahlaka, 2014).

Unlike the traditional definitions of design, which denote the intentional shaping of matter, energy, and process to meet a desire outcome, ecological design is the transformation of matter and energy through processes that are compatible and interact with nature, or that have been modelled on nature (Kibert, 2013). Although the terms “ecological design”, “ecologically sustainable design”, and “eco-construction” are often used interchangeably with regards to green building, they are
in fact terms that are used to describe the application of sustainability principles to building design (Kibert, 2013). Defined as a holistic and integrated approach aiming to support accessibility to healthy habitats, eco-construction is crucial in ensuring the conservation of natural resources, as well as developing the cultural and architectural heritage in construction (Samer, 2013).

1.4 Eco-Estates and Sustainable Development

The term “eco-estate” is relatively new; the development of eco-estates has gone from being a virtually unknown concept to numbering more than 50 across South Africa (Koblitz, 2006). Based on the concepts of sustainability, economy, environment, and people, eco-estates should in turn focus equally on profit, people, and the environment (Hooper, 2008). Thus there is perhaps a need for eco-estates to not only deliver overall value for the homeowners, but to do so in a manner that lowers environmental impact.

Figure 1.1. The concept of sustainable development (Source: MIT OpenCourseWare)

Figure 1.1 shows the complex nature of the term “sustainable development”. Sustainable development is not a term that is well defined, however, the definition provided by the Brundtland Report highlights two fundamental issues of sustainable development: environmental degradation accompanies economic growth, while economic growth is necessary for the alleviation of poverty (Adams, 2006). In most debates about sustainable development, either the environment or the economy is given priority (Giddings et al, 2002).
Sustainable development is often presented as a conceptual model with three interconnected rings (Giddings et al., 2002). Figure 1.1 above shows each of the three rings, which represent the economy, environment, and society. Figure 1.1 highlights that sustainable development exists where environmental, social, and economic objectives and outcomes are all sufficiently met. Where a balance cannot be entirely achieved, trade-offs between the various dimensions need to be negotiated (Dalal-Clayton & Sadler, 2014).

Green developments, and therefore eco-estates, are developments that seek to limit negative environmental effects that are often associated with the built environment (Hostetler & Noiseux, 2009). Furthermore, these developments aim to ensure that the buildings are energy efficient and that the site planning and the landscaping are environmentally sensitive (Hostetler & Noiseux, 2009).

Eco-estates have become popular as a response to the need to accommodate a more environmentally friendly lifestyle, and, as such, developers have responded by providing individuals with a new and green way to invest in property by creating housing associated with a focus on the importance of the environment (Waterberry, 2014). Properties in eco-estates are thus selling quickly, owing to the high demand for the security they provide as well as the increased awareness of environmental issues among homeowners (Bosch, 2013).

1.5 Motivation for the Study

With the global focus on sustainability, the construction industry has seen changes in the governance of the built environment (Berardi, 2015). The new agenda for the construction sector is the creation of policies, laws, and regulations as ways for the sector to adopt more sustainable practices (Hellstrom, 2007). There is an important need to address the construction industry specifically, since the building sector uses large amounts of energy and has high greenhouse gas emissions (Levine et al., 2007). Furthermore, the building sector is also one area in the economy in which potential for energy saving and pollution reduction is highest (Levine et al., 2007).

The development sector in South Africa has been mandated by the South African government to provide buildings that have a smaller environmental impact, with eco-development being one tool that can utilised to meet this mandate. As such, the Department of Social Housing (2003:3) has acknowledged that “the development of acceptable and sustainable medium density... housing can only be realised through sustainable social housing institutions and adequate private sector involvement... It
clearly contributes to sustainable development, especially when location, integration, viability and sustainability are carefully considered”.

Since 1994, the development of residential areas within gated communities has increased dramatically (Ballard & Jones, 2011). In a bid to differentiate themselves from similar developments both locally and abroad, developers in South Africa have begun to create estates with a particular theme (Ballard & Jones, 2011). However, whether or not these eco-estates stay true to their initial aims is questionable. Recently, other lifestyle estates have been the focus of environmental concern, with specific regard to putting local water resources under pressure, as well as disrupting natural areas in South Africa (property24, 2006). As a result, the South African government has adopted an approach that is stricter, as there are many concerns regarding the ecological effects of these estates on the environment (property24, 2006).

In response to the government’s suppression of approving plans for lifestyle estate development, developers have opted to create estates that address government’s concerns by marketing them as ecologically friendly. These developers claim that these developments are eco-friendly because they invest in and assist with the preservation of wilderness areas (property24, 2006). However, greenwashing may suggest that this trend in “going green” creates an opportunity for developers to employ questionable tactics in an effort to surpass competitors and gain an advantage (Mitchell & Ramey, 2011).

1.6 Research Problem, Aims and Objectives

In the current context of development in South Africa, consumers and developers have become increasingly aware of the need for a more sustainable method of construction and a need to ensure that houses that are built have a minimal impact on the surrounding environments. As a result, developers have begun developing residential areas that they term “eco-estates”.

Growing international awareness of environmental issues, as well as a sense of responsibility to preserve the environment for future generations, means that many buyers are being influenced to purchase houses in eco-estates (Bosch, 2013).
The aim of this research is:

To establish if residential estates, which market themselves as “eco”, are in fact sustainable.

The objectives of this research are to:

1. Calculate the environmental sustainability ‘score’ for residential developments using the Sustainable Development Assessment Tool (SBAT);
2. Explore the concept of greenwashing in the context of estate development in Gauteng; and
3. Assess the role that eco-estates can play in fostering sustainable development.

As the human population continues to grow beyond the 7 billion mark, so too does the number of environmental issues. Many of these environmental issues occur as a result of the development and provision of housing for the growing population. Buildings use a vast number of natural resources and create various forms of pollution. Some developers have become aware of the need to provide housing that reduces these negative environmental issues, and have begun to develop estates that focus on environmental friendliness. Consumers too are aware of the need to protect the environment, thus many are choosing to purchase products that will benefit the environment. Since homes represent a substantial investment for many individuals, it is important to determine whether or not potential homeowners are really buying what eco-estate developers are advertising. The sustainable building assessment tool was designed to determine the sustainability of buildings in the South African context. This tool was adapted for use in this study to calculate the environmental sustainability of eco-estates and to determine whether or not eco-estates were more sustainable than other lifestyles estates.

With government, businesses, and residential developers across the country embracing sustainable building methods, South Africa’s green building sector has seen an overall increase in the number of eco-developments. This trend has seen an increase in green features and fittings that did not feature on potential homeowners’ checklists five years ago (Bosch, 2013).

In order to achieve sustainability within this sector, developers need to adopt practices that involve more efficient allocation of resources, minimum energy consumption, and other mechanisms to achieve effective and efficient short- and long-term use of natural resources (Ding, 2008). Environmental assessment methods enable developers and other interested individuals to achieve the goal of
sustainable development by providing a methodological framework to measure and monitor environmental performance (Ding, 2008).
Chapter 2: Methodology

2.1 Introduction

This study seeks to establish whether or not residential estates use greenwashing methods to attract potential homeowners. The purpose of this study is to investigate a sample of both eco and non-eco residential estates to determine if there is any difference between the two types of estates with specific reference to their overall environmental sustainability. This research employed quantitative methods to generate findings for this study. Participants of this study included 14 residential estates within the Gauteng Province of South Africa.

This chapter will describe in detail the methodology used in the collection of the data for this research. Covered in this chapter will be the research design, specifically, the quantitative components, as well as a discussion of the participants and the sample used in this research study. A detailed explanation of methods used for analysis, as well as the ethical considerations for this research, will follow.

2.2 Research Design

Since the research aimed at studying large-scale patterns of behaviours, quantitative methods were used in this study to determine the environmental sustainability of residential estates in the Gauteng Province of South Africa. The number of residential estates chosen for this study is limited, since there are only seven residential estates that are currently marketed as eco-estates in Gauteng. In order to have a comparative sample, only seven non-eco-estates were then selected using simple random sampling, since the total number of non-eco-estates was significantly higher than the number of eco-estates.

Quantitative methods were implemented to ensure the authenticity of random sampling, as well as allowing for the generalisation of the results of the study. Since the study aims at determining whether or not eco-estates employ greenwashing as a way to attract potential homeowners, it is necessary to determine if there is a causal relationship between eco-estates and their environmental sustainability. In using the SBAT, quantitative data is produced.

The quantitative data collected for use by the SBAT was generated from performing content analysis of the estate documentation. The information used from each of the websites is classified as secondary data. Secondary data can be described as many different kinds of information, such as information about natural and human processes, that has been gathered by various agencies, often for a purpose that is different to that of the research (St Martin & Pavlovskaya, 2010;
Montello & Sutton, 2013). The original purpose of the information published on the residential estates websites was to inform potential and current homeowners of the rules and regulations of each of the estates, as well as to guide the architectural designs. These rules and regulations are directly related to the overall ethos of the estates.

Based on these resources, content analysis techniques were employed. Content analysis is a quantitative technique where the researcher objectively describes the denotative meaning of the content being analysed (du Plooy-Cilliers & Cronje, 2014). Since content analysis uses only the denotative meaning of words, this method is free of misinterpretation, thus there is an assumption that the data analysed is valid and reliable (du Plooy-Cilliers & Cronje, 2014). The process of content analysis is lengthy and often requires the researcher to re-examine the data several times to ensure that he or she was thorough (du Plooy-Cilliers & Cronje, 2014).

Once contextual analysis was completed, the data was then transformed to numerical coding to be used in the completion of the SBAT. For this study, however, the information was used to generate data that could then be used to calculate scores, which generated an overall environmental sustainability score, using the SBAT.

The SBAT is a tool that was developed to support sustainability performance improvements in buildings and construction processes by setting targets for sustainability (Gibberd, n.d.). In addition, objectives for sustainability performance can be set using this tool, and it can also be used to assess and improve the sustainability performance of buildings (Gibberd, n.d.). These different function highlight the adaptability of the tool, which allows the user to target specific sustainability indicators. This specific targeting was used in this study, as only the environmental sustainability was calculated. Once these scores were generated, they can then be used to make adjustments to the areas where sustainability scored lowest.

All aspects of sustainability – social, economic, and environmental criteria – are addressed by the tool (Gibberd, n.d.). A building or construction process is measured by the SBAT in terms of the degree to which it supports environmental, economic, and social sustainability (Gibberd, n.d.) For this study, as indicated above, only the environmental component of the SBAT was calculated, since the eco-estates use only environmental components in their advertising.
2.3 Research Setting

With more than 250 000 residential properties located in estates across South Africa, the majority are considered security estates, while 12% are considered more lavish golfing estates and the remaining 3% are uncategorised, but include eco-estates (Estate Living (EL), 2014). Estate living is in demand and on the rise owing to issues of security, but there is also an increasing trend that sees investors interested in purchasing homes in more exclusive and luxurious estates, more specifically, in estates that have been classified as country or eco-estates (EL, 2014).

When compared to other provinces in South Africa, Gauteng has the highest number of estates (Watt & Loos, n.d.): 61 % of the national total of estates is located within Gauteng. The Western Cape has less than half the total in Gauteng, while the remaining provinces make up just 10% of estate developments (Watts & Loos, n.d.). The large population in Gauteng and relentless property development in line with economic growth coupled with relatively high crime rates are factors that have led to the increased development in estates in the province (Watt & Loos, n.d.).

There are 11 residential estates within Gauteng that have marketed themselves as “eco-estates” (refer to figure 2.1). Included in this study were non-eco residential estates. All residential estates range in size from 240 hectares to over 500 hectares of land. The density of houses within these estates also varies considerably, with some having only seven stands available for purchase and development, while others have over 3000 stands developed and ready for purchase. Estates can either be classified as high or low density, where high density refers to estates that have an average plot size less than 700sqm, and where low density refers to estates that have a larger average plot size (Watt & Loos, n.d.). Although low density estates in Gauteng are aimed at providing a combination of security, community involvement, and a parkland lifestyle, they are often not as attractive to buyers as they are located further from key business nodes, which leads to longer commutes (Watt & Loos, n.d.)
The study was conducted within the Gauteng Province of South Africa. Covering a total area of 16,548 square kilometres, Gauteng is the smallest of the country's nine provinces, although it has the largest population with over 23% of the South African population residing in this province (Statistics South Africa, 2014).

Gauteng was chosen as the study area since the province is known to be the economic hub of South Africa. The province has the highest levels of per capita income and per capita disposable income in the country (Gauteng Economic Development Agency, n.d.). With a variety of business opportunities available in Gauteng, building activity, while slowing elsewhere in the country, has remained high in the province (Mahlanga, 2013).
This increase in development has seen approximately half of the flats and townhouses built in South Africa between 2001 and 2011 constructed in Gauteng (Mahlanga, 2013). This increase in property development has resulted in a net inward migration of more than 1,000,000 people over that timeframe (Mahlanga, 2013). As the population with the highest density (approximately 675 people per square kilometre), and as the economic hub of South Africa, migration to Gauteng increases annually, which results in an above average increase in building activity in Gauteng (Mahlanga, 2013).

2.4 The Study Population and Sample

For this study, the population consisted of all residential estates within Gauteng that have marketed themselves as “eco-estates”. A control group of non-eco-estates was also sampled.

Sampling is used as a way to select a subset of entities that can be used in a study to represent all of the entities in the population (Montello & Sutton, 2013). Convenience sampling can be defined as a method of nonprobability sampling, where the researcher accepts cases based on the availability and easy access (Montello & Sutton, 2013). As such, convenience sampling was used in this study as the research was gathered from online sources. Certain estates were chosen based on the availability of relevant online information. Although there are numerous estates, by process of convenient sample selection, only a number of these were used in the study (n=14).

Since the population for eco-estates was small (11 developments), a convenience sample of seven estates was used. These seven estates were selected based on the availability of online marketing and estate information. Four of the 11 developments did not have any materials available for use, which excluded them from selection. The same sample size was applied to non-eco-estates, which were selected based on simple random sampling. Simple random sampling refers to the procedure where each element in the population has the same and equal chance of being selected, which prevents researcher bias from occurring (Pascoe, 2014).

Since the population for eco-estates was small (11 developments), a convenience sample of seven estates was used. These seven estates were selected based on the availability of online marketing and estate information. Four of the 11 developments did not have any materials available for use, which excluded them from the sample chosen. The same sample size was applied to non-eco estates as well. The non-eco estates were selected based on simple random sampling.
Although convenience sampling is ideal for this study, there are draw-backs to this type of sampling. In some instances, convenience sampling is considered weak since there is little to no evidence to indicate that the researcher knows the population (Gravetter & Forzano, 2009). Furthermore, the researcher is unable to exercise control over the representativeness of the sample, which can result in the sample being biased (Gravetter & Forzano, 2009). It is, however, important to note that although convenience sampling does not guarantee a representative and unbiased sample, it is still a commonly used technique that offers an easier, less expensive, and timelier way of selecting participants (Gravetter & Forzano, 2009).

2.4.1 The Sampling Criteria

Residential estates included in the sample were chosen if they met certain criteria. In order for residential estates to be considered for the study, they needed to be an existing estate, i.e. they should not be in phase one of the development. This requirement is important, since all new developments must abide by the SANS 10400 Building Regulations, which have strict guidelines and rules for developers to follow with regard to elements of sustainability. Another criterion needed for the estate to be considered as part of the study is that it had to be marketed as “eco”, including the use of the labels “green”, “eco-friendly”, “nature” or “country”. In the case of non-eco-estates, the marketing had no reference to eco living. The final criterion for the population sample was that the estates must be located within the Gauteng Province of South Africa.

2.5 Data Collection

This study employed a number of processes in the collection of data. The estate information and resources were collected online from each of the individual estates’ websites. This information was then scrutinised using content analysis. After the content analysis was completed, the information gathered was included in the SBAT to determine the final environmental sustainability score for each estate.

2.5.1 The Data Collection Instrument

The SBAT is a tool that was developed as a way to implement sustainable practices in the building and development industries within South Africa (Gibberd, 2002). The tool identifies 15 areas that can indicate the level of sustainability of the building (Gibberd, 2002). There are three major headings under which these areas fall, environmental, economic, and social sustainability. For the purpose of this study, only the aspects referred to under the environmental component of the tool were assessed, since the estates focused only on environmental components when advertising themselves as eco-estates. The study could therefore not focus on the
other elements of sustainability, as these estates were not marketing themselves as socially or economically sustainable. Additionally, greenwashing focuses only on environmental aspects. As such, the study focused solely on the environmental elements of each of the estates and ignored the social and economic aspects.

The environmental component of SBAT focuses specifically on the following areas:

- Water
- Energy
- Waste
- Site
- Materials and components.

Table 2.1: Environmental Building Performance (Gibberd, 2002).

Each of the areas above are addressed by five specific questions (see table 2.1 above) that specifically assess the environmental sustainability of a building. The environmental aspects of the tool, used to evaluate the criteria discussed above, cover a wide range of criteria and score each of these criteria and the overall environmental sustainability score on the following criteria:

<table>
<thead>
<tr>
<th>Overall Value</th>
<th>0-1</th>
<th>1-2</th>
<th>2-3</th>
<th>3-4</th>
<th>4-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification</td>
<td>Very Poor</td>
<td>Poor</td>
<td>Average</td>
<td>Good</td>
<td>Excellent</td>
</tr>
</tbody>
</table>
The advantage of using SBAT is that the tool was designed to be used in developing countries, specifically, to be used in South Africa (Gibberd 2002). The design of SBAT thus takes into account the context and settings of buildings in South Africa. SBAT is the only tool that understands that development in South Africa means “addressing basic needs while avoiding negative environmental impacts” (Gibberd, 2002).

Although there are many positive aspects of using SBAT, there are also negative aspects. For instance SBAT is aimed at providing an indicative guide to the sustainability of buildings, and does not necessarily provide a comprehensive assessment (Gibberd, 2002). The use of indicators in the SBAT is a feature of the tool that enables users to assess a variety of different building types. This flexibility can be considered a weakness in that it does not allow comparisons of performance within a particular building type, but could become a strength through the development of a database that would house the indicators and performance targets for a variety of building types and contexts (Gibberd, 2003). Another benefit of using SBAT is the lack of prescribed performance targets as it allows the tool to be used in a much wider range of situations (Gibberd, 2003).

2.5.2 Data Collection Procedure

The SBAT was adapted in a way that allowed the researcher to record percentages based on the information that was gathered. This adaptation meant that instead of the estate manager awarding a score (as a percentage) for each question based on his/her own point of view, each estate was awarded a score according to the following criteria:

1. If the estate clearly stated (in their code of conduct, rules and regulations, or other documentation) that a certain element must be used, avoided, or done, the estate was then awarded 100% for that particular question.

2. If the estate clearly stated (in their code of conduct, rules and regulations, or other documentation) that a certain element should be used, avoided, or done, as a suggestion rather than a requirement, the estate was then awarded 50% for that particular question.

3. If there was no mention of the element in the estate’s documentation, then the estate was awarded zero for that particular question.

4. All estates received 100% for EN5.3 (See table 2.1), in accordance with the National Environmental Management: Air Quality Act 39 of 2004.

Content analysis of the estate’s code of conduct, rules and regulations, as well as any other available documentation was performed. This process entailed the researcher reading the documentation and making brief notes on relevant
information. These notes were then reviewed and classified according to the adaptation made to the SBAT, and the information was grouped according to the evaluation criteria. These steps were repeated for all documentation for all of the estates. The scores were then placed in the relevant evaluation criteria of SBAT and an overall environmental sustainability score was generated.

Once the data had been collected, it was analysed, using parametric statistical analyses. The data was subjected to testing using Microsoft Excel as well as the Statistical Package for Social Sciences (SPSS). Analyses included descriptive statistics, independent t-tests, as well as graphical representations of the data. These analyses determined any significant, as well as non-significant, difference between residential estates

2.6 Ethical Considerations

In order to avoid personal bias on behalf of the estates, and to adequately determine whether or not greenwashing was taking place, only information that could be obtained from the public domain was used in the study. Furthermore, the SBAT was completed by the researcher using standardised responses, ensuring that all estates were given fair consideration using the guidelines explained above. The research was given ethical clearance by the Research Ethics Review Committee of the College of Agriculture and Environmental Sciences, Unisa.

2.7 Conclusion

In this study the researcher used a quantitative tool known as the Sustainable Building Assessment Tool (SBAT). This tool was then adapted by the researcher to collect the data from a convenience sample of 14 subjects. The SBAT had 25 closed-ended questions that related specifically to the environmental, social and economic components of buildings in relation to sustainability. This research focused specifically on the environmental components to determine an overall environmental sustainability score for each of the residential estates. These scores were then used to determine whether or not these estates are in fact sustainable. This chapter described the research methodology by outlining the population, sample, and the data collection instruments used to collect the data. The ethical standards, reliability and validity of the study were also reported upon in this chapter.
Chapter 3: Literature Review

3.1 Introduction

The number of environmental problems the world faces increases on a daily basis. These issues can no longer be thought of as stand-alone issues that need to be addressed by individuals, but rather as global challenges that need to involve the entire human race (Essick, 2009). Although efforts to address these concerns need to be made by developed and developing countries alike, the latter also need to achieve social and economic advancements. Socio-economic disparities in developing countries require that environmental initiatives incorporate sustainable development principles (Sebake, 2008).

The focus of this chapter is on the importance of the construction industry in supporting environmental sustainability, since all developments, regardless of their size, have an impact on the surrounding environment. Residential developments in particular have long-term impacts, both on the communities they house, as well on the surrounding neighbourhoods (Gormley, 2009). It is important to view new developments as more than simply bricks and mortar; factors that will shape the lives of people on a daily basis, as well as for future generations to come, also need to be considered (Gormley, 2009).

There are many aspects to consider when dealing with the issues of sustainable development and residential developments. These key issues include: sustainability and development, eco-housing, and greenwashing. Greenwashing is used globally as a way to sell sustainability. Coupled with competitive altruism, greenwashing has seen an increase in the sales of products that are marketed as eco-friendly because consumers compete to appear “greener” than others. Although the literature presents these topics in a variety of contexts, this review will shift its focus from global perspectives to the South African context, as is required for comprehension of the research problem.

Environmental assessment tools used globally, such as BREEAM, LEED, and Green Star South Africa, will be discussed as ways to evaluate the sustainability of buildings, before addressing the Sustainable Building Assessment Tool and its role in analysing sustainability of buildings in a developing country, specifically in South Africa. Since sustainable development is a major component of this study, this chapter will provide an in-depth analysis of the concept as well as discussion of the history of the term, in addition to providing a critique on whether or not sustainable development is actually possible.
3.2 Sustainable Development and Eco-development

3.2.1. Sustainable Development

The generally accepted definition of sustainable development (SD) is “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Many researchers agree that the term “sustainable development” is vague and is often open to misinterpretation (Banon, et al., 2011; Marshall & Toffel, 2005; Filho, 2000). However, there is consensus that the terms “sustainable” and “development” are increasingly being used to describe the relationships between humans and the global environment (Brown et al., 1987).

![Diagram of Sustainable Development](image)

Figure 3.1: The Semantics of Sustainable Development (Lélé, 1991).

Figure 3.1 shows the complexity of the term “sustainable development”. It is evident in the diagram that there are two distinct meanings that need to be considered when referring to sustainable development. Firstly, there is the somewhat vague and at times trivial interpretation, where sustainable development is seen as a way of sustaining growth (Lélé, 1991). The second, more widely accepted, definition is that sustainable development is a method of achieving traditional objectives, while ensuring ecological sustainability (Lélé, 1991). Figure 3.1 also highlights the complexity of the term, since there are multiple connotations that exist when discussing sustainable development. These various connotations allow for multiple interpretations, which can at time appear vague or trivial. The figure also illustrates
that the literal definition for sustainability would mean that "development that can be continued -- either indefinitely or for the implicit time period of concern" (Lélé, 1991).

Sustainability is based on systems theory, which stipulates that society, the environment, and the economy are interrelated constituents of a larger system (Magis & Shinn, 2009). Although each of these phenomena is related to one another, it needs to be understood as distinct and different. Often referred to as an intergenerational equality, sustainable development is based on the premise that natural resources should be shared not just with the current generation, but with future generations as well (SAEP, n.d.). Sustainable development demands that focus needs to be placed on intergenerational equity (between the rich and poor), as well as intergenerational equity (between present and future generations) (Adams, 2009).

Thus sustainable development should be seen as more than the careful conservation of natural resources (SAEP, n.d.). Effective sustainable development should promote the eradication of poverty and extreme income and wealth inequalities, while providing access to quality and affordable basic services to all citizens (SAEP, n.d.). This requirements are especially important in fostering a stable, safe and just society within South Africa.

Since 1994, South Africa has successfully navigated from Apartheid to a democratic society. This shift rescued the economy from virtual bankruptcy and broke one of the critical binding constraints on growth (National Planning Commission, 2012). Although the country has managed to overcome obstacles constructed by Apartheid, it still faces the task of transforming the economy to one that employs more people, enabling the entire population to meet their potentials.

One of the ways that South Africa is able to transform the economy is through development, especially development in the built environment sector. Yet although this sector is responsible for job creation within South Africa, it is one aspect of the economy that has a disproportionate environmental impact (Kibert, 2013; Othman, 2009; San-Jose, Garrucho, Losada & Cuadrado, 2007). This impact occur as a result of the large number of resources required, as well as the replacement of natural systems with human artefacts (Kibert, 2013; Othman, 2009).

In South Africa, the Department of Environmental Affairs and Tourism (DEA&T) included sustainable development into the National Environmental Management Act (NEMA). Within this Act, three components of sustainable development were noted, including environmental, social, and economic sustainability. Based on these criteria, sustainable development in South Africa thus refers to development that sustains the natural environment; looks after its citizens, and ensures that economic welfare can
be maintained (Rosenberg, 2011). Therefore, in order for development to be considered sustainable in South Africa, all three of these principles need to be taken into account in every development decision (Rosenberg, 2011).

3.2.1.1. Ecological Sustainability

While sustainable development encompasses the three principles of the environment, society, and the economy, ecological sustainability focuses more on the balance of the three through the integration of these principles (EDO, 2010). Ecological sustainability should, by definition, be developmental activity that helps to sustain natural resources (Rosenberg, 2011). Furthermore, ecological sustainability should create a balance, where the sum of benefits people derive from the landscape is maintained (Haines-Young, 2000). This balance implies that economic objectives should not be favoured over environmental considerations. In reality, however, this is seldom the case. Without clear guidelines and policy, the concept of ecological sustainability will remain as only a concept.

However, NEMA (1998) does set out clear guidelines for achieving ecological sustainability, by highlighting the importance of considering all relevant factors, including:

“(i) That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
(ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
(iii) that the disturbance of landscapes and sites that constitute the nation’s cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
(iv) that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
(v) that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
(vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
(vii) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions;
(viii) and that negative impacts on the environment and on people’s environmental rights be anticipated and prevented, and where they cannot be altogether prevented
are minimised and remedied.” (NEMA, 1998).

These guidelines provide a clear framework for how development in South Africa should take place. The key component of these guidelines is the precautionary principle, which states that developments should not occur until there is a reasonable amount of surety that there will not be any negative impacts. If, however, there is any uncertainty, then the development should not occur (Rosenberg, 2011). In order for these guidelines to be followed, there needs to be decision-making model with a set of simple, measurable ecological planning indicators (Termorshuizen et al, 2007).

Models include environmental impact assessments, as well as environmental management plans, which are required under South African law. Environmental impact assessments (EIA) are used to provide decision-makers with an indication of the likely consequences of the development prior to decision-making (Wathern, 1988). EIAs aim to predict environmental impacts in the early stages in the project planning and design. They are also used to reduce adverse impacts, as well as shape projects to suit the local environment and present the predictions and options to decision-makers. Although EIA is internationally recognised and has both environmental and economic benefits, it is merely a tool that can be used to achieve sustainability.

Ecological sustainability can be achieved in many ways, and can in certain circumstances increase developmental opportunities, for example, decontaminating soil and re-growing forests. Some of these strategies are being used within eco-estates in South Africa.

3.2.1.2. Social Sustainability

Environmental issues are by definition social issues, and it is thus important to view from a broader interdisciplinary perspective rather than as stand-alone issues (Blaikie, 1995). Environmental conditions relate specifically to three aspects of social sustainability: (1) livelihoods: people living in poverty tend to be the most reliant on natural resources, and as such are the first to suffer adverse effects when these resources are degraded (SAEP, n.d.); (2) health: people living in poverty often inhabit environmentally impoverished areas, exposing them to various types of pollution, which affect the health of the individuals living there (SAEP, n.d.); and (3) vulnerability: poor people are most often exposed to environmental hazards, as well as environment-related conflict. They are often unable to cope with these issues, whereas wealthier individuals are able to afford healthcare for pollution-related illnesses, as well as are able to move away from the source of the problem (SAEP, n.d.).
The principle of social sustainability implies that the majority of people must benefit from development, thus requires fairness in the access to and benefits from resources, including natural resources (Rosenberg, 2011). Social sustainability also incorporates education, healthy environments, security, as well as the right for people to participate in decision-making processes that directly affect them (Rosenberg, 2011). Quantifying social sustainability is difficult to do, and, as a result, it is often overlooked or completely ignored (McKenzie, 2004).

South Africa is on track to achieving social sustainability through the abolition of Apartheid and the establishment of a democracy focused on equal rights (Rosenberg, 2011). There are, however, obstacles that prevent social sustainability from occurring, such as the discrepancies in the way people participate in the economy, as well as the ways in which different people benefit from the economy (Rosenberg 2011).

There are thus barriers that prevent complete social transformation from taking place. One such factor is poverty. While global poverty has declined rapidly over the last three decades, poverty in South Africa remains high, with 21.7% of South Africans living in extreme poverty (Nicolson, 2015). It can be argued that the poverty and inequalities seen in South Africa are not natural and represent ideals that were historically created and sustained (Gutto, 2001). While South Africa enjoys the title of being one of the wealthiest and most materialistically developed countries in Africa, the disparity between wealthy and poor is too glaring to overlook, and has at times been referred to as a rift (Gutto, 2001).

3.2.1.3. Economic Sustainability

Poverty is not the only challenge that South Africa currently faces. In order for the country to continue on the path to successful economic development, poverty, unemployment, and inequality all need to be overcome (Nicolson, 2015). Thus, as a principle, economic sustainability should focus on the economic activities that sustain people and the planet, with less focus on the maintenance of the economy (Rosenberg, 2011). As such, sustainable development requires that economic activities are reformed by (for example):

(1) the removal of unfair trade barriers;
(2) the removal of Government subsidies that are harmful to the environment, as well as to the poor; and
(3) the inclusion of the polluter pays principle, whereby those responsible for pollution and other harmful effects are responsible for redress (Rosenberg, 2011).

The construction industry is one area of the economy that is of high economic importance, but that also has numerous social and environmental consequences
The built environment is also unique in that existing buildings and the infrastructure needed to support these buildings, as well as the process of adding to it, have numerous environmental, social, and economic impacts (Sev, 2009). When compared with other industries, the construction industry is long lasting, since structures in the built environment on average have a lifespan of 80–100 years (Sev, 2009). Therefore, in order for a construction project to be considered sustainable, it needs to incorporate economic, social, and environmental sustainability, by providing a building that is affordable, assessable, and environmentally conscious (Kibert, 1994; Wyatt, 1994).

However, viewing sustainability as three distinct yet interconnected elements creates the potential for complications to arise (Harris, 2000). The goals of sustainable development require a balancing of objectives, and a lack of balance therefore implies failure. In reality, however, trade-offs are rarely avoided, since people are often capable of maximising one objective at a time (Norgaard, 2006). The concept of sustainability is idealistic and creates a superlative standard for how development should be, making it difficult to pin down analytically (Norgaard, 2006). The principles discussed above do, however, resonate on a level paralleled with common sense (Harris, 2000). The conundrum of sustainable development is simply that if it was achieved, “the world would be a better place” (Harris, 2000). In reality, however, sustainability is difficult to achieve as it is difficult to balance the three components equally in order to achieve sustainability (Harris, 2000). In some sense, it is therefore easier to identify unsustainability than sustainability, and in making this identification, policy action can take place to rectify it (Harris, 2000).

In light of the above, with the sustainable ideal set more than 25 years ago, there are often questions as to whether the concept is still relevant or even achievable (Park, 2011). The concept of sustainability is a rather contentious one, which often polarises and divides opinion, but sustainable development is possible (Roosa, 2010). In order for sustainable development to be achieved, a long term view is necessary, where there is recognition of the interconnectedness between issues, fields, disciples, and actors (Roosa, 2010). Sustainable development is global in nature, and it is therefore not enough for one country to achieve sustainability, as environmental degradation is universal; contemporary pollution has international impacts and local pollution problems are repeated the world over (Elliot, 1999).

Sustainability can be achieved through the use of local resources and participatory processes, both of which are low cost. The empowerment of local communities is vital to the success of sustainable development (Elliot, 1999). A lack of empowerment is also what has prevented sustainable development from happening in the past, indeed, . Development processes that undermined local
control over resources lead to increased insecurity of livelihoods and environmental degradation (Elliot, 1999).

3.3 Sustainable Development and Construction

The role of the construction industry in achieving the three elements of sustainable development – economic growth, social progress, and the protection of the environment – cannot be disregarded (Sev, 2009). The construction industry and sustainable development are interwoven, since construction impacts all three tiers of sustainable development. Not only does the construction industry contribute significantly to the economy, it also has strong environmental as well as social impacts (Sev, 2009).

The construction industry provides social security through the development of housing, workspaces, and infrastructure, as well as bolsters the economy, but has significant environmental consequences (Burgan & Sansom, 2006). It is evident in its emission of greenhouse gases, energy consumption, raw material consumption, and the production of waste (see table 3.1). These effects are further exacerbated since structures are long lasting (Sev, 2009), thus these structures have the ability to impact the environment long after they have been built.

Table 3.1 indicates that there are many issues created by the construction industry and buildings themselves, which affect all three components of sustainable development. There are more economic consequences, but there are also numerous and long lasting environmental issues. Some of the environmental issues occur during the initial phases of development (land use change and raw material extraction), while others continue long after the building is completed (energy and water use). The construction industry, although being of economic importance, has serious environmental consequences (Burgan & Sansom, 2006), demonstrating the interconnectedness of the components of sustainability. This table (3.1) suggests that by reducing environmental problems, economic problems can also be addressed.
Table 3.1: Main impacts of construction industry and buildings (Adapted from Sev, 2009).

<table>
<thead>
<tr>
<th></th>
<th>Environmental</th>
<th>Social</th>
<th>Economic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material – extraction, consumption, depletion</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Land use change</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Energy use and emission of greenhouse gases</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other indoor and outdoor emissions</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Water use and wastewater generation</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Increased need for transport (site specific)</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Waste generation</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Opportunity for corruption</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Disruption of communities</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Health risks on worksites, as well as for occupants</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Aesthetic degradation</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

In order to minimise the impacts of the built environment on the natural environment, the two should be viewed as linked, since there is an exchange of matter and energy that naturally occurs (Yeang, 2000). Furthermore, for a construction project to be considered sustainable, it needs to incorporate economic, social, and environmental issues at all stages, and not only in the planning stage (Kibert, 1994). To achieve sustainability, the construction industry has to rely on three basic principles (Sev, 2009), namely: (1) resource management, (2) life-cycle design, and (3) design for human and environment. These principles are shown in detail in Figure 3.2, below.
Figure 3.2: Framework for evaluating the sustainability of the construction industry (Sev, 2009).

Although there is consensus that construction needs to be sustainable, development of sustainable buildings has been limited by a number of factors (Glicksman & Lin, 2007), including the fragmentation of the building industry, resulting in very little vertical integration (Glicksman & Lin, 2007). People also associate sustainability with a loss of comfort, and as such they are less likely to choose products that promote sustainability (Glicksman & Lin, 2007). It is important to acknowledge that the solution for an increase in the number of sustainable buildings requires the proper integration of many factors in the planning, design, and technology, and operation of a building. Owing to the nature of building activities, developers focus more on controlling and correcting environmentally damaging actions related to development (Akadiri et al, 2012). Role players involved in all aspects of the construction of a building (architects, designers, and engineers) are able to reduce environmental impacts through the implementation of sustainable building designs and objectives (Akadiri et al, 2012).

However, while global aspirations are the focus of current sustainability initiatives, strategies, and processes, micro-level (project specific level) integrated decision-making goes largely unnoticed (Ugwu et al, 2006). This neglect is ironic, since it is at the micro-levels that sustainability objectives must be translated into concrete practical action (Akadiri et al, 2012). Nevertheless, the green building movement continues to gain momentum (Kibert, 2013). Professionals in both design and construction have used green buildings as the cornerstone of their practices. This, coupled with a multitude of innovative products and tools that are developed each year, ensure that the global movement remains relevant and achievable (Kibert, 2013).
Yet, in the South African context, there are individuals who believe that green building is too expensive, unprofitable, and unnecessary (King, n.d.). Despite the concerns of the few, many acknowledge the need for greener developments.

### 3.4 Sustainable Housing Guidelines

Agenda 21 was formulated at the 1992 Earth Summit in Rio as the international proposal for sustainable development. Chapter 7 of Agenda 21 alludes to the specific role human settlements have in relation to sustainable development, since meeting basic human needs relates in one way or another to the creation of human settlements and their performance (du Plessis, 2002). The Habitat Agenda, formulated in 1996 as a second international action plan, was created specifically to address the role of human settlements in sustainable development.

The latter indicated that the construction sector has a major role to play in terms of the sustainable development of human settlements, as is highlighted in Chapter 4, Section C of The Habitat Agenda (du Plessis, 2002). The construction industry and its activities are responsible for the consumption of vast amounts of global resources, as well as the production and emission of waste. Furthermore, the construction industry plays a role in socio-economic development and quality of life (du Plessis, 2002). Sustainable construction of residential settlements thus promotes resource efficiency, which in turn reduces the impact the buildings have on the environment, as well as the costs of running the buildings (City of Cape Town, 2012). The motivating factor towards a more sustainable built environment is the need to reduce greenhouse gas emissions and other environmental impacts (City of Cape Town, 2012).

#### 3.4.1 Energy as an element of sustainability

Energy is an essential aspect of sustainable development, yet the challenge lies in the fact that while there is a need to produce energy that has limited impacts on the environment and global resources, energy production still needs to be assessable to a growing global population (UNDESA, 2015). Furthermore, the production of electricity has substantial impacts on the environment and uses vast amounts of natural resources. As buildings are large consumers of energy, the reduction of energy or the use of renewable energy in buildings has an important contribution towards sustainability (Gibberd, 2003).

One of the most challenging areas for the development of sustainable buildings is the reduction of energy that is used in the built environment (Kibert, 2013). Although electricity is the most widely used source of energy able to run a full range of household appliances, it is the biggest producer of greenhouse gases (Masjukia et
Furthermore, the current rate of energy consumed through fossil fuels is not sustainable (Roosa, 2010): there is a growing demand for electricity in South Africa, but the supply does not meet the current demand. As a result, South African residents have experienced the inconvenience of load shedding (City of Cape Town, 2011). These factors have created a need for South Africans to make a conscious effort to ease the burden on the national grid through the use of energy saving methods and technologies. Often referred to as the best energy resources, energy efficiency is one of the most effective ways of meeting the demands of sustainable development (Sebitosi, 2008).

With the average household consuming most of its energy through heating, cooling, ventilation, lighting, and appliances, it is important to find innovative ways to reduce energy consumption (Milford, 2009). There are numerous technologies and practices that can be used to achieve sustainability in energy, while overcoming the primary obstacle of minimising environmental and economic consequences of the current method of energy generation and utilisation (Roosa, 2010).

### 3.4.1.1 Appliances and Lighting Fixtures

Electrical appliances use approximately 30% of all the energy used in a household (CPD, 2014). It is therefore important for homeowners to look for energy-rated white goods, such as refrigerators, tumble dryers, and dishwashers, which consume less energy. Cooking efficiently can also be done through the use of gas hobs, as they are cheaper to operate and produce 50% less greenhouse gas emissions than the electric equivalent (City of Cape Town, 2011).

One of the most cost effective and simplest methods of implementing energy saving in a household is through the phasing out of incandescent lamps and replacing them with compact fluorescent lamps (CFLs) and Light Emitting Diodes (LEDs) (CPD, 2014). Other energy efficient installations, such as geysers, stoves, and refrigerators, also provide the cheapest and easiest ways to reduce energy use, and, in doing so, improve the economic and environmental performance of existing developments (City of Cape Town, 2012).

By choosing to furnish homes with appliances and fixtures that use less electricity, homeowners contribute to sustainable development through the reduction in greenhouse gases that are ordinarily released during the production of electricity.

### 3.4.1.2 Green Architecture and Passive Design

Unlike the use of technology to reduce energy requirements in a building, green architecture is a method of architecture that focuses on the climate and geography of
an area in order to produce a building that combines both new and old technologies in a sustainable manner (City of Cape Town, 2011). The main premise behind green architecture is to ease the architectural burden on the environment by employing technologies and designs that save energy and resources (Xu & Liao, 2010). Green architecture is a philosophical view that advocates the use of sustainable energy sources, the conservation of energy, the reuse and safety of building materials, as well as the location of a building influenced by the impact it will have on the environment (Wines, 2015).

Previously known as “solar architecture”, green architecture focuses on the reduction of natural resources and fuels that are ordinarily used for heating and cooling of a building. Solar architecture focuses on harnessing the incident radiation, which is currently far exceeding the worldwide demand for energy, and curbing the use of fossil fuels for energy production (Schittich, 2003). Furthermore, fuel resources can be conserved through the immediate use of available solar energy through effective building design (Schittich, 2003; Milošević, 2004).

Elements of green architecture have been used in the years pre-dating the use of the term. Once considered as a contemporary movement, green architecture is in fact a historical concept. Green designers are not the first to consider the importance of using renewable resources; many architects have been designing buildings with attention to the environment for centuries (SSArchitects, 2015). The use of local building materials as well as harnessing natural energy represent simple yet effective sustainable design methods, which have been employed before many of the technological advancements seen in modern construction (SSArchitects, 2015). Many older buildings took a passive approach to design, since there was no other options available (Mehaffy & Salingaros, 2013). The use of passive design elements means that the building does not require any mechanical heating or cooling by utilising the natural climate of the area in maintaining thermal comfort (CPD, 2014; City of Cape Town, 2012). Some of these buildings were constructed in a time when energy was expensive, even unavailable in some locations, and solar architecture gained significant momentum in the early 1970s as a result of two oil crises (Schittich, 2003). Buildings were thus designed in a way that allowed for optimal natural daylight and warmth through their shape and orientation (Mehaffy & Salingaros, 2013).

Modern environmental and economic challenges have brought sustainability to the forefront of design and construction methods (SSArchitects, 2015). Although green architecture is aimed at designing buildings that are in harmony with the environment through the reduction in materials that are energy intensive and by utilising natural elements to meet the ventilation, heating, and cooling needs of the
building, there is a possibility that green architecture can become a label and marketing tool. If this happens, the practice of building optimisation with the aim of saving energy will become marginalised (Hartmann, 2012).

### 3.4.1.3 Renewable Energies as an Aspect of Sustainability

In order for development to occur within a society, a secure supply of energy is needed (Dincer, 2000). Sustainable development requires a sustainable supply of energy resources that are available readily, sustainability, and at a reasonable cost over a long period of time (Dincer, 2000). It would therefore appear that renewable energy resources are in many instances the most efficient and effective solutions in achieving sustainable development (Dincer, 2000).

Seen as the cleanest form of energy production, renewable energy systems are becoming more accessible to South African homeowners (City of Cape Town, 2011). Renewable power systems use renewable energy sources, such as sun, wind, and water, to produce electricity, which is continuously replenished from natural sources (CPD, 2014). While not all renewable resources are intrinsically clean, there is a multitude of choices that would provide cleaner energy (Dincer, 2000).

### 3.4.2 Water as an Element of Sustainability

There is a complex connection between water and energy, since all sources of energy (including electricity) require water in their production processes (United Nations Department of Economic and Social Affairs (UNDESA), 2014). Water resources are made available for human use and consumption (including irrigation) through pumping, transportation, treatment, and desalination, using energy (UNDESA, 2014). As with the impending electricity shortage (Dincer, 2000), water shortage is a reality faced by many countries around the world, as freshwater resources become polluted and depleted (Li et al., 2010). This situation is likely to continue as the global demand for water doubles roughly every 21 years (Li et al, 2010).

However, water is at the core of sustainable development, critical not only for socio-economic development, but for healthy ecosystems and human survival as well (UNDESA, 2015). Yet there are many negative environmental implications with regards to the large-scale provision and storage of water (Kibert, 2013), which are exacerbated by the need to pump the water through large networks of piping. This process consumes energy and requires maintenance. Furthermore, the delivery of water is not the only concern, since there is also a need to dispose of the water once it has been used, also requiring space and infrastructure. The reduction of water
consumption therefore supports sustainability since there are fewer environmental impacts relating to the delivery and disposal of water (Gibberd, 2003).

However, a reduction in water consumption does not seem possible, as it is one of the most critical resources in the built environment (Kibert, 2013). McKinsey and Company recently reported that by 2030, the global demand for water will exceed supply by more than 40%, and of the new demand from now until 2030, roughly 42% would come from four countries only: China, India, Brazil and South Africa (Kibert, 2013). Yet currently categorised as water stressed country, South Africa is forecast to experience physical water scarcity by the year 2025 (Otieno & Ochieng, 2004). With an increasing population and continued pollution of the resource, it is expected that there will be increased pressure on the available water. This pressure may result in increased conflict over its allocation and a further stress on this resource, leading to scarcity (Otieno & Ochieng, 2004).

The built environment hydrological cycle has thus been labelled as wasteful, inefficient, and illogical. This cycle is characterised by the input of potable water and the release of used, contaminated water, and as such rethinking of this cycle is needed to better use water resources, as well as to reduce the impacts and costs of treating effluent (Kibert, 2013). As such, the protection, conservation, efficiency, and re-use of water is necessary to reduce consumption and to reduce pressure on an already over-stressed resource (City of Cape Town, 2011).

3.4.2.1 Water-wise Installations

Reducing the consumption of water used in buildings can extend the availability of water (Kibert, 2013). The use of low-flow devices and water-efficient appliances can achieve a reduction in water consumption of up to 50% (City of Cape Town, 2012). Showers can be fitted with low-flow shower heads, which significantly reduce the amount of water used when showering. Similarly, indoor taps can be fitted with aerators, which aerate the water and decreasing the amount of water used. Dual-flush or multi-flush mechanisms can also be fitted to flush toilets with cisterns. These work by allowing the user to control the amount of water needed, as well as to prevent unnecessary flushing (City of Cape Town, 2012).

3.4.2.2 Rainwater Harvesting and Grey Wastewater Systems

Domestic rainwater harvesting and greywater treatment systems can play an important role in future water management (Li et al, 2010). Harvested rainwater is a renewable clean water source that is ideal for domestic uses. The harvested water is an alternative for many non-potable purposes, such as toilet flushing, cleaning, and for use in the garden (Li et al, 2010; City of Cape Town, 2012). These systems can
be used to address current water shortages, and can be an important aspect in achieving sustainable development (Li et al., 2010).

Grey wastewater is water that has been collected from washing operations, such as showers, bath tubs, washing machines, sinks, and dishwashers, but intentionally exclude black water sources, such as toilets (Li et al., 2010; City of Cape Town, 2012). Grey wastewater produces a more continuous supply of water for reuse, unlike rainwater, which is seasonal (City of Cape Town, 2012). Water collected from grey wastewater is mainly used for low-quality water applications, such as toilet flushing, garden watering, and car washing (Li et al., 2010).

3.4.2.3 Water-wise Landscaping

It has been suggested that approximately 30% of water used in a residential settings is used for exterior purposes, with the bulk of this being used for maintaining landscaping (Kibert, 2013). With water scarcity a growing trend globally, there looks to be less water available for landscaping, as water is diverted for use in more important aspects (Wade et al., 2007). Water-wise landscaping, also known as xeriscaping, can be used to reduce outdoor water use by as much as 50 percent (Wade et al., 2007). The use of indigenous plants is important in water-wise landscaping, as they tend to be hardier and are specifically adapted to the weather of the particular location (City of Cape Town, 2012). A water-wise landscape requires very little additional water from irrigation, and, when irrigation is used, it is applied efficiently and effectively (Wade et al., 2007).

3.4.3 Waste Minimisation and Management as an Element of Sustainability

The ecological effects of waste are far-reaching, impacting soil, water, and air quality, as well as energy consumption (Choate et al., 2005). Buildings are also responsible for producing large amounts of waste. Recycling building materials reduces the need for new materials and limits the amount of waste being produced by each building. As such, sustainability can be supported by reducing resource and energy consumption (Gibberd, 2003). There has been growing international concern about pollution, which has increased over the past 20 years. As such, a number of international protocols and conventions have been created as a way to address this growing problem. In an effort to meet the goals set out in Agenda 21, the South African government created an Integrate Pollution and Waste Management Policy (IP&WM) (Department of Environmental Affairs and Tourism, 2000).

The South African government published this policy in 1999 in recognition that inadequate or inappropriate waste management presents a threat to both human
health and environmental protection. This strategy presents a long-term plan for addressing key issues, needs, and problems experienced with waste management in South Africa (Gauteng Department of Agriculture, Conservation and Environment, 2006). For example, local authorities have the primary role of waste collection and disposal. The general public need to accept co-responsibility for this role in an effort to prevent pollution and minimise waste at the source (City of Cape Town, 2014). The implementation of effective recycling solutions will help to minimise household waste such as glass, metal, plastic and paper (City of Cape Town, 2012; City of Cape Town, 2014).

TO conclude this section, the green building movement gaining moment and is evolving in the process. It has been proven that sustainable buildings have substantial benefits both for the environment as well as for the economy (Kibert, 2014). Although there is progress in this field, there are also obstacles that limit the effectiveness of green building. Green building boosts the productivity with which buildings and their locales use resources – energy, water, and materials – while minimizing building effects on human wellbeing and environment throughout the building life cycle (Harris, 2011).

3.5 Eco-housing in South Africa

A report released by World Green Building Trends indicates that South Africa is the biggest developer of green buildings in Africa, with over 36 developers reporting plans for green developments (de Bruyn, 2015). Although it has been suggested that the current energy constraints are responsible for the shift to more sustainable methods of development, there are a number of other factors that are driving this trend (de Bruyn, 2015). In addition, South Africa has numerous policies and planning that have a role to play in residential developments. This section will analyse current trends with regards to housing and eco-housing, as well as identifying reasons for these local trends.

The National Department of Human Settlements (2014; 27) states that “a home is an asset that offers an entry point to social, commercial and work opportunities, thus offering a sense of being a full citizen”. For the first time in South African history, there are more black owned houses than white owned houses in suburban areas (Loos, 2015; Muller, 2014). This trend indicates progress with specific references to racial integration of South African cities and towns, as well as in terms of the growth of the black middle class (Loos, 2015). Black ownership of properties that fall within the upper-income bracket has more than doubled over the past 10 years, from 3.3% to 7.8% of total sales, which can be attributed to the increasing spending power of the middle to upper-income black consumer (Watt, 2013).
In addition, prior to the worldwide recession in 2008, South Africa experienced tremendous growth in the property market. This growth occurred in both in the residential as well as in the more exclusive leisure and lifestyle property markets. With urban areas predicted to increase as a result of a growing population as well as changing socio-economic profiles indicated above, two trends in the residential housing market have appeared. These trends either result in an increase in high-density, low-cost housing with small gardens, or relatively low density, expensive, expansive, and exclusive housing often associated with golf courses or open areas (Grey-Ross et al., 2008). Eco-estates meet the requirements of the latter trend, since the density and position of development is constrained, but are positioned as niche as they are projected as conserving biodiversity (Grey-Ross et al, 2008).

As with most forms of development, urban development in South Africa has resulted in many local extinctions, as well as the complete elimination of the majority of native species. Furthermore, urbanisation is a more permanent transformation (Neke & Du Plessis, 2004). As a result, the South African government has since restricted lifestyle developments, which, in turn, has led to a significant increase in the number of eco-friendly developers who invest and assist in preservation of wilderness areas throughout South Africa (property24, 2006).

In South Africa, there is thus a great awareness about the need to protect the environment and its various natural resources (Tibane & Vermeulen, 2014). This awareness is evident in the South African Constitution (1996), which gives all citizens the right to have the environment protected through reasonable legislative and other measures that secure ecologically sustainable development. The Constitution further acknowledges that economic development and social development is limited by what the environment can provide and only if the environment is sustained.

Not only is there a greater focus on the environment, but there is also a shift towards a healthier lifestyle. These factors, coupled with a need for personal space, has seen developers creating a niche market in eco-estates (Golding, 2015). By definition, an eco-estate is a “development in an unspoilt area where the natural environment of the flora and fauna flourish. Space is one of the major principles of any eco-estate and they are designed to accommodate fewer properties” (Gauteng and NW Province, 2015). The density of homes in a traditional eco-estate is considerably lower than single home suburbs, with a density of between one and five homes per hectare, as opposed to 20 homes per hectare. Furthermore, an eco-estate is subjected to an on-going Environmental Management Plan (EMP). This EMP requires a conservation office to complete a yearly report that is handed to local authorities for scrutinisation (Rainharvest, 2010).
Eco-estates provide the potential investor with a very lucrative investment. The investor has a property that is situated within a diverse natural environment, as well as the security and well-organised management structure offered by these estates (Levitas, 2012). There are a number of additional factors that have resulted in an increase in eco-estate development, including the location (proximity to the city or to a major tourism attraction like a game park), its concept and other selling features. These features may include roaming game and breath-taking scenery (Levitas, 2012).

3.6 Greenwashing

Since the beginning of the sustainability movement, environmentalists, lobbyists, and good manufacturers have pursued the benefits of going green (Harris, 2011). There is also an increased awareness of environmental issues, and many individuals feel compelled to protect the environment and the natural resources within it (Mitchell & Ramey, 2011). Organisational cultures are being adapted to reflect a greater responsibility for the environment, which is evident in the number of green products and services that companies are promoting (Mitchell & Ramey, 2011) through the use of advertising campaigns and logos (Mitchell & Ramey, 2011). In so doing, a greenwashing trend has emerged (Harris, 2011).

The term “greenwashing” is defined as tactics that are used to mislead consumers regarding the environmental practices of company or the environmental benefits of a product or a service (Bradford, 2007). There are, however, instances that may suggest that greenwashing is not an intentional endeavour, but represents a lack of communication between the company and its target audience (Arvizu, 2008). Despite this suggestion, it is important to recognise that in an attempt to maintain social legitimacy whilst engaging in seemingly illegitimate practices, corporations do employ a variety of tactics, including greenwashing (Arvizu, 2008).

Developers are not excluded from the practices of greenwashing. In fact, development corporations have the greatest incentive to integrate environmental values into their business practices (Parlow, 2008). Real estate developers have a greater motivation to be environmentally conscious, since the negative environmental consequences (urban run-off, poor air quality, unsustainable energy consumption, and degraded water quality) of this sector are under constant scrutiny (Parlow, 2008).

Developers therefore either use greenwashing to obtain discretionary land use approvals for their proposed developments, or the developers build green developments to meet the demand from environmentally conscious buyers (Parlow,
In some instances, however, developers choose to build properties that are green since they believe that green developments are important for future development. Greenwashing is therefore often apparent, since residential developers need to package their product correctly in order to attract possible buyers. They do this by knowing who they are targeting and working towards providing a solution that will meet their customers’ needs (Walker & Wan, 2012). With increasing need to create products that consumers what to buy, the motivation to greenwash urban developments is clear (Schmitt, 2012).

With the sustainable building market increasing annually, it is important for developers to have a well-designed marketing strategy that can set them apart from other similar developments (Eerikäinen & Sarasoa, 2013). Although there is substantial growth in the sustainable building market, it is still a relatively new one, and, as such, it is vital for developers to find unique and unused position in the market (Eerikäinen & Sarasoa, 2013). This need to establish a niche is taking place in the South African real-estate market, seen through the appearance of eco-estates in a rather saturated sector of lifestyle and security estates.

3.7 Greenwashing Development

There are both negative and positives aspects related to the concept of greenwashing. The negative side of greenwashing is the deliberate attempt to disguise a potential failure that often results in an increase in the problem it was claiming to reduce. The positive side is that greenwashing can reveal how difficult it is, even with the best of intentions, to precisely define sustainability, as well as how to achieve it (Bennetts, 2011). For some, true sustainability requires a sensitive balance between social, economic, and environmental factors (Bennetts, 2011). For others, the sheer vagueness of this concept is one reason why greenwashing has become so prevalent (Bennetts, 2011).

The green building industry is a source for greenwashing, which is reflected in the fact that green building is defined by multiple attributes, ranging from materials used to the actual performance of the building itself in its energy, water, and resource usage (Hunter, 2014). Ideally, green buildings would contain various green elements and products, which have been verified by a third-party certification body for specific and relevant claims, and the building itself, which would also be assessed by a third-party expert (Hunter, 2014). In reality though, this process seldom happens, since green building standards are “meta” standards (Hunter, 2014). Within the construction industry, the idea of sustainability is confusing and daunting.
3.8 Building Assessment Systems in South Africa

The prevalence of greenwashing in the building sector has led to green building certification systems being developed (City of Cape Town, 2012). These certification systems are aimed at providing an industry standard for claims relating to green buildings (City of Cape Town, 2012). It has been found that ratings have an important role in assisting consumers to make more responsible evaluations (Parguel *et al*, 2011). Similarly, third-party certifications are seen as the best way to ensure that consumers are made aware that the product is indeed environmentally sustainable (Kapalko, 2010).

With over 83 environmental assessment models globally (see figure 3.3.), there are many ways for developers to avoid the use of greenwashing. These assessment models are paramount in providing certifications that are considered to be acceptable to determine building sustainability. LEED and BREEAM are the most commonly used assessment tools, with many countries in Europe using both tools, while the Americas use LEED as their preferred method of building assessment.

![Figure 3.3. A world map showing the most commonly used environmental assessment models by country](image)

These rating tools set standards and benchmarks for green buildings by awarding points based on the measures that have been included in the building, after which a total score is given (Gunnell, 2009). Often developed under the guidelines of a rating system, green buildings are built following these measurements and are
subsequently recognised for that level of commitment (Wu & Low, 2010). There are two distinct categories of rating systems, namely, one which focuses on specific building components or activities, and the other that centres on regarding the building as a whole entity (Wu & Low, 2010).

Many studies have highlighted the importance of assessing sustainability (Cheng et al., 2008; Ding, 2008). Sustainability measurements in the building sector have since shifted from fashionable certifications to current practices in many areas of the world (Berardi, 2012). Certification systems have facilitated the move to greener buildings by enhancing the transparency of building operating costs and other sustainability metrics (Nelson et al., 2010). Until recently, South Africa was the only country in Africa that used building assessments to evaluate the sustainability of buildings (Berardi, 2012).

Although there are a variety of tools available for use in South Africa, many of the tools are not adequately adapted to suit the South African context and are for profit companies.

One tool, BREEAM, was developed in 1990 as the first environmental building assessment method and remains the most widely used (Larsson, 1998). This tool awards a single rating scheme of fair, good, very good, or excellent for single buildings. This system sets out a list of environmental criteria against which building performances are checked and evaluated (Ding, 2008). The assessment process can begin in early in the process, beginning in the initial stages of a project. The results of the study can then be input into the design development stage of buildings, which allow for changes to be made accordingly to satisfy pre-designed criteria (Johnson, 1993). As the oldest building assessment system, BREEAM serves as the foundation for many other rating systems, including LEED (Kibert, 2013).

Launched in 1998 by the US Green Building Council (USGBC), the Leadership in Energy and Environmental Design (LEED) was designed as a building assessment system for new construction (Kibert, 2013). The LEED building assessment system provides range used to rate products, for the purpose of guiding the life-cycle of design, construction, and operation of high performance green buildings (Kibert, 2013). Buildings are awarded certification in one of four levels, namely, certified (26-32 points), Silver (33-38 points), Gold (39-51 points), and Platinum (52-69 points) (Ding, 2008; Kibert, 2013; Roderick et al., 2009).

As this tool was created as a way to rate design and construction processes, focuses on points scored across seven categories, namely: site selection, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, regional priority, and innovation in design. A total of 100 points are available
across these criteria, with mandatory prerequisites for energy and water-use reduction, recycling collection, and tobacco smoke control (Vierra, 2014). It has been argued that the vision of the LEED rating system is severely limited, since the point system is only applicable to architectural building standards and does not take into account financial relevance, client relations or, simply, development (Rosenfield, 2013). These drawbacks are especially problematic when the development is in certain parts of Africa, as development in Africa requires that the needs and standards of construction must shift not simply to a new geographical and cultural context, but to one of development needs and capabilities (Rosenfield, 2013).

Furthermore, it is evident that LEED was created with American buildings in mind since there is the use of units that are not typically used in many other countries, for example, distance is measured in feet, while lighting is measured in footcandles (Gibberd, 2003). The use of American guidelines and standards means that the tool is not relevant to many other countries (Gibberd, 2003).

Similar to BREEAM and LEED, Green Star is a major green building assessment scheme used in Australia (Kibert, 2013). Green Star has been adapted to the South African context and is used locally as the Green Star South Africa. The Green Star SA was developed by the Green Building Council of South Africa and is based on the Australian Green Building Council tools. The Council SA continually develops the Green Star SA rating tools to provide an objective measurement for green buildings in South Africa and to recognise and reward environmental leadership in the property industry (Vierra, 2014). This rating tool is aimed at assessing different market sectors, such as office, retail, multi-unit residential, public, and education buildings (Green Building Council SA, 2008). However, the tool is adaptable to various market sectors, such as office, retail, and multi-unit residential. The objectives of the Green Star SA rating tools are to: “establish a common language and standard of measurement for green buildings, promote integrated, whole building design, raise awareness of green building benefits, recognize environmental leadership, and reduce the environmental impact of development” (Vierra, 2014).

Unlike other rating tools, Green Star has removed the process of applying weightings to criteria. What this means is that the number of scores available for a criterion simply reflects on the weighting for that criterion (i.e. one point for the energy criterion is equivalent to one point for the transport criterion). This system is, however, potentially problematic, in that there is a tendency for a criterion that has the higher the number of sub-criteria to be weighted more heavily (Siew, 2014). In fact, many of these tools described above are not adequately adapted to suit the South African context and are for profit companies.
The Sustainable Building Assessment Tool (SBAT) was thus developed in South Africa by the CSIR Building and Construction Technology to address the deficits of similar sustainability tools that often overlook the social and economic impacts of the build environment (Gunnell, 2009). SBAT focuses specifically on sustainable building and construction processes in developing countries by measuring sustainability performance in the built environment across 15 social, economic, and environmental criteria (Gibberd, 2008; van Wyk, 2008). Furthermore, since South Africa is a developing country, sustainability needs to be addressed in a unique way (Cosser, 2015). SBAT thus collects information throughout the building lifecycle for analysis and is stored on a database for use in future projects (Cosser, 2015).

In conclusion, as environmental consciousness increases amongst individuals, so does the market for greener homes (Parlow, 2008). With an increased growth of $30.6 billion between 2005 and 2010, developers globally are attempting to meet the demand for greener homes for what it appears are financial gains (Parlow, 2008). The major factors driving making green building mainstream can be attributed to homeowners' demand, as well as the superior environmental performance of green buildings (Nelson et al, 2010). Stricter government regulations have also led to the increase in the number of green buildings (Nelson et al, 2010). Although sustainability ratings may assist consumers make more environmentally informed decisions, it may be challenging and time consuming to determine which standards, certifications, and rating programs are most credible (Vierra, 2014).

3.9 Regulating Greenwashing in South Africa

A sustainability survey conducted by Oglivy Earth SA (2011) indicated that South African consumers have a high level of eco awareness, with only 18.3% of consumers trusting a company’s green credentials (Le Roux & Viljoen, 2012). This distrust can be attributed to unsubstantiated and false claims made by companies. Greenwashing thus threatens those who are legitimately trying to provide services and goods that are in fact ecologically friendly. However, terms such as “environmentally friendly”, “eco”, “energy efficient”, “water friendly”, and “green”, are currently not regulated by South African legislation, yet some are regulated by industry watchdogs, such as the Advertising Standards Authority and The Carbon Neutral Company (Le Roux & Viljoen, 2012).

Appendix G of the Code of the Advertising Standards Authority (ASA), which governs all advertisements, deals specifically with the use of environmental claims in advertising. According to the Code, environmental claims refer to “any direct or indirect claim, representation, reference or indication in an advertisement relating to the immediate or future impact or influence on the environment of a product or its packaging or a service” (The Advertising Standards Authority of South Africa (ASA),
Furthermore, the Code states that “all environmental claims and statements made in advertising should provide accurate information, meaningful to the consumer and based on recognised scientific standards and principles” (ASA, 2015). Finally, the Code stipulates that “advertisements should not contain vague, incomplete or irrelevant statements about environmental matters, nor should it impair public confidence in the efforts made by the business community to improve its ecological standards” (ASA, 2015).

Other than the Advertising Standards Authority, South Africans can rely on the Consumer Protection Act if green claims are too vague and unsubstantiated (Le Roux & Viljoen, 2012). The Consumer Protection Act prohibits any misleading trade descriptions that are direct or indirect indications of the materials and mode of manufacturing or production of products (Le Roux & Viljoen, 2012).

It is evident that there are ways that are in place to protect consumers from greenwashing through misleading environmental claims, but South Africa lacks formal guidelines that would direct how specific words or trade descriptions should be used. This lacuna suggests that consumers of green products are ultimately responsible for investigating the truth of the claims made regarding the environmental friendliness of the goods and services which they buy, and they should therefore be more active in the decision-making process (Le Roux & Viljoen, 2012).

Yet without legislation in South Africa to adequately define and provide requirements for what an eco-estate should be, there will always be confusion as to what they are (Grey-Ross et al., 2009). For some, eco-estates are housing developments that consider alternatives for the conservation of energy and water and the reduction of waste, focus on the impact of sanitation, while considering the use of sustainable building material (Swilling & Annecke, 2006). Others see eco-estates as conservation tools, providing refuges for endangered species (Grey-Ross et al., 2009). There is therefore an argument that eco-estates that focus on sustainable development may not necessarily allow for the conservation of natural fauna and flora (Grey-Ross et al., 2009), which implies that one definition of eco-estate cannot necessarily support the other. This observation is significant since the majority of eco-estates use wildlife as part of their advertising campaigns.

3.10 Competitive Altruism

In order to fully understand the impact of green advertising, it is important to also consider consumers’ responsiveness to this advertising, since consumers responses to an advert can be driven by individual motives and preferences, as well as collective and communal motives (Richards, 2013). With regards to this study, it is
important to identify that individuals across cultures and time have been known to compete for status by appearing to be more altruistic (Griskevicius et al., 2010). This behaviour is termed competitive altruism (Barclay & Willer, 2007; Roberts, 1998; Hawkes, 1993). Previously, social status was achieved through the consumption of luxury goods. With evolving social norm, it has been suggested that esteem can be attained through the demonstration that one is environmentally conscious through the consumption of products perceived to have a lower environmental impact (Sexton & Sexton, 2011). It has been theorised people would forgo luxury for environmental status as a result of competitive altruism (Cloud, 2009).

In light of current global concerns about environmental damage and global climate change, environmental protection conveys an image that was previously linked to wastefulness and excess (Kotchen, 2006; Sexton & Sexton, 2011). As such, consumers are undertaking costly actions to signal themselves as environmentally friendly, or “green” (Sexton & Sexton, 2011). Green products demonstrate to others that the owner is voluntarily incurring the cost of owning the product for the benefit of the environment (Griskevicius et al., 2010). It has been shown that as many as one third of consumers are willing to pay a premium for products with green characteristics, such as renewable energy (Blumenschein et al., 1997). This desire to be considered as environmentally friendly is further demonstrated by homeowners who have been known to install solar panels on the shaded side of the house in an attempt to display their investment to people on the street (Sexton & Sexton, 2011).

Competitive altruism theory thus suggests that the modern consumer will pay more for a product if in doing so they are perceived to be caring towards the environment (Griskevicius et al., 2010; Mitchell & Ramey, 2011). This concept can therefore be extended to developers, as well as potential homeowners, who use competitive altruism to garner interest in their proposed environmentally friendly developments. Competitive altruism may perhaps highlight a competitive strategic step made by some developers to create residential housing estates that are “green”. A belief of competitive altruism is that the more visible the products green label (calling a residential estate an eco-estate); the more likely consumers will be to attain it as a way to elevate the status (Mitchell & Ramey, 2011).

The competitive altruism theory offers an insight into why consumers will spend significantly more money, time, effort, and other valuable resources to procure goods and services, or patronise organisations that they perceive are environmentally friendly (Mitchell & Ramey, 2011). Although this theory allows organisations and developers alike to meet the demands that have emerged in response to the current green trend, some developers are taking advantage of this situation by using greenwashing instead (Mitchell & Ramey, 2011).
3.11 Conclusion

Being green is more than an environmental choice (Joseph, 2014). Status motives lead one to forgo luxury as a way to positively influence ones reputation (Cloud, 2009). Competitive altruism encourages individuals to behave in a way that can be beneficial to the environment. Many companies have realised this, and, as such, there is a growing increase in greenwashing as well as use of celebrity endorsements to encourage others to buy green products (Cloud, 2009). For these companies, it is also important to sell products at a higher price since it is difficult for less wealthy people to engage in status-seeking behaviours (Cloud, 2009). However, greenwashing can be avoided in the housing sector through the use of building assessment tools, which rate buildings according to their level of sustainability based on criteria that impact sustainability.

As South Africa is a developing country, sustainability is affected by a number of factors. The SBAT has thus been specifically created to assess buildings in the specific context of development. It is the only assessment tool that has been specifically created for use in South Africa. With an increase in green buildings expected to rise, it is important that such tools are used to ensure that new developments meet the standards required to be considered sustainable.
Chapter 4: The Sustainability of Eco-Estates in Gauteng, South Africa

4.1 Introduction

With the abundance of available technology, materials, and design methods for construction (De Wit, 2008), it would seem that new buildings would be able to achieve eco-friendliness and sustainability. Ultimately, sustainable development is a choice that is made by the developer. This choice relates to all aspects of sustainability, including environmental, social, and economics.

As South African cities are expanding, there is a shift in focus to find ways to minimise environmental impacts associated with new developments (Parlow, 2008). The important point to consider is whether these developments have been built to meet the market demand from environmentally conscious buyers (Parlow, 2008), or the developers have adopted environmentally responsible business practices for altruistic reasons alone, or greenwashed (Parlow, 2008).

This chapter will show that although many residential estates market themselves as eco, their environmental sustainability score reflects otherwise. These estates use greenwashing techniques to attract homeowners. While these homeowners may have been misled, competitive altruism suggests that the homeowners are as much to blame in believing for the false adverts in an attempt to appear as though they care about the environment.

4.2 Residential Estates and Sustainability

Residential estates in South Africa rely on various methods of marketing to distinguish themselves from other similar estates. Some of these residential estates have chosen to market themselves as eco-friendly. The estates have differentiated themselves from others through the use of the terms “green”, “eco”, “country”, and “nature”. Non-eco-estates make none of these environmental claims. Therefore, when comparing the environmental sustainability scores of eco-estates and non-eco-estates, eco-estates should outperform the latter.

Since the claims made by eco-estates focus especially on the environment, the other aspects of sustainability were excluded in this study.
Table 4.1. A summative table showing total environmental sustainability scores and averages for both residential eco-estates (green) and residential non-eco-estates (orange).

<table>
<thead>
<tr>
<th>Eco-Estate</th>
<th>Water</th>
<th>Energy</th>
<th>Waste</th>
<th>Site</th>
<th>Materials &amp; Components</th>
<th>Total Scores (25)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eco-Estate A</td>
<td>4.5</td>
<td>3.5</td>
<td>4</td>
<td>3.5</td>
<td>3.5</td>
<td>19</td>
<td>3.8</td>
</tr>
<tr>
<td>Eco-Estate B</td>
<td>3</td>
<td>4.5</td>
<td>0</td>
<td>2.5</td>
<td>4</td>
<td>14</td>
<td>2.8</td>
</tr>
<tr>
<td>Eco-Estate C</td>
<td>4</td>
<td>4.5</td>
<td>0</td>
<td>2</td>
<td>3.5</td>
<td>14</td>
<td>2.8</td>
</tr>
<tr>
<td>Eco-Estate D</td>
<td>2</td>
<td>2.5</td>
<td>0</td>
<td>4</td>
<td>11.5</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>Eco-Estate E</td>
<td>0.5</td>
<td>3</td>
<td>0</td>
<td>2.5</td>
<td>9</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Eco-Estate F</td>
<td>2.5</td>
<td>0</td>
<td>2.5</td>
<td>1.5</td>
<td>8</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Eco-Estate G</td>
<td>1.5</td>
<td>0.5</td>
<td>0</td>
<td>0.5</td>
<td>4.5</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Total [35]</td>
<td>18</td>
<td>18.5</td>
<td>6</td>
<td>15.5</td>
<td>22</td>
<td>78.5</td>
<td>16</td>
</tr>
<tr>
<td>Average</td>
<td>2.57</td>
<td>2.64</td>
<td>0.86</td>
<td>0.09</td>
<td>3.14</td>
<td>11.43</td>
<td>2.29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Eco Estate</th>
<th>Water</th>
<th>Energy</th>
<th>Waste</th>
<th>Site</th>
<th>Materials &amp; Components</th>
<th>Total Scores (25)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estate A</td>
<td>1.5</td>
<td>2.5</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>1.2</td>
</tr>
<tr>
<td>Estate B</td>
<td>1</td>
<td>1</td>
<td>1.5</td>
<td>0.5</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Estate C</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td>4.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Estate D</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0.8</td>
</tr>
<tr>
<td>Estate E</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
<td>0.5</td>
<td>1.5</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>Estate F</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
<td>0.5</td>
<td>1.5</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>Estate G</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>Total [9]</td>
<td>4.5</td>
<td>8</td>
<td>3.5</td>
<td>2.5</td>
<td>9</td>
<td>27.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Average</td>
<td>0.64</td>
<td>1.14</td>
<td>0.50</td>
<td>0.36</td>
<td>1.29</td>
<td>3.93</td>
<td>1.38</td>
</tr>
</tbody>
</table>

Table 4.1 shows a side by side summation of the environmental sustainability score for each of the 14 estates used within the study. All of the scores are rated on a scale of 0-5, where 0 – 1 = very poor; 1 – 2 = poor; 2 – 3 = average; 3 – 4 = good; and 4 – 5 = excellent. A score of less than 3 renders the criterion not sustainable. These results indicate that the overall environmental sustainability score for the residential eco-estates were higher than the overall environmental sustainability score for the non-eco-estates. These results are similar to the findings done in previous studies, which indicate that the best performing buildings in a comparative study were those that took a fully integrated approach to sustainable design—addressing site development, water savings, energy efficiency, materials selection, and indoor environmental quality (GSA Public Buildings Service, 2008).

The average environmental sustainability score for eco-estates was 11.43 out of a possible score of 25, and the average environmental sustainability score for non-eco-estates was 3.93 out of the possible score of 25. This difference (7.5) is significant and indicates that there is a substantial difference between the two types of residential estates. While the environmental sustainability scores for eco-estates are higher than the non-eco-estates, the scores for some of the individual eco-estates are not sufficient enough for them to be classified as sustainable. Although the overall difference in the total environmental sustainability score is high, there are also differences between the individual criteria, which will be elaborated on in the sections below.
The results shown in table 4.1 indicate that 14.28% of the eco-estates studied can be considered “good”. What this infers is that the estates have some sustainability features, but that there can be improvements made to ensure that they are completely sustainable. 42.86% (the majority) of the eco-estates surveyed had scores which classifies them as average. Thus the estates are neither sustainable, nor are they unsustainable. 42.86% of the eco-estates used in this study received scores below 3, resulting in a classification of poor to very poor. This result indicates that these estates are unsustainable and, although they advertise themselves as being eco-friendly, they have not adopted any features that reflect this status. It is therefore necessary to determine why these residential estates have chosen to market themselves as “eco”, since their overall scores show that they are not sustainable.

Although a large number of eco-estates did not obtain scores that classified them as ecologically sustainable, none of the non-eco-estates received a sufficient score either. 28.58% of the non-eco-estates received a classification of poor, while the majority, 71.42%, received a classification of very poor. While this was expected for non-eco-estates, the results of the eco-estates are interesting, since green buildings have lower operating and maintenance costs than compared to conventional buildings. Green buildings are also more energy efficient, as well as reduce negative impacts on the environment (ACE Update, 2014). As such, eco-estates should represent development that is the most efficient, as well as offering the least disruptive way of using land, water, and energy resources (ACE Update, 2014). The results of this study indicate the opposite.
Graph 4.1. A spider-graph showing the overall environmental sustainability score for each of the seven eco-estates.

Graph 4.2. A spider-graph showing the overall environmental sustainability score for each of the seven non-eco-estates.

When looking at graph 4.1 and graph 4.2, it becomes apparent how vastly different the environmental sustainable scores between the two types of estates are.
These spider-graphs display the multivariate data of the SBAT, with each of the environmental categories represented on axes that start from the same point. The more complete the graph is, the greater the sustainability of the building, since more of the requirements are being met. Eco-estate A had the highest environmental sustainability score. Overall, the majority of the eco-estates performed poorly in the categories of “waste” and “site”, but the majority of the eco-estates performed well in the “water” criterion.

### 4.2.1. Water Efficiency Measures

Although the residential eco-estates generally scored higher in this category, there is one non-eco-estate (Estate A) that had a higher score for water compared to one of the eco-estates (Eco-Estate E), where Estate A received a score of 1.5 and Eco-Estate E received a score of 0.5. When looking at the estate documentation, it is evident that Estate A scored higher as it has an on-site sewage treatment facility, which allows the estate to manage and treat their sewage and greywater. In doing so, they are able to reuse the water in the gardens and on the golf course of the estate. What is indicates is that some features of sustainability are not unique to the type of residential estate, but rather are used to fulfil a specific need of that particular estate. This observation is reflected in the excerpt from Estate A marketing material, shown below.

“Estate water and sewer reticulation is self-maintained. A Utilities plant is situated on the southern side of the estate supplying potable water to the estate as well as to the college. 3 x 1 000 000 litre sewer reactors process the sewer and the grey water is reintroduced into the lakes on the estate. This water in turn is utilized for irrigation purposes. Water quality is of utmost importance and thus our water and sewer gets tested on a daily basis by the operating staff at the utilities plant. Monthly laboratory tests are conducted by an independent lab appointed by Prentec and quarterly tests are conducted by Aquatico on both the potable as well as irrigation water.” (Estate A, 2011).

Overall, most of the residential eco-estates make provision for the use of rainwater harvesting methods, including, but not limited to, rainwater tanks that should be used to capture and store rainwater onsite. This water should be used to supplement municipal water supplies, especially for use in landscaping and irrigation.

Linked to this concept of using rainwater harvested for irrigation and landscaping is the use of water conservation through planting. Almost all of the residential estates (eco and non-eco) had elements of water conservation through the use of specific planting, highlighting the importance of xeriscaping as a method of water conservation, especially in areas which are water scarce. Since South Africa is a water scarce country, it is not surprising to see that both eco- and non-eco-
estates have policies that focus on the importance of saving water through the planting of indigenous vegetation. Eco-Estate E (below) discusses the reasoning behind their rules for homeowners to plant indigenous plants.

“The entrance to the site and the houses shall only be landscaped with indigenous plants... Plants that use a minimum amount of water shall be planted as far as possible and all planted areas shall be watered sparingly” (Eco-Estate E; 2005).

The estates all required that indigenous plants be used in favour of exotic plants, since indigenous plants often tend to consume less water than exotic plant species. Non-native plants use approximately 576 million m³ of water per annum more than the natural vegetation (Way n.d.). The planting of indigenous plants is therefore important as less water is needed for gardening purposes.

However, the word indigenous has also become a marketing tool (Ballard & Jones, 2011). In some sense then, indigenous planting is not just important for environmental protection, but for economic reasons as well. The latter is highlighted by the reality that landscape architects are opting to landscape with indigenous plants, despite the cost, in order to meet market demand (Ballard & Jones, 2011). Buying property in an indigenously landscaped estate is a form of ethical consumption (Ballard & Jones, 2011) that is in many ways a form of competitive altruism.

Gardening and the use of indigenous landscaping is not the only way that homeowners are able to display their concern for the environment. One other way is through the use of renewable energy forms, such as solar, which can be placed on the roof of houses thus indicating to other homeowners a desire to protect resources.
4.2.2. Sustainable Energy Use

The majority of the residential eco-estates (see graph 4.3) scored above 3 in the category of energy use. This score indicates that these estates are classified as “good” to “excellent” with regards to their environmental sustainability score, according to the SBAT. All of the non-eco-estates, however, scored below 3 (see graph 4.4), indicating that their energy performance is below average, and in many cases (5 out of 7), their performance was “very poor”.

Graph 4.3. A Spider-graph showing the sustainability scores for energy in eco-estates.

Graph 4.4. A Spider-graph showing the sustainability scores for energy in eco-estates.
The residential eco-estates scored higher in this section, as many of the estates use less energy through the use of passive and natural processes for ventilation, heating, and cooling. This use of passive design is clearly documented in many of the architectural guidelines for these estates. An example of this can be seen in the architectural and landscaping guidelines for Eco-Estate C, which states:

“It is our hope that this development will create a… climatically appropriate style that is… relevant to the region of Gauteng… where it is warmer outside in winter, the sun shines all year round and the temperature can fluctuate… thus material choice is critical to ensure low running costs through passive heating and cooling of the building” (Eco-Estate C, n.d.).

The South African Bureau of Standards (SABS) provides guidelines and general requirements for energy efficiency under the South African Building Regulations. These regulations (SANS 204/XA) state that wherever possible, passive building design must be encouraged (SABS, 2011). The SANS 204/XA regulation is relatively new (released in 2009) and, as such, some of the estates will automatically score higher as they have been developed after 2009.

When comparing electricity usage and lighting in conventional buildings and green buildings, it is evident that green buildings use significantly less energy than their counterparts (ACE Update, 2014). One study compared the actual energy used in green buildings to the actual energy used in conventional buildings and found that the green buildings on average used 5% to 30% less energy than conventional buildings (Committee to Evaluate Energy-Efficiency and Sustainability Standards, 2013).

“…we actively encourage the reduction of energy consumption through the use of renewable energy, passive design elements, energy efficient appliances and lighting… we do not endorse the use of diesel of (sic) petrol back-up generators, and urge a thoughtful consideration of battery and solar” (Eco-Estate D, 2014).

In the current context of energy in South Africa, it is important that sustainable energy be sourced as a replacement for coal-based energy production. With this in mind, both eco- and non-eco-estates should be striving to achieve energy efficiency. Currently, it would appear that competitive altruism is a driver in promoting the greening of some homes, with homeowners installing energy saving devices as a way to impress friends: “Buying a green product like one of those long-life compact fluorescent bulbs means giving up the understated softness of a regular incandescent. But you also gain something precious when you buy a compact fluorescent: status. When your friends see the bulb screwed into the socket of your lamp, many of them will think you're a better, more socially conscious person” (Cloud, 2009).
Home solar panels are one of the most visible consumption decisions households make. Behavioural economists have suggested that homeowners tend to over-invest in solar panels, while under-investing in other green home improvements, such as additional insulation and window caulking, since the former can be seen by others, while the others are not as obvious (Sexton & Sexton, 2010).

4.2.3. Waste Reduction

Waste reduction, unlike energy reducing products, is not visible. As a result, few individuals participate in the act of recycling, which evident in the scores for this category where many of the residential estates (10 out of 14), both eco and non-eco, receiving 0 out of a possible score of 5, thus that they fall into the category of “very poor”. These low scores may exist since the focus on waste in the SBAT is specific to recycling of all types of wastes. Almost all of the estates lacked any sort of on-site recycling programme, and much of their waste was simply diverted to municipal landfills via the use of metropolitan services such as “Pikitup”.

This neglect affects the overall sustainability score for “waste”, since recycling and the reduction of waste is one of the most effective ways to reduce environmental impacts. Only one residential eco-estate (Eco-Estate A) scored 4 out of a possible 5, because they have implemented a comprehensive recycling initiative that focuses on recycling of paper, metals, glass, plastics, cardboard, as well as computer components and printer cartridges.

This initiative is in contrast to what is expected with competitive altruism. Previously, a negative stereotype was assigned to people who recycled, as recycling was associated with a lack of resources, which in turn lowered the social status of those who did it (Smith, 2011). However, although the green movement is now a popular decision, it only tends to be effective when there is a public display of green products, behaviours, and decision-making (Smith, 2011). Since the estates have no recycling centres placed within their confines many homeowners would not feel the need to recycle, since there is no way to actively show others what they are doing.

Only Eco-Estate A had guidelines for the management and disposal of waste. This waste focused solely on building waste (see quotation below), but there was no mention of wastes generated on a daily basis within the house (municipal waste). There is more waste generated by homeowners on a daily basis than waste generated during the construction process, because individuals occupy a house over a longer period of time. According to the 1999 State of Environmental Report for South Africa (DEAT, 1999), the country generates over 42 million m$^3$ of solid waste every year. This is about 0.7 kg per person per day (Ogola et al, 2011).
“During construction an area should be dedicated for building waste to be separated and be made available for recycling and/or re-use elsewhere. If unavoidable, waste materials can be transported off site for re-cycling elsewhere or spoilt in an approved land fill area… Owners must design & dedicate a small area to house recycling containers. Specification of containers will be supplied by the HOA. This area should be adequately sized & located to allow access from outside to allow recycling sub-contractors to collect & remove materials from time to time… Where used building materials from other buildings can be re-used, owners are encouraged to do so. Materials that are obtained & transported to site from a 200km radius will be acceptable” (Eco-Estate A, n.d.).

4.2.4. Building Footprint: Site

Like waste, sites for development can be recycled. Both the residential eco-estates and non-eco-estates performed poorly in this category, although the non-eco-estates performed the worst, with all of the estates receiving a score of less than 1. Only two of the seven residential eco-estates scored above 3, while the remaining 5 scored between 0 and 2.5. There are a number of factors influencing this score. One of these factors, linked to energy, is that of neighbouring buildings.

Graph 4.5. A spider-graph showing the sustainability scores for site in eco-estates.
Graph 4.6. A spider-graph showing the sustainability scores for site in non-eco-estates.

These graphs indicate that both eco- and non-eco-estates performed poorly in this category. Many of the estates have been developed on previously unoccupied land, especially those estates located on the edge of the urban fringe. Here, grasslands are being replaced in favour of development. By building on “green” sites, biodiversity is lost, as it is removed to allow for development to occur.

Residential eco-estates that used natural and passive design elements tended to score highly on the neighbouring buildings question, since the houses needed to be built in such a way that the neighbouring buildings were not negatively affected by the positioning and size of the new building. In other words, one building should not influence another’s access to sunlight, daylight and ventilation.

Another factor that influences the scores for “site” is the vegetation of the area. Many residential eco-estates focus on leaving large portions of the development open and undeveloped. Although these areas will remain undeveloped, some of the estates use these areas for low-impact recreational activities such as hiking, mountain-biking, and game viewing. As such, these areas are largely covered in natural vegetation, such as grasslands, or woodlands. This is important as it increases biodiversity. Below is an example of the advertising used to describe land use for Eco-Estate C:

“The bulk of the 480 hectare estate is dedicated to the game reserve, natural parklands and green belts that create an authentic African Bushveld experience for the residents” (Eco-Estate C, 2015).
This quote highlights the importance that eco-estates place on nature as an object that can be bought and sold at a premium. The homeowners in eco-estates are able to show their friends and family their slice of nature, as well as being able to tell them about their role in conserving the environment. In many instances, the overall land occupied by the estates is subdivided to fit a maximum number of houses into the area, which means that very little conservation takes place.

### 4.2.5. Materials and Components

As with some of the other categories in the SBAT, the residential eco-estates performed better than the non-eco-estates with regards to “materials and components”. 28.57% of eco-estates were categorised as being excellent (receiving a score of more than 4), 42.86% of eco-estates were categorised as being good, while 28.57% of the eco-estates were rated as average. There results indicate than all of the eco-estates performed well in achieving sustainability for the materials and the components that were used in the construction process. The non-eco-estates performed poorly, with only 14.28% of estates being rated as average, while the remaining 85.72% were categorised as poor.

This section of the SBAT focuses on the materials used during the construction of the houses, as well as the impacts the building process would have on the overall site. Many of the estates (both eco and non-eco) had very lengthy documents pertaining to the specific materials that were permitted to be used in the construction of houses within the estate. However, these guidelines and rules tended to focus on the aesthetic appeal of the estates, rather than the environmental impacts of using certain materials. For example, one estate had over one page of information on paint choices, but there was no information about the use of materials with low embodied energy.

To conclude this section, it should be noted that with the increasing trend of gated communities in South Africa, there seems to be a need for estates to differentiate themselves. Buyers are becoming increasingly environmentally conscious, which means that homes that are more "green" seem to sell quicker and often at a premium price (McDonald, 2010; Levitas, 2015). Another factor that seems to be driving the increase of residential eco-estates is the rising costs of energy. Green communities that have been designed to conserve natural resources do not necessarily attract residents who have sufficient knowledge and motivation to independently maintain sustainable development (Hostetler & Noiseux, 2009). Although homeowners in green communities reported more knowledge about sustainable development than homeowners in conventional communities, their overall environmental scores were low and they showed similar attitudes to those in conventional communities (Hostetler & Noiseux, 2009). What this indicates is that sustainability in a residential setting is more than the building itself. It is important
that the values and the attitudes of the people living within those buildings align with and are willing to support endeavours to ensure sustainability.

### 4.3 Greenwashing of Residential Estates

It may appear through the naming or branding of these residential eco-estates that the environment is one of their main priorities, but under closer examination, many of these estates are not focused on environmental aspects. In the past, gated communities have been criticised for their role in reinforcing social inequality (Mbeki, 2005). As such, it was important for gated communities to rebrand themselves to garner greater social credibility, which they did through the use of indigenous plants (Ballard & Jones, 2011). The use of imaginary eco-sensitive styles (see Appendix A) and suggestive names are seen as a solid method for increasing an effectively substantial potential in the residential developments sector (see Appendix A). This illusion of a rustic country way of life is accomplished through persistent reference to nature (Hook & Vrdoljak, 2002).

However, many of the estate documents used to generate findings for this study show a greater focus on aesthetic appeal, security, and exclusivity, rather than on issues surrounding water and energy conservation, waste reduction, and limiting impacts on the environment. Table 4.2 indicates the advertising trends that each of the eco-estates follows when attracting potential homeowners.

#### Table 4.2 Advertising trends of eco-estates

<table>
<thead>
<tr>
<th>What Are they Advertising</th>
<th>Description</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space</td>
<td>Size of the overall Development</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Wildlife</td>
<td>Free-roaming animals</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Convenience</td>
<td>Closeness to off-site amenities, such as shopping malls.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Stand Size</td>
<td>Size of the stands available</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Security</td>
<td>Level of overall security, including 24 hour guarding of the development, cameras, sign-in and ID's</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>On-site amenities</td>
<td>Club-house, gym, school, restaurant and other facilities located within the estate.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Location</td>
<td>Located close to (20 – 30 minute drive) to major business centres in the Gauteng Province.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Exclusivity</td>
<td>Who can afford to live in the estate</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>The environment</td>
<td>Eco-design elements and a focus on sustainability</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Investment opportunity</td>
<td>A return on investment</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

An estate rating conducted in 2015 by New World Wealth reported that the top 10 residential estates in South Africa all had similar criteria. These criteria included value for money, security, scenery and wildlife, space, facilities, and
activities (Amoils & Bathurst, 2015). Many of these criteria used to determine the top estates in South Africa appear in almost of all of the documentation for the eco-estates used in this study. It would therefore appear that most estates use similar marketing strategies to attract potential homeowners. It can be seen in the table above that all (100%) of the residential eco-estates advertised space, on-site amenities, and an exclusive, upmarket lifestyle. This figure is in contrast to the 57% of eco-estates that refer to having some elements of environmental protection in the marketing:

“…Eco Estate is one of the most upmarket and exclusive private residential estates for the discerning individual insisting on the highest standards of living, security and safety, while enjoying the splendour of the natural environment” (Eco-Estate E, 2014).

Research conducted by Lightstone Properties in 2010 on community and estate living in South Africa indicates that the estimated total value for the residential properties in these estates and communities has a total value of R 643 billion. This figure equates to an average value of more than R 2 million per home, which is significantly higher than the national average of R884 000 per home (du Toit, 2015). With the average property price greater than R1.5 million, property in these estates falls within the luxury market (van Sittert, 2010). These statistics clearly indicate that only people who are wealthy would be able to afford to live in these areas.

In an attempt to appear prosocial, estates have chosen to incorporate elements of environmental friendliness over elements which outwardly display wealth and grandeur. This highlights competitive altruism at its best, since these outward displays of altruism (towards the environment) function to build and maintain prosocial reputations (Griskevicius et al, 2010).

Space and on-site amenities were also advertised by all the eco-estates in the study. Estates are islands that have been created for separate users of the estate away from people not living in the estate (Lemanski et al, 2008). Many estates have, in an attempt to cut-off connections with the surrounding city, included an array of activities that in many ways create a theme park-like feel. This aspect creates an even greater sense of detached from the reality of the asymmetrical socio-economic conditions that exist beyond the confines of these estates (Hook & Vrdoljak, 2002). These hotel-like amenities (restaurants, squash/tennis courts, private bars, children’s play-areas, swimming-pools, and a full accompaniment of caretaking staff), are paramount in ensuring that these estates are by definition, virtually “recreationally self-sufficient”, and so there is an ever decreasing need to leave the premises (Hook & Vrdoljak, 2002).

In one such estate, its main advertising brochure described in sublime detail the available amenities as a way to draw homeowners to the estate:
“Facilities include 37 kilometres of walking and biking trails that meander through 300Ha of pristine green belt along the riverside, a majestic 5Ha lake for non-motorized water sports, a 5000m² clubhouse with full gym, squash courts, studio’s, climbing wall, restaurant, indoor kids play area and even a private school… which means resident children can ride or walk safely to school without leaving the perimeter of the estate. Along with the impressive facilities of the estate, each stand also has a fibre optic connection and piped LP Gas. Located within… a number of convenient retail and commercial elements… where every possible convenience and luxury will be available for residents on their doorstep” (Eco-Estate B, 2014).

This quotation highlights more than 10 different facilities, and more than three distinct services that are available to homeowners. In many ways, estate living provides a retreat, an antidote to the harsh realities from a racist past and a convenient escape from the social inequalities of the post-apartheid dispensation (Murray, 2011). This abundance of recreational facilities, coupled with the ability to partake in extended leisure time, means that residents are afforded the luxury of a sensory experience close to that of an endless weekend (Murray, 2011).

Security, location, and convenience were also used in the advertising of five out of the seven residential eco-estates (see table 4.2). There was however reference to security in the remaining estates advertising. While most South Africans who are buying property are interested in having easy access to amenities, most are increasingly concerned about living in a secure environment (Property 24, 2015).

One estate uses both security and natural elements as their slogan on their advertising materials, stating: “Secure living for your family, within Johannesburg’s largest secure parkland” (Eco-Estate B, n.d.). Yet another estate lists all of the security features of their estate, which although impressive, seems somewhat excessive: “…Offers top security… 24 hours access control, on-site alarm monitoring and armed response, foot, vehicle patrols and guard dogs, full electric fencing, perimeter thermal CCTV system” (Eco-Estate G, 2012).

These statements indicate that for many of the residential eco-estates, security and safety of the residents is the top priority. This trend appears to be a global one, with a significant growth in private residential areas throughout the world (Lemanski et al, 2008). This global trend has seen gated communities worldwide using security features such as hard walling, razor wire, and fortified motifs (Ellin, 1997; Caldeira, 1999; Low, 2005).

Security in estates portrays a new and better place for an uncertain future (Murray, 2011). The security provided by these estates represents a concrete alternative to the imagined landscape of greater Johannesburg (Murray, 2011). Gated residential communities provide homeowners with an escape by creating
landscapes that evoke ideas of leisurely country living and a disconnection from dangerous city afforded to them by their privileged status.

The biggest area of growth in residential estates has been in Gauteng, where these estates have become popular as a response to high levels of crime, and a fear of crime (Landman & Schônteich, 2002), thus residents feel a need for safety and security. Estates are perceived as being safer than other types of neighbourhoods (Landman, 2004) thus, although homeowners bought into certain estates owing to the lifestyle they offered, for example being closer to nature, safety and security was the main motivator in their decision to invest in the estates (Landman, 2004).

Even though the biggest motivation to invest in residential estates is suggested to be a fear of crime, estates have had to find new ways of branding themselves. As such, estates have chosen to brand themselves as “eco-estates,” “game estates,” “nature estates,” and “forest estates” (Ballard & Jones, 2011). The marketing and consumption of nature has become integral to the production and consumption of gated communities in South Africa (Ballard & Jones, 2011). The excerpts from Eco-Estate E and C (below), show how nature can be used as commodity, a selling point for homeowners.

“The 112 000 square meters of beautiful landscaped areas, using indigenous plants only, adds to the aesthetic beauty of the estate. The three dams, where indigenous fish species have been introduced, are fed from two natural springs ensuring that the dams remain full all year round. Supporting biodiversity principles 14 game species, totalling [sic] 243 animals, which occurred historically in the area - ranging from Kudu to Steenbuck - have been reintroduced. The estate has thus far recorded 98 bird species, 28 species of reptile, 5 fish species and a magnitude of plant and insect life” (Eco-Estate E, 2014).

“The… Estate is an upmarket, secure 480 hectare residential estate which includes a game reserve stocked with several species of antelope and zebra” (Eco-Estate C, n.d.).

Not only have estates managed to differentiate themselves from other estates by choosing to brand themselves as “eco”, there are also additional marketing benefits associated with designing with the environment in mind (Green Building Council of South Africa (GBCSA), 2012). It has been reported that one development generated an additional R360 000 of free advertising after being accredited by the Green Building Council of South Africa (GBCSA, 2012). It is therefore more likely that estate developers would chose to go the route of an environmentally sustainable development since there is an almost guaranteed return on investment because South Africans are increasingly demanding green buildings (Property24, 2014).
Only one of the eco-estates (Eco-Estate E), focused on both the environment and wildlife, stating that:

“Eco Estate living is a philosophy whereby man [sic] lives in harmony with nature. This is achieved by careful design of houses, sensitive landscaping, energy efficiency and general conservation principals. In order to protect, conserve and maintain the natural beauty of Eco Estate an Environmental and Wildlife Management Plan has been implemented to ensure the sustainability of this exclusive natural environment for the next generation” (Eco-Estate E, 2014).

A study conducted in South Africa to determine the drivers of green building in the country found that the development of green buildings in South Africa has very little to do with environmental factors (Windapo, 2014). Rather, the study found that the motivation to develop green buildings was driven by economic factors. These economic factors, such as operating costs and stakeholder demands, were central to the increase in the overall number of green buildings in South Africa (Windapo, 2014).

4.4 Conclusion

This research has indicated that there are no clear criteria to define exactly what an eco-estate is and should be. This lack of clarity is evident in the ways that these estates choose to advertise – many of the eco-estates used in this study focused more on the security and lifestyle features of their estates, rather than focusing on the elements that in fact make them sustainable. This facet highlights the need to create a well-defined term for “eco-estate”. Without this definition and guidelines for operation, eco-estates will continue to function in any manner they choose.

The confusion created by a lack of an accepted definition for the term eco-estate has led some to question the integrity of the term. In the past, a complaint was lodged with the advertising standards authority by an environmentalist who argued that the use of the word “eco-estate” was misleading and constituted false advertising, since many of these estates were filled with “energy-hungry houses” built to accommodate long distance commuters (Ballard & Jones, 2011). In order for the estates to act in a more environmentally sustainable manner, they need to adopt and outline to potential homeowners building practices that are in line with global green building trends. Furthermore, building assessment tools, like SBAT, can be used in the design phase to determine the environmental sustainability of proposed houses and developments. Developers therefore need to make use of these tools if they have a genuine interest in creating estates that are truly environmentally sustainable.
Chapter 5: Conclusions and Contributions

5.1 Introduction

Development is an unrelenting process resulting in continued environmental degradation and destruction (Lélé, 1991). The resulting green trend has seen an increase in the number of renewable technologies, as well as various changes in the construction process. These changes are designed to ensure that future development has a smaller impact on the environment, including the resources it contains (UNEP, 2014). Without any government regulations or eco-friendly building standards, sustainable development does not appear to be an achievable goal. The choice for developments to become eco-friendly remains a voluntary process, which many developers are now choosing. Prior to 2010, there were less than five eco-estates within South Africa. With an ongoing global trend of environmental awareness, the number of eco-estates in South Africa has risen sharply to meet the demand for an environmentally friendly lifestyle. Since these types of developments are new, there are several concerns regarding their environmental sustainability. This chapter discusses the findings of this study, as well as presenting possible opportunities for further study. The contributions of this research, as well as the limitations of this research, are also described in this chapter.

5.2 Environmental Sustainability in Residential Estates

Many residential estates in Gauteng have chosen to market themselves as "eco-estates", thus this study looked to determine whether or not these estates are in fact "eco" by determining their overall environmental sustainability score. In order to calculate the environmental sustainability of residential estates in Gauteng, the online marketing materials, as well as rules and regulations for each estate, were analysed. The findings and the analyses of the study were presented in chapter 4.

One of the possible reasons for development of residential eco-estates is for like-minded, environmentally-conscious homeowners to contribute to the environmental sustainability of the country. In doing so, these estates have set themselves apart from other residential estates by incorporating environmental components into the development. However, the results of this study have found that although eco-estates had higher overall environmental sustainability scores when compared to non-eco-estates, their results were not high enough for them to be considered sustainable.

Many of the eco-estates performed poorly in the categories relating to the disposal and management of waste, the types of building materials used, as well as
the site itself and development of the site. These are the areas where developers have the most control and the scores for these criteria could significantly be improved through more stringent rules and regulations for homeowners. Since it is the developers who have chosen to create estates that are classified as "eco", this area should be where the eco-estates score highest.

However, although developers are responsible for the overall decision to market the estate as “eco”, the potential homeowners, landscapers, architects, and other relevant individuals have an equal responsibility to ensure that the finished product – the home within the estate – meet the criteria to increase overall environmental sustainability. Sustainability moves beyond simply the products used in the development of an area, it is about choices that individuals make on a daily basis that will determine whether or not environmental sustainability is achieved.

5.3. Marketing of Eco-Estates

Greenwashing is a term that has been used to generate sales of products that are supposedly green. This term can however be extended to developments as well, as developers try to find ways to differentiate themselves from one another. As residential estates are the norm in South Africa, it is important that new estates find ways to succeed in a saturated market. One way of doing so is to market the estate as “eco”.

However, although eco-estates market themselves as being environmentally friendly, it is evident from this research that they are not. This inspired the research to look more closely at what the eco-estates were marketing. The results of this study indicate that all of the eco-estates focused predominately on marketing aspects of space, exclusivity, and on-site amenities: they were marketing a lifestyle that would isolate the homeowners from the rest of the city. Thus although eco-estates have chosen to brand themselves as “eco”, very little of their marketing material focuses on creating awareness about the types of features that would be required to make the estates truly sustainable. In other words, there is a greater emphasis on the amenities and the aesthetics of these estates rather than any sincere effort to protect and preserve the natural environment and its resources.

Competitive altruism makes it easier for potential homeowners to succumb to the promise of environmental preservation, especially as global trends focus on the promotion of environmental awareness and the need for individuals to “go green”. It appears that people are prepared to pay more simply for the perception of being environmentally conscious. It is also financially beneficial for eco-estates to present an image of environmental-friendliness in the current market driven by the current green trend.
Exclusivity is another aspect that acts as a driver of this green trend. As there are only seven residential eco-estates in the Gauteng Province, the idea of exclusivity is evident: only a few estates have chosen to focus on environmental protection while providing homeowners with an environment that is reminiscent of a bushveld escape. Marketing nature is a way to differentiate these estates from other similar estates.

5.4 Contribution

The study found that although eco-estates are often perceived as sustainable, not all of them meet the criteria to actually be classified as environmentally sustainable. The research therefore highlights a need to develop a framework that will guide future developments in ensuring that they are in fact environmentally sustainable. Without a concise framework describing the requirements needed to be considered as an eco-estate, any developer can choose to market themselves as one, thereby leading to greenwashing. As such, eco-estates currently refer to anything that relates to the environment and nature. In an attempt to create a clearer understanding of this term, developers and estate managers, in consultation with environmental specialists, need to provide a concise and accurate definition for the term. This newly defined term (eco-estate) should include all of the relevant aspects necessary for sustainability, such as water, energy, waste, site, and materials.

Presently, there is no legislative requirement necessary for estates of this nature to undergo in order to be marketed as “eco”. Through further research and in consultation with developers, a framework needs to be established which will ensure that future developments of this nature comply with certain green building regulations. In doing so, these developments can then be awarded a rating that can be used to attract homeowners.

Another potential reason why eco-estates do not meet the criteria to be classified as environmentally sustainable is due to the marketing materials used to advertise these estates. Often, estates use imagery and phrases that are associated with preserving the environment, but the actual guidelines and rules for the estate make no such effort to conserve the environment. In order to address this misrepresentation, estates should be more transparent about the product they are selling. Residential committees, such as the Association of Residential Communities, should act as a governing body to guide and regulate the materials used to advertise estates.

Furthermore, environmental sustainability scores for eco-estates are in many ways affected by the homeowners within each estate. The estates may suggest that the homeowners, architects, and developers use certain fixtures, fittings, and building materials, but without buy-in from homeowners there is no possible way for an estate to improve their environmental sustainability score. Thus, it is important for
eco-estates to ensure that the interested homeowners are prepared to develop the land and build their home in accordance to stringent green building guidelines.

5.5 Limitations of the Study and Areas for Future Research

Firstly, the study focused only on residential estates within the Gauteng Province of South Africa. As such, the results of the study are not representative of the entire country. A large scale study, which included a larger sample, could be conducted in order to be representative of the larger population of eco-estates. An in-depth study could be beneficial, since it would provide detailed qualitative and quantitative data. This information could be collected through in-depth interviews with estate managers and homeowners alike.

Secondly, the adaptation of the SBAT meant that only the environmental components of sustainability were addressed. As a developing country, sustainability needs to also focus equally on social and economic issues. Future studies that incorporated all of the aspects of sustainable development would be able to accurately demonstrate the overall sustainability of eco-estates.

Furthermore, results may differ if SBAT was used within the design and construction phase of a development, rather than analysing completed estates only. It would also be interesting to see if the results of the study differed when using an array of different assessment tools. This type of study could then determine which tool is best suited for this type of assessment, as well as providing recommendations for the future.

Finally, as many of the estates included in this study had set aside portions of the development for conservation purposes, further research could be undertaken to study the impact these eco-estates have on the conservation of sensitive fauna and flora. Many of the current eco-estates include wildlife and proclaim to restore ecologically sensitive areas.

5.6 Conclusion

In order for sustainable development to occur, change and action is required to limit the impacts made on the environment through development processes. All aspects of development result in negative impacts on the environment, thus there needs to be an overarching goal for both developed and developing nations to take responsibility for the environmental issues that result from development.

Environmental assessment tools have been shown to be beneficial throughout all phases of the construction process. While many of these assessment tools were designed for use in developed countries, the SBAT was created with developing
countries in mind. The tool therefor acts as a way to balance environmental, social, and economic issues relating to sustainable development in these countries.

Although this study focused only on residential lifestyle estates in the Gauteng Province of South Africa, the results indicated that very few of the estates studied were sustainable. In analysing the estates, it became apparent that many of the estates used the environment as a marketing tool, using competitive altruism as a motivating factor for homeowners to buy into the idea of protecting the environment. Without regulations and legislation, this trend of greenwashing developments will continue. There needs to be a shift from assessing green developments as a voluntary process to one that is better regulated and managed.
References


Appendix – De-identified Estate Information
The following text is redacted and cannot be read naturally.
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Item 1</td>
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<td>5</td>
<td>Item 5</td>
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<td>Item 6</td>
</tr>
</tbody>
</table>

**Environmental Impact Statement**

The Environmental Impact Statement (EIS) is an important tool used to evaluate the potential environmental effects of a proposed project. It is a report that describes the possible environmental impacts of a project and includes a detailed analysis of the project's environmental effects. The EIS is prepared by the applicant and submitted to the relevant regulatory agency. The purpose of the EIS is to provide a comprehensive evaluation of the project's environmental effects, including both direct and indirect impacts, and to identify any potential adverse effects that could result from the project.

The EIS is used to inform decision-making processes and to ensure that the project is constructed in an environmentally responsible manner. It is also used to identify any necessary mitigation measures that can be implemented to minimize the project's environmental impacts.

The EIS is a critical component of the permitting process for many types of projects, including those that require approval from federal, state, or local agencies. The EIS is often used to demonstrate compliance with environmental regulations and to address public concerns about the project's environmental impacts.
95
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estates, as the use of conventional electrical geysers will not be allowed to be installed. This is in line with current Eskom requirements and our green homes initiative. Homeowners are not however limited to one product although the developers will endeavor to source certain recommended units at a reduced price for the homeowners. Instantaneous Gas Geysers (also known as Tankless Water Heaters) units are designed to be highly efficient and only heat water when it’s needed, a revolutionary advantage over inefficient tank-style water heaters/geysers. Tankless water heater technology will supply endless amounts of hot water to your lifestyle demands with up to 40% energy savings with a tankless water heater/gyser. These units can be used as a secondary heat source for solar geysers, eliminating the need entirely of costly electricity as a back-up heating source. From an aesthetic point of view split solar geyser units are mandatory. This means that the solar panel that heats water is separate from the geyser. This allows the homeowner to place the low profile panels unobtrusively on the roof while placing the bulky geyser within the roof void. If planned correctly the water or glycol will circulate through convection and no pump will be necessary. A pump is however recommended in the unlikely event that there is total cloud cover for an extended period of time. For aesthetic reasons it is also a requirement that any visible solar panels and frames as well as geysers are powder coated in a charcoal colour to match the roof. This is to avoid glare and minimize the aesthetic impact.

**Underfloor Heating**

Gas or solar heated underfloor heating is mandatory on all of the [redacted] as the use of conventional electrical underfloor heating will not be allowed to be installed. The use of gas and Solar heated underfloor heating has several benefits. In addition to saving on electricity bills and reduction in electrical demands, the owner also has a permanent hot water supply to heat the home which is not reliant on Eskom. Underfloor heating is achieved through the circulation of hot water through piping installed in the floor. This can be controlled through the use of valves and pumps to heat individual rooms or the entire house and can even be linked to a home automation system which will monitor the temperature, activate the pumps and open and close valves to maintain the desired environment in the home. Obviously the electrical cost savings are substantial as the only power required is for the pump and the control of the gas.

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**20. General**

These building, landscaping, I.T and sustainable housing guidelines are to be read in conjunction with the Agreement of Sale between the homeowner and the developer and the constitution of the Home Owners Association including any amendments thereeto. Even if a homeowner may have complied with these set out guidelines, the development company will have the absolute discretion to reject any plans which do not, in its sole discretion, embody the spirit of what is intended for the built environment in the estate. The Aesthetics Committee will in its absolute discretion, be entitled but not obliged to waive any of these guidelines but any waiver granted shall not constitute a precedent which will automatically be applicable to any other homeowner(s). Homeowners must be members of the Home Owners Association. During the development period, the developer shall be entitled in its absolute discretion to amend these guidelines from time to time. Should at any time any disputes arise relating to the application or implementation of these guidelines the Aesthetics Committee and or the development company's decision shall be final and binding on the parties concerned. These guidelines may not be amended by the Home Owners Association in future without the development company's written consent.
# Checklist for Building Approval

*Note: This checklist serves as a guide to the information that the Aesthetics Committee requires and will assist the applicant and the Aesthetics Committee in the speedy approval of plans. This information is to be submitted with stage 1 & 2 applications.*

## 1. The Site

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

- Contours
- Final levels after construction, max 1 m cut and fill
- Maximum building height (12 m incl. roof)
- First floor <70% ground floor
- Large roofs to be fragmented

**Building lines:**
- **Waterfall Equestrian Estate:**
  - Fence line: 3.5 m
  - Street: 13.5 m South entry build to line
  - 43.5 m North entry build to line
- **Waterfall Country Estate:**
  - Street: 3 m to garage
  - 5 m to house
  - Side: Aggregate of 6 m, minimum of 2 m
  - Midblock: 3 m single storey
  - 4 m double storey
- **Waterfall Country Village:**
  - Street: 2 m to garage
  - 3 m to house
  - Side: Aggregate of 4 m, minimum of 1.5 m
  - Midblock: 2 m single storey
  - 3 m double storey
  - Screen wall max 30% of boundary length
  - Building inside building lines

**Site plan:** Building lines

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

- Servitudes
- Extent of buildings
- Floor levels incl. a datum height

## 2. Land Use and Coverage

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

- Attic loft: wall plate max 9 m above ground level (8.1)
- **Waterfall Equestrian Estate:**
  - Maximum coverage of 8% of erf size
- **Waterfall Country Estate/Waterfall Country Village:**
  - Maximum coverage of 60% of erf size

## 3. Landscape Plan

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Notes</th>
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</thead>
<tbody>
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</tbody>
</table>

- Site clearing to be minimized, 1 m cut and fill max
24.10 Planning for Non-Compliance
24.12 Completion Certificate
24.13 Building Process
24.14 Completion of Examinations or Building without Plan Approved
24.15 Completion from Approved Plans
24.16 Maximum Building Period
24.17 Specific Conditions
24.18 Special Provisions
24.19 Approval Process
24.20 Notification Committee Procedure

40.1 EXISTING LAYOUT COMMITTEE
40.1 Recommissional Plan Live and The Policy
40.1.1 Recommissional Plan Live Committee
40.1.2 Architectural Committee
40.2 Existing Layout
40.2.1 Revised Plans
40.2.2 Existing Floor Plans
40.2.3 Detailed Plans
40.2.4 Detailed Sections
40.3 Existing Drawings
40.3.1 Building Connection
40.3.2 Existing Drawings
40.3.3 Existing Site Plan
40.3.4 Existing Plan
40.3.5 Site Plan
40.3.6 Existing Plan

24.2.1 Performance Payment
24.2.2 Payment Plan
24.2.3 Payment Plan Details
24.2.4 External Works
24.2.5 Indemnity Bond
24.2.6 Contractor’s Bond
24.2.7 Performance Guarantee
24.2.8 Contractor’s Liability

24.1 Examine and Contactual Details
24.2 Building Connection: Equipment and Control
24.3 Final of Approved Building Connections
24.4 Architects’ Contracts and Construction Management

Appendix A: Building Approvals

Appendix B: Building Specifications

Appendix C: Building Materials

Appendix D: Building Drawings
ACQUITURAL CHARACTER AND DESIGN GUIDELINES

1. Introduction

The acquisition of the site was framed in an understanding of the
historical and cultural context of the area.

The design process involved extensive research and consultations
with the local community to ensure the development was
responsive to the needs and values of the people.

The project aims to create a sustainable and
inclusive development that respects the
environment and respects the
character of the
surrounding community.

2. Site Plan

The site plan is presented in the appendix and
includes the following:

- Existing conditions
- Proposed development
- Public realm
- Infrastructure

3. Design Guidelines

The design guidelines are structured to
address the following aspects:

- Architecture
- Landscape
- Public realm
- Sustainability

4. Conclusion

The project represents an opportunity to
create a new
community that is
responsive to the
needs of the
surrounding
population.

The design
process
involved
extensive
consultations
with the
community
to ensure a
successful outcome.

The final
product
will be
a
landscape
that is
sustainable,
inclusive,
and
respects
the
local
culture.

Appendix

Site Plan

Design Guidelines

Conclusion
All specifications, including samples where required, must be submitted to the Aesthetics Committee.

No type or form of un-plastered brick will be permitted on external walls as the dominant feature of the house but may be used for decorative purposes at the discretion of the Aesthetics Committee. A maximum of 40% of face brick will be permitted on the exterior of the house. Two-tone face brick work and yellow face brick work is specifically excluded. If face brick is to be used then flash joints are recommended.

Natural stone can be used to add warmth and depth to the design, especially in the form of flooring or feature elements e.g. Chimneys, Columns, Fascia and retaining walls. “Dry packed” or stacked stonework is preferred to riven walling as it is more in keeping with the rustic aesthetic. No fake stone or concrete/fibreglass facings will be allowed.

Horizontal string courses and simple plaster or timber surrounds to openings are permitted, but no multiple corbelling, quoining, rustication or decorative mouldings will be permitted on any part of the building, boundary wall or outbuildings.

The developer reserves the right to specify the style, detail, and finish of the boundary wall in certain areas e.g. Main Boulevards. In the event that this becomes necessary, all details and specifications will be issued to the Homeowner’s architect by the Aesthetics committee and the building of these walls to the approved detail will be strictly enforced.

6.4.1 Recommended Wall Finishes

- Natural ‘Dry Pack’ Stone
- Smooth Plaster
- Textured or scratched plaster, painted, or with tinted finish e.g. Marmoran
- Timber Plank or Everite fibre cement building panels – only Horizontal Shiplap style is permissible
- Corrugated metal if combined with the same corrugated metal roof – Maximum 50%
- Facebrick in red colour e.g. Corobrick Country Classic, Bonn Satin or similar – samples to be provided (Min 40% of elevations)
- Combination of plaster and planking finish – subject to approval

6.4.2 Wall Colours

All exterior paint colours must be chosen from the approved colour palette for walls, doors and windows. The principal exterior paint colour may not be white. Any deviation from the approved colour palette will require specific approval from the Aesthetics Committee who will require a sample for approval. The colour palette will be included in the guideline annexures.

6. ROOFS

All major plan forms must be roofed. Roofs must be dominantly pitched in form and be between 30 to 45 degrees, in traditional styles – simple double pitched, pyramid, hipped and half hipped. Roof pitches must be consistent. Peaks must be symmetrical. Flat or lean-to roofs with a pitch of 5 to 15 degrees are acceptable provided that they do not exceed a maximum of 30% of the total roofed area. An extra allowance will be made for open lean-to verandas. The same material must be used on all pitched roofs, with the exception of slate and grey Chromadek sheeting, metal roof shingle tiles, or similar, which may be mixed. Sections which have a pitch of less than 5 degrees and are constructed in concrete shall be finished with pebbles or stone chips up to a thickness of no less than 60mm.

Lean-to roofs must abut the wall of a pitched roof and not exceed 6 meters or 2/3 of the gable width, whichever is the lesser. Roofs must coincide with plan elements.

6.1 Approved Roof Coverings are restricted to the following:

- Corrugated Metal Sheet – Chromadek or similar (Buffalo Brown, Kalahari Red, Sandstone Beige, Granite Sand, Dove Grey or Dark Dolphs colours)
- Additional colours may be approved at the total discretion of the Aesthetics Committee.
- Slate tiles – Marclara or similar (Blue Grey, West Country or Matt Black colour)
- Concrete Roof Tiles (Flat profile only) – Monier Coverland “Elite”, Monier Coverland “Perspective”, Infratech “Horizon” standard colour range (excluding red, terracotta and dolomite) and vintage colour range (excluding red, terracotta and dolomite). No verge tiles will be permitted. No multi blends will be permitted.

Corrugated sheeting is, however, recommended as this material best fits the architectural style. The sheeting must be colour banded and may not be painted on site.

A sample or specifications, including the profile, must be submitted to the architect for approval prior to the commencement of the laying roof. All houses are required to have eaves, both for aesthetic reasons, as well as in response to the climate as an aid to passive design requirements. Eaves may be of the open or closed type but overhangs should project at least 700mm and a minimum of 400mm over gable walls.

Chimneys and roof structures must complement the main structure.

Any roof mounted air conditioning units e.g. Breese Air must be hidden within the roof structure or housed in a house wall.

If possible solar panels should not be visible from the street and must be integrated into the overall design aesthetic. The panels must be mounted flush on the roof and the geyser panels to be housed in the roof void or cupboards and may not be external.

Stainless aluminium or Chromadek gutters and downpipes are recommended. These should be in an ogee pattern and must match the colour of the roof.

No variations to these restrictions on roof coverings will be permitted under any circumstances. The development company reserves the right to demand the removal of any roof covering that is in contravention of the guidelines, or impose fines of up to R10 000.00 per month if not removed. These fines form part of the levy and will be due and payable on the first day of the next month the fine is imposed.
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1. TIME DISCS

2. VENATIONAL, PERSONAL AND EXTERNAL STRATEGIES

3. EXTERNAL DOORS

4. WINDOWS AND LIGHTING

5. WAYS TO USE LIGHT AND SHADE
CHAPTER 8

MATERIALS

- Steel
- Copper
- Aluminum
- Plastic
- Glass
- Ceramic
- Wood
- Rubber
- Composite materials

The properties of these materials can be tailored for specific applications in the manufacturing process. Steel, for example, is often used for structural components due to its high strength and durability. Copper is ideal for electrical applications due to its excellent conductivity. Aluminum is lightweight and commonly used in aerospace and automotive industries. Plastic offers versatility in design and is used extensively in various consumer products. Glass is known for its transparency and is used in many applications such as windows and lenses. Ceramic is heat-resistant and is used in high-temperature applications. Wood is renewable and sustainable, making it a popular choice for many applications. Rubber is flexible and is used in various sealing and cushioning applications. Composite materials combine the advantages of multiple materials to create a superior product with unique properties.
GARDEN LANDSCAPING AND PLANTING GUIDELINES

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Prep</td>
<td>Digging, aerating, composting</td>
</tr>
<tr>
<td>Site Prep</td>
<td>Clearing, grading, leveling</td>
</tr>
<tr>
<td>Planting</td>
<td>Selecting, planting, staking</td>
</tr>
<tr>
<td>Watering</td>
<td>Irrigation, pipe placement</td>
</tr>
</tbody>
</table>

INTENSIVE

Garden care involves more frequent and intense management than other forms. This is because the garden is intended to be self-sustaining, requiring less input from external sources. The garden is designed to be a microcosm of nature, with all elements interacting in harmony.

The garden is divided into different sections, each with its own unique set of requirements. These sections include:

- **Vegetable garden**
- **Flower garden**
- **Herb garden**
- **Pollinator garden**

Each section is designed to provide a designated space for the growth of specific plants. The garden is intended to be a haven for pollinators, with a diverse range of flower and plant species. The garden is also designed to be a source of food, with a variety of vegetable and herb species.
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3.1.2 Building Contractor Management and Control

In order to ensure that the construction of buildings within the estate is executed in a controlled manner and to ensure that the life style of existing owners and residents is not unreasonably disrupted, the developer will issue a Building Contractors Code of Conduct.

The Code of Conduct must be signed by all contractors and will be strictly enforced by the developer or HOA, with penalties for non-compliance. In this regard the developer is not in a position to warrant that any penalties impose will have the desired result. Furthermore the developer does not undertake to necessarily impose a penalty in terms of each and every breach of the code, but will use its discretion in this regard, which it undertakes to exercise responsibly. It should be clearly understood that the developer is not in a position to warrant compliance with the under mentioned aspects of the code of conduct but that the developer will, at all times, use its best endeavours to ensure compliance.

The code of conduct will cover, inter-alia, the following:

- The days and times of the day during which construction may take place
- Receipt and storage of building materials
- Rubbish disposal
- Access for deliveries
- Staff ingress and egress from the estate
- Staff toilet and ablution facilities
- General behaviour of staff
- Contractor’s boards
- Fencing and screening of construction sites
- Protection of existing infrastructure
- Damage repair
- Environmental control
- Penalties for breach of rules
- Monitoring of construction activities in accordance with approved building plans
- Such matters as the developer deems to be in the interest of the general body of owners and residents of the estate
ACQUISITION GUIDELINES

SECTION 4

The acquisition of equipment and supplies is governed by the process outlined in the Acquisition Plan and the terms of the Purchase Order. The Acquisition Plan provides the framework for the procurement of equipment and supplies, and the Purchase Order specifies the details of the transaction, including the quantity, quality, and delivery terms. It is important to ensure that all procurement activities are conducted in compliance with the Acquisition Plan and the Purchase Order terms.

ACQUISITION PROCESS

1. The acquisition process begins with the identification of the equipment or supplies needed. The requisition is submitted to the appropriate department head, who approves the request.
2. The requisition is then forwarded to the Purchasing Department, which reviews the request and determines the appropriate supplier.
3. The Purchasing Department then prepares the Purchase Order, which is issued to the supplier.
4. The supplier fulfills the order, and the equipment or supplies are delivered to the requesting department.
5. Upon receipt, the equipment or supplies are inspected for compliance with the Purchase Order terms.
6. Any discrepancies are reported to the Purchasing Department, which investigates and resolves the issue.
7. The equipment or supplies are then integrated into the operational process.

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- It is important to ensure that all procurement activities are conducted in compliance with the Acquisition Plan and the Purchase Order terms.
Home 

Communist 

Street

Saw 

2021
null
20. General:

1) A certificate signed by an engineer shall state that he/she has studied the relevant geological report and that he/she has prescribed the necessary safety measures according to the geological conditions of the buildings and the site as well as installation of the wet services and such certificate shall be submitted together with the building plans. On completion of the building he must certify that all his specifications have been met.

3) All building and structures to be erected shall be made subject to the provision of the Guidelines and any all amendments to the said document as may be affected and approved by the owners association. Building plans shall only be submitted to the Municipality for final approval once the said plans have been evaluated and approved by the Aesthetics Committee.

5) The recommendations and guidelines as set out in the approved Environmental Management Plan shall be reflected in the building and landscape plans.

9) Should the owner obtain consent for a home undertaking, the following conditions shall form part of the consent:
   4.1 Any person practicing an occupation must occupy the dwelling house.
   4.2 The practice of such occupation may not, to the sole discretion of the Municipality, cause any nuisance of any nature whatsoever nor disturb the surroundings.
   4.3 No goods may be exhibited, displayed or stored without the written permission of the Municipality.
   4.4 The use of the more than 25% of the floor area of the dwelling house for the practice of such occupation is permitted.
   4.5 Not more than two employees in maintenance or support role or two agents may be employed unless the Municipality has given prior written consent. The conditions of Clause 7 are applicable to such application.
   4.6 No Occupation may be practiced from outbuilding unless the Municipality has given prior written consent the conditions of Clause 7 are applicable to such application.
   4.7 No shops may be practiced from outbuildings or dwelling houses.

5) No residential development which will take place within an area with decibel count in excess of the norm with reference to noise contour of Lanseria Aerodrome.

6) In addition to the to the above conditions the erf and buildings thereon are further subject to the general provision of the Peri-Urban areas Town Planning Scheme, 1974.
TO MY FELLOW RESIDENTS

The Eco-Estate F is a place to live and work where we are privileged to have the privilege to work and live. We must understand that our environment is a precious gift and we must take care of it. It is our responsibility to preserve and protect this environment for future generations. We must work together to ensure that our environment remains clean and healthy for all to enjoy.

Remember, we are not just visitors here; we are part of this environment. Let us work together to make Eco-Estate F a better place to live.

Sincerely,
[Signature]

Enquiries: [Contact Information]
S. POLLUTION CONTROL

Treated sludge of coal and non-coal fuels must be stored and properly handled.
The Architectural Rules

1. Introduction

The Architectural Rules document outlines the guidelines and principles that govern the design and implementation of architectural components and systems. These rules are essential for ensuring that all components and systems within the architecture are compatible, scalable, and maintainable.

2. Scope and Process

The Architectural Rules apply to all components and systems within the architecture. The process involves the identification, definition, and documentation of the rules, followed by their implementation and enforcement throughout the development and maintenance phases.

3. Key Principles

The key principles of the Architectural Rules include:

- Modularity: Components and systems should be designed to be independent and interchangeable.
- Scalability: The architecture should be capable of accommodating growth and changes without significant impact.
- Maintainability: Components and systems should be designed with ease of maintenance and modification in mind.
- Security: Security measures should be integrated into all components and systems to protect against unauthorized access and data breaches.
- Performance: The architecture should be designed to meet performance requirements.

4. Implementation

Implementation of the Architectural Rules involves the following steps:

- Identify the architectural components and systems.
- Define the rules for each component or system.
- Document the rules, including exceptions and guidelines.
- Implement the rules in the design and development processes.
- Enforce the rules through organizational policies and procedures.

5. Enforcement

Enforcement of the Architectural Rules is critical to ensure that all components and systems adhere to the established guidelines. This involves regular reviews of the architecture to identify areas that require adjustments and the imposition of consequences for non-compliance.

6. Conclusion

The Architectural Rules provide a framework for ensuring the quality and integrity of the architecture. By adhering to these rules, organizations can ensure that their systems and components are robust, scalable, and maintainable.
Additions, Alterations and Maintenance

Should ANY additions, alterations or maintenance be undertaken (including repainting of a house), these rules will apply and the necessary plans and/or permission shall be acquired prior to the commencement of such work.

General

24.1 These rules are to be read in conjunction with the Agreement of Sale between the owner and the developer, and the Constitution of the [Homeowners’ Association].

24.2 Even if an owner may have complied with these rules, the manager, together with the Building Committee, will have the absolute discretion to reject any plans which do not, in their sole discretion, embody the spirit of what is intended for the built environment in [Homeowners’ Association].

24.3 The manager, together with the Building Committee, will, in their absolute discretion, be entitled but not obliged to waive any of these guidelines but any waiver granted shall not constitute a precedent which shall automatically be applicable to any other owner(s).

24.4 Owners must be members of the [Homeowners’ Association].

24.5 During the development period, the developer and thereafter the [Homeowners’ Association] shall be entitled, in their absolute discretion, to amend these rules from time to time.

24.6 Should any disputes arise relating to the application or implementation of these rules the manager’s decision shall be final and binding on the parties concerned.

24.7 Owners are to ensure that all building associated documentation is completed and submitted including signed copies of approved plans, NHBCS certificates, title deed and the Builders Code of Conduct and Contractor Activities.
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document about the economic and social benefits of the infrastructure projects. The project will not only enhance the economic growth of the region but also improve the quality of life for the residents. The construction of the new road will reduce the travel time and increase the connectivity of the area, leading to increased trade and investment opportunities. The project will also create jobs and stimulate the local economy. The benefits of the project will be shared by all stakeholders, including the government, private sector, and local communities. The project is expected to be completed within the specified timeframe and within budget. The implementation of the project will be monitored and reviewed regularly to ensure its successful completion.
to warrant compliance with the under mentioned aspects of the code of conduct but that the developer will, at all times, use its best endeavours to ensure compliance.

The code of conduct will cover, inter-alia, the following:

- The days and times of the day during which construction may take place
- Receipt and storage of building materials
- Rubbish disposal
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- General behaviour of staff
- Contractor’s boards
- Fencing and screening of construction sites
- Protection of existing infrastructure
- Damage repair
- Environmental control
- Penalties for breach of rules
- Monitoring of construction activities in accordance with approved building plans
- Such matters as the developer deems to be in the interest of the general body of owners and residents of the estate
Non-Eco-Estate B

ARCHITECTURAL DESIGN AND BUILDING RULES
AND
BUILDING CONTRACTOR RULES

2014

For Office use:

Stand:

Owner:

Contractor:
<table>
<thead>
<tr>
<th>Condition</th>
<th>Control</th>
<th>Interpretation and Security</th>
<th>Security</th>
<th>Interpretation</th>
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The information and controls mentioned above are critical in ensuring the confidentiality, integrity, and availability of the organization's data. Any breach or deviation from these controls can lead to significant security incidents. Therefore, it is imperative to have a comprehensive and structured approach to safeguard against such threats.

The implementation of these controls and guidelines is essential for maintaining the organization's compliance with regulatory requirements and ensuring the protection of sensitive information. Regular audits and evaluations are recommended to assess the effectiveness of these controls and make necessary adjustments as required.
2.3.1. STREET BOUNDARY

2.3.1.1. Definitions

2.3.1.2. Establishment of Street Boundaries

All property owners are subject to the regulations contained in this code. The street boundaries are established by the city council. The city council may establish street boundaries as part of a development project. Boundaries established by the city council must be in accordance with the requirements of this code.

2.3.1.3. Maintenance

The city council is responsible for maintaining the street boundaries. The city council may contract with private companies to maintain the street boundaries. The city council may also require owners of property to maintain their own street boundaries.

2.3.1.4. Enforcement

The city council may enforce this code regarding street boundaries. If a property owner violates this code, the city council may take action to remedy the violation. The city council may require the property owner to put the street boundary in compliance with the code.

2.3.1.5. Appeals

If a property owner is unhappy with a decision of the city council regarding a street boundary, the property owner may appeal to the city council. The city council may reverse, modify, or affirm the decision of the city council.

2.3.1.6. Future Boundaries

Future street boundaries may be established by the city council. The city council may establish street boundaries as part of future development projects. Boundaries established by the city council must be in accordance with the requirements of this code.
6. CONGRATULATIONS

Any vehicle purchased by this Company is equipped with the Compressor, as required by this company. The Compressor is designed to provide the highest level of performance and efficiency. The Compressor is also designed to meet the following specifications:

- **Type:** Single-stage
- **Capacity:** 50 HP
- **Efficiency:** 95%
ensure compliance by any sub-contractors employed by the Contractor, and any suppliers to either contractors, sub-contractors or owners.

It is hereby placed on record that should the owners, the contractors or any sub-contractors fail to comply with the terms and conditions of this document, the owner as the responsible party would be in breach of agreement, and should the owner fail to remedy such breach within 7 (seven) days from date of delivery of a notice by the Home owners Association to this effect, the Home owners association will have the right inter alia:

8.1. Apply for an interdict on an urgent basis to prohibit any further building works on the premises and/or to rectify any transgressions, the costs thereof will be borne by the owner.

8.2. Will be entitled in addition to clause 9.2.1, to calculate any damages that the Home owners Association has suffered on account of the breach of contract by the owner and be entitled to without derogating from any other remedies available to the Home owners association in Law, institute a claim for damages suffered as a result of such breach of contract, which costs will also be borne by the owner.

8.3. Will be entitled in addition to clause 9.2.1 and/or 9.2.2 to, in terms of clause 27.2.3 of the Articles of association, impose a system of fines and other penalties as resolved by the Home owners Association from time to time.

8.4. Will be entitled in addition to clause 9.2.1 and/or 9.2.2 and/or 9.2.3 to perform the work and/or services which is required to be done or provided, or to rectify the breach, at the expense of the member and shall be entitled to recover all expenditure in connection thereof from the member, together with interest calculated thereon at prime bank rates, for the period date of expenditure to date of payment.

8.5. These options will not limit any other remedies that the Home Owners Association and/or the Developer may have in law.

Owner's Name ______________________________ Signature ______________________________

Date Signed ______________________________ Witness's Signature ______________________________

Stand Number ______________________________

Contact Numbers:

Tel: (Work)_____________________________ Tel: (Home)_____________________________

Fax. No_____________________________ Cell No_____________________________

E-Mail_____________________________
Non-Eco-Estate E

The Rules

as approved at a Constitutional General Meeting held on 23 November 2009
(including the Rules pertaining to enrolment of Trusted Individuals)
& as amended at a Constitutional General Meeting held on 18 November 2013
& as amended by the Board of Directors at a meeting held on 23 September 2014
& as amended by the Board of Directors and published on 13 August 2015
Application must be made to the Association for the erection of dollhouses which must be adequately screened and may not be visible from any street, golf course and/or the nature reserve area. Such dollhouses may be used solely for the purposes of a dollhouse. Dollhouses must be painted (including the roof of the dollhouse).

SPECIAL DESIGN CRITERIA FOR GOLF COURSE UNITS

When designing homes take note that building lines on the golf course frontage vary from 5 metres to 20 metres, depending on the title deed and township establishment conditions of the specific Unit.

All building lines are 10 metres except for those stands west of the 8" and 18" holes. Units west of the 18th hole are subject to a 17 metre building line of which the first 7 metres is in favour of the golf course. Units west of the 8th hole are subject to a 15 metre building line of which the first 5 metres is in favour of the golf course. These 7 metre and 5 metre areas may only be used for golf course purposes, and may not be used for any boundary walls, structures or private gardens.

Special aesthetic and design laws are applicable to all golf course Units. All homes and gardens shall be evaluated according to the Rules, and no deviation from the approved building plans shall be allowed without the prior approval of the Association and the golf course owner.

Golf ball safety nets are not permitted.

Only grass and indigenous trees shall be planted in the golf course frontage servitude. No existing trees may be removed from this area. Landscape plans for this area must be submitted to the Association for approval.

No swimming pools shall be permitted, between the Unit boundary and the appropriate building lines nor within the service servitude areas of the local authority, without approval from the Association and local authority. Members are responsible for safety precautions pertaining to swimming pools. Any screening of the swimming pool must be aesthetically pleasing.

Members are requested to preferably refrain from building boundary walls in order to preserve, blend with, complement and enhance an open front with the golf course and surrounding Units.

If a Member wishes to build a boundary wall facing the golf course, only approved palisade or similar boundary walls and/or fencing shall be allowed on the demarcated Unit boundary or building line. The specifications in regard to such boundary walls are as follows:

the maximum total height of the palisade or similar fencing shall be 1.2 metres high. The maximum height of columns is not to exceed 1.5 metres.

the maximum height of the bottom section (solid wall) shall be 500 millimetres.

The position and design of boundary walls shall be determined in consultation with the Association. It is preferable that boundary walls facing the golf course should not create a continuous linear boundary between the Units and golf course.

Side boundary walls shall only be built up to the demarcated golf course building lines applicable to each Unit. Such walls shall be stepped and the last 5 metres up to the golf course building line shall be a maximum of 1.2 metres high for palisade wall fencing or similar with the columns maximum height not exceeding 1.5 metres high.

Regular maintenance and repair of such walls is paramount since this is another frontage area of the Unit.
Rules and Regulations
Architectural Guidelines

The purpose of these guidelines is to encourage individual creativity while fostering a unity of material and finishes, to ensure that the overall development be in unison to create a balance and compatible life style for all residents.

The construction and improvements should commence within two years from the date of registration of transfer of ownership. In order to reduce inconvenience to neighbours as well as unsightliness, construction should proceed without lengthy interruptions and should be completed within 12 months from the date of commencement. Phased design should be handled in such a way that the end of each phase should be aesthetically acceptable to the Home Owners’ Association (HOA).

The design of dwelling and the entire stand should show sensitivity to the existing natural features, flora and topography. Permission is to be obtained from the estate manager before any existing trees are removed. All existing trees are to be shown on the site plan submitted with the building plans. Surrounding structures must be taken into account and any buildings on adjacent erven are to be indicated on the site plan.

ELEVATION TREATMENT OF ALL BUILDINGS MUST CONFORM TO GOOD ARCHITECTURE SO AS NOT TO INTERFERE WITH OR DETRACT FROM THE GENERAL APPEARANCE OF THE NEIGHBOURHOOD AND BE TO THE SATISFACTION OF THE H.O.A.

1 TOWNPLANNING CONTROLS

1.1 RESIDENTIAL ERVEN

   Single storey dwellings 50 percent maximum
   Double storey dwellings 80 percent of the area of the
   ground floor plan. Group housing in accordance with
   council regulations

   A schedule of areas is to be provided on the plans submitted for
   approval with the coverage expressed as a percentage of the site area.

1.2 BUILDING LINES (for residential and group housing)

   The following building lines shall apply:

   Street boundary   5.00 meters single storey
                     8.00 meters double storey
   Side boundaries   3.00 meters single storey
5.3 Unpainted reflective steel sheeting. Whether to roofs, gutters, down pipes or any other components of the external finishes.

5.4 Wood panel fencing.

5.5 Razor wire, security spikes or similar features (The Association deems, under the definition of “similar features”, that electric fencing is a prohibited material).

5.6 Galvanised garage doors.

5.7 Institute cast concrete panels with a brick or any other pattern imprinted into the surface thereof will not be permitted.

6  CONSTRUCTION ACTIVITIES

As the building within the residential estate will be constructed over a considerable time period, the following guidelines have been formulated for the benefit of residents.

6.1 All building materials are to be stored within the site boundary, no material is to be off-loaded onto the road or road reserve.

6.2 No advertising or sub-contractors boards will be permitted. Only the approved contractors’ professional board will be permitted (see Pro-Forma).

6.3 No workmen will be permitted on site between the hours of 16h30 and 07h00.

6.4 All contractors will be required to provide screened ablution facilities for the workmen and sub-contractors under his control.

6.5 Construction hours are restricted to 07h00 and 16h00 Monday to Friday and 7h00 to 13h00 on Saturdays. No construction activity is to take place on Sundays and Public Holidays. No building activities are allowed during the “builder’s holiday” (the period when builders cease building activities over the December school holiday). The Association’s will define the estate’s “builder’s holiday” each year as per industry norm.

6.6 Delivery routes and hours may be defined from time to time by the HOA and all contractors are to obtain these restrictions from the Estate Manager.

6.7 Fines may be levied from time to time by the HOA for contractors and delivery vehicles who spill material enroot, damage roadways and kerbs, stain tarmac and generally create a nuisance within the estate.

6.8 Contractors Rules and Regulations to be obtained from the Estate Manager.
HOME OWNERS ASSOCIATION

RULES AND REGULATIONS
ENIRONMENTAL MANAGEMENT

"The degree of environmental care exercised by a community says much for the level of culture and refinement attained by the said community". (Anon)

1. No rubble or refuse may be dumped or discarded in any public area, including parks, streets, sidewalks, lakes, dams, or vacant stands.
2. Residents and their guests are urged to leave any open space they visit in a cleaner condition than that in which it was found. Residents should also develop the habit of picking up and disposing of any litter encountered in the open spaces.
3. Picnicking is only permitted on specified places.
4. Flora may not be damaged or removed from any public area.
5. Fauna of any nature may not be chased, trapped or harmed in any way, in any area of the Estate.
6. Residents shall maintain trees, plants and shrubs, planted on their pavements by the Developer.
7. Residents shall maintain a high standard of frontage garden and pavement maintenance.
8. Residents should ensure that declared noxious flora are not planted or allowed to grow in their gardens.
9. Vacant stands must be kept clean on a regular basis to the satisfaction of the HOA, failing which, the HOA reserves the right to clean the stand at the owner’s expense.
10. The resident’s use of any open space areas is entirely at their own risk at all times. The HOA will entertain no claims for damages of whatsoever nature or from whatsoever cause arising.
11. No swimming, playing, boating or fishing in the dams, rivers or fountains is allowed, nor are dogs permitted to swim therein.
12. Garden encroachment onto the pavement is not permitted.
13. Floodlights must be adequately screened so as not to cause discomfort to neighbours.
14. Dogs are to be exercised on a leash only and are to be restricted to streets and walkways. (See also requirements relating to pets).
ARCHITECTURAL RULES & BUILDING DEADLINES

The Architectural Design Guidelines, received separately from the Developer, shall be deemed to be incorporated in and to form part of these rules.

It is the registered owner’s responsibility to be in the possession of the latest issue of these rules and to ensure that a copy is issued to the designing architect or builder to avoid any disagreement between all parties.

1. The purpose of these design guidelines is to encourage individual creativity within a unity of materials and finishes ensuring that the overall development harmonizes and creates a balanced lifestyle for all residents.

2. It is the aim of the professional team that the lifestyle reflected would represent that of the different South African cultural and regional backgrounds. This will start with the Western Cape architecture, then the Victorian/Colonial style of the Eastern Cape and KwaZulu-Natal, and finally with the Highveld/Old Transvaal Farm Style. To achieve this, architectural guidelines have been drawn up as far as the use of materials, the treatment of boundaries and the landscaping is concerned.

3. For the rest it is up to the individual architect to contribute to the successful execution of the developers aim and the supervising architects will also assist in attaining this goal.

4. The construction and improvements must commence within 2 years from the date of the first registration of transfer of ownership. This ruling will come into effect as from the 1st January 2004. Thus any person/company that bought prior to the said date will have 2 years form 1st January 2004, i.e. in case of a re-sale this date does not get extended.

5. In order to reduce inconvenience to neighbours as well as unsightliness, construction must proceed without lengthy interruptions and handled in such a way that the end of each phase should be aesthetically acceptable to the Home Owners Association. Once building work has commenced, it must be completed within 12 months.

6. Failing to start with construction within the mentioned two (2) years, penalties will be introduced by doubling up the monthly levies every six months until construction is completed.

7. The design of the dwelling, unit and the entire stand must show sensitivity to the existing natural features, flora and topography. Permission must be obtained from the HOA before existing trees are removed and all existing trees are to be shown on the site plan. Surrounding structures and houses must be taken into account in the design process. The newly planted trees on the sidewalks must be kept in mind as they are not to be removed.

8. The controlling authority for the development is the Architectural Esthetical Sub-Committee, who will be responsible for the approval of all plans and
PLAN

1. The action plan for the establishment of the
   implementation

2. To specify the roles and responsibilities of the
   stakeholders involved in the project

3. To identify the resources required for the
   implementation

4. To set the timelines and milestones for the
   implementation

5. To allocate the budget for the implementation

GENERAL RULES

6. The general rules for the implementation

7. The rules for the communication of the
   stakeholders involved in the project

8. The rules for the coordination of the
   stakeholders involved in the project

9. The rules for the monitoring and evaluation of
   the implementation

ARCHITECTURAL REQUIREMENTS

10. The architectural requirements for the
    implementation

11. The technical specifications for the
    implementation

12. The requirements for the training and
    support of the stakeholders involved in the
    project