

# SUSTAINABLE URBAN DEVELOPMENT

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## THE NEED FOR A SOUTH AFRICAN RATING TOOL FOR SUSTAINABLE PRECINCT DEVELOPMENTS

by

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## ABSTRACT

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Globally, urban sustainability is shifting its focus from individual buildings to sustainability at precinct, neighbourhood and community levels. This dissertation aims to determine whether the South African urban development industry has a need for the introduction and incorporation of a precinct level urban sustainability rating tool. This dissertation employs a literature review and single case study approach to define precinct level urban sustainability, to explore existing sustainability initiatives and to investigate the expected impacts of a South African precinct level urban sustainability rating tool.

The research finds that while there has been interest in precinct level sustainability from the private sector and some leading municipalities, precinct level sustainability runs the risk of becoming nothing more than a political catch-phrase and of becoming stuck in an ongoing cycle of planning, especially from a national regulatory point of view. It is expected that the introduction of a South African precinct level sustainability rating tool will mitigate this situation by providing motivation for the adoption of, and a clear guideline for the physical implementation of, wider sustainability principles and objectives.

# CONTENTS

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	page
PLAGIARISM DECLARATION	i
ETHICS APPROVAL	ii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
CONTENTS	vi
LIST OF IMAGES	xii
LIST OF TABLES	xiv
LIST OF ABBREVIATIONS	xv
CHAPTER ONE: INTRODUCTION	
1.1 Background	1
1.2 Research Problem Area	3
1.3 Research Question	4
1.4 Research Aim	4
1.5 Research Proposition	4
1.6 Research Objectives	5
1.7 Research Methodology	5
1.8 Limitations to Research	6
1.9 Layout of Dissertation	7
CHAPTER TWO: LITERATURE REVIEW	
2.1 Introduction to the Literature Review	8
2.2 The Call for Sustainable Urban Development	8
2.3 Sustainable Urban Development	10
2.3.1 Defining Sustainability and Sustainable Urban Development	10
2.3.2 The Basic Principles of Sustainable Urban Development	12
2.3.3 Green Infrastructure in Sustainable Urban Development	15
	vi

2.4	The Regulation of Sustainable Urban Development	19
2.4.1	The Importance of the Measurement and Recognition of Sustainable Urban Development	19
2.4.2	The Green Building Council Model	20
2.4.3	The World Green Building Council	22
2.5	Sustainable Urban Development in South Africa	24
2.5.1	Motivations for the Adoption of Sustainable Urban Development Principles in South Africa	25
2.5.2	The Green Building Council of South Africa	28
2.5.3	The Green Star South Africa Sustainable Urban Development Rating System	29
2.5.3.1	The Green Star South Africa Certification Process	33
2.5.3.2	Current Green Star South Africa Rating Tools	35
2.5.4	The Uptake of the Green Star South Africa Rating Tools	37
2.6	Sustainable Urban Development at the Precinct Level	39
2.6.1	The Focus Shift in Sustainable Urban Development	39
2.6.2	Defining Precinct or City Scale Urban Sustainability in South Africa	41
2.6.3	Defining Urban Precincts in South Africa	46
2.7	The Way Forward for the Green Star South Africa Rating System	52
2.7.1	The Introduction of the Socio-Economic Category	52
2.7.2	The Next Step: A South African Precinct Level Rating Tool	54
2.8	Existing International Precinct Level Sustainable Urban Development Rating Tools	55
2.8.1	The Australian Green Star Communities Rating Tool	56
2.8.2	The Leadership in Energy and Environmental Design – Neighbourhood Development Rating Tool	61
2.8.3	The Uptake of the Green Star Communities and LEED – Neighbourhood Development Rating Tools	65
2.8.4	Other Significant International Precinct Level Sustainability Rating Tools	67
2.8.4.1	The Building Research Establishment Environmental Assessment Method – Communities Rating Tool	67
2.8.4.2	The German Sustainable Buildings Council’s Urban Districts Rating Tool	68

2.8.4.3	The Comprehensive Assessment System for Built Environment Efficiency – Cities Rating Tool	68
2.8.4.4	The Pearl Community Rating System	69
2.8.5	The Suitability of Existing International Precinct Level Rating Tools to the South African Context	70
2.9	Conclusion of the Literature Review	70

### CHAPTER THREE: RESEARCH METHODOLOGY

3.1	Introduction to the Research Methodology	72
3.2	Philosophical Approaches to Research	72
3.3	Selected Research Methodologies	74
3.3.1	Qualitative Research	74
3.3.2	Case Studies	75
3.4	Revisiting the Research Question to Justify the Qualitative / Case Study Research Approach	76
3.4.1	Justification for the Implementation of a Single Case Study	77
3.5	Selection of a Case Study	78
3.6	Data Collection	79
3.6.1	Interviews	80
3.6.2	Photographic and Documentary Evidence	82
3.7	Data Analysis	83
3.8	Ethical Issues in Research	84
3.9	Limitations to this Research	86
3.10	Conclusion of the Research Methodology	87

### CHAPTER FOUR: CASE STUDY

4.1	Introduction to the Case Study	88
4.2	Defining the Century City Urban Development Precinct	89
4.3	A Brief History of Century City	91
4.4	The Regulation of the Century City Urban Development Precinct	95
4.4.1	The Basket of Mixed Use Rights	95
4.4.2	Environmental Management	97

4.4.3	The Century City Property Owners' Association	101
4.4.4	The Urban Design Framework	104
4.5	Sustainability in Century City	107
4.5.1	Sustainability Initiatives Currently in place in Century City	109
4.5.1.1	Intaka Island	110
4.5.1.2	Community Facilities	112
4.5.1.3	Public Transport and Pedestrian Facilities	114
4.5.1.4	Stormwater Management and Water Conservation	118
4.5.1.5	Community Outreach	120
4.5.1.6	Century City's Green Star South Africa ratings	121
4.5.2	Motivations for Adopting Sustainable Urban Development Principles in Century City	124
4.6	The Value of Precinct Level Urban Sustainability	126
4.7	The South African Urban Development Industry's Expansion to Larger Scales and the Expected Impact of a Precinct Level Sustainability Rating Tool	129
4.8	Century City's Sustainability Initiatives Compared to the Sustainable Urban Development Literature	133
4.8.1	Century City's Sustainability Initiatives Compared to the Twelve Basic Principles of Sustainable Urban Development	133
4.8.1.1	Air Pollution and CO <sub>2</sub> Emission	133
4.8.1.2	Water	134
4.8.1.3	Energy	134
4.8.1.4	Sanitation	134
4.8.1.5	Solid Waste	135
4.8.1.6	Land and Space	135
4.8.1.7	Building Materials and Design	135
4.8.1.8	Transport	136
4.8.1.9	Health	136
4.8.1.10	Food	137
4.8.1.11	Biodiversity and Recreational Space	137
4.8.1.12	Child-centred Development and Learning	138
4.8.2	Century City's Sustainability Initiatives Compared to Adriana Allen's Five Dimensioned Approach to Sustainability	138

4.8.2.1	Ecological Sustainability	139
4.8.2.2	Economic Sustainability	139
4.8.2.3	Physical Sustainability	139
4.8.2.4	Political Sustainability	140
4.8.2.5	Social Sustainability	140
4.8.3	Century City's Sustainability Initiatives in the Context of the Australian Green Star Communities Rating Requirements	141
4.9	Conclusion of the Case Study	153

#### CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1	Introduction	154
5.2	Revisiting the Research Question and Research Objectives	154
5.3	Concluding the Research	155
5.3.1	Meeting the Research Objectives	155
5.3.2	Answering the Research Question	157
5.3.3	The Green Star South Africa Communities Pilot Programme	158
5.4	Recommendations for Further Research	161

REFERENCES		162
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APPENDICES		175
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APPENDIX A:	Full Lists of Current and Potential Future World Green Building Council Members	176
APPENDIX B:	The Green Building Council of South Africa's Green Star SA Certification Process	187
APPENDIX C:	Green Star South Africa Certified Projects	191
APPENDIX D:	Australian Green Star Communities National Framework Checklist	201
APPENDIX E:	Australian Green Star Communities Pilot Certification Process	208
APPENDIX F:	LEED-ND Sustainable Neighbourhood Development Checklist	211
APPENDIX G:	LEED-ND Certification Process	225
APPENDIX H:	Green Star Communities and LEED – ND Certified Projects	226
APPENDIX I:	Baseline Interview Outline	237

APPENDIX J:	Typical Interview Consent Form	239
APPENDIX K:	CCPOA and Rabie Property Group Interview: Signed Consent Forms and Transcript	240
APPENDIX L:	Randomly Selected Interview Transcript	252

## LIST OF IMAGES

---

	page
CHAPTER ONE: INTRODUCTION	
No Images.	
CHAPTER TWO: LITERATURE REVIEW	
IMAGE 2.1: Overview of the Green Star SA certification process	33
IMAGE 2.2: Structure of the Green Star SA rating system	34
IMAGE 2.3: Green Star South Africa certified projects by year certified	37
IMAGE 2.4: Green Star South Africa certified projects by level of certification achieved	38
IMAGE 2.5: Green Star South Africa certified projects by type of certification	38
IMAGE 2.6: Green Star South Africa certified projects by location	39
IMAGE 2.7: Adriana Allen’s five dimensions of urban sustainability	45
IMAGE 2.8: The key elements for profiling an urban precinct	47
CHAPTER THREE: RESEARCH METHODOLOGY	
No Images.	
CHAPTER FOUR: CASE STUDY	
IMAGE 4.1: Century City Precinct Plan	90
IMAGE 4.2: Century City relative to Cape Town CBD	91
IMAGE 4.3: Aerial photographs depicting the development of the Century City urban precinct – 1990’s to 2015	94
IMAGE 4.4: The structure of the Century City Property Owners’ Association Management Team	102
IMAGE 4.5: The Century City Urban Design Framework Philosophy	104
IMAGE 4.6: Intaka Island, conserved from the historic “Sewe Pannetjies” wetland zone, and the Environmental Education Centre	111
IMAGE 4.7: Century City’s Public Transport and Pedestrian Map	117

Melissa Potgieter

IMAGE 4.8: The Aurecon Building in Century City, South Africa's first Green Star South Africa five Star rated building 122

IMAGE 4.9: An architect's rendering of the Century City Urban Square development in the Bridgeways precinct of Century City 124

#### CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

No Images.

## LIST OF TABLES

---

	page
CHAPTER ONE: INTRODUCTION	
No Tables.	
CHAPTER TWO: LITERATURE REVIEW	
TABLE 2.1: Green Star SA rating tool scores	34
TABLE 2.2: Considerations for determining the stakeholder profile of an urban precinct	49
TABLE 2.3: Defining ranges of South African urban precincts	51
TABLE 2.4: Australian Green Star Communities ratings	60
TABLE 2.5: Leadership in Energy and Environmental Design – Neighbourhood Development ratings	65
CHAPTER THREE: RESEARCH METHODOLOGY	
TABLE 3.1: Interview participant profile and anonymity codes	86
CHAPTER FOUR: CASE STUDY	
TABLE 4.1: Bulk areas available for development within the Century City urban precinct per mixed use zoning	96
TABLE 4.2: The Green Star Australia Communities National Framework Checklist of the Century City urban precinct	143
CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS	
No Tables.	

## LIST OF ABBREVIATIONS

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BREEAM	Building Research Establishment Environmental Assessment Method
CASBEE	Comprehensive Assessment System for Built Environment Efficiency
CBD	Central Business District
CID	City Improvement District
CO <sub>2</sub>	Carbon Dioxide
DGNB	Deutsche Gesellschaft Für Nachhaltiges Bauen (German Sustainable Building Council)
GBCA	Green Building Council of Australia
GBCSA	Green Building Council of South Africa
GSSA	Green Star South Africa
JSBC	Japan Sustainable Building Consortium
LEED	Leadership in Energy and Environmental Design
LEED-ND	Leadership in Energy and Environmental Design – Neighbourhood Development
PCRS	Pearl Community Rating System
SA	South Africa
SANS	South African National Standards
USGBC	United States Green Building Council
WorldGBC	World Green Building Council

## Chapter One: INTRODUCTION

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### 1.1 BACKGROUND

There is a finite quantity of energy and matter on Earth, and what is consumed is taken from this closed system and eventually returns to the system in one form or another. These flows of matter from the environment and back into it support all life and ecosystems on the planet (GSA Office of Governmentwide Policy, 2009). The carrying capacity of an environment is the maximum population size of any and all biological species that the environment can sustain indefinitely, given the availability in the environment of food, water, habitat and other necessary resources that the various species rely on in order to survive and develop (Green Building Council of South Africa (8), 2015). The maximal load that the global population has forced the planet Earth to cater for has far exceeded the carrying capacity of the Earth's environment, with human resource consumption and pollution taking place at a rate that is approximately forty percent higher than that which the Earth is capable of renewing or absorbing (BioRegional on behalf of Whitehill Bordon Eco Town, 2011).

The world's current industrial economic system was conceived and initiated in an era when the scale and efficiency of human activity was small compared to the seemingly limitless bounty of the natural environment. While the countless decisions resulting from this open view of the world may have improved many lives, they have resulted in an increasingly negative impact on nature and human well-being as the inequality and inadequacy of the economic system surpasses the planet Earth's natural limits (GSA Office of Governmentwide Policy, 2009). This unsustainable lifestyle of the world's population is placing significant pressure on the planet's natural systems, cycles and ecological services, causing unwelcome and irreversible consequences (BioRegional on behalf of Whitehill Bordon Eco Town, 2011). The active restoration, protection and maintenance of the Earth's natural systems, services and resources has become an unavoidable necessity to conserve and sustain the finite and

rapidly diminishing global energy supply (GSA Office of Governmentwide Policy, 2009). It has come to the point where sustainable steps must continuously be taken to minimise negative impacts on global climates and to ultimately have a positive impact on the environment (Green Building Council of South Africa (8), 2015).

Across the globe, governments, businesses and neighbourhoods are responding to climate change and the over-consumption of natural resources (BioRegional on behalf of Whitehill Bordon Eco Town, 2011). The international built environment is responsible for forty percent of global solid waste generation, twelve percent of global fresh water consumption and forty percent of global end-use energy consumption. Hence, given this large global impact of the built environment, it is the appropriate place to implement far reaching positive change (Green Building Council of South Africa (8), 2015).

The predominant result of many of the responsive and pro-active approaches to counteract environmental degradation has been the creation of the global terminology 'urban sustainability', which refers to the improvement of social and economic conditions of an increasingly urbanised population while preserving life systems and maintaining environmental quality (Kruger, n.d.). An increasingly important facet of urban sustainability has been raised in the works of Argentinean scholar Adriana Allan which calls for the recognition and inclusion of a fundamental political dimension to all aspects of urban sustainability (Allen, 2009). There should be a political underpinning of any processes which aim to formulate sustainable development policies and programmes, which would then allow for locally specific agendas and solutions. Allen usefully differentiates between five aspects of sustainability – economic, social, ecological, physical and political – of which political sustainability refers to the quality and local context of governance systems guiding the relationships between and actions of the different actors among the other four aspects of sustainability (Pieterse, 2010).

The focus on urban and environmental sustainability and energy efficiency has generated a growing sensitivity within the general public and the professions of the property development industry. As priorities shift, opportunities to design new building types, precincts and communities that follow good urban practices of employing appropriate scale,

civic responsiveness, climatic responsiveness and attributes in common with local patterns is an emerging new chapter in the growth of cities and towns (Urban Design Associates, 2013). Urban sustainability on a precinct or larger scale builds on the values of smart growth, new urbanism and green buildings, and, if successful, it will vastly reduce or even eliminate environmental harm and will improve upon the current quality of life. The creation, support and management of environmentally-sound precincts and communities that are well designed for a high quality of life is the path to sustainable global lifestyles (Farr, 2008). Sustainable urban developments are energy efficient, resource efficient and environmentally responsible; they are healthy and productive, socially responsible and economically robust environments for people (Green Building Council of South Africa (9), 2015).

## 1.2 RESEARCH PROBLEM AREA

The world is entering a new age of green and sustainable design that explores the development of sustainable precincts and larger urban areas, moving outside of the current urban development comfort zone which focuses on designing and constructing environmentally-sound buildings. This move necessitates the ongoing collaboration of a wide range of organisations and competencies to address socio-economic issues and the liveability of the environment outside of green buildings (Aurecon SA (Pty) Ltd, 2014). Further to the above, a major challenge faced in sustainable urban development is how to catalyse, increase and accelerate the transformation and the physical implementation of sustainable urban development to reach global sustainability objectives (McCormick, Anderberg, Coenen & Neij, 2013).

The Green Building Council of South Africa has a well-established system for rating green buildings, but little is known about what the South African urban development leaders and industries are doing towards creating and encouraging sustainable urban development on a precinct or larger urban scale. In South Africa, the concept of sustainable precincts is still evolving and very much undefined and arguments have also been made that sustainable development efforts in South Africa have been predominantly focused on planning and

strategising activities while there are difficulties in the physical implementation and follow-through of these plans and strategies.

### 1.3 RESEARCH QUESTION

The research question posed for the purposes of this dissertation is as follows:

Is there a need for the introduction and incorporation of a precinct level sustainability rating tool in South Africa?

### 1.4 RESEARCH AIM

The proposed aim of this dissertation is to establish whether the South African urban development industry has a need for the introduction and incorporation of sustainable precinct development principles, policies and initiatives.

This dissertation will investigate the current state of the South African sustainable urban development industry and will attempt to determine what the driving forces are behind current sustainable urban development movements in South Africa. The research will explore the definitions of sustainability and sustainable urban development and will look in to the latest international sustainable urban development activities and standards. The research will also touch on the main difficulties faced by the South African urban development industry in attempts to achieve sustainability and will explore possible and/or probable ways forward for the industry.

### 1.5 RESEARCH PROPOSITION

The initial premise of this dissertation is to demonstrate that the introduction of a South African sustainable precinct rating tool will encourage the South African urban development industries and role players to incorporate and implement sustainable urban development

principles, policies and initiatives on precinct or larger scales outside of single green buildings.

## 1.6 RESEARCH OBJECTIVES

Embedded in the research question and aim of this dissertation are the following research objectives:

- Defining sustainability.
- Defining sustainable urban development on a precinct or larger scale.
- Establishing the importance of sustainable urban development.
- Establishing the importance of sustainability rating systems and tools.
- Investigating the current South African sustainable urban development environment.
- Investigating the main drivers currently motivating South African urban development industries and role players to adopt sustainable urban development values in precinct or community level projects.

## 1.7 RESEARCH METHODOLOGY

The research aim and objectives of this dissertation as described above will be achieved by adopting the following research method:

1. A literature review. This literature review will include a review of local and international literature on sustainability and sustainable urban development, a

review of sustainable urban development in the current South African context, as well as a review of existing local and international standards, procedures and benchmarks for sustainable precincts, neighbourhoods and communities and sustainable urban development rating tools.

2. A single case study of an urban development precinct. The data collection methods to be followed for this case study are semi-structured interviews with key stakeholders in the urban development precinct, the gathering of documentary evidence on the precinct and the collection of photographic material of the precinct.
3. The collected information from both the literature review and the case study will be analysed in order to determine whether the introduction of a South African sustainable precinct development rating tool will increase the South African industries' and role players' participation in sustainable development activities outside of single green buildings on precinct or larger scale projects.
4. Based on the analysis of the information collected as outlined above, discussions will be held, conclusions will be drawn and recommendations will be made with regards to whether the current South African urban development industry has a need for the introduction of a precinct level sustainable development rating tool.

## 1.8 LIMITATIONS TO RESEARCH

The following limitations apply to this research dissertation:

- A single case study is being undertaken and the results and conclusion will therefore be case specific.
- A specific precinct is being studied which limits the diversity and generalisability of the possible outcomes.

## 1.9 LAYOUT OF DISSERTATION

The dissertation is laid out in accordance with the research methodology as described above.

Chapter Two covers the literature review. It includes theoretical framework literature covering the definitions of sustainability and sustainable urban developments, the basic principles of global sustainable urban development movements and international sustainable urban development rating tools. It also includes contextual framework literature covering urban sustainability movements and rating tools in South Africa.

Chapter Three will define the research methodology that was used in this research. It includes a discussion of the philosophical approach used in the research, the explanation and justification of the methodological approach used, and assessments of the ethical issues and the limitations associated with the study.

Chapter Four documents the case study. It provides an overview of the urban development precinct chosen as the case, as well as the presentation and discussion of the research findings as per the data collection methods outlined above.

Chapter Five, the final chapter of this dissertation, brings together and discusses all of the information set forth in the preceding chapters. It includes critical reflections on the findings both in terms of the literature and in terms of the case study, as well as a reflection on the achievement of the research objectives as outlined above. This chapter also contains the answer to the research question regarding whether the current South African urban development industry has a need for the introduction of a precinct level sustainable development rating tool.

## Chapter Two: LITERATURE REVIEW

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### 2.1 INTRODUCTION TO THE LITERATURE REVIEW

The following chapter will build on the concepts raised in Chapter One. Through the investigation of existing literature, this chapter probes the issues raised in the Research Aim and Objectives in an attempt to adequately answer the Research Question.

This chapter begins by clarifying the need for and the origin of the concept of sustainable development, followed by the definitions of sustainability and sustainable urban development. The chapter then goes on to explore the basic principles of sustainable urban development and the use of green infrastructure in such developments.

The chapter then moves to the regulation of sustainable urban development through Green Building Councils and the current state of sustainable urban development in South Africa, including South Africa's Green Building Council and existing rating tool system.

Finally, the importance of the scale of sustainable urban development activities is examined, including potential ways forward for South Africa's industries and the precedent setting international precinct level sustainability rating systems.

### 2.2 THE CALL FOR SUSTAINABLE URBAN DEVELOPMENT

The world's cities are globally seen as the realm where natural, social and economic environments are most tightly intertwined into complex systems. The impacts of these urbanised areas, such as cities and precincts, on the environment are generally vast, and are evident far outside their urban dimensions (Malan, 2008). Global urbanisation is growing at unprecedented rates and with that, the pressures on cities' infrastructure systems and their internal and surrounding natural environments are also growing. More than half of the

world's population lives in cities, and it is estimated that by 2025 more than eighty percent of the population of developed countries and more than sixty percent of that of developing countries will be urbanised (Malan, 2008).

In the face of this global urbanisation and advancing climate change, it is becoming clear that cities, precincts and urban areas can no longer be built the way they used to be (Perinotto, 2014). There is a global recognition that the achievement of modernity in the developed world was made possible by the establishment of economic and development systems that are heavily dependent on the world's rapidly diminishing natural resources, such as water, energy, food, land and building materials. These systems are also greatly dependent on waste disposal into the world's natural systems, such as landfills, seas, rivers, dams, wetlands, forests and the air itself, at a rate that is greater than these natural systems' waste absorption capacities. It has inevitably been agreed that if nothing is done about these destructive processes modernity would come to an end, with the only debate being how long it would take for this end of modernity to come about (Swilling, 2005).

This recognition was the key point of departure for ecological postmodernism, which postulates that if the developing world, made up of developing countries such as South Africa, did not exist, the simple solution would be to stop population growth and development altogether leading to steady state economies across the world (Swilling, 2005). In these economies population levels and the levels of consumption of energy and materials are stable or fluctuate only mildly (CASSE, 2010). The problem with this notion is that developing countries do, in fact, exist, and, despite the critique of developmentalism by the developmental postmodernists and the liberal ecologists, population growth, development to eradicate poverty and urbanisation in the developing world is unavoidable (Swilling, 2005). The main challenge that is brought to the fore by the above is how developing countries like South Africa can achieve the economic and development status of a developed country without relying on the destructive and natural resource exhaustive development path of the developed world (Swilling, 2005).

It has become necessary to reconcile the developing world's need for developmentalism with an environmentally conscious, limits-to-growth mentality through redefining

development as a process that must take place in such a way that it does not lead to the replication of the environmentally unsustainable economic systems that had evolved in the developed world. The result was the combination of sustainability and development and the invention of the concept of sustainable development (Swilling, 2005).

## 2.3 SUSTAINABLE URBAN DEVELOPMENT

### 2.3.1 DEFINING SUSTAINABILITY AND SUSTAINABLE URBAN DEVELOPMENT

Sustainability is a complex subject, and, particularly in the development and construction industries, the term is often misunderstood and misused (Hyde, Moore, Kavanagh *et al.*, 2007).

For many sustainability simply implies being 'environmentally friendly', but merely seeking a reduction in energy usage, the recycling of waste and the protection of wildlife will not be enough to drive the industries in their progress towards more sustainable patterns of development (Hyde, Moore, Kavanagh *et al.*, 2007). A more appropriate understanding should include the recognition that sustainability is closely tied to development and construction undertakings and that particular attention should be paid to the critical planning and design activities. It is also essential for the development and construction industries to accept the dynamic process of sustainability, which offers the potential to improve the quality of life while simultaneously protecting and enhancing interrelated support systems, including environmental, economic and social (Hyde, Moore, Kavanagh *et al.*, 2007).

The central definition that captures the meaning of sustainability, specifically in relation to the urban development context, is inevitably the famous quote from the 1987 Brundtland Report which defined sustainable development as (Swilling, 2005):

*“ ... development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”* (World Commission on Environment and Development, 1987: 43)

The 1998 Sustainability Accords took it a step further from the Brundtland Report and defined sustainable development as follows:

*“Sustainability may be described as our responsibility to proceed in a way that will sustain life that will allow our children, grandchildren and great-grandchildren to live comfortably in a friendly, clean, and healthy world. That people: i. Take responsibility for life in all its forms as well as respect human work and aspirations; ii. Respect individual rights and community responsibilities; iii. Recognize social, environmental, economic, and political systems to be inter-dependent; iv. Weigh costs and benefits of decisions fully, including long-term costs and benefits to future generations; v. Acknowledge that resources are finite and that there are limits to growth; vi. Assume control of their destinies; vii. Recognize that our ability to see the needs of the future is limited, and any attempt to define sustainability should remain as open and flexible as possible.”* (Thomas Jefferson Sustainability Council, 1998)

Based on numerous academic discussions it is possible to summarise the concept of sustainability as a development approach that adheres to the following (Swilling, 2005):

- The systematic extraction of substances from the earth's crust must not take place at a faster rate than nature's capacity to renew or restore what is extracted. In the case of non-renewable substances, such as oil, non-renewables must as far as possible be substituted with renewables, such as solar energy, and non-renewables must be used more efficiently through the implementation of initiatives such as recycling.
- Wastes from socially produced materials must not be deposited into natural systems in increasing concentrations that will deplete and destroy these systems. Wastes must, therefore, not be disposed into natural systems at a rate faster than these systems' absorption rates. It is necessary to stop the use of certain compounds, such as the top twelve deadly chemicals, to continuously reuse dangerous compounds, such as certain high-grade plastics or aluminium that can be continuously recycled, and only dispose of compounds into natural systems if breakdown or absorption is possible.

- Nature must not be degraded by the over-exploitation and destruction of biodiversity. The destruction of forests, seas, wild areas, water supplies, land and soils, non-human species (excluding invasive alien species moving between geographic contexts and invasive pests), and air supplies must be stopped.
- All fundamental human needs must be met, in this and in future generations. A process to redistribute and ensure access to resources is necessary to reverse the over-consumption of the rich and to eradicate the poverty of the poor.

### 2.3.2 THE BASIC PRINCIPLES OF SUSTAINABLE URBAN DEVELOPMENT

Throughout the world, wherever urban development policies, planning processes and/or project designs have been influenced by sustainability, one or more of the twelve generally accepted sustainability criteria have been integrated into the wider socio-economic frameworks. The twelve issues that would need to be addressed by any urban theory or urban development policy that wishes to marry equity, urban economic growth and environmental sustainability are, in no particular order: air pollution and CO<sub>2</sub> emissions, water, sanitation, solid waste, energy, land and space, building materials and design, transport, health, food, biodiversity and recreational space, and child-centred development and learning (Swilling, 2005).

The twelve preliminary criteria that address the basic sustainability issues in urban development, and that need to be considered by any development that wishes to be established as a sustainable development, are summarised below:

1. Air Pollution and CO<sub>2</sub> Emissions: Regulations and incentives to reduce overall air pollution and CO<sub>2</sub> emissions should be introduced. Especially from motor vehicles, factories, and utilities such as power stations (Swilling, 2005).

2. Water: Regulations and incentives should be introduced to reduce total water consumption as much as possible. Water consumption should be made as efficient as possible through the implementation of initiatives that reduce leakage (including early leak detection systems), that enforce the use of water saving devices by end users, and that support the use of recycled water instead of potable water for applications such as toilet flushing and irrigation. Dependence on large-scale, infrastructure intensive water capture systems such as dams and long-distance water transport systems should be reduced as far as possible. On-site rainwater harvesting should be encouraged and improved for use in recycled water applications (Swilling, 2005).
3. Sanitation: Sewerage systems should be converted from the current dualist system, which relies on expensive bulk sewerage treatment with toxic sludge going into landfills and unhealthy and environmentally destructive on-site systems in poor areas, to community-based systems for all income groups where sewerage is treated on site at precinct level and reused for recycled water applications. Special sewerage storage and treatment solutions must be provided for on-site collection and disposal of hazardous liquid wastes from industrial establishments (Swilling, 2005).
4. Solid Waste: Incentives should be introduced that encourage end users to separate solid waste at the source and that encourage collection systems to be linked to recycling businesses. Regulations should strive for zero solid waste transfers to landfill sites, other than toxic waste which should be disposed of in such a manner that it does not contaminate surrounding areas (Swilling, 2005).
5. Energy: Regulations should be introduced to reduce and eventually eliminate the use of fossil fuel based energy sources and to encourage the transition to cleaner energy sources including solar, wind, hydraulic or hydrogen power, or any combination thereof. Increased energy efficiency in end users should also be encouraged via the use of low-energy lighting, solar water heaters and heat sharing, among others (Swilling, 2005).

6. Land and Space: Land use and urban design planning should allow for a combination of densification, mixed land use, mixed income residential areas, child-centred design for maximum safety and visibility, as well as the greening of public and private open spaces to avoid the heat island effect of paved urban areas and the incorporation of green infrastructure into urban areas (Swilling, 2005).
7. Building Materials and Design: Building regulations should link the approval of building plans to an assessment of the environmental and social impacts of the proposed building's materials, spatial and architectural design. Matters that should be taken into account during the assessment should include north orientation, passive heating and cooling mechanisms, insulation and ventilation and interior to exterior relations, among others (Swilling, 2005).
8. Transport: Urban design principles should encourage the radical reduction of private motor vehicle use, the increased use of public transport, and the reduction of dependency on all forms of transport that depend on the use of fossil fuels. Urban areas should be designed in such a manner that regular journey lengths are reduced or eliminated as much as possible. Precincts should be pedestrian friendly and there should be mixed transport hubs that would facilitate and encourage the use of alternative transport modes, such as bus, train, taxi, and bicycle (Swilling, 2005).
9. Health: Sustainable urban developments should include or should be in close proximity to public health institutions that are focussed on ensuring the provision of, at least, basic health care services (Swilling, 2005).
10. Food: Regulations and incentives should be introduced that strongly encourage increasing food supplies from urban farms that make use of organic farming methods. These regulations should reduce the cost and improve the nutrient value of food supplies by incentivising the use of inputs from composted urban wastes and incentivising rural farmers to convert to organic production methods through buying policies of local food markets (Swilling, 2005).

11. Biodiversity and Recreational Space: Regulations should be introduced to require increased provision of conservation areas and recreational parks within urban boundaries. Support and recognition should also be given to the use of indigenous flora along streets, in residential yards and in commercial and industrial areas. Incentives should also be introduced to encourage the expansion and use of urban agricultural areas as green recreational spaces (Swilling, 2005).
  
12. Child-centred Development and Learning: Regulations and incentives should be introduced to encourage the use of school yards for food production and greening, and to encourage the incorporation of biodiversity and sustainability into the school teaching curriculum with special reference and attention to the positive relationship between increased nature experiences and decreased violence (Swilling, 2005).

### 2.3.3 GREEN INFRASTRUCTURE IN SUSTAINABLE URBAN DEVELOPMENT

Infrastructure, defined as the sets of structural elements that support the day-to-day functions and influence the direction of human society, both within urban areas and as interconnecting elements between cities, is critical to sustainable community development and the future well-being of societies. Sustainable infrastructure refers to the design, construction and operation of these structural elements in such a manner that will not diminish the social, economic and ecological processes that are required to maintain human equity and diversity and the functionality of natural systems (Community Research Connections, 2015). Sustainable infrastructure refers to anything built or utilised in such a way that it contributes to the overall sustainability of natural resources, in most cases this is related to two of the most high profile conservation areas, namely energy consumption and water use. Sustainable infrastructure can make a difference in a number of fields within the development and construction industries, including transportation, architecture and energy generation. In the long term, the main goal of sustainable infrastructure is to promote sustainable living amongst the entire population (wiseGEEK, 2015).

Forests, wetlands, coral reefs, and other natural ecosystems are not often thought of as infrastructure, but they are. Forests, for example, can act as natural water filtration plants as they can prevent silt and pollutants from entering streams that supply fresh water to downstream cities and businesses. As such, these natural ecosystems are a form of 'green infrastructure' that has the potential to serve the same function as 'grey infrastructure', the human-engineered solutions that usually involve concrete and steel, only solve a single problem at a time, and require huge expenses to build and maintain (Talberth & Hanson, 2012). The development and construction industries need to stop looking at green and grey infrastructure separately. A transformation is needed in these industries to move from old 19<sup>th</sup> Century infrastructure design principles to a wiser combination of green and traditional grey infrastructure that will meet the needs of the 21<sup>st</sup> Century (American Rivers, 2015). New infrastructure should enhance the environment to improve health, quality of life and resilience to climate change, and not only be seen as a means to improve connectivity. New infrastructure provides opportunities to reconnect people and places, to maintain and enhance ecological networks, and to understand and experience the environments that are lived in and travelled through on a daily basis. Through the collaboration of green and grey infrastructure, designed to reflect the character and aspirations of an area, movement corridors in urban and rural areas can be revived as places to spend time in rather than just to rush through (Lanchbury, 2011).

Green infrastructure is increasingly recognised as an essential part of sustainable spatial planning, due to its role as a life support system able to deliver multiple environmental functions and playing a key part in adapting to and mitigating climate change. The increased awareness of the importance of green infrastructure does, however, not always go hand in hand with a full understanding of what it is (Natural England, 2009).

The term 'green infrastructure' can encompass a wide array of specific practices, and therefore a number of definitions for green infrastructure exist. Green infrastructure is a strategically planned and delivered network comprising the broadest range of high quality green spaces and other environmental features. It should be designed and managed as a multi-functional resource capable of delivering those ecological services and quality of life benefits required by the communities it serves, and is needed to underpin sustainability. Its

design and management should also respect and enhance the character and distinctiveness of an area with regard to habitats and landscape types (Natural England, 2009).

Green infrastructure is an approach to water management that protects, restores, and/or mimics the natural water cycle. Green infrastructure is effective and economical, and enhances community safety and quality of life (American Rivers, 2015). Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments (United States Environmental Protection Agency, 2015).

On a city or county scale, green infrastructure refers to the interconnected networks of natural areas that provide a range of ecosystem services including habitat, flood protection, carbon sinks, cleaner air, and cleaner water, while on a precinct or site scale, it refers to stormwater management systems that imitate nature by soaking up and storing water (United States Environmental Protection Agency, 2015). Green infrastructure includes established green spaces and new sites and should thread through and surround the built environment and connect the urban areas to their wider rural locality, accommodating both accessible natural green spaces within local communities and much larger sites in the urban fringe and wider countryside (Natural England, 2009). The implementation of green infrastructure means planting trees and restoring wetlands, rather than building costly new water treatment plants, it means choosing water efficiency over building new water supply and storage dams, it means restoring floodplains instead of building taller levees (American Rivers, 2015).

Green infrastructure incorporates both the natural environment and engineered systems to provide clean water, conserve ecosystem values and functions, and provide a wide array of benefits to people and wildlife (American Rivers, 2015). Green infrastructure should be understood using terms such as multi-functionality, connectivity, habitability, resilience, identity and return on investment (Green, 2013). All definitions conclude that green infrastructure is about bringing together the natural and built environments and the use of landscapes as infrastructure (Green, 2013). Green infrastructure underpins the sustainability of towns and cities, including the conservation of biodiversity and making the urban environment resilient to the effects of climate change (Natural England, 2009).

Since the fact that a single area of land has the potential to offer multiple benefits, providing its ecosystems are in a healthy state, is an underlying principle of green infrastructure, investments into green infrastructure make sound economic sense and are generally characterised by a high level of returns over time (European Union (2), 2015). Powered by the diversity of life within them, such healthy ecosystems provide society with a stream of valuable, economically important goods and services, including clean air and water, carbon storage, pollination, and playing a central role in fighting climate change impacts by protecting urban areas against floods and other such environmental disasters. Above all, green infrastructure offers a smart and integrated way of managing natural capital (European Union (1), 2013).

Advancing climate change and global urbanisation, which is growing at unprecedented rates, is putting pressure on city infrastructure systems as well as on natural environments (The Fifth Estate, 2014). Climate change will affect urban areas in a number of ways, varying from higher rainfall volumes in some areas to higher temperatures in others. For South Africa, the forecast is an increasingly hotter climate, increasing by between four and five degrees Celsius, with generally drier conditions. A higher rate of precipitation is forecast for the north-eastern coastal regions (van Wyk, 2014). It is becoming clear that future precinct designs need to throw out the concept of sustainability as a three-legged stool giving equal weighting to environment, social and economic outcomes, and environmental concerns need to be at the top of a pyramid, because without it the benefits of social and economic initiatives will be limited (The Fifth Estate, 2014). By replacing lost carbon sinks, by reducing the heat island effect in urban areas through shading and evaporative cooling, by reducing the volume of runoff and by increasing natural features that can reduce the effects of storm surges and flooding, green infrastructure can be implemented as both climate change mitigation and climate change adaptation strategies (van Wyk, 2014).

The use of green infrastructure throughout cities can improve the health of the population, including their mental health, by making areas more green and walkable. Such green areas are also proving to have less crime, and to boost the educational performance of children and the cognitive abilities of adults (Green, 2013). The design of infrastructure should

respond to place in innovative ways to create significant and memorable environments, and demands a truly collaborative approach between all disciplines involved in all areas of the development and construction industries (Lanchbury, 2011). All too often the challenges faced today are approached in a highly segregated manner with very little consideration to the complex interactions between major land use activities such as housing, agriculture, transportation and biodiversity. The design and implementation of green infrastructure often promotes dynamic forward-thinking solutions that enable the tackling of diverse and often competing land management issues in a spatially comprehensible manner. Green infrastructure investments are therefore perfectly set up to create both high- and low-skilled jobs, including planning, engineering and construction related positions, as well as positions in the restoration and maintenance of urban and rural ecosystems (European Union (1), 2013). The provision of green infrastructure in and around urban areas contributes towards creating places where people want to live and work (Natural England, 2009).

## 2.4 THE REGULATION OF SUSTAINABLE URBAN DEVELOPMENT

### 2.4.1 THE IMPORTANCE OF THE MEASUREMENT AND RECOGNITION OF SUSTAINABLE URBAN DEVELOPMENT

Over the last twenty years or so there has been a sharp increase in interest in the sustainability of urban areas, however, international urban development industries were faced with the task of understanding and translating theoretical, political and strategic sustainability objectives into physical implementation and concrete action at project-specific levels. A clear need arose for structured methodology, techniques and decision support tools to enable urban development industry professionals to evaluate the sustainability of their existing or proposed developments (Ugwu & Haupt, 2007).

The measurement and recognition of sustainable urban development through international ratings and certification systems has become a helpful point of reference for sustainability and green design. It helps to define the sustainable urban development market, gives

developers a clear goal for achieving urban sustainability and removes subjectivity from and gives credibility to sustainable developments (Aurecon SA (Pty) Ltd, 2014). These rating tools and certification systems, as developed by the international green building councils or other similar institutions, are capable of creating changes in their local markets and of bringing the learning and innovations of their particular contexts to the global stage (Green Building Council of South Africa (19), 2015).

Rating tools and certification systems encourage balanced outcomes. Developments are required to achieve a minimum number of points in all rated categories making it impossible for very poor performance in one area to be eliminated or balanced out by exceptional performance in another area (Blundell, 2014). Furthermore, all precinct level certifications should be reassessed every number of years to ensure the necessary sustainability targets are continuously being achieved and maintained within the rated development to keep up with the continually evolving standards of urban sustainable development (Blundell, 2014).

The measurement and recognition of sustainable urban development objectives, principles and initiatives also provide essential groundwork and support for successful institutional transformation as well as for efficient decision making in design, specification and construction across various discipline and project-level interfaces (Ugwu & Haupt, 2007).

#### 2.4.2 THE GREEN BUILDING COUNCIL MODEL

Green Building Councils are member-based organisations that empower, regulate and educate industry leaders to effect the transformation of their local building industries toward sustainability. They are independent organisations that have developed and operate according to the best practices of the international Green Building Council Model (World GBC, 2015).

According to the international Green Building Council Model the main role of a Green Building Council is to create a platform that brings the whole of the building industry together with a mission to drive the sustainable transformation of the built environment.

Through bringing the industry together a Green Building Council becomes the body driving sustainability in its local built environment and creates the holistic approach considering all stakeholders through the whole of the building's life-cycle that is required for successful sustainable building practice (World GBC, 2015).

A Green Building Council achieves its role through governance, education, advocacy and building certification. The strategic direction of a green building Council is driven by a diverse board of directors that is made up of stakeholders from across the building industry as voted on by the Green Building Council's members. Green Building Councils practice transparency and good governance and the Board of Directors reports to its Green Building Council's members (World GBC, 2015).

A Green Building Council puts country specific education and awareness programs in place to build up the skills of the local building industry. A country's Green Building Council drives market transformation and shifts the behaviour and mind-sets of both the public and industry professionals (World GBC, 2015).

As industry led organisations that work in close partnerships with government, Green Building Councils help develop public policies and initiatives that speed up the transformation towards sustainable built environments (World GBC, 2015).

Green Building Councils work closely with building certification and rating tools and help develop a common language and understanding of expectations around how green buildings should be designed, constructed, renovated, decommissioned and should perform during their life-cycle. These internationally recognised tools also drive building baseline standards higher through facilitating easier access to knowledge, skills and materials which in turn grows the demand for green and sustainable building and development (World GBC, 2015).

Green Building Councils observing a common model, the previously discussed international Green Building Council Model, also means that newly established Green Building Councils do not have to reinvent the wheel and can therefore deliver faster results than they would

be capable of if they were working in isolation. As the international blanket authority on green building and sustainable development the World Green Building Council continuously develops and updates sustainability guidelines and collects useful resources from all around globe to help facilitate strong Green Building Council growth (World GBC, 2015).

### 2.4.3 THE WORLD GREEN BUILDING COUNCIL

The World Green Building Council (WorldGBC), established in 2002, is a network of national Green Building Councils and is the world's largest international organisation influencing and driving the world's sustainable development markets. The WorldGBC's mission is to strengthen member councils by championing their leadership and connecting them to a network of knowledge, inspiration and practical support (World GBC, 2015).

The World Green Building Council fosters and supports new and emerging Green Building Councils around the world by providing them with the tools and strategies necessary to establish strong organisations and leadership positions in their countries. The WorldGBC works closely with its member councils to promote local green building actions and to address global issues such as climate change. By driving collaboration and increasing the profile of the green building market, the WorldGBC works to ensure that green building and sustainable development is a part of any comprehensive strategy to deliver carbon emission reductions. With over one hundred thousand buildings and almost one billion square metres of green building space already certified, the influence and impact of the global network that is the World Green Building Council is a significant force for social and environmental change (World GBC, 2015).

In order to become a recognised member of the World Green Building Council, a local Green Building Council must meet a specific set of criteria that are verified by the WorldGBC, must submit an annual report to the WorldGBC and must pay an annual membership fee. Each year the WorldGBC assigns a membership status reflecting their maturity to each of its member Green Building Councils (World GBC, 2015). A member Green Building Council's

membership status is based on how developed its organisation is and is assigned to one of the following three categories (World GBC, 2015):

- **Established Green Building Council:** A Green Building Council that is fully operational and displays stability and the required national positioning.
- **Emerging Green Building Council:** A Green Building Council that has developed its organisation to a point where it is operational and that has begun to roll out various programmes and initiatives.
- **Prospective Green Building Council:** A Green Building Council that has brought together a strong group of founding members, has developed a strategic plan for how the Green Building Council will be developed, and is registered as a legal entity.

Benefits for a Green Building Council to be a recognised member of the World Green Building Council include the increased credibility, the better access to resources and the ability to effect greater impacts on the transformation of the global property development market that go hand in hand with being part of the global community of green building leaders. Being part of the WorldGBC movement means celebrating local action to drive the global transformation of the built environment, building partnerships with like-minded entities, supporting the case for green buildings and sustainable development through access to a wealth of knowledge from across the world, facilitating closer collaboration through regional networks and congress, and strengthening Green Building Councils by creating opportunities to learn from one another and by documenting the best practices of the green Building Council model (World GBC, 2015).

The full lists of current and potential future members of the World Green Building Council, including their current membership status, are presented in Appendix A.

## 2.5 SUSTAINABLE URBAN DEVELOPMENT IN SOUTH AFRICA

In South Africa, the officially accepted concept of urban sustainability is still very poorly defined, and while the various definitions used concede that sustainability is aimed at meeting today's needs without compromising future generations, the concept runs the risk of becoming no more than a political catch phrase (Kruger, n.d.). Sustainability in general seems to have become the catch all phrase that refers to the long-term viability of both the natural systems within which social systems are embedded and the social systems themselves which are dependent on the services provided by the natural systems, but does not provide much clarity on how this long-term viability is to be achieved (Swilling, 2005).

Over the past decade South Africa has slowly been catching up to the growing international movement towards sustainable urban development. In 2002 the City of Johannesburg played host to the World Summit on Sustainable Development, a forum that focusses global attention and directs international action towards meeting difficult sustainability challenges. The summit provides a platform for international deliberation on methods to improve of the growing population's standard of living while simultaneously conserving the planet's natural resources despite ever-increasing demands for food, water, shelter, sanitation, energy, health services and economic security (United Nations, 2002). This international conference being held on South African soil prompted the country's first major steps towards sustainability in urban development. The December 2002 paper entitled *Strengthening Sustainability in the Integrated Development Planning Process*, published by the Department of Environmental Affairs and Tourism and written by key urbanists in partnership with a rising group of environmental policy analysts, marked the start of South Africa's newly adopted trend that includes the generation of green or sustainable Integrated Development Plans and the greening of national policy perspectives (Swilling, 2005). Arguments, however, can and are being made that public sector sustainable development efforts in South Africa are continuously focussed on planning and strategising activities while there has been very little emphasis on the physical implementation and follow-through of these plans and strategies (Rennkamp & Westin, 2013).

In spite of this sustainable urban development enterprises have become increasingly popular among developers, both public and private, and it would therefore be a mistake to see the influence of local policies and strategies as the sole drivers of the development and construction industries' turn towards sustainability (Swilling, 2005).

### 2.5.1 MOTIVATIONS FOR THE ADOPTION OF SUSTAINABLE URBAN DEVELOPMENT PRINCIPLES IN SOUTH AFRICA

In South Africa sustainability and sustainable urban development provides a theoretical framework for alleviating some of the major development challenges that the country faces. These challenges include political instability, high levels of corruption, the mismanagement of economic resources, high indebtedness, the low levels of foreign exchange and investments, and low productivity rates in agriculture and industry (Cohen, 2006). Further challenges motivating both local and national policy makers to incorporate sustainable urban development principles include Africa and South Africa's rapid population growth, and minimising and reversing the apartheid legacy of urban segregation and urban sprawl (Donaldson, 2001). The physical manifestations of these challenges that still dominate South African cities include over-population, widespread poverty, poor water quality, uncontrolled pollution, unhealthy housing conditions, hygienic problems and inadequate infrastructure. All of these conditions can be alleviated by sustainable urban development principles and initiatives (McCormick, Anderberg, Coenen & Neij, 2013).

For the general public and fields outside of political and environmental programmes, the biggest physical driver behind the adoption and incorporation of sustainable urban development principles, initiatives and activities in South Africa, measuring at over 40% of motivations, is the continuously rising operating costs of conventional buildings, especially in terms of electricity and water supply (Green Building Council of South Africa (21), 2016). Ongoing difficulties experienced with electricity supply from Eskom and the resultant price increases have caused electricity costs in South Africa to be approximately a third of buildings' total operating costs, with slight variations depending on the type of the building (Rogerson, 2014). A range of sustainability initiatives that have the ability to reduce

dependence on the national electricity supplier and to substantially reduce electricity usage, and thereby cost, have been introduced to the South African urban development industry through the Green Building Council of South Africa and its Green Star South Africa rating tool suite (Rogerson, 2014). These technologies include LED lighting alternatives, solar panels, electricity usage monitoring systems, motion activated lighting, green planted roofs as building insulation solutions, water circulation based heating and cooling systems, and solar panels (Green Building Council of South Africa (12), 2015).

South Africa is also currently suffering from ongoing drought conditions that are severely restricting the availability of potable water and that are leading to growing water use restrictions and exponential price increases. This is putting further strain on the operation of buildings and the cost thereof (Green Building Council of South Africa (21), 2016). The use of water-wise technologies, such as low-flush toilets, and the promotion of rain water harvesting and the use of treated effluent for applications such as irrigation were introduced and are promoted by the existing Green Star South Africa rating tool suite (Green Building Council of South Africa (14), 2015). These increasing restrictions and the rising expenses associated with the use of water and electricity in South Africa will also aid in the promotion of precinct and larger scale sustainable urban development principles, initiatives and activities that will further mitigate the crippling effects on building operating costs (Green Building Council of South Africa (21), 2016).

Even though the South African urban development industries are still in the relatively early stages of the implementation of sustainability principles and initiatives, research has shown that there is a clear business case for sustainable urban development in South Africa. Both developers and property investment funds are recognising that sustainable urban developments are already becoming the new industry norm. If urban sustainability did not make good financial sense, big name developers and property funds, such as Rabie Property Group and Growthpoint, would not be active members of the Green Building Council of South Africa (Green Building Council of South Africa (21), 2016). As property owners, and often landlords, developers and property investment funds can benefit from building and owning sustainable developments in a number of ways, including rental premiums, reduced vacancy rates, improved sales value, reputational spin offs such as corporate reporting and

marketing, and future proofing investments against effects of climate change and possible future sustainability legislations (Rogerson, 2014). On the other hand, letting sustainable properties also makes business and financial sense for tenants. Tenants of green buildings are able to lease spaces at lower operating costs with notable reductions in water and energy consumption and also benefit from increased employee productivity as a result of the healthier indoor environments created by sustainable development principles and initiatives (Rogerson, 2014).

Other motivations for going green include compliance to local and national ecological and environmental regulations, the creation of healthier living and working environments, higher returns on investments in commercial properties, to satisfy client demands, corporate social investment, environmental responsibility and doing the right thing (Rogerson, 2014).

Ever-increasing national participation in sustainable urban development initiatives and activities is a sign of increasing maturity and sophistication in the country's property market, elevating the country's property markets in the global property development and investment arenas (Green Building Council of South Africa (21), 2016).

Prior to the introduction of the Green Building Council of South Africa and its Green Star South Africa rating system, sustainable urban development projects in South Africa were mostly driven and stimulated by (Swilling, 2005):

- Environmental sustainability enthusiasts' desire to demonstrate the life quality and economic affordability benefits that arise from the incorporation of sustainability into urban project design and implementation processes.
- Local government entities wishing to lead by example.
- Private developers seeking the financial advantage and prestige of being on the leading edge of sustainability and urban development trends.

The Green Building Council of South Africa and the Green Star South Africa rating system, as discussed below, has brought credibility and comparability to sustainable building activities, giving sustainability an alluring competitive edge.

## 2.5.2 THE GREEN BUILDING COUNCIL OF SOUTH AFRICA

The Green Building Council of South Africa (GBCSA) was formed in 2007 as an independent, non-profit company to lead the greening of the South African commercial property sector through the provision of green building rating tools, training, knowledge and promotional networks. The GBCSA, built on the international Green Building Council model, leads the transformation of the South African property industry to ensure environmentally sustainable designs, construction and operational practices. The GBCSA is made up of a team of industry experts that work in collaboration with industry bodies, professionals, leaders and government departments, and who are dedicated to developing market-based green solutions for the South African property industry (Green Building Council of South Africa (19), 2015). In 2008 the Green Building Council of South Africa became the 13<sup>th</sup> full member council to the World Green Building Council (Green Building Council of South Africa (19), 2015).

The Green Building Council of South Africa's mission is to promote encourage and facilitate green building in the South African property and construction industries through market-based solutions. The mission is attained through focusing on advocacy and promotion, rating tools, education and training, and the sharing of resources, by (Green Building Council of South Africa (9), 2015):

- Raising awareness of the environmental, economic and social benefits of green building;
- Supporting the government to legislate and facilitate the adoption of green building practices;

- Recognising industry leaders who achieve industry excellence;
- Supporting the development and growth of other green building councils in Africa;
- Establishing a South African common language and best practice standard of measurement for green buildings through the development of the Green Star South Africa rating tools;
- Hosting the annual South African Green Building Convention to showcase the latest trends and innovations delivered by international and local green building thought leaders;
- Running Green Star SA Accredited Professional programmes in support of the Green Star SA tools and other green building related training;
- Offering building tours of Green Star SA certified green buildings;
- Creating awareness and resources around green building through sharing knowledge and research around sustainability and general green building; and
- Providing easy access to technical manuals, guides, research, news and case studies, online and through the GBCSA's newsletter and social media.

### 2.5.3 THE GREEN STAR SOUTH AFRICA SUSTAINABLE URBAN DEVELOPMENT RATING SYSTEM

The Green Star South Africa rating system was adopted, adapted and contextualised from the Green Building Council of Australia's Green Star rating system. The original Australian system was used as a base and was significantly modified, through South African context studies, rigid peer reviews and expert input, to respond to the local South African market and environmental context (Green Building Council of South Africa (9), 2015).

The aim of Green Star South Africa is to provide an objective measurement for green buildings and to recognise and reward environmental leadership in the property industry through the use of multiple rating tools built for the different building typologies and uses. The objectives of the rating tools are (Green Building Council of South Africa (9), 2015):

- Establishing a common language and standard measurement for green buildings;
- Promoting integrated, whole-building design;
- Raising awareness of green building benefits;
- Reducing the environmental impacts of property developments; and
- Recognising environmental leadership.

The Green Star South Africa rating tools all consist of a number of categories which assess the environmental impacts that are the direct consequences of an urban development project's site selection, design and construction processes and activities (Green Building Council of South Africa (20), 2008). The nine categories against which sustainability is measured by the Green Star South Africa rating system are:

- Management – This category promotes the adoption of environmental principles from project inception, design and construction phases, to commissioning, tuning and operation of a building and its systems. Management initiatives include engaging professionals with thorough understanding of green building principles and Green Star SA, recycling demolition and other construction waste, managing construction activities to minimise pollution and enhanced commissioning and tuning of a building's systems. All of the credits in this category can roughly be divided into one of three main themes, namely, Green Star SA Accredited Professional,

commissioning related credits, or contractor related credits (Green Building Council of South Africa (10), 2015).

- Indoor Environment Quality – This category addresses how heating and cooling systems, lighting, indoor air pollutants and various other building attributes can contribute to a healthier indoor environment quality. The credits in this category can be roughly divided into one of the following themes: air quality, occupant comfort or hazardous materials (Green Building Council of South Africa (11), 2015).
- Energy – This category targets an overall reduction in energy consumption, mainly through more efficient use of energy in buildings and through the generation of energy from alternative, ‘green’ sources (Green Building Council of South Africa (12), 2015).
- Transport – This category rewards discouragement of the use of automotive commuting and encouragement of the use of alternative methods of transportation which would both result in the reduction in overall automotive commuting. The available option of alternative transport methods that are rewarded through this category include pedestrian and cycling opportunities and facilities, trains, buses, taxis, light rail and/or trams (Green Building Council of South Africa (13), 2015).
- Water – This category addresses the reduction of potable water usage through the design of water efficient systems, rainwater collection and water reuse, in an attempt to ease the pressure on South Africa’s water sources (Green Building Council of South Africa (14), 2015).
- Materials – This category targets the consumption of resources through rewarding careful selection of and reuse of materials. The basic concept of this category is to reduce the amount of natural resources used, reuse whatever materials can be reused and recycle wherever possible (Green Building Council of South Africa (15), 2015).

- Land Use and Ecology – This category promotes and rewards initiatives that improve or reduce impacts of urban development on ecological systems and biodiversity (Green Building Council of South Africa (16), 2015).
- Emissions – This category deals with the environmental impacts of an urban development's emissions other than greenhouse gasses (which are covered in the Energy category). This category targets emissions including and relating to watercourse pollution, light pollution, ozone depletion and sewage (Green Building Council of South Africa (5), 2015).
- Innovation – This is an optional category. This category encourages, recognises and rewards the spread of innovative technologies, designs and processes for commercial building applications that impact upon environmental performance. The demonstration of efforts to apply sustainable development principles to the wider process of designing and procuring buildings, as well as any positive environmental influence on the project's wider geographic area are encouraged. The core credits of this category are innovative strategies and technologies, exceeding Green Star SA benchmarks, and environmental design initiatives. These efforts are recognised over and above any of the other categories' credits (Green Building Council of South Africa (7), 2015).

The assessment of buildings through the Green Star South Africa rating system aims to drive change in the South African sustainable urban development market. The GBCSA has diligently been focussing on areas of environmental impact that are direct consequences of an urban development project's briefing, design, construction and maintenance (Green Building Council of South Africa (4), 2015).

### 2.5.3.1 THE GREEN STAR SOUTH AFRICA CERTIFICATION PROCESS

Green Star South Africa Certification is a formal process during which a development project makes use of a specific GSSA rating tool to guide the design, construction and/or management processes. During the certification process a documentation-based submission is collated as proof of the achievement of the required sustainability outcomes (Green Building Council of South Africa (3), 2015).

The following image summarises the Green Star South Africa certification process.

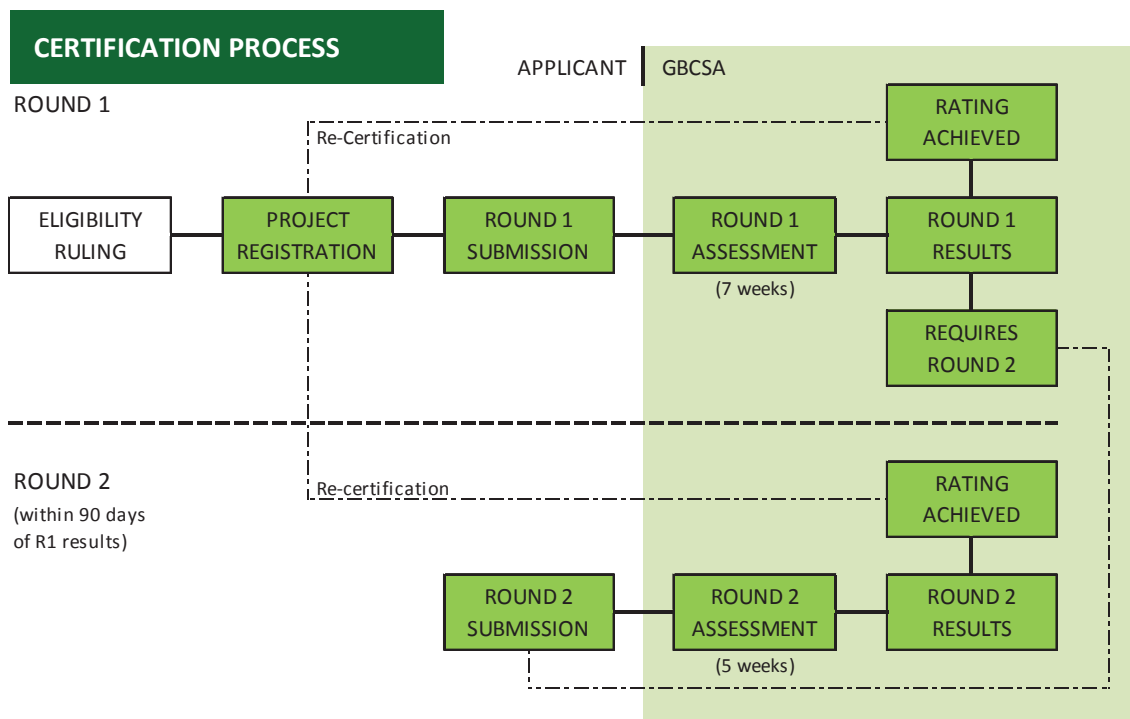


IMAGE 2.1: Overview of the Green Star SA certification process (Green Building Council of South Africa (3), 2015).

Once an eligible project has been registered with the Green Building Council of South Africa and their certification submission has been received, the Council will appoint two third-party assessors, one acting as an Assessor and the other as a Moderator, to review the project submission and make a recommendation as to the rating of the project to the GBCSA (Green Building Council of South Africa (3), 2015).

The complete, detailed description of the Green Star South Africa certification process can be seen in Appendix B.

The image below demonstrates the assessment process.

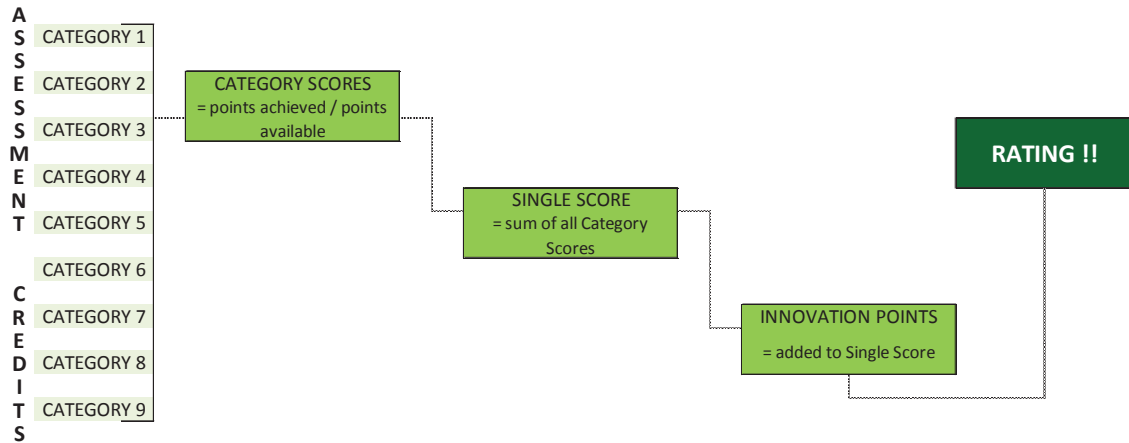


IMAGE 2.2: Structure of the Green Star SA rating system (Green Building Council of South Africa (4), 2015).

The final Green Star South Africa rating is then determined and awarded by comparing the overall project score with the rating scale as shown in the Table below.

TABLE 2.1: Green Star SA rating tool scores (Green Building Council of South Africa (4), 2015).

OVERALL SCORE	RATING	REPRESENTS
10 - 19	One Star	"On the Journey to a Better, Greener Building"
20 - 29	Two Star	"On the Journey to a Better, Greener Building"
30 - 44	Three Star	"Good Practice"
45 - 59	Four Star	"Best Practice"
60 - 74	Five Star	"South African Excellence"
75 +	Six Star	"World Leadership"

Most of the rating tools in the GSSA rating system only award certifications to projects that achieve a Three Star or higher rating as the other two ratings simply indicate standard industry practice (Green Building Council of South Africa (19), 2015). A Green Star South Africa certification can be pursued for design or as-built, which are both once-off

certifications for either the project's design or construction processes and achievements respectively, or a certification can be pursued for an existing building's performance. A performance rating is achieved based on the ongoing assessment of a building management and maintenance operations and such a certification is only valid for three years, after which the building must be reassessed to ensure continuous achievement and maintenance of sustainability targets (Green Building Council of South Africa (4), 2015).

In the case of management or performance based ratings, the tools require that the project be recertified every number of years to ensure that the necessary sustainability targets are continuously being achieved and maintained within the rated development project (Green Building Council of South Africa (19), 2015).

### 2.5.3.2 CURRENT GREEN STAR SOUTH AFRICA RATING TOOLS

The Green Star SA rating tools that have been developed by the GBCSA to date are (Green Building Council of South Africa (9), 2015):

- Multi-Unit Residential Tool – The new building rating tool that assesses and certifies the design and construction of any new multi-unit residential building or major refurbishment of an existing multi-unit residential building. A once-off design and/or as-built GSSA certification can be pursued under this tool.
- Public and Education Building Tool – The new building rating tool that assesses and certifies the design and construction of any new public or education building or major refurbishment of an existing public or education building. A once-off design and/or as-built GSSA certification can be pursued under this tool.
- Office Tool – The new building rating tool that assesses and certifies the design and construction of any new office building or major refurbishment of an existing office building. A once-off design and/or as-built GSSA certification can be pursued under this tool.

- Retail Centre Tool – The new building rating tool that assesses and certifies the design and construction of any new retail centre building or major refurbishment of an existing retail centre building. A once-off design and/or as-built GSSA certification can be pursued under this tool.
- Existing Building Performance Tool – The existing building rating tool that assesses the operational performance of existing buildings. A periodic building performance certification can be pursued under this tool.
- Interiors Tool – The existing building fit-out rating tool that assesses the sustainability of tenants' interior fit-outs and retrofits. A periodic building performance certification can be pursued under this tool.

The introduction of the existing Green Star South Africa rating tools into the South African urban development industry has significantly increased the adoption of and participation in sustainable urban development principles, activities and initiatives across the country. This rating suite has been the single biggest catalyst for sustainable urban development at building level in South Africa, as it has provided developers, designers and other development industry professionals, both private and public, with measurable sustainable outcomes to target (Green Building Council of South Africa (18), 2016). The rating tools provide a measurable 'how' for the achievement of sustainable urban development ideals in South Africa, which has for the most part been lacking despite years of both national and local authorities emphasising sustainability in urban planning and strategising processes.

South Africa currently boasts with the world's highest percentage of new development projects coming online being green rated developments versus conventional building developments (Green Building Council of South Africa (21), 2016).

## 2.5.4 THE UPTAKE OF THE GREEN STAR SOUTH AFRICA RATING TOOLS

Since the release of the first Green Star South Africa rating tool in 2008, 198 South African building projects have received a Green Star South Africa rating certification. There are also a further 90 projects currently registered with the Green Building Council of South Africa in pursuit of a Green Star South Africa rating certification (Green Building Council of South Africa (22), 2017).

The images below demonstrate some of the statistics of the existing Green Star South Africa certified projects.

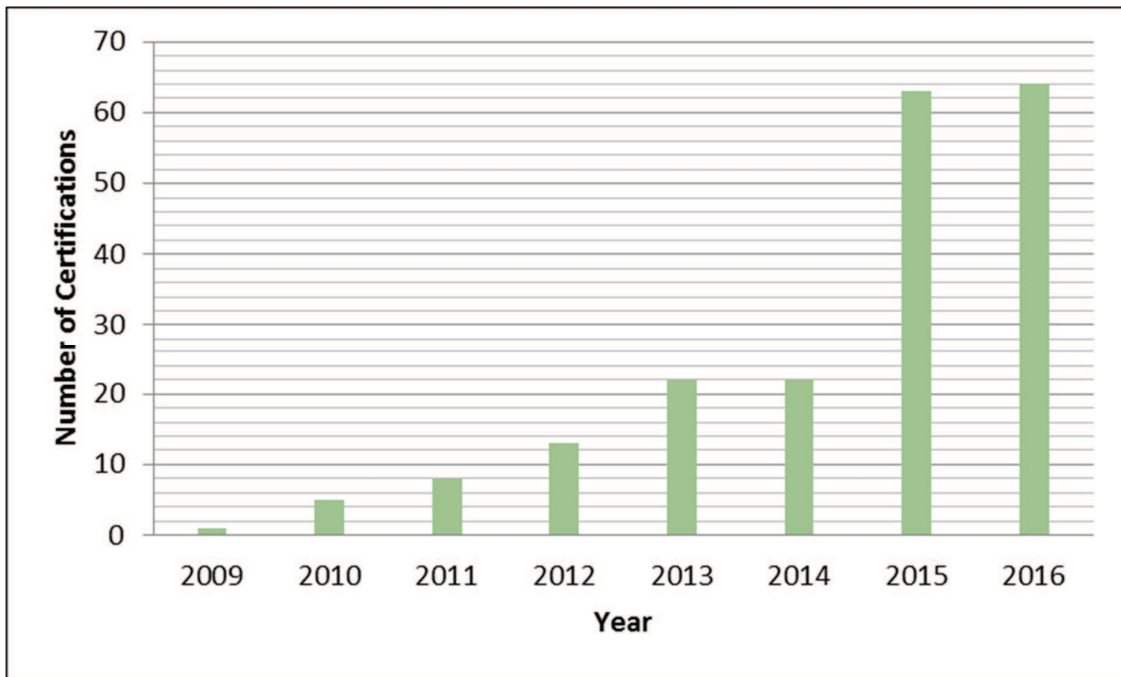


IMAGE 2.3: Green Star South Africa certified projects by year certified.

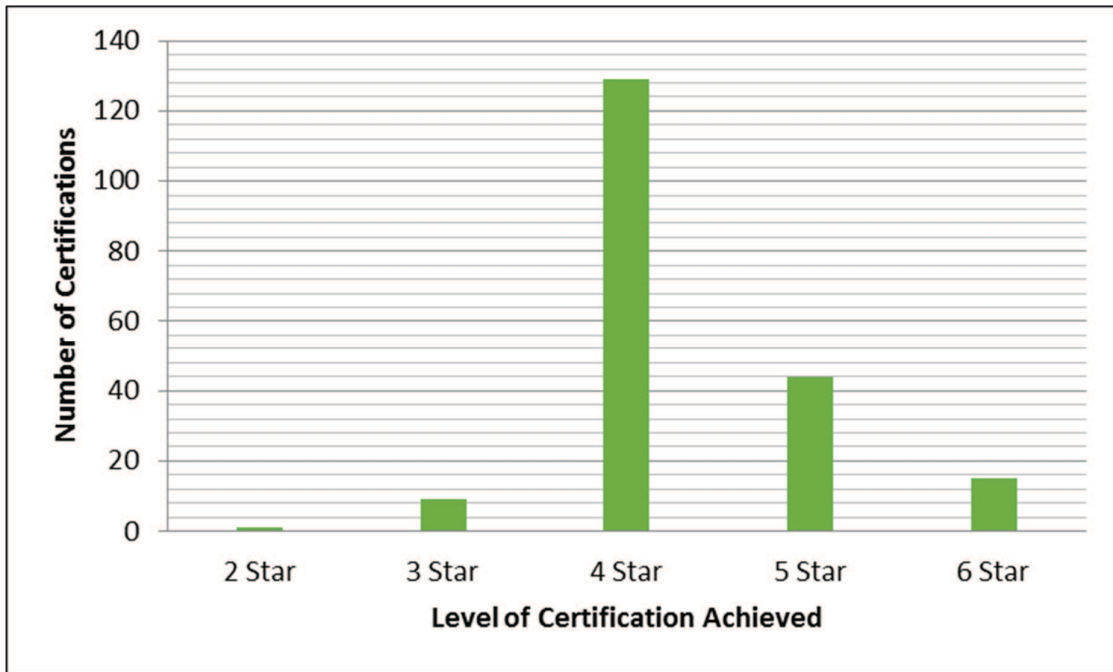


IMAGE 2.4: Green Star South Africa certified projects by level of certification achieved.

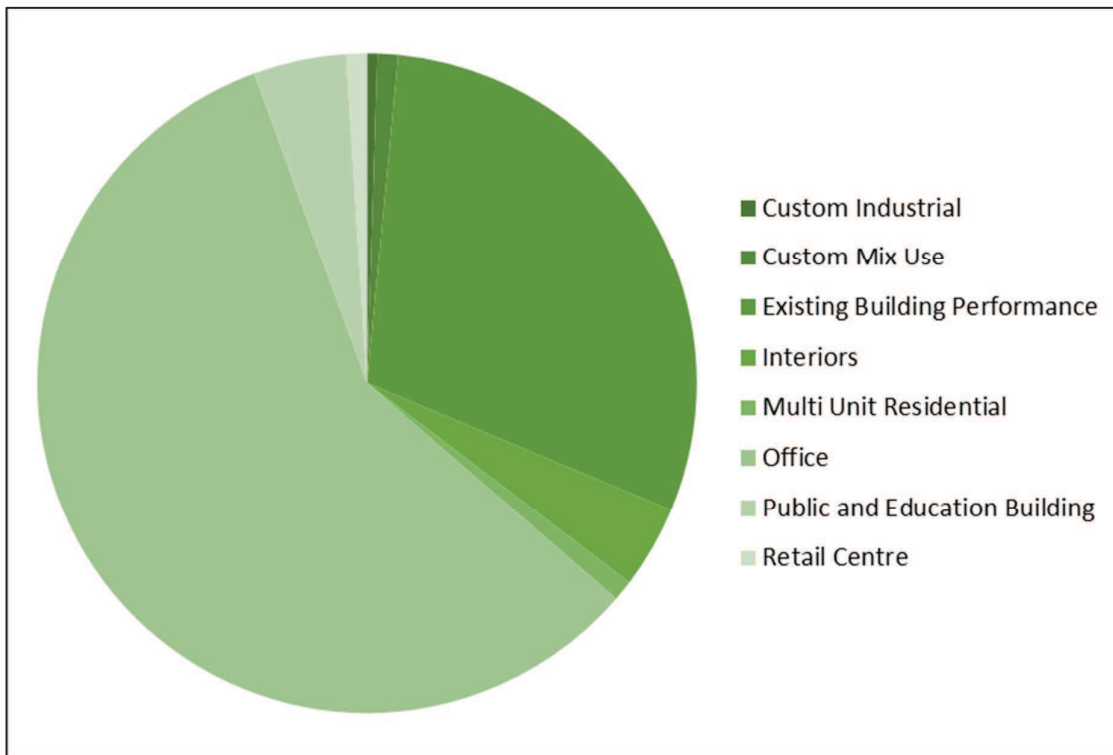


IMAGE 2.5: Green Star South Africa certified projects by type of certification.

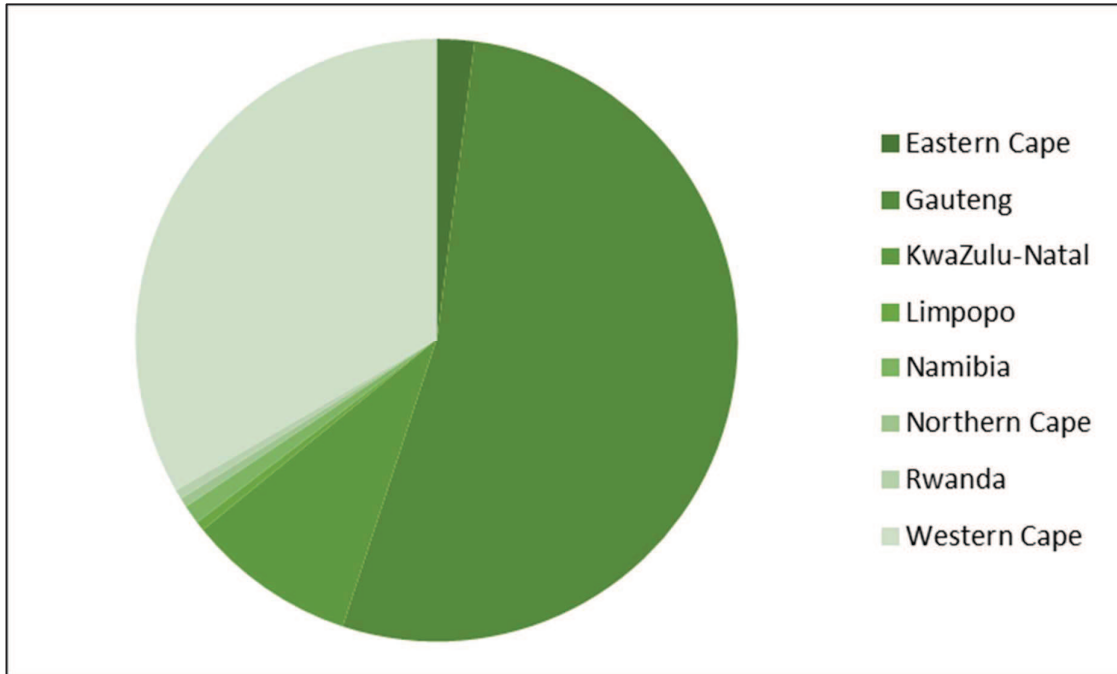


IMAGE 2.6: Green Star South Africa certified projects by location.

The full list of Green Star South Africa certified projects can be viewed in Appendix C.

## 2.6 SUSTAINABLE URBAN DEVELOPMENT AT THE PRECINCT LEVEL

### 2.6.1 THE FOCUS SHIFT IN SUSTAINABLE URBAN DEVELOPMENT

As urban pressures increase on the back of global urbanisation and advancing climate change, the number of large, master-planned developments will continue to grow (Blundell, 2014). Cities and these large, master-planned urban areas are, by definition, not inherently sustainable as urban dwellers and the economic activities of the urban area inevitably depend upon environmental and ecological resources and services external to their built-up setting (Allen, 2009). With regards to urban sustainability, there needs to be a shift from the single green building approach to a wider approach which includes looking at the sustainability of larger scale urban environments as well as buildings (Aurecon SA (Pty) Ltd, 2014). Many first world countries are already applying this shift in focus and have introduced and incorporated guidelines, standards and rating tools for sustainable urban

development at community, district, precinct and neighbourhood levels (Green Building Council of South Africa (18), 2016).

The global need for and increasing implementation of sustainable urban development objectives and activities at precinct or larger urban scales, as opposed to singular buildings or small clusters of buildings on single erven in isolation from their surrounding environments, is clear. The objectives of creating sustainable urban environments will not be reached by beautifully sustainable and self-sufficient buildings in isolation, surrounded by urban ruins. In order for sustainable urban development in South Africa to move forward and follow on the global sustainable urban development trends, there needs to be a shift in the focus of the implementation of urban sustainability objectives from a building scale to a macro scale focussed on urban precincts and holistic master-planned developments (Blundell, 2014).

Developers, urban planners and government authorities around the world are increasingly viewing precinct developments as the answer to the scale of sustainability initiatives and measurements and there is widespread belief that sustainable urban precincts could be the answer to many of the most pressing environmental and socio-economic problems (Green Building Council of South Africa (18), 2016). Precinct developments offer opportunities to take the pressure off existing energy, water and transport infrastructure as well as to help lower carbon emissions. Sustainable precincts that recycle water and waste, generate their own power and have high aspirations for social outcomes, such as public transport and affordable housing, are the key to creating a sustainable urban environment. Truly sustainable precinct development projects will stand out as much for their socio-economic achievements as for their environmental ones (Blundell, 2014).

The prevailing developing world difficulties challenging sustainable urban development objectives are exaggerated by South Africa's distinctive urban realities of dispersed cities with dysfunctional low density urban sprawls and racially divided urban growth patterns and exceptionally high urbanisation rates (Donaldson, 2001). South Africa's urban development arena is faced with the unique challenges that arise from the apartheid era legacy of a spatially segregated, highly fragmented and completely dispersed urban society. Urban

planners and managers together with the politicians responsible for urban development are still dealing with the immense task of restructuring, transforming, reintegrating and reconstructing the country's urban fabric (Donaldson, 2001). These challenges make it essential for sustainable urban development objectives within the South African context to be considered on precinct or larger scales in order to have valuable impacts on South Africa's urban scene.

A sustainable precinct should aim to create amenity, a sense of place, and to be resilient, both economically and to climate change (Blundell, 2014). Creating places for people that include places to work, rest and play, with high quality urban design connecting smart and sustainable buildings, is the key ingredient in designing and maintaining successful and thriving communities. It is the spaces between buildings that determine the liveability, walkability and value of a community, and good planning and urban design are the fundamental building blocks of a sustainable community (Aurecon SA (Pty) Ltd, 2014).

It is predicted that fast-developing, sustainable precincts will continue to gain traction and popularity both globally and in South Africa over the coming years (Aurecon SA (Pty) Ltd, 2014).

## 2.6.2 DEFINING PRECINCT OR CITY SCALE URBAN SUSTAINABILITY IN SOUTH AFRICA

The South African urban development and construction industries must recognise that working towards sustainability demands an awareness of how everything works, whether natural or man-made, and that there needs to be a similar understanding of the likely effects on processes and outcomes that any urban development planning and design decisions and actions may have on each other as well as on the planned development site's natural systems (Hyde, Moore, Kavanagh *et al.*, 2007). Urban sustainability should be analysed and understood at the precinct level, in the perspective of its fundamental bio-physical, socio-cultural and economic environments, as well as beyond the confines of the city or precinct in the geographic extent of its ecological footprint (Malan, 2008).

In the simplest of terms, sustainable urban precincts can be defined as mixed-use greenfield, brownfield, infill or revitalisation projects that, due to their scale and mix, provide opportunities for greater connectivity and lead to greater innovation, social and economic outcomes, and environmental sustainability. What is made clear by continued research is that sustainable precincts mean everything has to change: urban design and construction principles cannot remain as they are if the urban development and construction industries hope to adapt to and realise the ideals of 21<sup>st</sup> Century sustainability (Perinotto, 2014).

Globally, the most common understanding of urban sustainability is based on the definition as laid out in the Brundtland Report as quoted in Section 2.3.1 of this chapter. This definition concludes that a sustainable urban development model should cater for everyone living now while avoiding the irreversible depletion of non-renewable resources, limiting the options of future generations. The premise of the Brundtland definition is that sustainable development can be defined as a triple bottom-line approach that finds an appropriate balance between economic, social and ecological requirements and obligations (Pieterse, 2010). Following the popularisation of the Brundtland definition of urban sustainability, sustainability actions and initiatives have been performing a balancing act between economic, social and ecological goals rather than promoting any real change to urban development procedures and requirements (Allen, 2009).

Unfortunately research has shown that there are a number of flaws and limitations to this conceptual approach to sustainable urban development, specifically in the context of developing countries such as South Africa, the most significant of which are, firstly, the assumption of a consensual model of political decision making and, secondly, the view that social and ecological reforms will take place within the existing economic model of extractive capitalism (Pieterse, 2010). While some assumption of a contemporary condition cannot completely be avoided, there should always be room to work at locally specific agendas and solutions (Pieterse, 2010). Research has shown that, especially in sub-Saharan Africa and the developing country context, even though industry professionals are aware of and are willing to implement sustainable urban development initiatives and activities, these

initiatives and activities must first make financial sense to developers and must retain business-as-usual relatively high rates of return on investments before they are adopted and/or physically implemented (Nduka & Ogunsanmi, 2015).

A further pressing problem with the widely accepted model of urban sustainability as defined in the Brundtland Report is the apparently limited understanding of the inherent trade-offs found in the simultaneous pursuit of economic, social and ecological objectives. The view of urban sustainability as provided by the Brundtland definition is also widely found to be too abstract and does not appreciate how sustainable development should unfold at the urban level (Allen, 2009).

A more appropriate definition for sustainable urban development in South Africa would be an approach that does not presuppose any particular model of modernity or any specific economic system and that does recognise high levels of interdependence between spheres of sustainability (Pieterse, 2010). In order to answer the question of what urban sustainability means and how the effects of ongoing urbanisation and urban development can or should be evaluated, a more encompassing vision of the concept of urban sustainability is required, one that adequately defines the goals of the sustainability processes while simultaneously acknowledging the political dimension of these processes (Allen, 2009). The National Science Foundation Workgroup on Sustainability also argues that a definition of sustainability should focus on sustainable lives and livelihoods rather than sustaining continuous urban development. The group advocates an understanding of social and ecological processes as non-linear, indeterminate, contextually specific and attainable through many different methods. They further promote a definition of sustainability that entails necessarily flexible and ongoing processes, that transcends conventional dualism such as urban vs rural, local versus global and economy versus environment, and that supports diversity, difference and local contingency (National Science Foundation Workshop on Urban Sustainability, 2000).

Given the above criticisms of the Brundtland definition, a suitable alternative for defining sustainable urban development is derived in the works of Argentinean scholar Adriana Allen, who argues for the recognition that, while economic, social and environmental

objectives still apply, the built environment in an increasingly urbanised world is a central component to the liveability of the world. Allen (2009) argues that the search for more sustainable forms of urbanisation is highly dependent on the political and institutional decisions that would promote competition and/or cooperation between the different aspects and role players of sustainability and urban development (Allen, 2009; Pieterse, 2010). Moreover Allen (2001) differentiates between five different facets of sustainability which all function interdependently within the constraints of the bioregional ecological capacity of any given urban region. This bioregional ecological capacity acts as the relative measure which assesses whether changes and/or interventions in any of the five dimensions are moving towards or against urban sustainability (Allen, 2001). The five sustainability dimensions of Allen's model for advancing sustainable urban development are:

- **Political sustainability:** This dimension refers to the quality of the political governance systems which guide the relationships between and actions of different role players among the other four dimensions. It involves the democratisation of processes aimed at formulating policies and programmes to advance sustainable urban development and involves the participation of civil society in all areas of decision-making. Political sustainability is the circle that links the other four dimensions of sustainability (Allen, 2009; Pieterse, 2010).
- **Economic sustainability:** This domain is defined as the ability of the local economy to sustain itself, taking into consideration the full impact of production cycles, without causing irreversible damage to or depletion of its natural resource base and/or without increasing the local ecological footprint (Allen, 2009; Pieterse, 2010).
- **Ecological sustainability:** This domain relates to the impact of urban consumption and production on the integrity and ecological health of the urban region and the maintenance of the global ecological carrying capacity. This objective demands long term consideration of the relation between the state and dynamics of environmental and ecological resources and services and the demands exerted over them (Allen, 2009; Pieterse, 2010).

- Physical sustainability or the sustainability of the built environment: This aspect refers to the physical capacity and ability of the urban built environment and technologies to support and maintain human life and productive activities without damaging or disrupting the urban regional environment. It also includes a concern for the efficiency of the built environment to support the local economy (Allen, 2009; Pieterse, 2010).
- Social sustainability: This dimension is relies on a set of actions and policies which should aim to improve and support the quality of life and the livelihoods of local communities while also being committed to fairness, inclusiveness and cultural adequacy which promotes equal access and distribution of rights to use and appropriate the natural, economic and urban environments (Allen, 2009; Pieterse, 2010).

The image below illustrates Allen’s approach to urban sustainability and captures the political underpinning of the other four domains of urban sustainability.

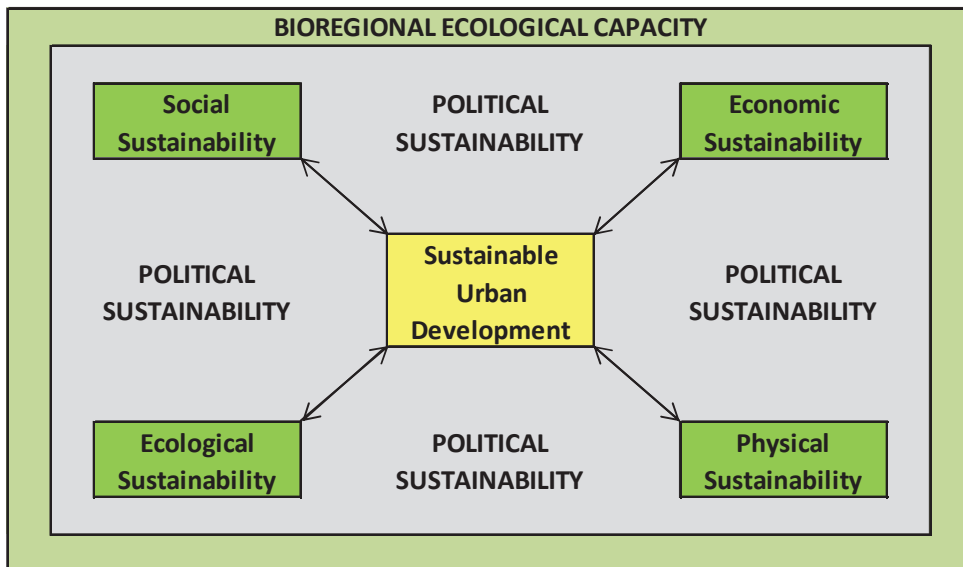


IMAGE 2.7: Adriana Allen’s five dimensions of urban sustainability (adapted from Figure 1 in Pieterse, 2010: 15).

The image shows that if the four facets of social, economic, ecological and physical sustainability are all, in a way, pulling against each other, each aiming to achieve maximum sustainability in their individual arenas, the political dimension will or should act as the mechanism that balances and regulates the other four dimensions within the boundaries of sustainability within the constraints of the bioregional ecological capacity (Allen, 2001).

Since cities and urban precincts cannot become “islands of reform” in isolation from the wider global political economy in which they are produced, a wider view of urban sustainability is called for which should re-embed the understanding of cities and their multiple and diverse impacts on society and the environment into the modern processes of urbanisation (Allen, 2009).

### 2.6.3 DEFINING URBAN PRECINCTS IN SOUTH AFRICA

South Africa has various types of urban precincts as a result of the relatively recent growth in urbanisation as associated with a developing country and as a result the country’s particular segregating political history (Donaldson, 2001). These types of urban precincts can be characterised by three main features which are, first, the nature of the precinct and its stakeholders, second, the spatial context of the precinct, and third, the economic context of the precinct (South African National Treasury, 2014).

Insight into the nature of a precinct and its stakeholders, as well as the potential complexity based on the diversity of interests present in the precinct, can be determined through the examination of three defining elements (South African National Treasury, 2014):

1. The market segment or socio-economic profile of the precinct;
2. The existing land use mix of the precinct; and
3. The stakeholder mix of the precinct.

The three-dimensional matrix in the image below illustrates the possible combinations of these elements which could define any given precinct in South Africa.

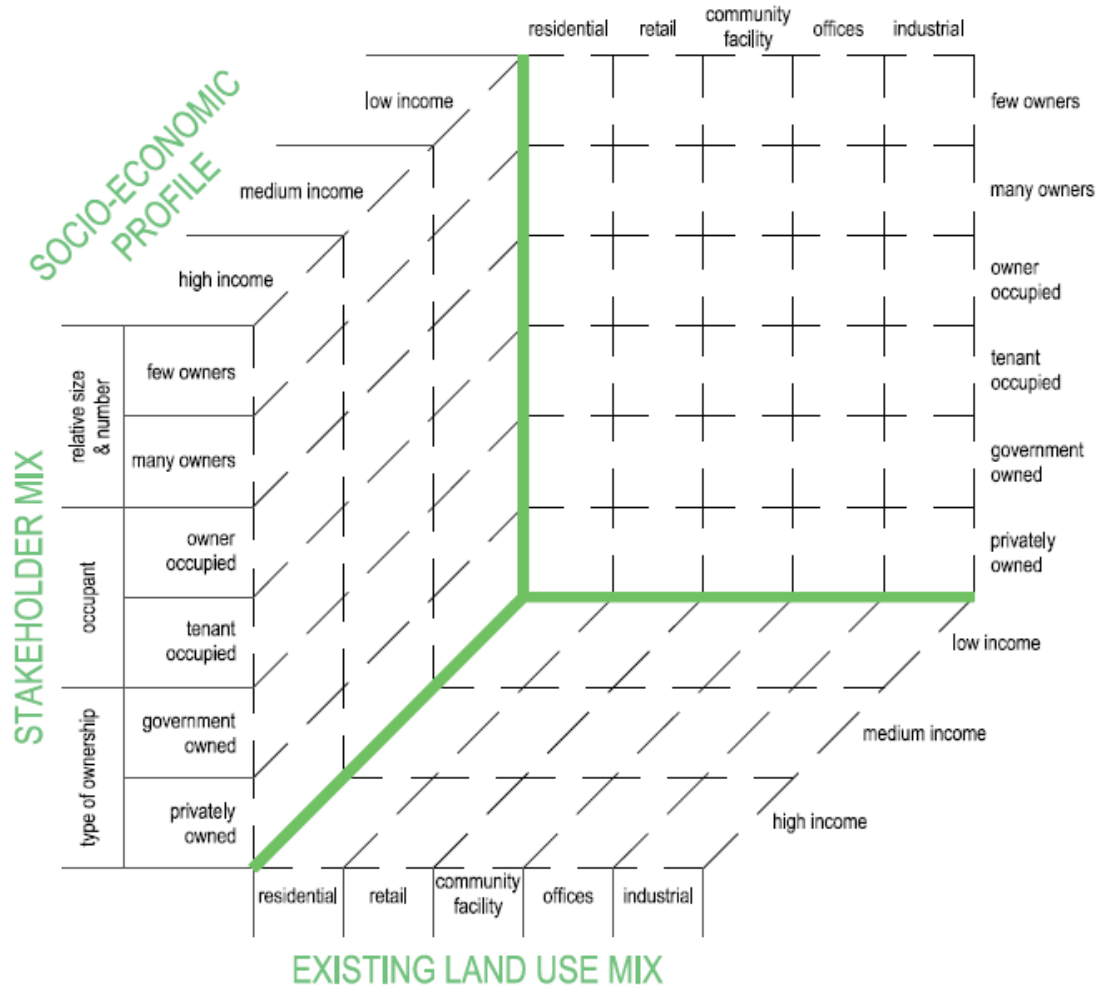


IMAGE 2.8: The key elements for profiling an urban precinct (adapted from Figure 7 in South African National Treasury, 2014: 18).

The market segment or socio-economic profile of a precinct is primarily concerned with understanding the social characteristics of current and future predominant users and customers of the precinct. Important considerations include whether it is a mixed income area catering to a variety of incomes versus serving only one section of the market, whether it is a high-income node with low vacancy levels and high property values with active investors versus a largely informal, low-income node, and what impact increasing the

residential component could have on the variety of income groups present in the precinct (South African National Treasury, 2014).

The existing land use mix of the precinct can help in understanding the nature of the precinct by defining the role it plays in its surrounding community and city as a whole and what the key land uses are that attract people to the precinct. Some defining land uses include a modal interchange where many people travel through each day, purely retail, private assets and investment opportunities, or public assets such as courts, schools, hospitals and/or libraries (South African National Treasury, 2014).

The vertical dimension of the matrix is the stakeholder mix and is the most complex of the defining elements which attempts to capture the range of stakeholder interests that may exist in any specific urban precinct (South African National Treasury, 2014). The three most easily recognised stakeholder mixes in precincts are publicly owned precincts such as CIDs and municipalities, private precincts such as the Century City development privately owned and developed by Rabie Property Group, and public-private partnerships including investor dominated precincts such as the Sandton area of Johannesburg dominated by Growthpoint Properties Limited.

The stakeholder mix of a precinct will inform the final choice of the precinct's planning, management and maintenance models. It is important that the different reasons and motivations for the various types of stakeholders be viewed realistically: private property owners will be concerned with property values and returns on investments, business owners will be concerned with available parking and foot traffic, and residents will be concerned with safety, comfort, facilities and nearby employment opportunities (South African National Treasury, 2014).

Some of the factors that should be considered when determining the stakeholder mix or profile of a precinct and the possible implications of those factors are shown in the table below.

TABLE 2.2: Considerations for determining the stakeholder profile of an urban precinct (South African National Treasury, 2014).

FACTORS TO CONSIDER	POSSIBLE IMPLICATION
Type of Property Ownership	Public sector owners are not as responsive to property values as private investors. Public agencies may also have less control of their budgets, and therefore greater difficulty in allocating funds to precinct planning and management.
Type of Occupant	Tenants can easily move elsewhere so may be reluctant to assist, whereas owners have a vested interest in the area surrounding their property.
Relative Size and Scale of Owners	A few large institutional property owners are easier to organise than many small owners who do not have the time or the resources to invest in precinct maintenance and management.
Tenant Mix	Small independents have fewer resources to draw on while national chains have access to more resources.
History of Rates Payments	This may indicate the level of satisfaction with municipal services and could affect the relationship between the municipality and the rate paying community.
Any Evidence of Social Capital	What is the current state of relationships between the different stakeholders, and could these relationships help or hinder any agreements on the maintenance and management of the precinct.
Perceptions of the Area	How do the different stakeholders view the area and how do they currently view the future of the urban precinct.

Further to the contextual factors discussed above and given that urban precincts never function in isolation, the physical, spatial role and the setting of the precinct in relation to the rest of its city should also be considered. Fundamental considerations should include the precinct's physical location within the city's spatial or urban network, its proximity to activity corridors, the CBD or emerging urban hubs, whether the precinct is located on the city's primary or secondary networks or in a peripheral area, whether the precinct is a

movement generator or significant transport hub, and/or whether the precinct is an established or still emerging node within the city (South African National Treasury, 2014).

A general lack of understanding of the economic forces that drive urban development by local policy-makers and urban planners has been undermining South African spatial planning initiatives attempting to address the post-apartheid legacy of inequitable and inefficient urban structures (Donaldson, 2001). The two key elements of the economic context of an urban precinct are the role of the precinct in the local property market as well as the precinct's influences on and possible traction of local business location decisions (South African National Treasury, 2014).

An urban precinct's economic characteristics, its spatial characteristics, its purpose within its city's overall urban network strategy and the nature of the stakeholders present will all affect the precinct's priority for investment, its readiness for the implementation of precinct management and maintenance programmes, and the type operational entity selected to oversee these programmes (South African National Treasury, 2014).

There are a number of different types of precincts, all of which are inter-connected in the broader urban scale of cities and all of which have a different role to play in their cities (South African National Treasury, 2014). The type of precinct in terms of its social and economic contexts and especially its stakeholder profile will determine the key role-players and motivators in any management programmes and, inherently, sustainability initiatives.

The table below summarises the main variations of urban precincts found in the South African urban fabric.

TABLE 2.3: Defining ranges of South African urban precincts (South African National Treasury, 2014).

PRECINCT ATTRIBUTE	POSSIBLE RANGE OF CIRCUMSTANCES AND KEY CONSIDERATIONS	IMPLEMENTATION OF PRECINCT MANAGEMENT OR SUSTAINABILITY INITIATIVES
Status of the property market	Well established to none.	Easiest to implement where strong private property base gives an economic incentive for committed action.
Nature of property ownership	Fully private, mixed, or fully public. Large institutional owners, too many small single-property owning landowners.	Easiest to implement where large private property owners have an economic interest and additional capacity to become involved in management activities. Dominant public sector institutions can also provide strong leadership.  More difficult to implement with a diversity of small interests.
Nature of customer/users	Understanding the current mix and nature of users, and what the current demand is in the precinct (both actual and unrealised).	Applicable to all types, but must be responsive to their needs. Must be aware of the unmet demands on the node, and not have unrealistic expectations of future.
Land-uses present	Single-use to mixed-use.	Diverse, mixed use areas are most suited to precinct management and sustainability initiatives.
Municipal plans for the area	Does the area appear in municipal plans? What type of development should be in these areas? What is the highest, best use for the area?	Higher order nodes, in particular CBDs and urban hubs, are most suited to precinct management and sustainability initiatives.
Role of the municipality	Dominant land-owner, to one of several land-owners, or only basic service provision.	Will vary according to the context: may be a founding member of management programmes and sustainability initiatives, or it may be restricted to coordination and general service provision.
Role of the public sector	Dominant land-owner, to one of several land-owners.	A precinct with a dominant land-owner will be most suited to precinct management and sustainability initiatives.

State of municipal service provision	Poor to excellent quality.	An insufficient level of service provision as a key driver for the establishment of precinct management entities.
Core need	“Crime and grime” issues, to marketing and branding, to basic service provision, or basic economic infrastructure.	Supplementary service provision, community organisation and lobbying or engagement with municipality.
Focus of precinct management	Inclusive, day to day operational management.	Focus needs to be agreed by all stakeholders.

## 2.7 THE WAY FORWARD FOR THE GREEN STAR SOUTH AFRICA RATING SYSTEM

### 2.7.1 THE INTRODUCTION OF THE SOCIO-ECONOMIC CATEGORY

As a first step towards urban sustainability outside of the widely accepted and adopted environmentally responsible or ‘green’ individual buildings, the Green Building Council of South Africa introduced the Socio-Economic Category into their Green Star South Africa rating portfolio in October of 2013 (Aurecon SA (Pty) Ltd, 2014). The Socio-Economic Category has been launched as an optional additional category which assesses and recognises the social-economic initiatives of base building refurbishments or new building projects that are aiming for ratings under any of the Office, Retail Centre, Multi-Unit Residential, Public and Education Building or the Interiors rating tools (Green Building Council of South Africa (17), 2013).

The processes of designing, constructing and operating buildings can, at least to some degree, address societal challenges such as poverty, unemployment, lack of education and skills, and poor health. This Socio-Economic Category is the Green Building Council of South Africa’s first step in addressing the social and economic factors important to broader sustainability issues that are particularly relevant for South Africa and other developing countries. The Green Building Council of South Africa encourages all project teams seeking

Green Star South Africa ratings to make use of the Socio-Economic category to improve, assess and validate their socio-economic attributes, mainly in the design and construction phases of the urban development project (Green Building Council of South Africa (17), 2013).

The pioneering Socio-Economic Category aims to recognise urban development projects for achievements across the following priority set of seven possible credits (Green Building Council of South Africa (17), 2013):

- Employment Creation – This credit awards design decisions and construction practices which create employment opportunities, including facilities for micro enterprises, targeted employment for priority groups, and labour-intensive construction methodologies.
- Economic Opportunity – This credit deals with the growth and development of small and medium sized enterprises through interventions in the design, construction and operational phases of a building project. These activities include the procurement of goods and services, and the creation and backing of enterprise development support programmes.
- Skills Development and Training – This credit targets skills development, training and the provision of practical work experience opportunities for people employed in the categories of unskilled, semi-skilled, skilled, supervisory, technical or design and are part of the project’s design and/or construction teams.
- Community Benefit – This credit recognises projects that provide facilities for community or public benefit in response to socio-economic needs or facilities identified as assets of the surrounding communities or stakeholders.

- Empowerment – This credit recognises projects that are aligned with and have made achievements in implementing the principles of Broad-Based Black Economic Empowerment.
- Health and Safety – This credit recognises actions taken that improve the primary health of construction workers, as well as actions taken to promote better safety practices and understanding in the construction industry.
- Mixed Income Housing – This credit is currently only available for projects pursuing a Multi-Unit Residential rating. It awards the creation of mixed income housing options by way of including proportions of more affordable housing, by providing a range of housing types, or by including accommodation for low-income staff.

### 2.7.2 THE NEXT STEP: A SOUTH AFRICAN PRECINCT LEVEL RATING TOOL

The introduction of the Green Star South Africa sustainable urban development rating system as described above has led to a dramatic increase in green building activities and the widespread adoption of sustainable practices in the South African urban development and construction industries (Aurecon SA (Pty) Ltd, 2014). The existing GSSA rating tools provide a common language and standard of measurement for green buildings and a clear picture of what is expected in terms of global sustainability practices for building design and construction, and they provide clear guidelines on how to achieve the various levels of ratings. These existing rating tools promote and encourage integrated and whole-building design, raise awareness of the benefits of sustainable building activities, and stimulate significant reductions of the environmental impacts of urban development (Green Building Council of South Africa (20), 2008).

However, as evidenced by the global trend towards the development of sustainable communities, neighbourhoods and settlements, the established model of the Green Star South Africa rating system, which only focuses on single buildings or small clusters of buildings in isolation, is no longer sufficient for the progress and advancement of

sustainable urban development principles, initiatives and activities in the South African markets (Perinotto, 2014).

As a first step the Green Building Council of South Africa had introduced the Socio-Economic Category into their Green Star South Africa rating system (Aurecon SA (Pty) Ltd, 2014). As described in the section above, the introduction of this category was the GBCSA's first step in addressing the social and economic factors important to broader sustainability issues that are particularly relevant for South Africa and other developing countries (Green Building Council of South Africa (17), 2013).

The next step for the Green Building Council of South Africa will be the development and introduction of a precinct level rating tool fit for the South African, and developing country, context. The GBCSA has confirmed that, as with the other rating tools in the Green Star SA rating portfolio, a precinct or community level rating tool will be adopted and adapted from the existing international precinct level rating tools, specifically those used in the Australian and North American industries (Green Building Council of South Africa (18), 2016).

## 2.8 EXISTING INTERNATIONAL PRECINCT LEVEL SUSTAINABLE URBAN DEVELOPMENT RATING TOOLS

The leading international sustainable urban development markets, including Australia, Europe and the United States, are more advanced than the South African market as a result of, among others, voluntary market drivers and the continued support of regulatory and government bodies, and they have developed rating tools for the measurement and benchmarking of sustainable precinct, community and neighbourhood level developments (Perinotto, 2014). These existing international precinct level sustainability rating tools move beyond the assessment of individual buildings and place the emphasis on the interrelationships between sustainable buildings, public open spaces and private working spaces within defined community boundaries (Orova & Reith, 2013).

Precinct, neighbourhood and community level sustainability rating tools from across the world assess urban developments through the use of all-inclusive approaches which assess common environmental and other sustainability measures of buildings within their greater urban settings in order to improve the overall sustainable quality and performance of urban precincts (Japan Sustainable Building Consortium, 2015). These international rating tools promote collaborative and interdisciplinary approaches to the planning and implementation of urban development projects with the intention of improving the overall quality of life through the integration of environmental, economic, cultural and social objectives (Abu Dhabi Urban Planning Council, 2010).

As it is most likely that any South African precinct level rating tool will be based on Australian and the United States' rating tools, the existing tools of these two countries will be the main focus of this section, with a brief summary of some of the other significant international precinct level rating tools included at the end of the section.

### 2.8.1 THE AUSTRALIAN GREEN STAR COMMUNITIES RATING TOOL

The Green Building Council of Australia (GBCA) was launched in 2002 and is uniquely supported by both the Australian built environment industry and governments across the country, encouraging the country-wide adoption of sustainable building practices. The organisation works with their members to transform Australia's built environment into one that is healthy, liveable, productive, resilient and sustainable (Green Building Council of South Africa (1), 2015).

As previously stated the Green Building Council of South Africa's Green Star South Africa rating systems are based on the Green Building Council of Australia's Green Star rating systems. The Australian Green Star rating tools that have been developed to date are (Green Building Council of Australia, 2015):

- Green Star Design and As Built – The new building rating tool that combines the legacy rating tools for Education, Healthcare, Industrial, Multi Unit Residential,

Office, Retail and Public buildings into one tool that certifies the design and construction of any building or major refurbishment.

- Green Star Interiors – The existing building rating tool that assesses the sustainability of interior fit-outs.
- Green Star Performance – The existing building rating tool that assesses the operational performance of existing buildings.
- Green Star Communities – The rating tool that assesses and certifies the sustainability of community-level projects.

The addition of the Green Star Communities rating tool demonstrates the Green Building Council of Australia's movement of thinking beyond individual buildings and their commitment to the creation of better neighbourhoods, communities and cities through the outlining of pathways, indicators and methods of measurement to achieve this vision (Green Building Council of Australia, 2015).

The Green Star Communities rating tool is a voluntary rating tool that was developed by the Green Building Council of Australia, in close collaboration with the built environment industry including government, public and private sector developers, professional services providers, academia and product manufacturers and suppliers, to provide best practice benchmarks and third-party verification of the sustainability of community and precinct level developments (Green Building Council of Australia, 2015).

The Green Star Communities tool resulting from the Green building Council of Australia's above mentioned research into similar previously established rating and measurement tools and close collaboration with built environment industry professionals is an independent rating tool that supports the planning, design and delivery of communities, precincts and neighbourhoods that prioritize environmental sustainability alongside broader issues such as economic prosperity, liveability and community health and wellbeing (Green Star (Australia) (2), 2015). The first Green Star Communities pilot tool was launched in June of

2012, with the updated Pilot v0.2 being released in February of 2015 (Green Building Council of Australia, 2015).

The Green Star Communities rating tool assesses the sustainability performance of a community, neighbourhood or precinct sized project's planning, design and construction outcomes against industry benchmarks and minimum standard requirements. This tool's National Framework Checklist is divided into the following six categories, each of which is further divided into recognisable outcomes and awardable credits (Green Building Council of Australia, 2015):

- Visionary Leadership and Governance – This category recognises and rewards the establishment of coordinated and transparent approaches to design and construction activities, a commitment to implementation with practical and enforceable standards of ownership, accountability and delivery and performance evaluation opportunities for continual improvement, and continuous and transparent engagement with all stakeholders.
- Liveability – This category rewards the provision of diverse and affordable housing options, the creation of healthy, safe and secure communities, initiatives and activities which foster inclusiveness and cohesiveness, and the adaptability of buildings and communities.
- Environmental responsibility – This category promotes the enhancement of natural environments and the reduction of urban developments' ecological footprints.
- Design excellence and leadership – This category rewards the adoption of effective planning practices, the encouragement of integrated design, the maintenance of flexible and adaptable approaches to the design of buildings and spaces, the creation of desirable spaces and places, and the promotion of universal accessibility.

- Economic prosperity – This category recognises the promotion of education and learning opportunities, enhanced employment opportunities, the attraction of investment, and the encouragement of innovation.
- Innovation – This category promotes and rewards activities fostering sustainable cultures and behaviours, and encourages and rewards innovation in the field of sustainable urban development.

The full Green Star Communities rating tool National Framework Checklist, against which projects record their responses and required actions to achieve a Green Star Communities certification, is presented in Appendix C.

The Green Star Communities Pilot tool supports the Australian federal government and National Urban policy by providing nationally consistent benchmarks and project level deliverable outcomes, Australian state governments with planning and approvals of significant projects, Australian local governments with frameworks for greater sustainable development outcomes, developers with more efficient processes, financiers with frameworks for sustainable investments, and consumers to make informed decisions about where they choose to live, work and play (Green Star (Australia) (2), 2015).

The following is a summary of the Green Star Communities eligibility criteria (Green Star (Australia) (2), 2015):

1. Space Use: The project must contain at least four buildings of any size and mix of Class 1 – 9 structures as classified under the Building Code of Australia.
2. Spatial Differentiation: The project must be clearly distinct, i.e. the project must have a clear study area boundary that is subject to a “plan of development”. This may be a structure plan, master plan, neighbourhood plan, renewal plan or similar, and this plan or planning process must be managed by a government entity and/or a private sector or community-owned development entity.

3. **Conditional Requirements:** The project must achieve a minimum of 15%, 25% or 35% of the available points in each of the five mandatory categories (economic prosperity, environmental responsibility, design excellence and leadership, governance, and liveability) when seeking a 4, 5 or 6 Star Green Star Communities rating respectively. The project must achieve a minimum of 45 points overall. Where the project is subject to approval under the Environmental Protection and Biodiversity Conservation Act 1999 as a controlled action, the project must receive written approval under the Act.
  
4. **Timing of Certification:** The project's initial project certification must be achieved within three years of registration and recertification must be achieved within five years of initial certification, or within five years from the project's last recertification date.

The Green Star Communities Pilot tool's full certification process can be viewed in Appendix D.

Green Star Communities projects are awarded points by an independent assessment panel based on how well they perform in each category. A rating is then determined by comparing the overall score with the rating scale as shown in the Table below.

TABLE 2.4: Australian Green Star Communities ratings (Green Building Council of Australia, 2015).

POINT SCORE	GREEN STAR RATING AWARDED	OUTCOME
45 - 59	Four Star	Best Practice
60 - 74	Five Star	Australian Excellence
75 +	Six Star	World Leader

The Green Star Communities rating tool, as with all the other tools in the Green Star rating system, aims to recognise and reward projects that achieve best practice outcomes or higher and, therefore, projects are not awarded 1, 2 or 3 Star ratings certification as these represent minimum, average and standard good practice respectively (Green Building

Council of Australia, 2015). Urban development projects with green Star Communities certifications must be reassessed every five years in order to confirm continuous achievement and maintenance of their sustainability targets (Blundell, 2014).

The Australian Green Star Communities rating tool is one of the world's first independent and transparent national schemes able to assess and certify the sustainability of precinct-level projects (Green Building Council of Australia, 2015).

## 2.8.2 THE LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN – NEIGHBOURHOOD DEVELOPMENT RATING TOOL

The Leadership in Energy and Environmental Design (LEED) programme is the most widely recognised and most widely used green building certification programme in the world. The LEED certification programme was developed by the United States Green Building Council (USGBC) and guides the design, construction, maintenance and operations of buildings, homes and communities. The LEED rating systems are supported by numerous USGBC staff and volunteers, serving on committees and advisory groups, who are constantly re-evaluating the LEED benchmarks and procedures to ensure they remain technically rigorous, market relevant and leadership-orientated. LEED has found lasting relevance through its experts' continued dedication to keeping LEED on the leading edge of the global sustainable design and building movement (U.S. Green Building Council (1), 2015).

The Leadership in Energy and Environmental Design programme's rating systems are continuously updated through the correction and clarification of credit languages, adaptations of existing rating tools to respond to the particular needs, constraints and opportunities of different project types, and through the comprehensive improvement phase which includes multiple avenues for stakeholder input and final approval the United States Green Building Council (U.S. Green Building Council (1), 2015).

The Leadership in Energy and Environmental Design programme currently consists of five rating systems that address multiple project types. The LEED rating systems are (U.S. Green Building Council (1), 2015):

- Building Design and Construction – The new building rating tool that certifies the design and construction of any building or major refurbishment.
- Interior Design and Construction – The existing building rating tool that assesses and certifies the sustainability of new interior fit-outs.
- Building Operations and Maintenance – The rating tool that assesses and certifies the operational performance and maintenance of existing buildings.
- Neighbourhood Development – The rating tool that assesses and certifies the sustainability of neighbourhood-level projects.
- Homes – The rating tool that assesses and certifies sustainability protocols in a residential context.

Each rating system guides the design and operational decisions of the project team on their path towards Leadership in Energy and Environmental Design certification through credit requirements that address the unique needs of building and project types (U.S. Green Building Council (1), 2015).

The Leadership in Energy and Environmental Design Neighbourhood Development (LEED ND) rating tool is the first LEED rating system to focus beyond the building level and it promotes best practices in location, design and development at the neighbourhood scale. LEED-ND was co-developed by the Natural Resources Defense Council, the Congress for the New Urbanism and the United States Green Building Council, and its broad approach to neighbourhood sustainability reflects the most current research and ideas about smart, green, sustainable and well-designed neighbourhoods (Welch, Benfield & Raimi, 2015).

In addition to green buildings, Leadership in Energy and Environmental Design Neighbourhood Development prioritises criteria such as site location, urban design, transportation, housing affordability, walkability, socio-economics, and neighbourhood-wide green infrastructure. LEED-ND defines a set of measurable standards that collectively identify whether a development or proposed development of two buildings or more can be deemed environmentally superior. These standards include prerequisites required as a baseline for sustainable neighbourhood development and credits to reward additional best practice standards for sustainable neighbourhood development (Welch, Benfield & Raimi, 2015).

The key strategies of the Leadership in Energy and Environmental Design Neighbourhood Development rating system are organised into three basic sections, namely: smart location and linkage, neighbourhood pattern and design, and green infrastructure and buildings. The smart location and linkage strategies focus on where to build. It includes the selection of smart locations such as previously developed sites or contaminated sites, designs sensitive to the project site's natural setting, the design of connected neighbourhoods with good connections for pedestrians, cyclists and vehicles, and a focus on public transit through the location of housing and jobs in compact clusters near public transit nodes (Welch, Benfield & Raimi, 2015).

The neighbourhood pattern and design strategy focusses on what to build. It includes the design of neighbourhoods that use land efficiently and thereby limit urban sprawl and reduce bulk infrastructure requirements, and the design of diverse and convenient neighbourhoods through combining residential, commercial, live-work land uses and a range of housing types and sizes that are designed for a variety of ages and abilities. Further, it includes the design of walkable streets that are comfortable, safe and inviting for pedestrians, and the inclusion of public parks, open spaces, gardens and ecological areas. Other design considerations within this strategy are reducing parking and transportation demand and providing safe, comfortable and well-maintained bicycle facility (Welch, Benfield & Raimi, 2015).

The green infrastructure and buildings strategies focus on how to manage environmental impacts. It includes recognition for reusing older buildings and for including green buildings into the neighbourhood. It includes design leading to reductions in construction, stormwater and light pollution and the reduction of heat islands (Welch, Benfield & Raimi, 2015).

The Leadership in Energy and Environmental Design rating system further recognises and rewards innovation and exemplary environmental design and process performance, as well as the consideration and inclusion of any geographically-specific environmental, social equity or public health priorities (Welch, Benfield & Raimi, 2015).

The Leadership in Energy and Environmental Design Neighbourhood Development rating tool's full Sustainable Neighbourhood Development Checklist describing all of the tool's credits and prerequisites is presented in Appendix E.

The Leadership in Energy and Environmental Design Neighbourhood Development rating tool helps to improve neighbourhoods, precincts and communities to (Welch, Benfield & Raimi, 2015):

1. Evaluate development proposals.
2. Improve development proposals.
3. Guide improvements to existing neighbourhoods.
4. Inform community planning and zoning activities.
5. Inform specific state, local, and regional policy.

The Leadership in Energy and Environmental Design – Neighbourhood Development rating system is applicable to a wide variety of advocacy efforts and community-level projects, but certification is most appropriate for projects smaller than 320 acres and larger than one

building, being developed by a single developer or coordinated development group, and being constructed within a predictable timeframe. Due to the long time frame of large-scale planning and development projects, the LEED-ND rating tool has a three-stage certification process which allows the United States Green Building Council to recognise projects as they move through the planning, entitlement and construction process, and allows the project team to receive feedback throughout the development process (Welch, Benfield & Raimi, 2015).

The full LEED-ND certification process can be viewed in Appendix F.

All Leadership in Energy and Environmental Design rating systems, including LEED for Neighbourhood Development, have been evaluating projects on a 100-point base scale since 2009. Projects seeking certification must meet all prerequisites and then earn at least 40 points by achieving various credits. The LEED-ND Certification Levels are awarded according to the rating scale as shown in the Table below.

TABLE 2.5: Leadership in Energy and Environmental Design – Neighbourhood Development ratings (Welch, Benfield & Raimi, 2015).

POINT SCORE	LEED-ND CERTIFICATION LEVEL AWARDED
40 - 49	LEED-ND Certified (basic certification)
50 - 59	LEED-ND Silver Certified
60 - 79	LEED-ND Gold Certified
80 - 100	LEED-ND Platinum Certified

### 2.8.3 THE UPTAKE OF THE GREEN STAR COMMUNITIES AND LEED – NEIGHBOURHOOD DEVELOPMENT RATING TOOLS

Green Star Australia released its first Communities rating tool, Pilot Version 0.0, in June of 2012. As with all of the tools in the Green Star suite, the Communities rating tool is continually being updated and improved. The current version available is the fifth released version, Green Star Communities V1.1 (Green Star (Australia) (4), 2016).

In the four years since the release of the Green Star Communities rating tool, 25 precinct level projects have received a Green Star Communities certification, of which 17 projects have achieved a 6 Star Green Star certification (Green Star (Australia) (3), 2016). There are also a further 14 projects currently registered with Green Star Australia in pursuit of Green Star Communities ratings (Green Star (Australia) (3), 2016).

The Leadership in Energy and Environmental Design – Neighbourhood Development rating tool was first introduced into the North American urban development industry in 2008. The latest available version of the LEED – ND tool is Version v4, released in April 2016 (U.S. Green Building Council (2), 2016).

In the eight years since the release of the Leadership in Energy and Environmental Design – Neighbourhood Development rating tool, 167 precinct level projects have received a LEED - ND certification, of which 13 projects have achieved a Platinum certification (U.S. Green Building Council (3), 2016). There are also a further 288 projects currently registered with U.S. Green Building Council in pursuit of LEED – ND ratings (U.S. Green Building Council (3), 2016).

Among the registered projects currently striving for a Leadership in Energy and Environmental Design – Neighbourhood Development certification is the Menlyn Maine precinct development situated in Tswane, South Africa (U.S. Green Building Council (3), 2016). This is the first South African urban development project to register for a sustainability certification at precinct level.

Full lists of the Green Star Communities and LEED – ND certified projects can be seen in Appendix G.

## 2.8.4 OTHER SIGNIFICANT INTERNATIONAL PRECINCT LEVEL SUSTAINABILITY RATING TOOLS

As any South African precinct level rating tool is most likely to be based on the Australian and the United States' rating tools, the above sections of this chapter have described in detail these countries' sustainability rating systems and specifically their community and neighbourhood level rating tools. This section will provide a brief summary of some of the other precedent setting international precinct level rating tools, such as including the Building Research Establishment Environmental Assessment Method (BREEAM) Communities tool used in the United Kingdom, The German Sustainable Building Council (Deutsche Gesellschaft für Nachhaltiges Bauen – DGNB) Urban Districts rating tool used primarily in Germany, the Comprehensive Assessment System for Built Environment Efficiency (CASBEE) City or Urban Development tools used primarily in Japan, and the Pearl Community Rating System (PCRS) used primarily in the United Arab Emirates.

### 2.8.4.1 THE BUILDING RESEARCH ESTABLISHMENT ENVIRONMENTAL ASSESSMENT METHOD – COMMUNITIES RATING TOOL

The Building Research Establishment Environmental Assessment Method was launched in 1990 and was the world's first sustainability rating system used to establish the standard for sustainable building design, construction and operations. BREEAM was developed by the Building Research Establishment (BRE) with the aim of ensuring that its standards provide social and economic benefits while alleviating the impact of the built environment on the natural environment (Building Research Establishment, 2016). The BREEAM Communities rating tool was developed in 2011 through the expansion of BREEAM and with the aim of supporting design features, infrastructure, building lifecycles and the master planning of large scale developments. The main objective of this tool is the expansion of environmental assessment to a more encompassing approach to sustainability through the consideration of social and economic impacts on the wider scale as necessary for large-scale urban development projects (Building Research Establishment, 2016). The six rating categories of

the BREEAM rating tool, which are measured through a number of attainable credits similar to those in the Australian Green Star Communities and the LEED-ND rating tools, are governance, social and economic wellbeing, resources and energy, land use and ecology, transport and movement, and innovation (Building Research Establishment, 2016).

#### 2.8.4.2 THE GERMAN SUSTAINABLE BUILDING COUNCIL'S URBAN DISTRICTS RATING TOOL

The German Sustainable Building Council's rating system differs from other international rating tools in that it does not view buildings in isolation, but rather assesses any building or urban districts within their surrounding environments. The DGNB's Urban Districts rating tool assessment is based on the overall performance of the building or district over its entire lifecycle, and weighs environmental, economic, socio-cultural, and functional aspects, as well as technologies and processes used during development, and the location and performance of the development site (German Sustainable Building Council, 2016). The DGNB's rating system is also outcome orientated instead of input based, which allows for a more holistic view of the overall impact of the final finished building or urban district to be evaluated (German Sustainable Building Council, 2016).

#### 2.8.4.3 THE COMPREHENSIVE ASSESSMENT SYSTEM FOR BUILT ENVIRONMENT EFFICIENCY CITIES RATING TOOL

The Comprehensive Assessment System for Built Environment Efficiency is a rating tool that was developed by the Japan Sustainable Building Consortium (JSBC) to enable them to evaluate the environmental performance of buildings and the built environment. The CASBEE system is founded on three main areas of evaluation, namely, the evaluation of built environments through their entire lifecycles, the evaluation of buildings based on their impacts on environmental quality and environmental load, and the evaluation of built environments according to the Built Environment Efficiency index (Japan Sustainable

Building Consortium, 2015). The CASBEE-City rating tool assesses the quality and performance of cities from a triple bottom line perspective. These three perspectives are: environmental, including nature conservation, local environment quality, resource recycling, and CO<sub>2</sub> absorption; social, including living environment, social services, and social vitality; and economic, including industrial vitality, financial viability, and CO<sub>2</sub> trading (Japan Sustainable Building Consortium, 2015). The CASBEE system has a number of specific rating tools under which sustainability certifications can be awarded to urban development projects. Among these tools is the CASBEE-Urban Development rating tool which assesses groups of buildings and urban precincts. The CASBEE-City assessment takes place at a municipal level and requires a clearly defined area or precinct boundary in order to achieve a CASBEE-Urban Development rating and certification (Japan Sustainable Building Consortium, 2015).

#### 2.8.4.4 THE PEARL COMMUNITY RATING SYSTEM

The Pearl Community Rating System was developed by the Abu Dhabi Urban Planning Council as part of their Estidama – translates to ‘sustainability’ from Arabic – initiative which is being used to transform Abu Dhabi into a model for sustainable urbanism. The objective of the Estidama initiative is the creation of sustainable communities, cities and global enterprises by balancing environmental, economic, cultural and social perspectives and requirements (Abu Dhabi Urban Planning Council, 2010). The PCRS tool forms part of the larger Pearl Rating System which is applied to urban development projects throughout their lifecycles, including the design, construction and operation and maintenance phases (Abu Dhabi Urban Planning Council, 2010). The seven sustainability criteria that are assessed by the PCRS are integrated development processes, natural systems, liveable communities, precious water – which is specifically significant in the Middle East, resourceful energy, stewarding materials, and innovating practice (Abu Dhabi Urban Planning Council, 2010).

## 2.8.5 THE SUITABILITY OF EXISTING INTERNATIONAL PRECINCT LEVEL SUSTAINABILITY RATING TOOLS TO THE SOUTH AFRICAN CONTEXT

All of the existing international precinct, neighbourhood and/or community level sustainability rating tools seem to be outcome orientated rather than being process orientated. Since one of the main hurdles impeding precinct level sustainable urban development progress in South Africa is the difficulty of bridging the gap between the planning of sustainability objectives and the physical implementation of these planned objectives, international precinct level sustainability rating tools will have to be adjusted to focus more on sustainable development processes and applications rather than outcomes.

The international precinct level sustainability rating tools will also have to be restructured to suit the environment and requirements of a developing country as opposed to the first world country situations they currently serve. In line with this, a South African precinct level sustainability rating tool will have to be adjusted to take, among other things, the country's very unique political history into account and will, therefore, have to allow for the reintegration of South Africa's widespread and segregated urban communities. A South African tool will also have to be adjustable to be appropriate for the various types of precincts prevalent in South Africa, whether fully private, fully public, or whether they are joint ventures between both the private and public sectors.

## 2.9 CONCLUSION OF THE LITERATURE REVIEW

This chapter discussed sustainability and sustainable urban development and how it is continuously evolving in response to climate change and global urbanisation. An in depth study of urban sustainability was carried out along with studies into the global and local South African shifts in focus from the sustainability of single buildings in isolation towards the development of sustainable urban precincts and large, master-planned developments. Defining urban precincts in a South African context was investigated and some of the more significant existing international precinct level rating tools and systems were examined.

An in depth look into the current state of the South African sustainable urban development industry has revealed that, despite developers' desires to retain business-as-usual financial feasibilities and profits, the urban development industry responded positively to the introduction of the existing Green Star South Africa rating tool suite, which had a facilitating effect on sustainability at building level. The second biggest motivation behind going green has been the mitigation of escalating building operating costs, mostly resulting from difficulties experienced with national electricity supply and ongoing drought conditions, circumstances that will also advance South African precinct level urban sustainability agendas. Further motivations for the adoption of green building principles in South Africa include doing the right thing, complying to local and national ecological and environmental regulations, creating healthier living and working environments, higher returns on investments in commercial properties, and satisfying client demands.

The literature has also shown that South African urban sustainability at scales larger than individual buildings is running the risk of becoming nothing more than a political catchphrase as sustainable development efforts are continuously focussed on planning and strategising while little emphasis is being placed on the physical implementation of these plans and strategies. The South African industry is in need of advisory procedures and an instructive approach for the implementing local and global precinct and larger scale urban sustainability policies and achieving overarching sustainable urban development objectives.

This research contributes to the South African context of sustainable urban development literature by examining the shift the focus of urban sustainability objectives from buildings in isolation to include larger scales of development, as well as by highlighting the importance of, and the catalytic effect of, the measurement and recognition of sustainable urban development principles, initiatives and activities on the physical implementation of both global, national and local sustainability objectives.

The following chapter will define, discuss and defend the research methodology adopted in this study, including a description of the data collection and analysis techniques that will be utilised during the study.

## Chapter Three: RESEARCH METHODOLOGY

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### 3.1 INTRODUCTION TO THE RESEARCH METHODOLOGY

The previous chapter presented a snapshot of the vast existing literature available in the field of sustainable urban development. Among others it has shown that the existing sustainability rating tools, both local and international, have acted as catalysts for increased sustainable activities in the urban development industries. This chapter defines and discusses the research methodology adopted in this study which is aimed at testing the research question in a predefined and real world case.

This chapter starts by discussing the broad philosophical approaches to research available for use in studies of this type. It then moves on to define, describe and defend the selected research methodology of a qualitative single case study, and includes a description of the data collection and analysis techniques that will be utilised in this study. The chapter is concluded with an assessment of the possible ethical issues and limitations associated with this study.

### 3.2 PHILOSOPHICAL APPROACHES TO RESEARCH

Research can be defined and characterised as (Leedy, 1997):

*“a process through which we attempt to achieve systematically, and with the support of data, the answer to a question, resolution to a problem or greater understanding of a phenomenon.”* (Leedy, 1997: 5)

The research approach, or research paradigm, informs and guides how scientific research should be conducted, and is based on person’s philosophies, their assumptions about the world and the general nature of knowledge (Collis & Hussy, 2003; Guba & Lincoln, 1994).

There are many different approaches to research, the most prominent of which are exploratory, descriptive and explanatory research, basic and applied research, cross-sectional and longitudinal research, qualitative and quantitative research, and any mix of two or more research methods. The research approach adopted for any given piece of research depends on the nature of the question, problem or phenomenon being investigated (English, Basckin, de Jager & Nassimbeni, 2012).

The distinction between exploratory, descriptive and explanatory research is in the goals of the research (Babbie & Mouton, 2001). Exploratory research is a preliminary investigation of a relatively unknown field of study, which is likely to generate new insights, more questions, and hypotheses, while descriptive research is an in-depth study of an individual, a situation, a group, an organisation or a phenomenon with the aim to describe the object of the study accurately, and explanatory research is designed to indicate causality (Babbie & Mouton, 2001).

In basic and applied research the distinguishing feature of the type of research is its purpose (Durrheim, 1999). Basic research can be defined as research which advances knowledge of and develops general theoretical explanations of the fundamentals of how the social world works, while applied research is defined as research which attempts to address a specific policy question or to solve a concrete problem and which has a direct and practical real-world application (Neuman, 1999).

A further way of categorising research is along a time dimension through cross-sectional or longitudinal studies (English, Basckin, de Jager & Nassimbeni, 2012). Cross-sectional studies take snapshots of the objects of the studies at specific times and these snapshots are then analysed using exploratory, descriptive or explanatory research methods. Longitudinal studies are more complicated and more expensive to conduct as they take place over very long periods of time during which the objects of the study are continuously studied (English, Basckin, de Jager & Nassimbeni, 2012).

Perhaps the most popular distinction of research approaches is that of qualitative and quantitative research. Research conducted to generate a new theory through the collection,

analysis and interpretation of data is known as the inductive, or qualitative, approach to research (Neuman, 1999). Qualitative research is also described as the exposure of underlying meanings and patterns of relationships through the non-numerical examination and interpretation of observation (Babbie, 2010). Research conducted to test a theory about the world, based in the physical sciences and commonly used in the social sciences is known as the hypo-deductive, or quantitative, approach to research (English, Basckin, de Jager & Nassimbeni, 2012). Quantitative research can also be defined as the description and explanation of any observed phenomena through the numerical representation and manipulation of the observations (Babbie, 2010).

Since there are a number of features that are common to all types of research, it is uncommon that a research study is limited to one specific research method. Many methodologists argue that it can be useful to employ a mixture of research methodologies during any study. Most research dissertations and theses make use of a mix of two or more of the predominant research methods (English, Basckin, de Jager & Nassimbeni, 2012).

### 3.3 SELECTED RESEARCH METHODOLOGIES

#### 3.3.1 QUALITATIVE RESEARCH

The term “qualitative research” typically means any type of research that produces findings not arrived at through statistical procedures or other means of quantification, and refers to research about persons’ lives, behaviours and lived experiences, as well as about organisational functioning, cultural phenomena and social movements (Strauss & Corbin, 1990). The qualitative research approach is sensitive, nuanced, detailed and contextual, and, while some of the data may be quantified, the bulk of the research analysis is interpretive (Strauss & Corbin, 1990). In other words, qualitative research functions within a naturalistic and interpretive domain and can be defined as the study of things in their natural setting in an attempt to interpret and comprehend occurrences in the contexts that people bring to them (Sarantakos, 2013). The main purpose of qualitative research is to gain an in-depth

insight into and understanding of the phenomenon being investigated (English, Basckin, de Jager & Nassimbeni, 2012).

Qualitative research makes use of a wide variety of interconnected data collection and analysis methods with the aim of attaining a better understanding of the complexities and inherent relationships within the research problem's context (Denzin & Lincoln, 1998). The most important of these data collection and analysis methods and strategies used in qualitative research projects include (English, Basckin, de Jager & Nassimbeni, 2012):

- case studies,
- interviews,
- grounded theory,
- participative observation,
- focus groups, and
- social network analysis.

### 3.3.2 CASE STUDIES

Case studies are widely used in social sciences and management studies since standard experimental and survey designs are unsuitable due to there being too many variables for the number of observations made based on the central context (Yin, 1981). As a research methodology, case studies represent *“an analytical description of an event, a process, an institution or a program”* (Hoaglin, Bucknam, Mostellet & Stoto, 1982; English, Basckin, de Jager & Nassimbeni, 2012: 265) which support the creation of theoretical constructs, propositions or mid-range theories (Eisenhardt, 1991).

The case study approach makes use of multiple sources of evidence and regards entire cases of study as units within which the relationships between the features become important (English, Basckin, de Jager & Nassimbeni, 2012). Case studies are rich empirical descriptions of information based on a wide array of data sources and have been described by researchers as one of the most interesting forms of information processing (Bartunek, Rynes & Ireland, 2006).

Case studies can be classified according to their principal purpose. These classifications are:

- The intrinsic case study. A case study undertaken because the researcher wants to know more about a particular case.
- The instrumental case study. A case study where a particular case is studied for insight into an issue or studied to refine a theory.
- The collective case study. A case study where the intrinsic case study is extended to cover more than one case in an effort to learn more about the particular phenomenon, population or condition being researched.

### 3.4 REVISITING THE RESEARCH QUESTION AND PROPOSITION TO JUSTIFY THE QUALITATIVE / CASE STUDY RESEARCH APPROACH

The research question of this dissertation as outlined in Chapter One is:

*Is there a need for the introduction and incorporation of a precinct level sustainability rating tool in South Africa?*

The research proposition as outlined in Chapter One is:

*The introduction of a South African sustainable precinct rating tool will encourage the South African urban development industries and role players to incorporate and*

*implement sustainable urban development principles, policies and initiatives on precinct or larger scales outside of single green buildings.*

Through the examination and careful analysis of the research question and proposition as repeated above and of the research aim and objectives as outlined in Chapter One this study can be classified as a qualitative study as it can be characterised as an “*attempt to obtain an in-depth understanding of the meanings and definitions of the situation presented by informants*” (Wainwright, 1997; English, Basckin, de Jager & Nassimbeni, 2012: 243). The research question and proposition clearly indicate that the research to be undertaken will be heavily dependent on people, and their opinions and understanding of sustainable urban development principles and activities, as well as their personal and professional motivations for adopting and incorporating such principles and activities.

The logic of a qualitative and case study approach to research does not demand large samples and it does not attempt to detach the phenomenon from its setting (English, Basckin, de Jager & Nassimbeni, 2012). Participants’ perspectives and contextual factors are important to the inquiry since the purpose is to gain an in-depth understanding of the phenomenon being investigated (English, Basckin, de Jager & Nassimbeni, 2012). Since the research question and proposition as outlined above have a clearly defined context, that of sustainable urban development measurement and rating at a precinct level, a case study approach is deemed appropriate.

Qualitative research and the case study research approach have been the dominant approaches to research employed by researchers in the field of sustainable urban development. Previous research that has followed this approach includes works by Allen (2001), Blundell (2014), Chia-hao (2013), Malan (2008), Michell (2010), and Pieterse (2010).

### 3.4.1 JUSTIFICATION FOR THE IMPLEMENTATION OF A SINGLE CASE STUDY

Although multiple case studies provide a more comprehensive scope for data collection and analysis, the importance of single case studies is maintained due to the enhanced theory

formation which results from this method's allowance for the interpretation and understanding of a focussed area of study (Eisenhardt, 1991). A single case study research method can be described as either an intrinsic case study, during which insights into the case itself is the purpose of the research, or an instrumental case study, during which a case is studied with the purpose of providing insight into a particular issue, redrawing generalisations, or building theories (Gable, 1994).

This study's research question requires that a specific insight be gained, that is, whether the introduction of a precinct level sustainable urban development rating tool will motivate the South African urban development industries and role players to adopt and incorporate precinct level sustainable urban development initiatives. This can be achieved through the implementation of a single intrinsic case study.

### 3.5 SELECTION OF A CASE STUDY

The research question posed in Chapter One and repeated in Section 3.3 above is focussed on the motivation behind the adoption of sustainable urban development principles and initiatives and whether the introduction of a precinct level sustainable urban development rating tool will encourage South African urban development industries and role players to adopt and incorporate precinct levels sustainable urban development initiatives.

The Century City urban development precinct located just outside Cape Town is an ideal case to study. It is one of South Africa's foremost "green" destinations and is known for its considerable amount of Green Star South Africa green rated buildings, including the Aurecon building which was the first building in South Africa to achieve a Five Star GSSA rating.

When undertaking a case study a unit of analysis is required in order to set the case boundaries. The unit of analysis can be either a single holistic unit, where the entire case is studied as a whole, or it can be multiple embedded units, where the case being studied is broken up into smaller units which can be studied as interdependent "cases" (Yin, 2003).

The Century City urban development case can be undertaken as a single holistic unit or multiple embedded units, where the development is broken up into separate smaller precincts, including various commercial and residential precincts. For the purposes of this dissertation the Century City urban development precinct will be studied as a number of interdependent sub-precincts within the boundaries of the larger development that is controlled by a single management entity.

The fact that the Century City urban development precinct is managed as a mini-municipality by a single controlling entity and that it can be viewed as a number of smaller interdependent sub-precincts within the boundaries of its larger framework further justifies its use as a single case study for this research. The uniqueness of the Century City urban development precinct as described above also helps with generalisation and larger applicability issues often associated with the single case study approach. Century City's mini-municipality style of management lends itself, and any research findings based on the development, to being compared to larger metropolitan areas and the procedural activities of municipal authorities.

### 3.6 DATA COLLECTION

Qualitative research embraces various methods of data collection which all share a general orientation to a naturalistic or interpretive inquiry approach (English, Basckin, de Jager & Nassimbeni, 2012). Qualitative research methods use grounded, loosely structured approaches for data collection to counter the very complex, elusive and exotic process characteristics of social processes (Miles & Huberman, 1994). The most commonly employed data collection methods for case studies are interviews, audio-visual material, photographic evidence and documentary evidence including reports, which are all obtained from multiple sources to increase the confidence of the research findings (Creswell, Hanson, Plano-Clark & Morales, 2007).

This dissertation will make use of interviews and the collection of documentary and photographic evidence as the methods of data collection.

Research findings may be substantiated across data sets by examining data attained from various sources and through various different methods, thereby reducing the influence of bias that exists in any single case study (Bowen, 2009).

### 3.6.1 INTERVIEWS

Interviews aim to understand the contextual reality of the case being studied from the participant's point of view and are a very important method for data collection in qualitative and case study research (English, Basckin, de Jager & Nassimbeni, 2012). In qualitative interviews the emphasis should be on the respondents' interpretation and understanding of issues, events and behavioural patterns (Yin, 2003), and, therefore, the role of the interviewer should be to listen, observe sensitivity and stimulate the conversation (Michell, 2010).

There are three main types of interviews that have been identified based on their degree of structure:

- Structured Interviews

In structured interviews the interview schedule or questionnaire is pre-planned and standardised for each respondent (English, Basckin, de Jager & Nassimbeni, 2012). A structured interview approach can be used to achieve the greatest reliability and validity of the measurement of key concepts (Bryman & Bell, 2011). Structured interviews allow for very little variation in their responses and thereby limit flexibility and variation (Punch, 2014). The interviewer must play a neutral role, while the interviewee is encouraged to answer in a rational and factual manner without much allowance for emotional responses (Punch, 2014).

- Semi-structured Interviews

In semi-structured interviews the interviewer plans a number of set questions, but is not restricted to them and has sufficient flexibility to ask additional questions which may arise as the interview develops (English, Basckin, de Jager & Nassimbeni, 2012). The questions the researcher asks during semi-structured interviews aim to focus and guide the responses of the respondents towards information that is appropriate to the study that the researcher is conducting (Dumay & Qu, 2011). Although there is flexibility to vary questions and responses in the semi-structured interview, generally, the questions asked and the wording of both the questions and the answers received will be similar across all of the interviews conducted (Bryman & Bell, 2011).

- Unstructured Interviews

In unstructured interviews there are no fixed questions, the researcher only has some general questions to initiate and maintain the interview (English, Basckin, de Jager & Nassimbeni, 2012). Specific issues may arise during the conversation as the respondent responds to the general questions without any restrictions, which may then prompt further, more specific questions from the researcher (Bryman & Bell, 2011). The conversational and free-flowing nature of unstructured interviews allows the researcher to attain a broader scope of information (Fontana & Frey, 2000).

For the purposes of this study semi-structured interviews will be used, which will allow the researcher the freedom to ask additional questions as the interviews progress in order to achieve this dissertation's specific research objectives.

The baseline interview questionnaire consists of questions specifically querying how the urban development professionals and management teams define sustainability and what importance sustainability, or certain aspects of sustainability, has or have to them. The questions enquire further into the current status of sustainability initiatives within the case study precinct and what the motivations were behind the adoption and incorporation of

these initiatives. Further, the questions also enquire as to the effects that the existing sustainable urban development rating tools have had on the urban development industry as a whole and on the case study precinct in particular. These questions, and the themes they raise and draw out, should shed light on the current status of the South African sustainable urban development industries as well as the motivations behind adopting sustainability initiatives and/or pursuing sustainability ratings. These produced themes should provide sufficient evidence to allow adequate conclusions to be drawn as answers to the research question as set forth by this dissertation.

A copy of the baseline interview outline can be seen in Appendix H.

### 3.6.2 PHOTOGRAPHIC AND DOCUMENTARY EVIDENCE

Documentary and photographic evidence, both historical and contemporary, provides a vast source of data to draw from in the arena of social science research (Punch, 2014).

In qualitative research it is very important to triangulate data procured through different methods, including interviews, photographic evidence and documentary evidence, by combining all the different types of data (Punch, 2014). It is important to use this triangulation of data to evaluate the authenticity, credibility, meaning and representativeness of the collected documentary evidence (Jupp, 2006). Documentary evidence is also implemented as a method of cross-validating the data collected through other means, which increases the credibility and validity of the information collected (Noor, 2008).

Photographic evidence displays a universal message and can be very effective when integrated within the research, however, photographic evidence should not stand on its own, but should rather be used to enhance and support the rest of the research (Punch, 2014). The implementation of a variety of data collection methods enriches and enhances the information gathered and allows for more comprehensive and more reliable findings to be attained (Bowen, 2009).

### 3.7 DATA ANALYSIS

Qualitative data collection methods, such as interviews and photographic and documentary evidence as described above, produce words and texts in various forms which will need to be analysed to arrive at conclusions and answer the research question posed at the start of the study (English, Basckin, de Jager & Nassimbeni, 2012). Analytic induction is the general principle which underlies most methods of analysis and which guides qualitative research (Punch, 1998).

Analytic induction involves the comparison of incidents and the establishment of similarities and differences with the aim of creating defined data categories and concepts (Punch, 1998). One of the most predominant approaches to analytic induction is the Miles and Huberman framework for qualitative analysis (English, Basckin, de Jager & Nassimbeni, 2012). According to Miles and Huberman, an essential function of qualitative analysis is to establish stable relationships between the theories under investigation based on categorisations and consistencies that link the various ideas revealed in the collected data (Miles & Huberman, 1994).

The Miles and Huberman framework for qualitative analysis is split into three phases of analysis (English, Basckin, de Jager & Nassimbeni, 2012):

1. Data Reduction – This is the process where the researcher selects and simplifies the collected data from the texts, documents, interview transcripts and the like. During the data reduction process the researcher has to make decisions about how to code the selected and simplified data based on the themes, patterns and clusters that emerge from the data (Miles & Huberman, 1994).

Coding is the process during which descriptive labels are assigned to segments of data. This coding attaches meanings to segmented data,

allowing patterns to form and allowing the researcher to organise and sort through the collected data. Codes can be derived from the literature review or can be generated inductively from the gathered information being studied (English, Basckin, de Jager & Nassimbeni, 2012).

2. Data Display – This refers to the ways in which the researcher displays the selected and simplified data after it has been organised, compressed and assembled (Miles & Huberman, 1994). Data can be displayed in any number of ways, including graphs, charts, networks and/or diagrams. These data displays are used for organising and summarising the collected information (Punch, 1998).
3. Drawing Conclusions – This is the process during which the displayed and organised data is interpreted and conclusions are drawn (Punch, 1998).

These three phases of Miles and Huberman’s framework for qualitative analysis form an interactive, cyclical process through which the researcher can verify conclusions by going backwards and forwards through the data, testing the conclusions (Punch, 1998).

The data analysis of this study will be approached using the NVivo computer-assisted qualitative data analysis software, which will facilitate the data analysis techniques as described above.

### 3.8 ETHICAL ISSUES IN RESEARCH

Ethics can be defined as the norms of behaviour which distinguish between acceptable and unacceptable behaviours (Resnik, 2011). Ethics in research can be defined as the codes or guidelines which help to reconcile value and conflict (Gillespie, 2014).

There are four main ethical principles that need to be considered and adhered to in qualitative research undertakings, and they are (Bryman & Bell, 2011):

- Will participation in the data collection cause any harm, whether it is physical, mental, legal or otherwise, to the participants?
- Is there any invasion of privacy?
- Is there any deception involved in the data collection process? Do the participants know exactly what type of research is being conducted, including the purpose and intent of the research, and for which purpose they have been invited to participate?
- Have all participants given their informed consent to have their views and opinions utilised for the study in question?

Data protection, reciprocity, accountability, confidentiality, mutual respect and trust, affiliations and conflicts of interest are other issues that require ethical consideration during the course of any research undertaking (Bryman & Bell, 2011).

Due to the ethical issues that accompany the use of interviews as a method of data collection, each respondent was asked to complete and sign a consent form before participating in the interview process.

A copy of the consent form, which asks whether the interview participant wishes to remain anonymous and consents to being recorded and/or quoted, can be viewed in Appendix I.

Seven interviews were conducted during the course of this study's research and data collection phases. Of the seven persons interviewed, five of them requested to remain anonymous, but consented to have their roles in their relevant industries identified. The two interview participants who consented to being identified are Chris Blackshaw, the CEO of the Century City Property Owners' Association, and Colin Anderson, a Director of Rabie Property Group. The completed and signed consent forms of these two interview participants, as well as a copy of their interview transcript can be viewed in Appendix J.

The interviews took place between August 2015 and March 2016, and all of the interviews lasted between 30 – 60 minutes. The interview participant profile and their respective anonymity codes are outlined in the table below.

TABLE 3.1: Interview participant profile and anonymity codes.

CONSENT TO BE IDENTIFIED	NAME / ANONYMITY CODE	POSITION IN INDUSTRY
Yes	Chris Blackshaw	CEO of Century City Property Owners' Association
Yes	Colin Anderson	Director of Rabie Property Group
No	OMT	Representative of Operations and Management Team
No	GBCSA1	Technical Coordinator at the Green Building Council of South Africa
No	GBCSA2	Technical Coordinator at the Green Building Council of South Africa
No	SE1	Civil Engineer specialising in Urban Sustainability based in the Cape Town Area
No	SE2	Civil Engineer specialising in Urban Sustainability based in the Cape Town Area

A randomly selected transcript from the remaining interviews listed above can be viewed in Appendix K.

### 3.9 LIMITATIONS TO THIS RESEARCH

The main limitation to this research project arises from the single case study research approach being employed. The conclusions drawn from the case study will be case specific, which will limit the diversity and generalisability of the findings.

Further limitations stem from the use of interviews as a data collection method. The quality, reliability and validity of data obtained through semi-structured interviews depends on the ability of the interviewer to necessarily adjust the questions asked to suit the specific interviewees while still retaining similar meaning to the questions to facilitate comparability (Barriball & While, 1994). Furthermore, circumstances surrounding every interviewee may affect the way in which they respond to the questions posed or may compel them to give “socially desirable” responses, which could affect the validity and reliability of the data collected through the interview process (Barriball & While, 1994). The use of interviews as a data collection method can result in conclusions that talk back to the researchers presupposed theories due to possible bias in both the collection and analysis of the data (Denzin & Lincoln, 2005).

### 3.10 CONCLUSION OF THE RESEARCH METHODOLOGY

This chapter has set forth the broad philosophical approaches to research, and has defined and discussed the chosen research methodology of a qualitative single intrinsic case study. The chapter has also provided a description of how the research data will be gathered and analysed during this study, and finally has highlighted some of the ethical concerns and research limitations that might be experienced during the course of the study.

The next chapter will define and discuss the chosen case study as well as the emergent themes, patterns and conclusions that arise from the research conducted as described in this chapter.

## Chapter Four: CASE STUDY

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### 4.1 INTRODUCTION TO THE CASE STUDY

This chapter describes the case selected for the purposes of this dissertation and presents the results of the research conducted using the research methodology as outlined in the preceding chapter.

This chapter describes and defines the Century City Urban Development Precinct as the object of the case study and summarises its development history. The chapter examines the sustainability initiatives, particularly those that occur at a precinct level, that are currently being employed within the Century City precinct, as well as how sustainability is defined by the precinct's development and management teams. These current sustainability activities are placed into the context of the definitions of sustainability and sustainable urban development as defined in Chapter Two and are also measured against the main principles or attributes of sustainable precinct level developments as recognised and rated by the existing international precinct level rating systems.

The chapter then explores the motivations have led to the adoption of precinct level sustainability initiatives and activities by Century City's development and management teams. The effect that the introduction of the existing Green Star South Africa rating tools had on the implementation of sustainability principles and initiatives at a building level is also examined.

This chapter discusses the emergent sustainability initiatives, motivation patterns, and conclusions that arise from the conducted research.

From a referencing perspective it is necessary to state here that all direct quotations made in this chapter are quotations of statements made by the various interview participants as described in Table 3.1 in the previous chapter.

## 4.2 DEFINING THE CENTURY CITY URBAN DEVELOPMENT PRECINCT

Century City is a mixed use urban development situated about ten kilometres via the N1 highway outside of the City of Cape Town's Central Business District. It is strategically located at the intersection of the N1 and N7 highways, with two railway corridors also running past the site (Planning Partners, 2005). Embracing the principles of new urbanism, which include mixed use, walkability, place making, good architectural and urban design and sustainability (NewUrbanism.org, 2006), Century City combines office, retail, residential and leisure components in an integrated, stimulating and aesthetically pleasing urban environment (Century City Property Owners' Association (2), 2015).

Century City, as a unique city complementing Cape Town's historic CBD, has become a sought-after address for corporate South Africa, as well as home to a thriving and continuously growing residential community meeting 21<sup>st</sup> Century demands and needs (Century City Property Owners' Association (2), 2015). Property owners and residents are flourishing in Century City's lifestyle set in an attractive, clean and safe environment and promoting and enhancing quality of life, comfort and human spirit (Century City Property Owners' Association (2), 2015).

The images below show the Century City urban development precinct boundaries and its location relative to the Cape Town CBD, respectively.

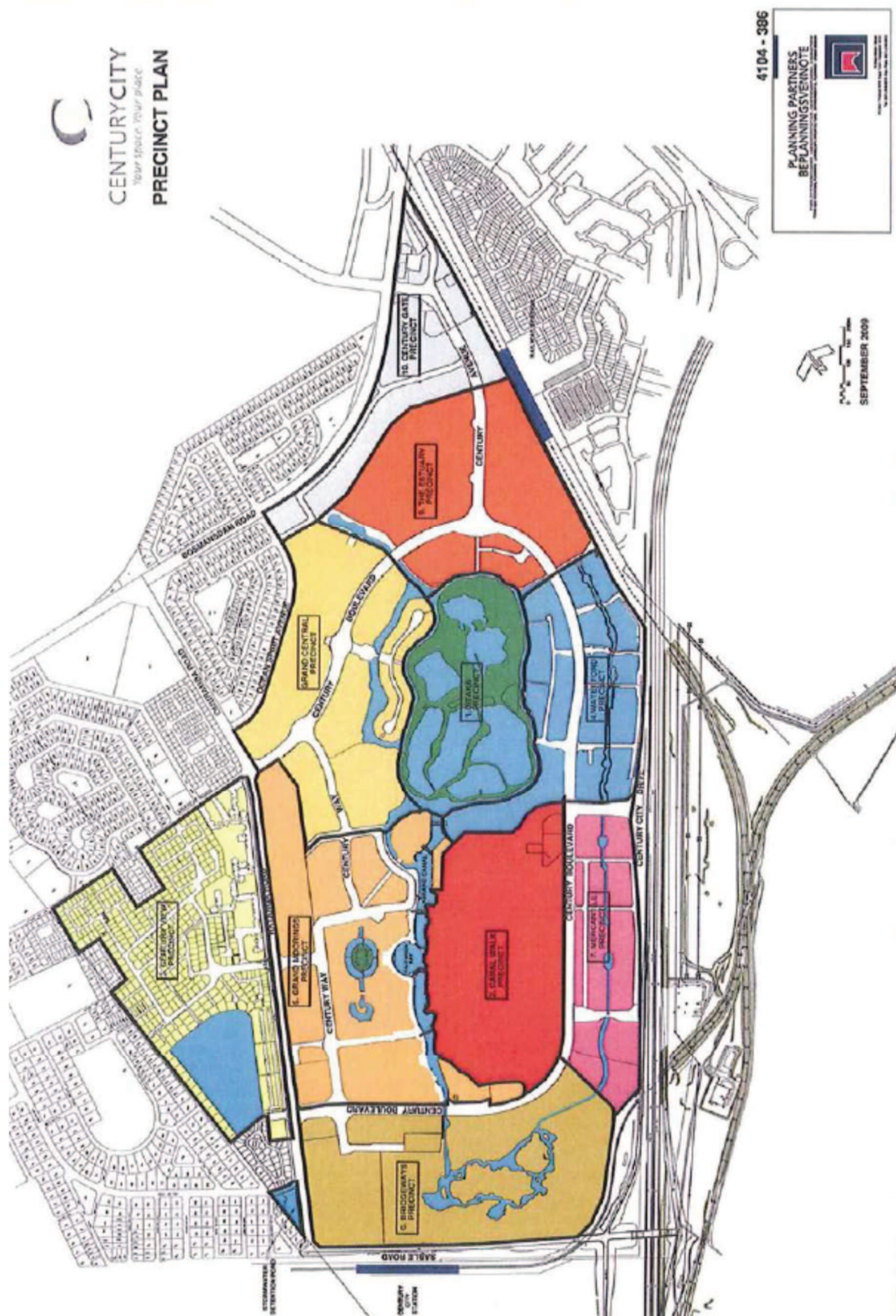


IMAGE 4.1: Century City Precinct Plan (Century City Property Owners' Association (2), 2015: 7).

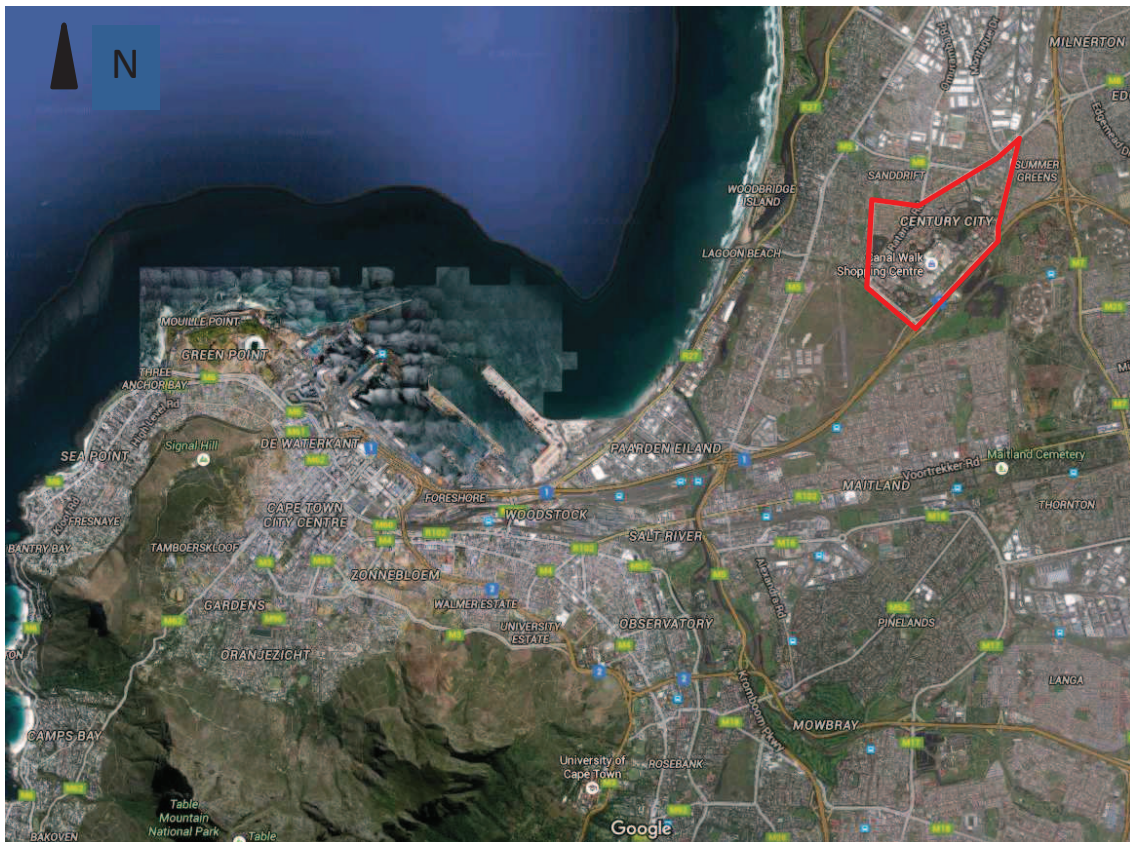


IMAGE 4.2: Century City relative to Cape Town CBD (Google Earth, 2016).

Given its central location and the fact that all stages of building and precinct level development activities with its boundaries, from conceptual planning to occupancy, are directly influenced by a wide array of green initiatives, Century City is an ideal development to showcase long-term sustainability attributes within an urban environment (Century City Property Owners' Association (6), 2015).

### 4.3 A BRIEF HISTORY OF CENTURY CITY

The concept of the Century City urban development as it is known today was first imagined in 1996 when the Premier of the Western Cape formally approved the rezoning of Erf 1609, a 250 hectare wasteland alongside the N1 just outside of central Cape Town now known as Century City, from a purely residential to a mixed use sub divisional area (Century City

Property Owners' Association (7), 2015). The site's previous owner, Ilco Homes, had started developing entry level housing on the neighbouring site to the north, separated from the current Century City by the railway line. Unfortunately, the site's residential zoning and allowed housing could not sustain the large amount of infrastructure required, and Ilco Homes subsequently ran into financial difficulties. Cape Town based developer Monex, led by Marin Wragge, then stepped in and it was Mr Wragge who realised that the only chance of saving the development of the site was to have it rezoned to mixed use (Century City Property Owners' Association (2), 2015).

Conditions attached to the approved rezoning were the preparation and submission of a Traffic Impact Assessment, an Environmental Impact Report and a General Site Development Plan. The Environmental Impact Report further required the preparation of an Environmental Management Plan, the on-site retention of a 16 hectare environmentally protected wetland, and the establishment of the Bloulei Environmental Committee to ensure compliance with the Environmental Management Plan. Once the above conditions and requirements were met, Monex were given the rights to subdivide Erf 1609 and dispose of sites in accordance with a scheduled basket of commercial, residential, retail and leisure use rights (Century City Property Owners' Association (7), 2015).

The first development activities commenced in 1997, despite industry kingpins' belief that the Century City plan was overly ambitious and completely unattainable. At first, corporates were slow to be convinced of Century City's potential but the pioneering plunge of big name corporates, including PriceWaterhouseCoopers, Vodacom, Business Connexion and Unisys, began to change business's initial scepticism (Century City Property Owners' Association (7), 2015). The opening of the Ratanga Junction theme park and the Canal Walk shopping centre in 1998 and 2000 respectively were the next major milestones in the development evolution of Century City (Century City Property Owners' Association (2), 2015).

Unfortunately, as it was overcapitalised for the South African market at that stage, Ratanga Junction incurred heavy losses in the early years which resulted in the demise of Monex (Century City Property Owners' Association (2), 2015). In July of 2004 the Century City site and development rights were sold to what is now Rabie Property Group (Pty) Ltd (Century

City Property Owners' Association (7), 2015). While the theme park initially struggled, Canal Walk shopping centre rallied. It is now one of the most successful shopping centres in South Africa and has proved to be a major catalyst for development in its immediate vicinity (Century City Property Owners' Association (2), 2015).

Over the past decade, under the flag of Rabie Property Group, the Century City precinct has seen a significant amount of development. More than one million square meters of development has taken place and/or is approved to take place, with the total investment into the urban precinct standing at more than R21billion (Century City Property Owners' Association (2), 2015).

The aerial photographs below illustrate the development evolution of Century City, from a waterlogged wasteland in the 1990's to a fully functional and thriving mixed use urban precinct.

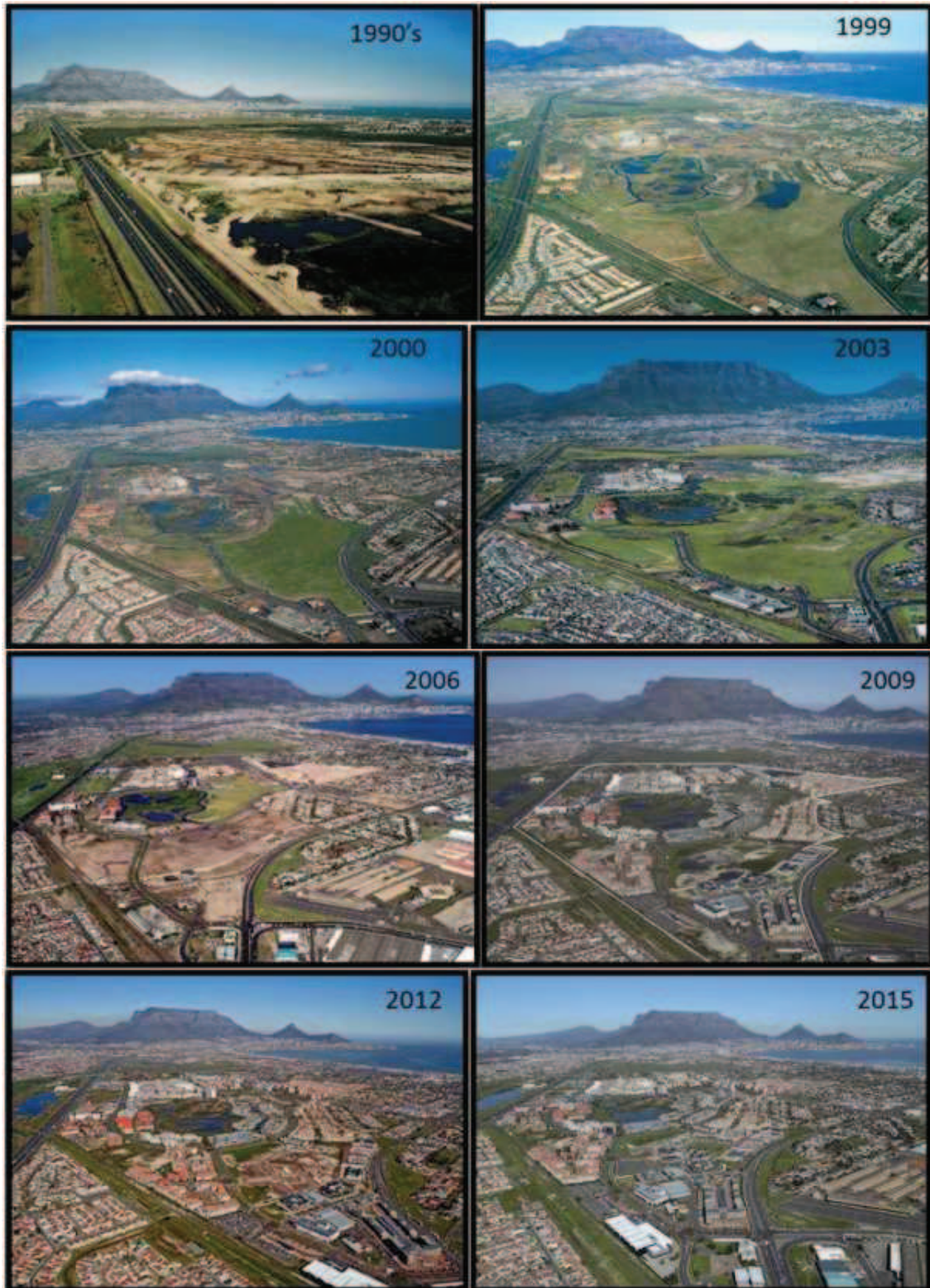


IMAGE 4.3: Aerial photographs depicting the development of the Century City urban precinct – 1990's to 2015 (Century City Property Owners' Association (2), 2015).

## 4.4 THE REGULATION OF THE CENTURY CITY URBAN DEVELOPMENT PRECINCT

### 4.4.1 THE BASKET OF MIXED USE RIGHTS

When the Century City site was rezoned from purely residential to mixed use, a basket of development rights was given to the developer totalling more than 1.25 million square meters of bulk development area (Century City Property Owners' Association (2), 2015). The City of Cape Town local planning authority agreed to a very unique planning process for the Century City urban precinct in which land is only subdivided off the “mother site” and allocated specific use rights once the sale of the portion of land has been concluded. This means that the developer’s clients can purchase the size and location of land which best suits their needs and then have the necessary development rights to satisfy their specific requirements allocated to their site. This process has major advantages for both the developer and their clients, offering them unique flexibility and freeing them from having to pay inflated land prices for prescribed rights that may not be necessary for the portion of land’s ultimate use. It also empowers the developer to adapt the mix of land uses in response to ever changing market forces (Century City Property Owners' Association (2), 2015).

This process is, however, not completely without limitations. The development rights of the Century City urban precinct are directly linked to the traffic capacity and flow within the precinct and also on the surrounding road networks. The City of Cape Town planning and transportation authorities have agreed that the precinct’s developer may vary the quantum of individual land uses on the condition that the total number of vehicle trips generated by the site as a whole does not exceed the permitted maximum (Century City Property Owners' Association (2), 2015). This maximum is directly linked to the carrying capacity of the roads in and around Century City and the flow and congestion of traffic in the area. Rabie Property Group, as the developers of Century City, are committed to various infrastructure upgrade projects which endeavour to significantly improve the traffic capacity and flow of the Century City urban precinct and its surrounding areas. Further to these physical

improvements by the developer, the Century City Property Owners' Association is also continuously adding and refining measures to improve peak traffic flows and mitigate the effects of extra traffic expected from additional developments being completed within the precinct (Century City Property Owners' Association (8), 2015).

The table below summarises the Century City urban precinct's bulk area rights per mixed use, the bulk areas allocated, that is, the areas of currently approved and/or completed developments in Century City, and the bulk areas still available for development in Century City:

TABLE 4.1: Bulk areas available for development within the Century City urban precinct per mixed use zoning (Century City Property Owners' Association (2), 2015).

<b>LAND USE</b>	<b>BULK AVAILABLE (m<sup>2</sup>)</b>	<b>BULK ALLOCATED (m<sup>2</sup>) *</b>	<b>BULK REMAINING (m<sup>2</sup>)</b>
Commercial	591,180	451,026	140,154
Residential	311,000 (3,110 units)	211,009	99,991
Retail	299,720	211,854	87,866
Lifestyle / Leisure (Hotels)	55,000 (1,000 keys)	31,790	23,210
Lifestyle / Leisure (General)	83,244	53,440	29,804
Subtotal	1,340,144	959,119	381,025
Century View (Residential)	90,000 (900 units)	90,000	0
<b>Total</b>	<b>1,430,144</b>	<b>1,049,119</b>	<b>381,025</b>
* Bulk allocated in terms of approvals granted			

At the time that Rabie Property Group took over ownership of the Century City urban precinct the built form stood at approximately 255,000 square metres, with about one million square metres of bulk area still available for development. As per the table above

there is currently only about 380,000 square meters of bulk area left over for future development plans and activities with the Century City urban precinct (Century City Property Owners' Association (2), 2015).

The City of Cape Town local authority remains responsible for approving subdivisions within the Century City urban precinct, while the developers and town planners remain enthusiastic to ensure that the site as a whole develops in an integrated and coordinated manner that is compatible with the planning, architectural and environmental objectives established for the precinct (Century City Property Owners' Association (7), 2015).

Thanks to the unique planning process as described above, the Century City urban precinct has become a model for new urbanism with its development being approached by adapting and responding to what buyers want. As a result, Century City comprises of an eclectic mix of commercial, retail, residential and leisure components, creating a self-sufficient and inviting community (Rabie Property Group & Century City Property Owners' Association, 2015).

#### 4.4.2 ENVIRONMENTAL MANAGEMENT

The ecological importance of the permanent and seasonal wetlands on the site of the Century City urban precinct development was identified in 1995 during the development's planning process (Lochner, 2005). As part of the approval conditions for the rezoning of the 250 hectare Erf 1609 from purely residential to mixed use, the developers of the Century City urban precinct prepared an Environmental Management Plan (EMP), established the Intaka Island, formerly known as Blouvlei, wetland conservation area, and created the Blouvlei Environmental Committee (Century City Property Owners' Association (7), 2015).

One of the principal regulations set out in the Environmental Impact Assessment (EIA) and subsequent Environmental Management Plan completed as part of the planning process of the development was that the new development had to incorporate the wetlands system and associated vegetation and birdlife, including the prominent heronry, consisting of

around 3,800 birds of 12 different species, that existed on the site before development began (Lochner, 2005). Intaka Island is a 16 hectare green lung in the heart of Century City rich in birdlife and indigenous plants that comprises of 8 hectare ecologically sensitive seasonal salt pan zone conserved from the historic “Sewe Pannetjies” wetlands, the last remaining of their kind, and 8 hectare of reconstructed wetlands that serve as a natural filter and cleanser of the water in the canals that run through the different elements of Century City (Century City Property Owners' Association (2), 2015). The award-winning Intaka Island wetland conservation area, together with the 8 kilometres of navigable canals that meander through the urban precinct, is one of the Century City urban precinct’s unique attractions (Century City Property Owners' Association (2), 2015).

The Environmental Impact Assessment was prepared in 1996 by the Council for Scientific and Industrial Research and was closely integrated with the planning process of the Century City urban precinct. The EIA emphasised the following key issues (Lochner, 2005):

- Any new development must incorporate the original hydro-geological features of the site into the new conserved wetland design.
- Any new development must conserve the seasonal pan habitats indigenous to the site.
- Any new development must maintain acceptable water quality in the wetlands.
- Any new development must re-incorporate the existing heronry into the conserved wetlands area.
- Environmental Management Plans must be prepared, submitted to and approved by the Cape Nature Conservation authority and implemented for each of the construction, establishment and operational phases of the development and wetlands conservation areas.

The final operational phase Environmental Management Plan was prepared and implemented in June of 2003 (Lochner, 2005). The main purpose of the EMP and all other environmental management policies and practices within the Century City urban precinct is to reduce the precinct's carbon footprint and to regulate a sustainable future. Various controls and restrictions are applied within the Century City urban precinct in pursuit of the ecological and environmental goals and objectives detailed in the EMP. These controls and restrictions include the following (Century City Property Owners' Association (7), 2015):

- The wetland and canal system must remain free of pollutants, particularly sewage discharge, herbicides, algaecides, fertilisers and/or any chemicals. In case of contamination of the waters by any pollutants the responsible offender is liable for the cost of remedying any damage caused by pollution into the canals or wetlands.
- All landscaping proposals must be submitted to and approved by the Century City Property Owners' Association to ensure that no flora that could be detrimental to the wetland environment is planted within the precinct.
- The Environmental Manager is to receive and approve all proposals for any bird deterrent devices that any property owners wish to install within the precinct prior to installation.
- The ownership and movement of pets is regulated within the Century City urban precinct. All pets must be restricted to private properties and are not allowed to roam the common areas of the precinct, with the exception of dogs on leashes. Property owners are responsible for the removal of all pet waste. All dogs and cats must wear collars with identification rings. Any pets found roaming the precinct without identification will be removed and taken to the SPCA. With the exception of guide dogs, no pets are allowed on Intaka Island. No rodents may be kept as pets within the Century City precinct.

- Property owners and visitors to the precinct are also discouraged from discarding food into or near any of the waterways on the site and are held liable for any resulting vermin infestations. Similarly, all areas in the precinct, both public and private, are to be litter-free at all times, and any offenders will be fined and are liable for any expenses incurred to remedy the situation.
- Owners of vacant property are to ensure that their plots are kept free from alien vegetation, litter, fill material and/or building rubble at all times, and that the soil on their land is kept stabilised at all times to prevent dust pollution to neighbouring properties.

Further to the above, the EMP also provides guidelines and regulations for building design and construction materials, methods and techniques, the use of water and the consumption of power, the use of alternative power, and recycling activities. Also, all property owners, tenants, staff, contactors and any visitors to the Century City urban precinct must comply at all times to any and all instructions, verbal or written, issued by the Century City Property Owners' Association (Century City Property Owners' Association (7), 2015).

The Blouvllei Environmental Committee, now known as the Intaka Island Environmental Committee, was established in 1996 by the developers of the Century City urban precinct in response to the rezoning conditions and to guide the implementation of the precinct's EMP. The Committee meets on a monthly basis and comprises of representatives of the century City Property Owners' Association, the Western Cape Nature Conservation Board, Friends of Rietvlei, the City of Cape Town local authority, as well as specialist botanical and ornithological consultants (Lochner, 2005).

The Intaka Island Environmental Committee is guided by three main documents: the original EIA approved by the provincial Department of Housing, Local Government and planning dated 24 July 1996, the environmental policy of the Century City Property Owners' Association, and the Environmental Management Plan. The EMP is the primary guiding document for the Committee and includes the vision, goal, objectives, actions, monitoring requirements, environmental criteria and targets and possible remedial actions (Lochner,

2005). In accordance with all three guiding documents the main purpose of the Intaka Island Environmental Committee is to (Lochner, 2005):

- Actively participate in the design of the EMP for the wetlands on the Century City site, including regular updates to the EMP and the monitoring programmes it contains.
- Make recommendation for ongoing improvements to the Century City EMP and to contribute to the implementation of the EMP, particularly the monitoring and evaluation aspects.
- Prepare the annual budget for the implementation of the EMP, including agreeing on the priority actions.
- Contribute to the internal audits of the EMP undertaken every 2 to 3 years.
- Review proposals for surrounding developments and provide guidance, minimising any potential impacts of such new developments on the integrity of Century City's wetlands and waterways.
- Boost public awareness of wetlands and their educational opportunities.

The Intaka Island Environmental Committee, together with the Century City Property Owners' Association, oversees the implementation of the Century City urban precinct's Environmental Management Plan (Century City Property Owners' Association (7), 2015).

#### 4.4.3 THE CENTURY CITY PROPERTY OWNERS' ASSOCIATION

The original developers of the Century City urban precinct registered the Century City Property Owners' Association (CCPOA) as a Section 21 Company. The CCPOA is a non-profit organisation that functions as a mini municipality, in charge of governance and

administration within the Century City precinct, and with the interests of the property owners represented by an elected Board of Directors and the day to day activities managed by a Chief Executive Officer (Century City Property Owners' Association (7), 2015). The Century City urban precinct is divided into 10 Precincts as shown on the Precinct Map in Image 4.1 and property owners within each of the precincts elect one director to serve on the Board of Directors. The CEO is appointed by the CCPOA's Board of Directors and supported by a structured management team (Century City Property Owners' Association (7), 2015), as illustrated by the organogram in the image below.

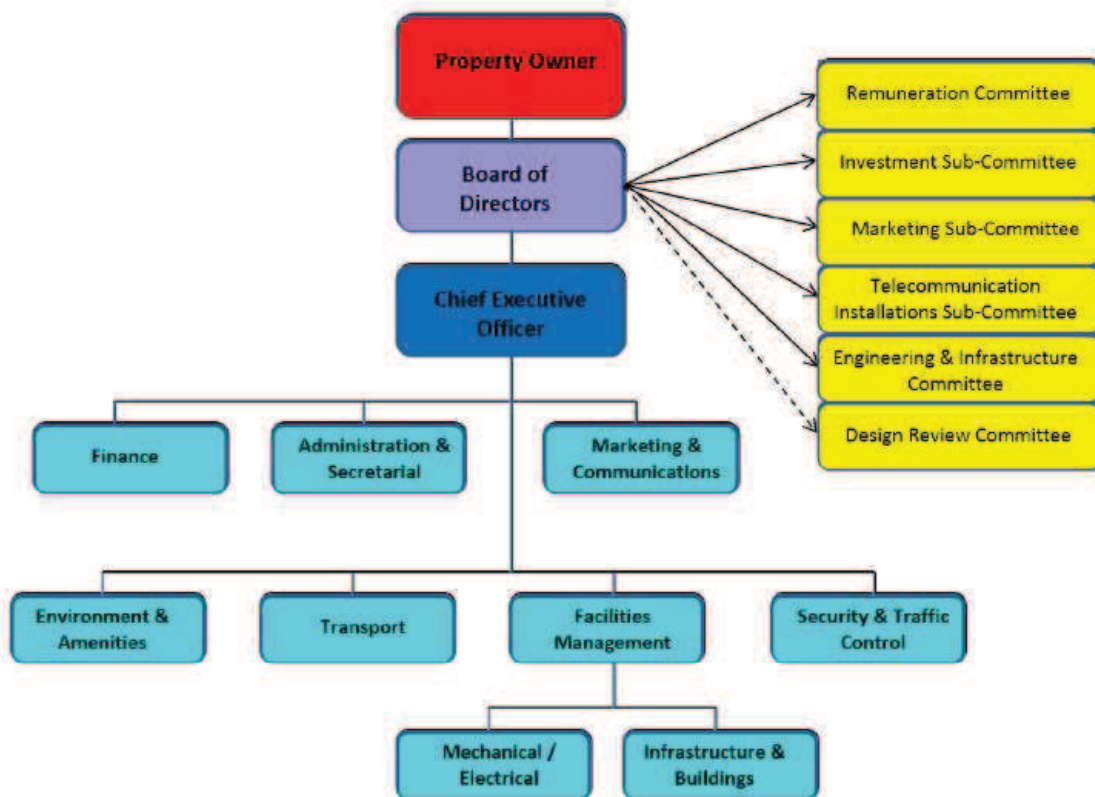


IMAGE 4.4: The structure of the Century City Property Owners' Association Management Team (Century City Property Owners' Association (7), 2015: 6).

The CCPOA's main responsibilities are (Century City Property Owners' Association (2), 2015):

- General site security, site access control, and traffic monitoring and control.

- Stormwater management and the maintenance of the canals and the water quality of all of Century City's waterways.
- The maintenance and landscaping of all public areas and the running of an on-site nursery.
- The planting, maintenance and environmental conservation of the award-winning Intaka Island wetlands conservation area.
- The management of the Century City Transport Interchange which controls all public transport into and within Century City.
- The maintenance of all infrastructure including roads, bridges and guardhouses, street lighting and perimeter fencing, and the supply of treated effluent for irrigation purposes.
- The formulation and implementation of the Urban Design Framework as endorsed by the Design Review Committee.
- The formulation and implementation of the Disaster Management Plan.
- Full accounting and corporate governance functions for Century City, including levy collections and administration.
- The management and marketing of the Century City brand.
- Sourcing, coordination and management of community events in the Century City urban precinct.
- Internal marketing and communication with the Century City community, property owners, tenants and residents.

#### 4.4.4 THE URBAN DESIGN FRAMEWORK

The Urban Design Framework (UDF) for the Century City urban precinct establishes a philosophy and set of principles for the development of land, design of buildings and establishment of public spaces, and also institutes the design review process during which the Design Review Committee, as appointed by the Century City Property Owners' Association, scrutinises and approves new development proposals (Planning Partners, 2005). The UDF focuses on the environmental, functional and form aspects of the Century City built environment and its chief objective is the achievement of one composite form, that is that both the buildings and the open spaces within Century City are parts of a single larger picture. The precinct's buildings and open spaces' form and functional relationships are more important than their individual characteristics (Century City Property Owners' Association (2), 2015).

The guiding philosophy of Century City's UDF is based on the belief that good design and the implementation thereof will create and sustain value and will ensure a balance between functionality, commercial value and aesthetics (Planning Partners, 2005). Century City's UDF Philosophy is illustrated in the image below.

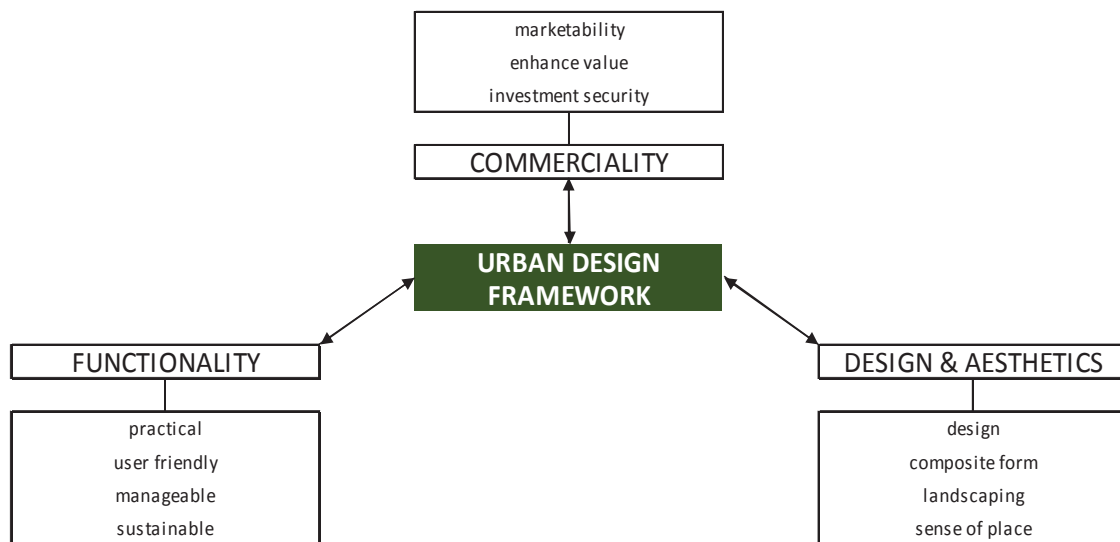


IMAGE 4.5: The Century City Urban Design Framework Philosophy (Planning Partners, 2005: 5).

The UDF's vision for Century City is to create an integrated, mixed use development with a good image and sense of place, which provides a vibrant and rich experience for visitors and residents alike, and achieves enhanced real estate values and investment potential. In order to realise this vision, the UDF identifies and defines the following design and development policies and principles (Planning Partners, 2005):

- The desirable urban form and architectural features for the Century City urban development precinct that will exhibit a positive relationship between individual buildings and public spaces, including streets and waterways.
- Negotiable and non-negotiable design and development elements.
- The design review procedures.
- The framework within which individual developments can occur within the Century City urban precinct, allowing investors to unlock the potential of their land portions without compromising the greater good and design intent of the precinct as a whole.

The Urban Design Framework's policies place pronounced emphasis on the public spaces within the Century City urban precinct and incorporate strong public defining elements including distinct urban gateways or access points into the Century City precinct, the main vehicular movement corridor along Century Avenue and Century Boulevard, the public open spaces and interconnecting waterway systems, and internal precinct streets, squares and focal points. Since all public domains within the Century City urban precinct are privately owned and are efficiently controlled and managed by the singular Century City Property Owners' Association entity, the precinct as a whole exhibits a unique sense of cohesiveness and interconnectivity (Planning Partners, 2005).

The City of Cape Town local authority is responsible for approving subdivisions within the Century City urban precinct, but beyond that it is the precinct developer's responsibility to ensure that the site as a whole develops in a coordinated and integrated manner that is

compatible with the planning, architectural and environmental goals advocated in Century City's UDF (Century City Property Owners' Association (7), 2015). In pursuit of this, all potential developers in the Century City urban precinct are required to comply with the UDF and to go through the design review process and meet all requirements as set forth by the Design Review Committee (Planning Partners, 2005). The design review process is an integral part of implementing, monitoring and maintaining the objective of Century City's Urban Design Framework (Planning Partners, 2005).

The key objectives of the design review process, as administrated by the Design Review Committee, are as follows (Planning Partners, 2005):

- Encourage developers to comply with the Century City urban precinct's UDF.
- Provide clear guidelines to potential developers and their design teams to ensure compliance with the site UDF.
- Make the submission process as user-friendly and simple as possible with minimal administrative procedures and delays.
- Provide a structured basis for decisions and eliminates subjectivity and bias.

The management of development activities in the Century City urban precinct operates as a "package of plans" process during which approvals are based on the UDF, the plan for the precinct in which the plot is located, and the overall site development plans. Proposed developments that are consistent with these plans can be implemented with minimum administrative delays as the Design Review Committee is committed to delivering timely and supportive responses to any new development enterprises initiated in accordance with the land acquisition and design review process (Planning Partners, 2005).

Applying the Urban Design Framework consistently will enhance the overall value of the Century City urban precinct. People will find the precinct an attractive place to visit and

property owners will have confidence that their investments will be protected. To ensure these positive results there is an onus on the developers, the property owners and the operations managers within the precinct to respect the UDF, as its success depends on the resolve of all parties involved to continuously implement the principles and objectives advocated by the Framework (Planning Partners, 2005).

Adherence to this Urban Design Framework, both in the public environment and private developments, does not compromise any practical and/or functional considerations and is a chief requirement for sustaining the vision and unlocking the full potential of the Century City urban precinct development (Planning Partners, 2005).

#### 4.5 SUSTAINABILITY IN CENTURY CITY

Century City prides itself on being one of the leading sustainable urban precinct developments in South Africa and of being at the forefront of sustainable settlements and development aimed at reducing the carbon footprint of urban precincts (Century City Property Owners' Association (4), 2015).

What came through very clearly during the interview process was that the developers of the Century City urban precinct, as a private owner-developer entity, place high emphasis on the commercial sustainability of precincts and the urban environment. Colin Anderson, a Director of Rabie Property Group said the following on defining urban sustainability:

*“It takes more than the buildings, it takes the entire precinct. So what it means is almost an integrated precinct where you’ve got a bit of everything ... together so that a precinct doesn’t die at any time of the day. That would be a sustainable precinct, something that doesn’t die like some of the other cities have died, relying too heavily on or having no residential ... Something that lives on 24/7 would be a sustainable precinct ... that it does not just work office hours.”* – Colin Anderson, Director of Rabie Property Group (2016)

It is evident that the sustainability initiatives in the Century City precinct are combined efforts of the development team, professional design teams and the management and

operations teams. Through this inclusionary approach more aspects of sustainability come into play.

Urban sustainability as defined by Chris Blackshaw, the CEO of the Century City Property Owners' Association and head of management in the Century City precinct:

*“There is a business sustainability side to it. That [the urban precinct is] a healthy business environment. And then there's obviously the environment when considering urban sustainability. In your textbooks it would be around minimising the environmental impact of that precinct, or carbon footprint, minimal ecological impact. It would move around minimal impact now which would impede on future generations and everything else. An important point to make is that with urban sustainability there is an environmental sustainability component, but a lot of people do not recognise that there is also a practical, functional, commercial sustainability, and you need both, the two need to marry to create a sustainable urban precinct.”* – Chris Blackshaw, CEO of the Century City Property Owners' Association (2016)

The importance of operations management in urban sustainability is further supported by Century City's management team:

*“I believe that operations, management and building or infrastructure performance play a critical role in the sustainability of any urban development.”* – Century City Operations and Management Team Representative (2015)

Urban sustainability as defined by sustainability engineers, as members of the professional design teams of developments within the Century City urban precinct:

*“Urban development is the social, cultural, economic and physical/environmental development of cities, as well as the underlying causes of these processes. A sustainable development is one that creates a healthy balance between these spheres in a way that will allow these processes all to thrive for generations to come.”* – Civil Engineer specialising in Urban Sustainability based in the Cape Town Area (2015)

Sustainability initiatives and objectives directly influence changes in all of the stages of the Century City urban precinct's development, from conceptual planning to the occupancy of buildings or sub-precincts. Century City is therefore well placed to showcase long term

sustainable attributes within an urban environment (Century City Property Owners' Association (6), 2015).

#### 4.5.1 SUSTAINABILITY INITIATIVES CURRENTLY IN PLACE IN CENTURY CITY

As an urban precinct development, Century City offers all the conventional, authority required bulk services including water, stormwater, wastewater, irrigation and electrical infrastructure, and roads and pedestrian facilities, communal-use areas and landscaping. However, in line with the CCPOA and its stakeholders' aims to reduce the Century City precinct's carbon footprint and become a sustainable settlement a number of green initiatives are also offered (Century City Property Owners' Association (4), 2015). Besides being environmentally "green", these initiatives also impact on many social and lifestyle aspects of persons living and working in the Century City urban precinct. The green initiatives include (Century City Property Owners' Association (4), 2015):

- Integration of sensitive ecological systems into the urban environment
- Public and environmental amenities in close proximity to one another
- Ease of access to public transport
- Water infrastructure with a lower environmental impact
- Community outreach programmes
- Green Star South Africa certifications

#### 4.5.1.1 INTAKA ISLAND

As described in the Environmental Management section above, the Intaka Island wetland conservation area was established in response to the local authority requirements and regulations as set out in the EIA and subsequent EMPs to protect the historic and ecologically sensitive “Sewe Pannetjies” wetlands located on the Century City development site.

Intaka Island includes 16 hectares of wetlands, a bird sanctuary, three large breeding heronries and eight kilometres of associated canals which meander through Century City’s urban developments. The conservation area provides seven different habitats which are home to 212 species of indigenous plants, of which 24 plant species are on the endangered Red Data list, and over 120 different bird species, including migratory birds (Century City Property Owners' Association (6), 2015). The reconstructed conservation area of Intaka Island, which is open to the public on a controlled basis, has become an important eco-tourism destination (Century City Property Owners' Association (2), 2015), and is one of the Cape Town Metropolitan Area’s core conservation sites (Lochner, 2005).

The proximity of the well-managed wetlands and canal system to the urban development pockets, particularly the residential sub-precincts, has proven to add major marketing and aesthetic value to the Century City urban precinct (Anderson & Blackshaw, 2016).

Intaka Island is also home to a contemporary Environmental Education/Visitors Centre. This Centre, aside from being the welcome point for visitors, also meets the Century City precinct’s environmental education objectives by creating a platform and venue for showcasing industry-leading sustainability practices, focussing on energy optimisation and natural resource efficiencies. Some of these sustainable living best practices currently on display include a biogas digester, solar and wind renewable energy facilities, energy efficient lighting technologies, grey and black water treatment systems, low consumption water fittings, waste separation for recycling initiatives, and passive heating and cooling strategies (Century City Property Owners' Association (6), 2015).



IMAGE 4.6: Intaka Island, conserved from the historic “Sewe Pannetjies” wetland zone, and the Environmental Education Centre (Rabie Property Group & Century City Property Owners' Association, 2015: 14-15).

#### 4.5.1.2 COMMUNITY FACILITIES

The bulk of the Century City urban precinct consists of more than 160,000 square metres of occupied office space, more than 3,500 completed homes and over 400 shops in the Canal Walk Shopping Centre alone (Century City Property Owners' Association (4), 2015). Aside from these bulk developments, Century City also boasts a wide array of community amenities and services, including Intaka Island as described above, which encourage healthy and all-inclusive lifestyles within the Century City urban precinct. These amenities and services include various leisure facilities and activities, health and fitness facilities, conference facilities, educational institutions, religious establishments and emergency response services (Century City Property Owners' Association (6), 2015).

The leisure facilities and activities include a number of shops and restaurants, those inside Canal Walk and also a number of smaller establishments scattered across the greater Century City urban precinct, the Ratanga Junction theme park, canoeing and other water sports in the canals, and various running and cycle paths (Century City Property Owners' Association (6), 2015), as well as Central Park and the Century City Clubhouse, a 4,500 square metre field and multi-use clubhouse which are available to Century City's general community as a venue for corporate or sporting events or simply some family recreation (Century City Property Owners' Association (3), 2016).

In terms of health and fitness facilities, Century City is home to a 4,000 square metre state-of-the-art Virgin Active gym. A number of the residential developments in the Century City urban precinct also house private gym facilities for their residents, and Century City also has a Canoe Club, an Athletic Club, summer and winter touch rugby leagues and an Adventure Bootcamp for Women all run from the Century City Clubhouse (Century City Property Owners' Association (3), 2016). The number of scenic walking, cycling and running trails that wind through the Century City urban precinct provide residents of and visitors to the precinct with plenty of opportunities to exercise in a safe and secure environment (Century City Property Owners' Association (2), 2015).

The Century City urban precinct, as a complementary corporate alternative to the Cape Town CBD, boasts with a number of conference facilities catering for large and small groups, including the Manhattan Suites and Conferencing, the EasyStay Hotel, the Regus, the business Centre and the Island Club Hotel, each offering various types of facilities (Century City Property Owners' Association (3), 2016).

Century City is also home to a number of educational institutions, including Abbots College, Abeille Ruche, Curro Private School and Endeavour Educare Centre, catering for children from toddlers to 18 years old, from day care to high school (Century City Property Owners' Association (3), 2016).

There are also four churches currently operating within Century City, namely the Cape Grace Congregational Church, Shofar Church, Hillsong Church and the Planetshakers City Church Cape Town. Further to the churches operating within the urban precinct, Century City is also conveniently centrally located, offering easy access to many other religious organisations and places of worship in the surrounding areas (Century City Property Owners' Association (3), 2016).

Century City also boasts medical facilities as well as well managed emergency response services and immediate crisis support staff which are closely coordinated with the City of Cape Town's emergency services (Century City Property Owners' Association (6), 2015). The Century City Property Owners' Association security personnel are usually first to arrive at the scene of an emergency incident and are trained, through regular drills, to provide emergency first aid, a fire fighting response and traffic control until the City of Cape Town's formal emergency services arrive (Century City Property Owners' Association (2), 2015).

The CCPOA also has a master Disaster Management Plan (DMP) in place that will be implemented immediately if a major event occurs. This master DMP, as well as individual property owners' DMPs including building evacuation plans, are subjected to regular audits to ensure that they are up to date, aligned and readily enforceable (Century City Property Owners' Association (2), 2015).

The combination of the bulk residential and commercial spaces within close proximity to the carefully positioned community amenities and services as described above drastically reduces necessary travel and travel time, reducing the related environmental impact and allowing more time for leisure and lifestyle activities (Century City Property Owners' Association (6), 2015).

#### 4.5.1.3 PUBLIC TRANSPORT AND PEDESTRIAN FACILITIES

The Century City urban precinct is strategically located to serve as the central connection hub between the main arteries of the greater Cape Town Metropolitan area's growing public transport system. Century City is central to both the northern and southern suburbs and is approximately 16 kilometres by road from the Cape Town CBD and 14 kilometres by road from the Bellville CBD (Century City Property Owners' Association (6), 2015). Century City, as a successful mixed-use development which includes a major shopping centre and which acts as a central public transport hub for the greater Cape Town area, generates and accommodates heavy traffic flows (Century City Property Owners' Association (8), 2015). Under the management of the Century City Property Owners' Association, the urban precinct facilitates six different means of mass public transport, including commuter and MyCiti buses, minibus and metered taxis, rail services and designated pedestrian facilities (Century City Property Owners' Association (4), 2015).

Century City has three major public transport hubs connecting it to neighbouring areas and the greater Cape Town Metropolitan area. The first is the Century City Railway Station which forms part of the main Cape Town to Bellville train route and is located to the south-east of the urban precinct (Century City Property Owners' Association (5), 2016). The second and third are the two public transport interchanges, the primary located off Ratanga Road to the west and the secondary off Century Avenue to the north. Both of these interchanges are well serviced, with designated MyCiti bus and minibus taxi lanes and terminus buildings fully equipped with waiting areas, public toilets, public telephones, tickets offices and vending machines (Century City Property Owners' Association (2), 2015). Commuter buses and minibus taxis are not permitted to operate on the Century City urban precinct's internal

road network, but do operate from the two public transport interchanges, connecting the precinct to neighbouring areas. The Golden Arrow Bus Service operates designated services to Century City from the Cape Town CBD, Atlantis, Elsies River, Hanover Park, Khayelitsha, Killarney and Nyanga. Alternative commuter bus services also operate from the northern Montague Gardens and Bosmansdam Road areas to Century City's secondary interchange off Century Avenue. Formal minibus taxi services to Century City's public transport interchanges operate from Bellville, Elsies River, Goodwood, Guguletu, Khayelitsha, Koeberg, Langa, Maitland, Mitchells Plain, Nyanga, and various other Cape Flats destinations (Century City Property Owners' Association (5), 2016).

There are also various alternative and public transport modes available within the Century City urban precinct. The most prominent is the number of MyCiti bus feeder routes, replacing Century City's private Internal Shuttle Buses, that run along Century Boulevard and Century Avenue, the precinct's main commercial artery (Century City Property Owners' Association (2), 2015). Metered taxis are also permitted to operate on Century City's internal road network, with agreed staging areas set aside at the Canal Walk Shopping Centre for a limited number of registered operators (Century City Property Owners' Association (5), 2016).

An E-Parking service is also offered to companies situated in the Century City urban precinct as a convenient and alternative "park and ride" system (Century City Property Owners' Association (6), 2015). There are currently four E-Parking facilities, one located at the primary public transport interchange off Ratanga Road, two located off Century Avenue and one located at the corner of Century Boulevard and Century City Drive. All of these facilities are within walking distance of at least one MyCiti bus stop, providing easy access to all areas of the larger precinct (Century City Property Owners' Association (5), 2016).

Century City accommodates more 4,800 daily commuters from the Railway Station and over 100,000 monthly passengers on its internal modes of public transport, securing the clear economic and environmental benefits of public transport (Century City Property Owners' Association (4), 2015).

Further to the various alternative and public transport modes described above, Century City is also uniquely designed to accommodate non-motorised transport, with dedicated cycling and pedestrian routes across the precinct. Cyclists and pedestrians have a range of options with numerous pedestrian bridges linking the different parts of the urban precinct as well as various access routes in and out of Century City (Century City Property Owners' Association (5), 2016).

The image below shows the Century City urban precinct's public transport networks and major pedestrian routes. The Century City Railway Station is shown along the bottom of the image with the primary public transport interchange shown off Ratanga Road. The various MyCiti bus stops along Century City's main commercial arteries, Century Boulevard and Century Avenue, are also indicated on the map, as well as the four current E-Parking facilities. Designated cycle routes are shown in dotted blue, with major pedestrian routes shown in dotted yellow and the nature trails through Intaka Island shown in dashed green.



### Century City Wayfinding Map

<ul style="list-style-type: none"> <li> Public Transport Interchange</li> <li> Railway</li> <li> MyCiti Bus</li> <li> Parking</li> <li> e-Parking</li> <li> Service Station</li> </ul>	<ul style="list-style-type: none"> <li> Public Restrooms</li> <li> Shopping</li> <li> Restaurant</li> <li> Fast Food</li> <li> Entertainment</li> <li> Theme Park</li> <li> Boat Tours</li> </ul>	<ul style="list-style-type: none"> <li> Cycle Route</li> <li> Pedestrian Route</li> <li> Nature Trail</li> <li> Day Hospital</li> <li> Conference Centre</li> <li> Accommodation</li> <li> School</li> </ul>	<ul style="list-style-type: none"> <li> Sport</li> <li> Soccer</li> <li> Canoeing</li> <li> Gym</li> <li> Worship</li> <li> Bird Hide</li> <li> Recycling</li> </ul>	<p><b>Contacts</b></p> <ul style="list-style-type: none"> <li>Century City Property Owners' Association: 021 552 6889</li> <li>Security Control Centre: 021 202 1000</li> <li>Intaka Island: 021 552 6889</li> <li><a href="http://www.centurycity.co.za">www.centurycity.co.za</a></li> <li><a href="https://www.facebook.com/CenturyCityZA">www.facebook.com/CenturyCityZA</a></li> <li><a href="https://twitter.com/CenturyCityZA">@CenturyCityZA</a></li> <li><a href="http://www.intaka.co.za">www.intaka.co.za</a></li> </ul>
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IMAGE 4.7: Century City’s Public Transport and Pedestrian Map (Century City Property Owners' Association (1), 2016).

#### 4.5.1.4 STORMWATER MANAGEMENT AND WATER CONSERVATION

The Century City urban precinct development is located on a site that was previously a series of ecologically significant salt flats and, speaking from a development point of view, a waterlogged wasteland with strict development requirements from the local authority to conserve certain aspects of the wetlands (Century City Property Owners' Association (7), 2015).

The developers of Century City decided to view these obstacles for their potential rather than their problems and they, as described in the sections above, established the Intaka Island wetland conservation area and associated canal system throughout the urban precinct. Besides the environmental conservation aspects of wetlands as required by the local authority, Intaka Island together with the canal system provide the Century City urban precinct with industry leading stormwater management facilities and unique marketing capabilities and aesthetic value (Anderson & Blackshaw, 2016).

Chris Blackshaw, CEO of the Century City Property Owners' Association, and Colin Anderson, Director of Rabie Property Group, said the following:

*"The history was that we had the "7 Pannetjies" (historical wetland/salt flats) here and now, from a development position, how do you deal with all that water, especially seasonally, canals was the way of dealing with it and then obviously it's got a major marketing and aesthetic value." – Chris Blackshaw, CEO of the Century City Property Owners' Association (2016)*

*"It started off as: there is a wetland, and how do we get rid of the wetland. Initially it was a solution to a problem. It has now been that there are some regulations that require you to do that [on-site stormwater management], but, over and above that, we've found, especially on the residential side, there is added value to having canals. It has in fact worked out that the stormwater management aspects of the water and the canals around all of the built sub-precincts was a bonus, it was initiated to solve another problem and for the look and feel of it, with stormwater management being an added bonus." – Colin Anderson, Director of Rabie Property Group (2016)*

Century City's canal system acts as an on-site stormwater retention facility capable of storing up to 83,000 cubic metres of stormwater runoff before overflowing to downstream

City of Cape Town municipal facilities and eventually ending up in the ocean (Century City Property Owners' Association (4), 2015). All stormwater runoff is treated via silt traps before being attenuated in the canal system, with the Intaka Island wetlands acting as a natural cleansing and polishing water filter, further maintaining the water quality of the canals (Century City Property Owners' Association (6), 2015). These on-site stormwater treatment and attenuation facilities, which drastically reduce the downstream and off-site impact of stormwater and effluent runoff, are seen as industry leading and as Colin Anderson states, “I think that the engineers who came up with the concept initially were cleverer than they knew” (Anderson & Blackshaw, 2016). The City of Cape Town local authority has since adopted, and is now enforcing, new urban stormwater management policies which require all new urban developments to include on-site stormwater retention and polishing capabilities (City of Cape Town, Roads & Stormwater Department , 2009).

The Century City urban precinct is also located in a severely water stressed region, and, even though the cost of potable water does not yet reflect the severity of the shortage, Century City is at the forefront of efficient water design and mindful consumption. Century City's water supply network is supported by a 125 litre per second recycled water supply pipeline fed from the nearby Potsdam Wastewater Treatment Works. This recycled water is further treated at Century City's on-site grey water treatment facility where after it is used for irrigation and, in newer buildings, for toilet and urinal flushing. The treated effluent is also fed into the managed wetlands to maintain the precinct's canal water levels during the dry seasons (Century City Property Owners' Association (6), 2015).

In further efforts to support environmental awareness and reduce potable water consumption, many building owners have innovatively incorporated the use of the Century City urban precinct's treated effluent supply together with individual rainwater harvesting systems to supply their own irrigation systems and for use in their building's energy efficient, water-based cooling systems (Century City Property Owners' Association (6), 2015).

#### 4.5.1.5 COMMUNITY OUTREACH

Rabie Property Group, as the main owner-developer of the Century City urban precinct, is involved in community upliftment outreach programmes in the communities surrounding the Century City precinct as part of their corporate social investment programme (Rabie Property Group & Century City Property Owners' Association, 2015).

Since 2007, Rabie has made significant contributions towards infrastructure and learning experience improvement at the Sinenjongo High School, located in the neighbouring Joe Slovo Park area. Rabie funds a number of ongoing mentoring and upskilling programmes for the school's teaching staff. These programmes are mainly aimed at improving maths and science skills and the English proficiency of teachers and learners (Rabie Property Group & Century City Property Owners' Association, 2015). Rabie's ongoing support has had positive results, with Sinenjongo High School's 2015 matric pass rate confirmed as 90.6%, up from the approximately 27% that it was when Rabie started sponsoring the school in 2007 (Green Building Council of South Africa (2), 2016).

What started out as Rabie Property Group sponsoring the construction of new computer and science laboratories at the school, has evolved into the construction of a brand new Sinenjongo High School, a joint venture between Rabie, the Western Cape Education Department and the Department of Transport and Public Works scheduled for completion in December 2016, in time for the 2017 academic year. The new school will accommodate more than 1,200 learners from Joe Slovo and the surrounding areas of Milnerton (Western Cape Government, 2016).

In an innovative approach to ensure continued support to the high school, Rabie Property Group conditioned its investment into the construction of the popular Fives Futbol arenas in Century City on that a portion of net profits from the sporting establishment must be donated to Sinenjongo High School. The school received its first dividend from this initiative in May of 2014, and used the proceeds to fund ongoing intervention programmes at the school (Rabie Property Group & Century City Property Owners' Association, 2015).

The Century City Property Owners' Association also supports the Sinenjongo High School through its school feeding programmes and hosting the learners for various environmental education programmes (Rabie Property Group & Century City Property Owners' Association, 2015).

The Intaka Island Environmental Education Centre, a joint venture between Rabie, the CCPOA and other stakeholders, has also used its environmental awareness programmes as opportunities for job creation. Field rangers, who started out as security officers, have successfully completed training courses and are now running the primary school educational programmes, and general workers have also been given opportunities to train for and obtain boat skipper's licences. These workers now captain the boats that take visitors and school groups out on tours of Intaka Island's surrounding canals (Rabie Property Group & Century City Property Owners' Association, 2015).

#### 4.5.1.6 CENTURY CITY'S GREEN STAR SOUTH AFRICA RATINGS

Century City is home to South Africa's first Five Star Green Star South Africa rating, which was awarded to the Aurecon building in July 2011 in the New Buildings Design category of the GSSA ratings suite.



IMAGE 4.8: The Aurecon Building in Century City, South Africa's first Green Star South Africa Five Star rated building (Rabie Property Group & Century City Property Owners' Association, 2015: 12).

Century City boasts with a number of other Green Star South Africa ratings developments, including (Anderson & Blackshaw, 2016):

- Aurecon West – Five Star GSSA New Building Design Certification, February 2016.
- Bridge Park East – Five Star GSSA New Building Design Certification, April 2015 (As Built certification pending).
- Bridge Park West – Five Star GSSA New Building Design Certification, April 2015 (As Built certification pending).
- Chevron – Five Star GSSA New Building Design Certification, June 2013 (As Built certification pending).

- No 17 Park Lane – Five Star GSSA New Building Design Certification, March 2013.
- Business Centre – Four Star GSSA New Building Design and As Built Certifications, November 2014.
- Centennial Place – Four Star GSSA Existing Building Performance Certification, April 2015.
- Estuaries Plaza – Four Star GSSA New Building As Built Certification, October 2015.
- Ibis House in The Estuaries Office park – Four Star GSSA New Building Design Certification, March 2013.
- No 3 Bridgeways – Four Star GSSA New Building Design and As Built Certifications, November 2014.
- Standard Bank in Canal Walk Shopping Centre – Four Star GSSA Interiors As Built Certification, July 2015.

The Bridgeways precinct in Century City is also set to become South Africa's largest all-green business precinct. This precinct is already home to the Five Star rated Bridge Park East and West and Chevron, as well as two Four Star rated buildings. When the Bridgeways precinct is completed it will also house the Century City Urban Square development, which includes a 900-seater conference centre, a 125-room hotel, showrooms, apartments, offices, restaurants and parking facilities (Rabie Property Group & Century City Property Owners' Association, 2015). This development is currently registered with the Green Building Council of South Africa as a pilot project for the new Green Star SA mixed use rating tool (Anderson & Blackshaw, 2016).



IMAGE 4.9: An architect's rendering of the Century City Urban Square development in the Bridgeways precinct of Century City (Rabie Property Group & Century City Property Owners' Association, 2015: 18).

Rabie Property Group and the Century City Property Owners' Association aim to further solidify Century City's position as a premier destination for companies and individuals committed to improving their environmental scorecard by encouraging future developments to strive for Green Star SA status, both Design and As Built (Rabie Property Group & Century City Property Owners' Association, 2015), and by encouraging the operations and facilities management teams of existing buildings to strive for Existing Building Performance Green Star SA ratings.

#### 4.5.2 MOTIVATIONS FOR ADOPTING SUSTAINABLE URBAN DEVELOPMENT PRINCIPLES IN CENTURY CITY

The development and management teams of the Century City urban precinct have emphasised environmental responsibility, future proofing their development and

maintaining a competitive commercial edge as their main motivations for adopting urban sustainability objectives:

*“Our sustainable development initiatives and policies are more as a result of releasing the need to be environmentally conscious and responsible and conserving it for future use, by changing the behaviour of staff and tenants by means of implementing waste, water, energy saving initiatives and transport management practices, rather than being driven by local authority.” – Century City Operations and Management Team Representative (2015)*

*“We firmly believe that by building green buildings, coupled with the roll out of Century City Connect – the high speed fibre optic network which enables the fastest connectivity speeds in Africa – we are ‘future proofing’ our buildings.” – Colin Anderson, Director of Rabie Property Group (2016)*

*“We want [Century City] to be a destination where people want to be. And [sustainability] gives us that competitive edge.” – Colin Anderson, Director of Rabie Property Group (2016)*

Further motivation behind the adoption and implementation of sustainable objectives and initiatives is the development and management teams’ desire to maintain the Century City urban precinct’s status as one of the leading and most sustainable urban precincts in South Africa, through the creation of an entirely green precinct:

*“Century City prides itself and strives to be at the cutting edge of everything. So whether it’s our fibre connectivity or whether it’s our environmental education on Intaka Island or whether it’s public transport, accessibility or whatever we pride ourselves of pushing the boundaries. So [sustainability] is again one of the boundaries, we are one of the leaders.” – Chris Blackshaw, CEO of the Century City Property Owners’ Association (2016)*

*“Yes, the goal is to develop an entirely green precinct by incorporating all applicable standards and ratings in an effort to ensure a sustainable environment. The goal is to achieve as many Green Star ratings as possible for all new developments in Century City.” – Century City Operations and Management Team Representative (2015)*

## 4.6 THE VALUE OF PRECINCT LEVEL URBAN SUSTAINABILITY

The importance of urban sustainability and the shift in focus from the sustainability of individual buildings in isolation to the holistic inclusion of sustainable precincts, communities and cities, is very clearly understood by all parties involved in the development, operation and management of the Century City urban precinct:

*“Certainly it is [important]. Buildings can’t live in isolation. So there is no point having one fantastic building surrounded by a bunch of slums.” – Colin Anderson, Director of Rabie Property Group (2016)*

*“It is of critical importance to the Green Building Council of South Africa – the survival of our environment, economy and social fabric will depend on how we adapt our cities into more sustainable cities.” – Technical Coordinator at the Green Building Council of South Africa (2015)*

As developers, Rabie Property Group understands the critical importance of sustainability, particularly at precinct level where development rollouts can take many years. It is essential that the urban precinct will be sustainable, operable and comfortably maintainable throughout the entire development process, and then also through the completed development’s entire lifecycle:

*“Property is a long term game. So for us to develop a precinct, this is a large precinct that is going to be developed probably over thirty years, you can’t have a short term view on something like that ... Properties, we buy them and want to hold them and want the values to grow, so again as I said earlier, if that single property would do beautifully but if the surroundings die around it then we’ve got nothing, we’ve got a beautiful building in the middle of nothing. So, I think [urban sustainability] is just a commercial reality, if you’re in it for the long term, you’ve got to be thinking long term.” – Colin Anderson, Director of Rabie Property Group (2016)*

*“We’re fortunate in this situation that we own a massive chunk of the property here at Century City and so, what it does, it makes us more conscious of what we do with every development, because if we mess up this one, we’ve messed it up for the next one.” – Colin Anderson, Director of Rabie Property Group (2016)*

The value of sustainable precincts cannot necessarily be defined in the clear financial terms that are desirable to developers and investors but, despite inevitable challenges, the

benefits of the development of sustainable precincts and larger urban areas remain evident (Aurecon SA (Pty) Ltd, 2014). These benefits and opportunities include a number of financial, institutional, legal and social prospects that are inherent to the adoption and incorporation of neighbourhood level sustainability initiatives, objectives and principles, and that influence each other, both directly and indirectly. The areas in which these benefits and opportunities are most apparent include (Alexander & Modack, 2015):

- The incorporation of mixed use and mixed income into a single precinct, settlement or neighbourhood.
- Densification, adaptability and the opportunity and scale for incremental development.
- Financial feasibility.
- Socio-economic integration and inclusivity.
- Resource efficiency and the incorporation of sustainable infrastructure and new alternative technologies

Rabie Property Group and the Century City Property Owners' Association both agree that precinct level sustainability has a number of benefits outside of only financial profits which are worth it despite the inherent difficulties:

*"In a way, looking at sustainability at a precinct level at times could be easier and could help resolve challenges. I mean, Rabie as a developer controls many of the transport and mobility and those sorts of issues and has been looking at it, not at a building level, but at a Century City wide level, which means you look at the economies of scale and you can get the necessary finance together to do those things. Some of the challenges we've had here in this sub-precinct, where you have coolers and everything else – there are potential opportunities for collective, whether it's cooling or heating beyond just one building. If you can't get your required mass on a particular building and you've got the economies of scale if you work with a number of buildings you could sort out that surplus or deficiency by adding another building to the system. There are opportunities, but it's difficult, as we've found it to*

*be, because then you're dealing with different property owners and jurisdiction and such things." – Chris Blackshaw, CEO of the Century City Property Owners' Association (2016)*

*"There's also the financing and the holding costs of those kinds of facilities, if you want dual facilities, like urban cooling. We've done it in this precinct, which is a smaller sub-precinct of Century City because we control the entire precinct so we've got a central chiller plant, we've got four-five buildings here so it works for all of those buildings. But whether or not we could take that and build an even bigger one, that we could deal with the building next door, that's a lot of capital outlay up front and that's unfortunately not the commercial." – Colin Anderson, Director of Rabie Property Group (2016)*

*"That's the whole question of putting a lot of infrastructure up front and you've got a long period of roll-out of development in a precinct, so it's not just a building which has got your two year turnover, this may be a lengthier period and you're going to have to put that infrastructure cost up front and that places pressure on the financial aspects of any development, particularly if smaller developers are involved. In 2006/2007 we looked at providing a central back-up power facility where each supply line to a building has this back-up and when new buildings are added to the precinct an extra generator is just added onto the back of the back-up power facility, but it is difficult doing it retrospectively, where every building already has its own back-up system. These things should be planned up front for future roll-out." – Chris Blackshaw, CEO of the Century City Property Owners' Association (2016)*

Sustainable precincts present a range of benefits to stakeholders and affected communities, including providing safe, attractive facilities and a healthy living environment, and contributing to diverse, vibrant and evolving communities. By embedding principles of good design right from the start these sustainable communities can also be affordable. Greening and sustainability on a city and precinct scale will also allow the development and construction industries and governments to deliver large-scale socio-economic priorities such as energy security, job creation, social stability and efficient resource management (Aurecon SA (Pty) Ltd, 2014).

#### 4.7 THE SOUTH AFRICAN URBAN DEVELOPMENT INDUSTRY'S EXPANSION TO LARGER SCALES AND THE EXPECTED IMPACT OF A PRECINCT LEVEL SUSTAINABILITY RATING TOOL

The South African urban development industry and its various role players has already, in accordance with global industry trends, commenced with the implementation of the wider objectives of sustainability to include the development of sustainable precincts, neighbourhoods, communities and cities together with the development of individual sustainable buildings:

*“There are many urban designers, both public and private, doing great work integrating sustainable development principals into the designs of cities and precincts, regardless of whether they are seeking certification or not, but a certification will help independently verify their intentions.”* – Technical Coordinator at the Green Building Council of South Africa (2015)

*“There are currently a number of research and planning operations in progress with both the local City of Cape Town municipality and the provincial Western Cape government’s Department of Environmental Affairs and Development Planning to determine the way forward in terms of sustainable neighbourhood and settlement development and the feasibility of alternative sustainable infrastructure technologies ... We, and all government entities, must, however, be careful not to become trapped in an ongoing planning cycle. Clear guidelines for the implementation of neighbourhood and city level sustainability must be established and enforced.”* – Cape Town Civil Engineer specialising in Urban Sustainability (2015)

*“From a GBCSA operational perspective, a Communities rating tool relevant to the South African context is currently under development and will be made available to the South African market within the coming years.”* – Technical Coordinator at the Green Building Council of South Africa (2015)

As a first effort to regulate and encourage sustainability in urban development operations at precinct and larger scales the South African government has published the SANS 10400XA and SANS 204 parts of the National Building Regulations. SANS 10400XA deals with environmental sustainability and energy usage in buildings and includes a number of compulsory requirements that must be achieved during the design and construction of any new building (National Building Regulations (1), 2011). SANS 204 is a voluntary building

standard which promotes energy efficiency in buildings and precincts. Its requirements are significantly more stringent than the compulsory SANS 10400XA requirements and represent the minimum requirements that must be achieved in a building's design and construction for the building to achieve a Green Star South Africa rating (National Building Regulations (2), 2008). Local urban development professionals expect that within the next couple of years these SANS 204 requirements will become compulsory, and that more sustainability regulations, particularly ones related to precincts and communities, will be added to the SANS suite.

In further attempts to promote larger scale sustainable urban development in the public sectors, to avoid sustainability being limited to isolated private sector developments and leading municipal areas, the Green Building Council of South Africa is working closely with local and national governments to present more progressive spatial and urban planning requirements which will enforce sustainable precinct and community level development. The goal is to achieve large scale urban sustainability across all sectors and all spheres of the South African urban development industry:

*“The green Building Council of South Africa also advocates for sustainable development with government at all levels to promote sustainable development of buildings, urban scale projects and cities. We would like to see all role players in the South African industry to contribute to urban sustainability.”* – Technical Coordinator at the Green Building Council of South Africa (2015)

Above compliance with the compulsory building regulations updated to include sustainability and the Green Building Council of South Africa's inputs into governments' spatial planning activities, the introduction of the existing Green Star South Africa sustainable building rating tool set resulted in a widespread increase in sustainable building activities:

*“Initial progress has been slow but with the Green Building Council's existing tools the drive towards sustainable buildings and the implementation of sustainability initiatives has risen significantly.”* – Century City Operations and Management Team Representative (2015)

*“The introduction of the rating tools has been the single biggest catalyst behind the sweeping adoption and incorporation of sustainability objectives and initiatives in the South African urban development industries” – Cape Town Civil Engineer specialising in Urban Sustainability (2015)*

*“The Green Star South Africa rating tools give South African development and construction industry professionals clear sustainability objectives to target during the design and construction of buildings, and also provide clear guidelines on how to achieve and incorporate the desired sustainability goals and initiatives.” – Cape Town Civil Engineer specialising in Urban Sustainability (2015)*

The inclusion of sustainability objectives into the South African urban development industry’s regulations, together with the ever growing interest of the industry’s leading role players in the advancement of sustainability goals shows that urban sustainability is becoming the industry norm:

*“Sustainability will continue to be a major consideration in building projects of any scale or building lifecycle, whether in the building’s design, construction or operation. In my opinion sustainable buildings will be the standard buildings of tomorrow. Sustainability in the built environment is the new norm.” – Technical Coordinator at the Green Building Council of South Africa (2015)*

*“Sustainability is no longer only an option, it is becoming the new industry standard. Sustainable practice has become unavoidable, and failure to include sustainability into new development or refurbishment projects will be a costly mistake.” – Cape Town Civil Engineer specialising in Urban Sustainability (2015)*

*“I believe it is imperative that all new development must incorporate sustainability principles in order for them to be effective and sufficient, ... all urban developments will incorporate sustainable initiatives going forwards, especially when you consider the current water and energy crises that our country is facing. Developers will, from a cost efficiency point of view, have no other choice but to implement sustainable initiatives.” – Century City Operations and Management Team Representative (2015)*

Leading South African urban development industry role players have already started showing interest in achieving sustainability ratings at scales larger than individual buildings:

*“The Green Building Council of South Africa is seeing growing interest from neighbourhood scale projects in South Africa and Africa that want to be certified using the Green Star – Communities tool, which is currently possible via the Green*

*Building Council of Australia supported by the GBCSA.” – Technical Coordinator at the Green Building Council of South Africa (2015)*

*“Yes, there has already been significant interest from various project teams in South Africa and Africa in pursuing a rating under the Communities Tool.” – Technical Coordinator at the Green Building Council of South Africa (2015)*

It is expected that, similar to the response to the existing Green Star South Africa rating tool suite, the introduction of the South African Communities rating tool will lead to a substantial increase in precinct and community urban sustainability undertakings and accomplishments. Developers, especially, also look forward to the credibility and comparability that the new Communities rating tool will provide to their urban sustainability initiatives:

*“It is most definitely expected that the introduction of a South African adaptation of a precinct or community level rating tool to Green Star South Africa will motivate and significantly increase urban sustainability activities at larger scales.” – Cape Town Civil Engineer specialising in Urban Sustainability (2015)*

*“The advantage of [a community level rating] is that it wouldn’t just be a marketing speak. It wouldn’t just be you writing some fancy words in your brochure saying this is what we do. This is a certification that the market then says, this is true, this is real. I think there is a massive advantage. It’s what happened with the green buildings.” – Colin Anderson, Director of Rabie Property Group (2016)*

*“[A precinct level rating] is credibility, and it’s comparability, you can compare other prospective areas ... It is legitimate in terms of credibility.” – Chris Blackshaw, CEO of the Century City Property Owners’ Association (2016)*

*“As seen with the existing Green Star SA Rating Tool Suite, the new [community/precinct level] tool will act as a catalyst for further sustainable urban development.” – Technical Coordinator at the Green Building Council of South Africa (2015)*

## 4.8 CENTURY CITY'S SUSTAINABILITY INITIATIVES COMPARED TO THE SUSTAINABLE URBAN DEVELOPMENT LITERATURE

### 4.8.1 CENTURY CITY'S SUSTAINABILITY INITIATIVES COMPARED TO THE TWELVE BASIC PRINCIPLES OF SUSTAINABLE URBAN DEVELOPMENT

As discussed in Section 2.3.2 of Chapter Two, any urban development that wishes to be established as a sustainable development should integrate all or at least most of the twelve basic sustainability principles into the development's wider socio-economic framework. The twelve basic sustainability issues that need to be addressed in order to marry equity, urban economic growth and environmental sustainability objectives are, in no particular order: air pollution and CO<sub>2</sub> emissions, water, energy, sanitation, solid waste, land and space, building materials and design, transport, health, food, biodiversity and recreational space, and child-centred development and learning.

Century City's current sustainability objectives and initiatives can be compared to these basic sustainability principles to demonstrate the urban precinct's overall compliance to urban sustainability.

#### 4.8.1.1 AIR POLLUTION AND CO<sub>2</sub> EMISSIONS

While the Century City urban development precinct is not an industrial precinct in which everyday CO<sub>2</sub> emissions have the tendency to become excessive, Century City's comprehensive public transport network and first-rate pedestrian facilities promote a reduction in the use of private vehicles within the urban precinct. By minimising private vehicle use within the precinct, the development also minimises air pollution and CO<sub>2</sub> emissions associated with heavily trafficked areas.

#### 4.8.1.2 WATER

The Century City urban development precinct fares well in terms of water conservation, making use of rainwater harvesting and treated effluent supplied from the nearby Potsdam Wastewater Treatment Works for applications such as toilet flushing, irrigation and water-based heating and cooling systems. The entire precinct's irrigation networks and systems run on treated effluent, saving significant amounts of potable water in efforts to mitigate the ongoing drought conditions in its local region.

Further to the above, the Century City urban development precinct also boasts a world-class stormwater management open canal system that integrates the functions of stormwater management and treatment, recreational activities, aesthetic values, and ecological biodiversity and conservation, all into one well-designed element.

#### 4.8.1.3 ENERGY

Many of the Century City urban development precinct's building developments make use of low-energy lighting and solar panels as measures to reduce energy consumption levels. Some of Century City's smaller sub-precincts also make use of centralised heating, cooling and back-up electricity generator systems, in which major, energy-intensive plant and applications are shared between a number of buildings and public spaces rather than each being equipped with its own systems.

#### 4.8.1.4 SANITATION

Century City does not have on-site, precinct level wastewater treatment and recycling facilities. The urban development precinct's wastewater drainage system is, however, linked to the nearby Potsdam Wastewater Treatment Works which does treat and recycle wastewater, and Century City is supplied with treated effluent from the Works for use in appropriate water-use applications as described in Section 4.8.1.2 above.

#### 4.8.1.5 SOLID WASTE

While the Century City urban development precinct does not currently make use of a precinct wide solid waste management plan and system, many of the smaller sub-precincts and individual building developments do comply with sustainability standards in terms of solid waste management and recycling initiatives. These initiatives are generally implemented in pursuit of Green Star South Africa sustainability ratings at individual building level.

#### 4.8.1.6 LAND AND SPACE

Besides the lack of provision for mixed-income group integration, which is mitigated by the precinct's extensive public transport network connecting to areas populated by all income groups, the Century City urban development precinct does very well in terms of sustainable land use and space requirements. The urban development precinct includes a wide array of different land uses, as well as mixed use single facilities. The precinct also incorporates green infrastructure into its services arrangement and the greening of open spaces and pedestrian areas into the urban area.

#### 4.8.1.7 BUILDING MATERIALS AND DESIGN

Both Rabie Property Group and the Century City Property Owners' Association, as the developers and management team of the Century City urban development precinct, strongly encourage the pursuit of Design and/or As Built Green Star South Africa building sustainability ratings with their clients, developments and prospective tenants. As a result of this there are a number of building developments within Century City that have incorporated sustainable building design processes and have implemented sustainable building materials into their construction practices. The Century City urban development precinct currently boasts with ten Green Star South Africa Design and/or As Built certified

building developments, with many of the precinct's new projects also aiming for Green Star certification.

#### 4.8.1.8 TRANSPORT

Century City boasts a comprehensive public transport system comprising of a number of public transport modes and three major interchanges. The urban precinct's central location lends itself to being easily linked to the City of Cape Town CBD, as well as the City's northern and southern suburbs and the many surrounding neighbourhoods and informal settlements, through public transport.

The mass public transport modes currently facilitated with the Century City urban development precinct include train services via the Century City Railway Station, MyCiti and commuter bus services, and minibus and metered taxi services.

Century City also contains ample designated non-motorised transport and pedestrian facilities and interconnecting networks, further promoting sustainable accessibility and movability throughout the urban development precinct.

#### 4.8.1.9 HEALTH

The Century City urban development precinct boasts a number of medical facilities, as well as a number of fitness facilities and activities. The precinct is home to a state-of-the-art gym, with a number of the precinct's residential developments also being equipped with private gym facilities. Century City also has a Canoe Club, an Athletic Club, summer and winter touch rugby leagues, an Adventure Bootcamp for Women, and a number of scenic walking, cycling and running trails that wind through the Century City urban precinct and provide residents of and visitors to the precinct with plenty of opportunities to exercise in a safe and secure environment.

Century City also boasts well managed emergency response services and immediate crisis support teams. These teams are usually first to arrive at the scene of an emergency incident and are trained to provide emergency first aid, firefighting response and traffic control until the formal emergency services arrive.

#### 4.8.1.10 FOOD

The Century City urban development precinct meets its food related sustainability requirements through some sustainable gardening activities and practices at some of its educational institutions and through community outreach programmes. One such programme is the Century City Property Owners' Association's school feeding initiative at the Sinenjongo High School in the nearby Joe Slovo Park informal settlement area.

#### 4.8.1.11 BIODIVERSITY AND RECREATIONAL SPACE

The biodiversity and recreational space requirements is probably the one of these twelve basic sustainability principles that the Century City urban development precinct satisfies the most comprehensively.

In terms of biodiversity, the Century City urban development precinct is home to the Intaka Island wetland conservation area which includes large wetlands, a bird sanctuary, breeding heronries and eight kilometres of associated canals which meander through Century City's urban developments. The conservation area, which has also become an important eco-tourism destination, provides seven different habitats which are home to 212 species of indigenous plants, of which 24 plant species are on the endangered Red Data list, and over 120 different bird species.

Through Intaka Island, Century City is also home to a contemporary Environmental Education/Visitors Centre which creates a platform and venue for showcasing industry-

leading sustainability practices, focussing on energy optimisation and natural resource efficiencies.

In terms of recreational spaces, the Century City urban development precinct includes a wide array of shops, restaurants and other leisure facilities and activities. These other activities include the Ratanga Junction theme park, canoeing and other water sports in the canals, various running and cycle paths, as well as Central Park and the Century City Clubhouse which are available to the precinct's general community for corporate and/or sporting events or simply some family recreation.

#### 4.8.1.12 CHILD-CENTRED DEVELOPMENT AND LEARNING

In terms of child-centred development and learning, the Century City urban development precinct caters for children from toddlers to 18 year olds. The precinct is home to a number of educational institutions, including Abbots College, Abeille Ruche, Curro Private School and Endeavour Educare Centre.

#### 4.8.2 CENTURY CITY'S SUSTAINABILITY INITIATIVES COMPARED TO ADRIANA ALLEN'S FIVE DIMENSIONED APPROACH TO SUSTAINABILITY

As outlined in Chapter Two, Argentinean scholar Adriana Allen defines urban sustainability at precinct level in terms of the following five dimensions: ecological sustainability, economic sustainability, physical sustainability, political sustainability and social sustainability. Century City's current sustainability objectives and initiatives can be compared to these dimensions to demonstrate the urban precinct's overall compliance to urban sustainability.

#### 4.8.2.1 ECOLOGICAL SUSTAINABILITY

The Century City urban precinct shows resolute efforts in ecological sustainability: through the Intaka Island wetland conservation and environmental education area, through their innovative stormwater management systems, through their water consciousness and the use of recycled water in heating, cooling and irrigation systems, and through their focus on energy efficiency, both at building and sub-precinct levels.

#### 4.8.2.2 ECONOMIC SUSTAINABILITY

The economic sustainability of the Century City urban precinct is clearly very important to the majority owners and developers, Rabie Property Group. Their aspiration and pursuit of creating a 24-hour environment across the entire urban precinct throughout its long-term lifecycle is evident in the inclusion of many different uses in close proximity to each other and through their creation of flexible spaces and buildings which may be converted to suit evolving market trends.

#### 4.8.2.3 PHYSICAL SUSTAINABILITY

In terms of physical sustainability, Rabie Property Group and the Century City Property Owners' Association both strive to achieve as many Green Star South Africa ratings as possible, especially in any new buildings and sub-precincts. Their aim is for the Century City urban precinct to finally become a completely 'green' precinct in terms of Green Star ratings.

Continuous upgrading of infrastructure and well-managed maintenance practices across the precinct further promote and ensure the physical sustainability of the Century City urban precinct.

#### 4.8.2.4 POLITICAL SUSTAINABILITY

The Century City urban precinct is managed as a privately run mini-municipality. These autonomous conditions, together with a clear operation and management vision and a well-defined and enforced set of rules and regulations, create high levels of political sustainability in the Century City precinct's internal environment. The precinct is, however, not completely immune to its external political setting of the regional City of Cape Town Municipality, the provincial Western Cape Government, and even the South African National Government, and will still be affected by major political changes or unrest in any of the greater political environments.

#### 4.8.2.5 SOCIAL SUSTAINABILITY

The Century City urban precinct's social sustainability objectives are met through community outreach programmes, the numerous educational and religious opportunities, the provision of public spaces and community facilities, and the proximity of residential spaces to commercial and leisure establishments.

Social sustainability, specifically in terms of socio-economic inclusivity, is the one area in which the Century City urban precinct falls short. The residential component of the precinct caters only for upper-middle and higher socio-economic groups. Century City does not include any low cost, high density residential stock and does not provide entry level residential property or accommodate lower income or previously disadvantaged groups. This shortcoming can also be linked to and viewed in the light of political sustainability, especially in the South African context where, due to the country's political history, reintegration and socio-economic inclusivity are of utmost importance.

This lack of socio-economic residential inclusivity is, however, alleviated by the proximity and high number of public transport options, nodes and routes, which connect the Century City commercial hub and its numerous leisure facilities to surrounding communities of all socio-economic backgrounds.

#### 4.8.3 CENTURY CITY'S SUSTAINABILITY INITIATIVES IN THE CONTEXT OF THE AUSTRALIAN GREEN STAR COMMUNITIES RATING REQUIREMENTS

Both the development and management teams of the Century City urban precinct are confident that, when one is made available, their precinct would easily achieve a precinct or community level Green Star South Africa rating certification:

*"I think we would pass a precinct level rating with flying colours."* – Colin Anderson, Director of Rabie Property Group (2016)

The Green Building Council of South Africa has confirmed that the adaptation of the South African precinct and community level tool is already underway and, similar to the other tools in the existing Green Star South Africa rating tool suite, their precinct level rating tool will also be based on the Green Star Australia tool:

*"The South African tool will follow international standard and will be based on Green Star Australia's Communities tool, which is a third generation tool based on international review of LEED and BREEAM."* – Technical Coordinator at the Green Building Council of South Africa (2015)

Table 4.2 below contains a simple analysis of the Century City urban precinct in relation to the Green Star Australia Communities tool's National Framework Checklist. The checklist focusses on five main categories: enhancing liveability, creating opportunities for economic prosperity, fostering environmental responsibility, embracing design excellence, and the demonstration of visionary leadership and strong governance. The preliminary analysis shows that the precinct does incorporate, at least to some degree, most of the requirements as listed in the checklist, and that the owners and developers of Century City would be able to achieve a Green Star sustainability rating for their precinct should they decide to pursue it.

This comparison with the Green Star Australia Communities rating tool highlights that the Century City urban precinct's main shortcoming in terms of sustainability is its lack of socio-economic inclusivity. This is particularly apparent in the residential component of the

precinct, which is only aimed at the upper-middle and higher socio-economic income groups. However, this lack of allowance for lower income and higher density residential stock is mitigated by the abundance and proximity of public transport routes and nodes, which connect Century City's commercial hub to surrounding communities of all socio-economic backgrounds.

The preliminary analysis of Century City measured against the Green Star Australia Communities checklist aligns with and confirms the overall sustainability compliance of the urban precinct as determined during the comparison to Adriana Allen's dimensions of sustainability. Both comparisons conclude that, overall, the Century City urban development relates favourably to accepted definitions and objectives of urban sustainability at precinct or community level.

TABLE 4.2: The Green Star Australia Communities National Framework Checklist of the Century City urban precinct.

Key Considerations	Response	Comments
<b>ENHANCE LIVEABILITY</b>		
<b>Providing diverse and affordable living</b>		
Is there a diversity of dwellings, buildings and facilities reflecting the socio-economic needs of the community?	Not really	Century City does provide a diversity of uses and facilities, but is mainly aimed at the upper-middle socio-economic class, with little opportunities for persons of disadvantaged socio-economic backgrounds
Is there access to local services such as transit, food, health and conveniences?	Yes	
<b>Creating healthy, safe and secure communities</b>		
Is community health and safety being promoted through planning and design processes, partnerships and community engagement?	Yes	

<b>Fostering inclusiveness and cohesiveness</b>		
Does the project provide diverse and inclusive environments for all ages, abilities, cultures and socio-economic backgrounds?	Mostly	Century City provides diverse and inclusive environments in terms of age, ability and culture, but is mainly aimed at the upper-middle socio-economic class, with little opportunities for persons of disadvantaged socio-economic backgrounds
Has the community been involved in developing a shared vision for the project?	No	Century City is a privately owned development undertaken, for the most part, by a single owner-developer entity. The precinct is developed in accordance with a pre-determined Urban Design Framework, with little input from the community
Is community cohesion being facilitated by promoting diversity, tolerance and respect?	Yes	
Are stakeholders being engaged throughout the life of the project?	Yes	(Private stakeholders)
<b>Building community adaptability</b>		
Are considerations being made for building community capacity and the ability for the community to adapt to changing needs?	Yes	
Is there a diversity of uses and activities accessible to the community?	Yes	

<b>CREATE OPPORTUNITIES FOR ECONOMIC PROSPERITY</b>		
<b>Promoting education and learning</b>		
Does the community have access to a variety of education and learning opportunities?	Yes	
<b>Enhancing employment opportunities</b>		
Does the project provide for a diversity of employment opportunities that meet local and regional needs?	Mostly	
Is the production and procurement of local goods and services encouraged?	Sometimes	
<b>Attracting investment</b>		
Is the necessary infrastructure provided to facilitate community and business connectivity?	Yes	
Is ongoing sustainable and ethical investment possible for local businesses?	Yes	
Is there a viable business case, inclusive of externalities, to develop green infrastructure systems and the supporting jobs?	Yes	
<b>Encouraging innovation</b>		
Are there initiatives in place to encourage business and community innovation?	Yes	

Are there new business opportunities available to enhance competitiveness?	Yes	
Is investment in sustainable infrastructure being encouraged?	Yes	
Has a lifecycle management approach been applied to the project to encourage resource efficiency and reduce lifecycle costs?	Yes	
<b>FOSTER ENVIRONMENTAL RESPONSIBILITY</b>		
<b>Enhancing our natural environment</b>		
Has the natural environment and culture heritage of the environment been protected, valued, restored and enhanced?	Yes	
Has biodiversity been promoted through the provision of habitats, spaces and environments in community and urban areas?	Yes	
Are greenhouse gas emissions, contaminants and other pollutants to land, water and the atmosphere being managed?	Yes	
Have the potential risks from climate change and natural disasters been assessed and management strategies developed?	Yes	
<b>Reducing our ecological footprint</b>		
Are there efficient systems in place for water and wastewater treatment and reuse?	Yes	

Are there efficient systems in place for sustainable energy generation and distribution, demand management and energy efficiency?	Mostly	Energy efficiency, distribution and demand management is currently only being applied at building level
Are there environmentally efficient systems in place for waste management and recycling?	Yes	
Is greater resource efficiency (within a lifecycle context) encouraged across these systems?	Yes	
Are existing buildings being retrofitted and reused?	No	Century City is a greenfields development, i.e. there were no existing buildings on the site when development began
Are sustainable transport systems being used and encouraged?	Yes	
Is food security and sustainable food production being promoted?	Not really	
Are communities being educated on their individual and collective impacts, by making resource savings and consumption data available?	Yes	
<b>EMBRACE DESIGN EXCELLENCE</b>		
<b>Adopting effective planning practices</b>		
Has an integrated planning framework been established, to enable the delivery of a shared design vision, in collaboration with stakeholders?	Yes	

Has planning been undertaken for considered density, mixed use and connectivity?	Yes	
Are valuable land uses such as good quality agricultural land being protected?	Yes	
Have specific design outcomes for the project been identified, and are they clear, measurable and communicated to stakeholders?	Yes	
<b>Encouraging integrated design</b>		
Has the context of the project and site been considered in creating a sense of place?	Yes	
Has a coherent urban structure been planned and designed for; to encourage connectivity between places and systems, such as transport, communication, social and physical infrastructure systems?	Yes	
<b>Maintaining flexible and adaptable approaches</b>		
Are there opportunities available to retrofit and revitalize existing communities, precincts, places and buildings?	Sometimes	The Century City urban precinct is new so retrofitting is not currently being investigated. However, some buildings have been flexibly designed so that use can be changed to suit market trends
Has flexibility and adaptability been incorporated into the design of the project?	Mostly	

Can the project adapt to enhance the comfort, health, safety and well-being of people who live and work there, regardless of changing climatic and other environmental and physical conditions?	Mostly	
<b>Creating desirable places</b>		
Does the area promote a sense of place, community identity and local character?	Yes	
Does the project support a connection with nature?	Yes	
Does the project provide a high quality integrated and safe public realm that meets the needs of the local community?	Yes	
Has a quality built form been provided that includes landscapes responsive to both climate and context?	Yes	
Has the conservation and celebration of cultural heritage and archaeological assets across landscapes, places and sites been considered?	Yes	
Have vibrant, stimulating and memorable places to live, work and play been created?	Yes	

<b>Promoting accessibility</b>		
Have higher densities been located closer to public transport systems and services, to enhance the walkability of the area, promote health and encourage public transport use?	Yes	The entire Century City urban precinct has been designed to enhance walkability, promote health and encourage public transport use. This is achieved through mixed uses in close proximity to one another rather than higher densities
Has accessibility, diversity and mixed use been encouraged to reflect local values and broader metropolitan needs?	Yes	
<b>DEMONSTRATING VISIONARY LEADERSHIP AND STRONG GOVERNANCE</b>		
<b>Establish coordinated and transparent approaches</b>		
Have coordinated approaches among cross-sectoral stakeholder interests been facilitated?	Yes	Century City’s Urban Design Framework
Has an accountable and transparent decision-making process through inclusion and provision of information been established?	Yes	Century City’s land acquisition process and Urban Design Framework
Have practical, accessible standards of responsibility, resource allocation and programming been established?	Yes	Century City’s Urban Design Framework

<b>Build a commitment to implementation</b>		
Have practical and enforceable standards of ownership, accountability and delivery been developed?	Yes	Land acquisition process, Urban Design Framework and Century City Rules and Regulations as enforced by the CCPOA
Have performance evaluation, feedback and support mechanisms been incorporated to provide opportunities for continual improvement?	Yes	Land acquisition process, Urban Design Framework and Century City Rules and Regulations as enforced by the CCPOA
<b>Engaging with stakeholders</b>		
Has a shared vision with stakeholders across the community, industry and government been established?	Yes	(Private stakeholders)
Can progress towards this vision – through building community capacity, assessing performance and encouraging leadership – be monitored?	Yes	Century City’s land acquisition process and Urban Design Framework
<b>Fostering sustainable cultures and behaviours</b>		
Are awareness and education opportunities being provided to enable sustainable practices?	Yes	Intaka Island Environmental Education Centre
Are sustainable behaviours and systems for monitoring environmental data, sharing information and facilitating continual improvement being encouraged?	Yes	

Encouraging and rewarding innovation		
Is open access to information being provided to enhance innovation?	Yes	
Are mechanisms established to reward leadership in innovation and excellence?	Sometimes	Century City does not currently have an internal reward programme, but the developers and the CCPOA strive to achieve as many property industry awards and Green Star SA certifications as possible

## 4.9 CONCLUSION OF THE CASE STUDY

This chapter presented the information that was gathered during the case study of the Century City urban precinct. The data collected, through interviews, relevant documentation, news articles and photographic evidence, was analysed to reveal the emergent definitions and implementations of sustainable urban development objectives within Century City, as well as the impacts of existing Green Star South Africa rating tools and the expectations around precinct level sustainability initiatives and ratings. This chapter also discussed Century City in the light of the literature reviewed in Chapter Two, particularly the defining elements of urban sustainability and existing international community level rating tools.

The final chapter reviews the case study findings in relation to the research question and objectives laid forth in Chapter One. The chapter concludes the research and makes recommendations for the way forward and possible further studies.

## Chapter Five: CONCLUSION AND RECOMMENDATIONS

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### 5.1 INTRODUCTION

The previous chapter analysed the data collected during the case study of the Century City urban precinct, identifying emergent sustainability definitions and initiatives currently in place as well as opinions and expectations of current and future Green Star South Africa sustainability ratings. The previous chapter also discussed the Century City case study in relation to the literature reviewed in Chapter Two.

This chapter discusses the case study findings in the light of the research question and objectives as outlined in Chapter One, showing how they were answered and met, and concludes this research study. Finally, this chapter makes recommendations for the way forward and possible further research.

### 5.2 REVISITING THE RESEARCH QUESTION AND RESEARCH OBJECTIVES

Chapter One of this dissertation outlines the research question, research aim, research proposition and research objectives to be achieved by this study. The question to be answered by this research dissertation, posed in two ways, is the following:

*Is there a need for the introduction and incorporation of a precinct level sustainability rating tool in South Africa?*

The research objectives to be met are:

- Defining sustainability.
- Defining sustainable urban development on a precinct or larger scale.

- Establishing the importance of sustainable urban development.
- Establishing the importance of sustainability rating systems and tools.
- Investigating the current South African sustainable urban development environment.
- Investigating the current participation of South African urban development industries and role players in sustainable urban development activities.
- Investigating the main drivers currently motivating South African urban development industries and role players to adopt sustainable urban development values in precinct or community level projects.

### 5.3 CONCLUDING THE RESEARCH

#### 5.3.1 MEETING THE RESEARCH OBJECTIVES

The research objectives are comprehensively met in the literature review and case study of Chapters Two and Four. The most important aspects are summarised below.

In a response to climate change and the world's diminishing resources the urban development and construction industries are entering a new age of green design that explores the development of sustainable precincts, a concept which rose from the merger of sustainable building, infrastructure and urban design. While the contributions to environmental sustainability, occupant health and productivity, and the cost-efficiency of green buildings is inarguably demonstrated by a wealth of local and international research, the establishment and promotion of international sustainable neighbourhood and communities rating tools such as the Leadership in Energy and Environmental Design Neighbourhood Development and the Australian Green Star Communities tools makes it

clear that the sustainable built environment is moving its focus beyond individual green buildings towards sustainable precincts.

The research suggests that precinct or larger scale urban sustainability, particularly in the South African context is best defined by Argentinean scholar Adriana Allen's five dimensioned approach to sustainability, which includes ecological, economic, physical and social sustainability, all within the context of political sustainability and the bioregional ecological capacity. Creating places for people is the key ingredient in designing and maintaining successful and thriving sustainable precincts and communities, and it is the spaces between buildings that determine the liveability, walkability and value of a precinct.

Within the scope of existing literature on sustainable urban development in South Africa, both the literature review and the case study of this work highlight that, while there is increasing awareness of and interest in sustainable urban development objectives across the South African urban development industry, developers and investors are still highly focussed on business-as-usual financial feasibility and relatively high rates of return. Sustainable urban development principles, objectives and initiatives are pursued by private developers mainly in attempts to mitigate the crippling effects of raising operating costs of conventional buildings, especially in terms of electricity and water supply restrictions.

The above perspective that sustainability must make business and financial sense before developers pursue it has resulted in the biggest driver behind the adoption and incorporation of sustainable urban development principles, initiatives and activities in South Africa being the continuously rising operating costs of conventional buildings, especially in terms of electricity and water supply restrictions. These increasing restrictions and the rising expenses associated with the use of water and electricity in South Africa will also aid in the promotion of precinct and larger scale sustainable urban development principles, initiatives and activities that will allow for further mitigation of the effects of rising electricity and water consumption costs.

Another motivation for the pursuit and implementation of urban sustainability objectives and initiatives that came through strongly in the case study is the maintenance of a

competitive advantage in local and global property markets that are increasingly recognising the unavoidable significance of urban sustainability. The research also demonstrated that environmental consciousness and responsibility, conservation for future generations, future proofing buildings and thereby investments, compliance to local and national ecological and environmental regulations, the creation of healthier living and working environments, higher returns on investments in commercial properties, to satisfy client demands, corporate social investment and doing the right thing are among further motivations for the adoption and implementation of various sustainability initiatives by both public and private developers.

Research has shown that the existing Green Star South Africa rating tool suite has proven to be a major catalyst for the incorporation of sustainability objectives, principles and initiatives at building level. Building level sustainability is becoming the new urban development industry norm and is even being incorporated into mandatory national building regulations. Buildings can, however, not live in isolation from their surroundings and there is a rapidly growing interest in precinct and community level urban sustainability and the rating thereof from the South African urban development industry's professionals, from the private sector, as well as from leading municipalities.

### 5.3.2 ANSWERING THE RESEARCH QUESTION

*Is there a need for the introduction and incorporation of a precinct level sustainability rating tool in South Africa?*

In one word: Yes.

On a regulatory level in South Africa, while there are various research and planning operations underway and the concept of sustainable precincts is still evolving, the standards and procedures for the design, construction and maintenance of sustainable precincts are running the risk of becoming stuck in an ongoing cycle of planning. Many are of the opinion that sustainable urban development is at risk of becoming nothing more than a political

catch phrase. The country's urban development industry professionals expect that the introduction of a precinct or community level Green Star South Africa rating tool will bridge the gap between planning and implementation, as the rating tool will provide the necessary guidelines to dramatically increase the understanding of and participation in the physical implementation of precinct level urban sustainability. The expectation is that a precinct or community level Green Star South Africa rating tool will catalyse the physical implementation of precinct and larger scale sustainable urban development objectives in South Africa, just as the case was with individual building sustainability when the existing Green Star South Africa rating suite was introduced.

The research also demonstrates that the South African urban development industry's private sector and leading municipalities are already incorporating precinct level sustainability objectives, principles and initiatives regardless of the possibility of certification. In addition, there is also a growing interest from developers and projects in South Africa and Africa to actively seek precinct level certification via the existing international precinct and community level rating tools. This shows that South Africa's urban development industry is not only ready for a precinct level sustainability rating tool, but actively pursuing it. The introduction of a precinct level sustainability rating tool tailored to fit the South African context will provide all of the local industry professionals eager to include community level sustainability initiatives with a legitimate form of credibility and comparability.

### 5.3.3 THE GREEN STAR SOUTH AFRICA COMMUNITIES PILOT PROGRAMME

Since the first submission of this dissertation the Green building Council of South Africa has announced the launch of its locally applicable version of the Australian green Star Communities rating tool into the South African urban development industry (Green Building Council of South Africa (23), 2016).

The South African Green Star Communities rating tool will (Green Building Council of South Africa (23), 2016):

- Drive the development of more sustainable neighbourhoods and precincts to ultimately make South African and other African countries' cities more sustainable;
- Assist governments, urban development project teams, contractors and other industry professionals to provide diverse, affordable, inclusive, well connected and healthy places to live, work and play;
- Offer recognition for demonstrated leadership and commitment to sustainability;
- Assist urban development industry professionals and end users in achieving real value for money through demonstrated life-cycle cost savings; and
- Encourage opportunities for business diversity, efficiency, economic development, and innovation.

The Green Star Communities tool is being launched in South Africa through a stakeholder engagement process involving a technical advisory panel including over thirty industry experts who are providing input and guidance on the applicability of the tool's criteria to the South African context. The advisory panel includes academia and both public and private sector urban development stakeholders (Green Building Council of South Africa (23), 2016).

The South African launch of the Green Star Communities tool also includes a number of precinct scale development pilot projects that will test and be certified by the Green Building Council of South Africa using the pilot tool framework. The GBCSA has accepted 14 projects to form part of the technical advisory panel, and these projects will provide essential feedback allowing the South African Communities tool to be appropriately adjusted to the local context. These pilot projects, as early adopters, are vital to support the

long term success and applicability of this Green Star Communities tool in the African and South African context (Green Building Council of South Africa (23), 2016).

Eight of the fourteen pilot projects have already committed to pursuing a certification using the South African Green Star Communities tool, with each of them target a 4 Star or higher rating. These eight projects are (Green Building Council of South Africa (23), 2016):

- Braamfontein West, Johannesburg – led by EcoCentric.
- Blue Rock, Somerset West – developed by Swisatec.
- Garden Cities: Phase 13, Sunningdale, Cape Town – developed by Garden Cities.
- Kgoro Precinct, Johannesburg – developed by Ceder Park Properties.
- Menlyn Maine, Tswane – developed by Menlyn Maine Holdings.
- Nature’s Path Lifestyle Village, Keurbooms, Plettenberg Bay – developed by PMG Africa.
- Oxford Parks, Johannesburg – developed by Intaprop.
- Sandton Gate, Johannesburg – developed by a joint venture between Abland and Tiber.

The Green building Council of South Africa has also indicated that it will be reviewing the ‘Communities’ name of the rating tools for the African context to make it more identifiable with neighbourhood and precinct scale sustainable development projects in South Africa and the rest of Africa (Green Building Council of South Africa (23), 2016).

## 5.4 RECOMMENDATIONS FOR FURTHER RESEARCH

As described in Chapter One, the main limitation of this dissertation is that the research is based on a single case study. Even though the Century City precinct's capacity to be subdivided into smaller precinct units and its mini-municipality style of management and operation lend to it a certain degree of generalisability and wider applicability, further research should include more case studies, specifically studies on sustainable urban development in different types of precincts and communities across South Africa, including public-private partnerships, investor dominated precincts and public precincts such as CIDs and local municipal districts.

Further research into precinct level sustainability in the South African context could also incorporate the difficulties of adapting a developed world rating tool, such as the LEED-ND tool or the Green star Australia Communities rating tool, for a still developing country such as South Africa.

Once the South African precinct level rating tool has been established, further research could be conducted to determine the specific effects that the tool's introduction may have had on sustainability in the South African urban development industry. Also, once more South African urban development precincts have been established as 'green' in terms of sustainable urban development principles and objectives, further research will be able to provide more clarity on the specific factors motivating property developers, owners and other urban development industry professionals to adopt and incorporate sustainable urban development principles, objectives and initiatives.

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## APPENDICES

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- Appendix A: Full Lists of Current and Potential Future World Green Building Council Members
- Appendix B: The Green Building Council of South Africa's Green Star SA Certification Process
- Appendix C: Green Star South Africa Certified projects
- Appendix D: Australian Green Star Communities National Framework Checklist
- Appendix E: Australian Green Star Communities Pilot Certification Process
- Appendix F: LEED-ND Sustainable Neighbourhood Development Checklist
- Appendix G: LEED-ND Certification Process
- Appendix H: Green Star Communities and LEED-ND Certified Projects
- Appendix I: Baseline Interview Outline
- Appendix J: Typical Interview Consent Form
- Appendix K: CCPOA and Rabie Property Group Interview: Signed Consent Forms and Transcript
- Appendix L: Randomly Selected Interview Transcript

## Appendix A: FULL LISTS OF CURRENT AND POTENTIAL FUTURE WORLD GREEN BUILDING COUNCIL MEMBERS

Below is the full list of current World Green Building Council members (World GBC, 2015):

<b>Member Council</b>	<b>Membership Level</b>	<b>Country/Economic Zone</b>	<b>Region</b>
1. Argentina Green Building Council	Established	Argentina	Americas
2. Austrian Sustainable Building Council	Emerging	Austria	Europe
3. Bahrain Green Building Council	Prospective	Bahrain	MENA
4. Bulgarian Green Building Council	Emerging	Bulgaria	Europe
5. Canada Green Building Council	Established	Canada	Americas
6. Chile Green Building Council	Established	Chile	Americas

7.	Colombia Green Building Council	Established	Colombia	Americas
8.	Costa Rica Green Building Council	Prospective	Costa Rica	Americas
9.	Croatia Green Building Council	Established	Croatia	Europe
10.	Czech Green Building Council	Prospective	Czech Republic	Europe
11.	Dominican Republic Green Building Council	Prospective	Dominican Republic	Americas
12.	Dutch Green Building Council	Established	Netherlands	Europe
13.	Ecuador Green Building Council	Prospective	Ecuador	Americas
14.	Egypt Green Building Council	Prospective	Egypt	MENA
15.	El Salvador Green Building Council	Prospective	El Salvador	Americas
16.	Emirates Green Building Council	Established	United Arab Emirates	MENA

17.	France Green Building Council	Established	France	Europe
18.	German Sustainable Building Council	Established	Germany	Europe
19.	Ghana Green Building Council	Prospective	Ghana	Africa
<b>20.</b>	<b>Green Building Council Australia</b>	<b>Established</b>	<b>Australia</b>	<b>Asia – Pacific</b>
21.	Green Building Council Bolivia	Prospective	Bolivia	Americas
22.	Green Building Council Brasil	Established	Brazil	Americas
23.	Green Building Council Espana	Established	Spain	Europe
24.	Green Building Council Finland	Emerging	Finland	Europe
25.	Green Building Council Indonesia	Emerging	Indonesia	Asia – Pacific

26.	Green Building Council Italia	Emerging	Italy	Europe
27.	Green Building Council Namibia	Prospective	Namibia	Africa
28.	Green Building Council Nigeria	Prospective	Nigeria	Africa
29.	Green Building Council of Georgia	Prospective	Georgia	Europe
30.	Green Building Council of Sri Lanka	Prospective	Sri Lanka	Asia – Pacific
31.	Green Building Council Slovenia	Prospective	Slovenia	Europe
<b>32.</b>	<b>Green Building Council South Africa</b>	<b>Established</b>	<b>South Africa</b>	<b>Africa</b>
33.	Guatemala Green Building Council	Emerging	Guatemala	Americas
34.	Hellenic Green Building Council	Prospective	Greece	Europe

35.	Hong Kong Green Building Council	Established	Hong Kong China	Asia – Pacific
36.	Hungary Green Building Council	Emerging	Hungary	Europe
37.	Indian Green Building Council	Established	India	Asia – Pacific
38.	Irish Green Building Council	Prospective	Ireland	Europe
39.	Japan Sustainable Building Consortium	Established	Japan	Asia – Pacific
40.	Jordan Green Building Council	Established	Jordan	MENA
41.	Kenya Green Building Council	Prospective	Kenya	Africa
42.	Korea Green Building Council	Prospective	South Korea	Asia – Pacific
43.	Kuwait Green Building Council	Prospective	Kuwait	MENA
44.	Latvian Sustainable Building	Prospective	Latvia	Europe

	Council			
45.	Lebanon Green Building Council	Emerging	Lebanon	MENA
46.	Macedonia Green Building Council	Prospective	Macedonia	Europe
47.	Malaysia Green Building Confederation	Established	Malaysia	Asia – Pacific
48.	Mauritius Green Building Council	Prospective	Mauritius	Africa
49.	Montenegro Green Building Council	Prospective	Montenegro	Europe
50.	Morocco Green Building Council	Prospective	Morocco	MENA
51.	New Zealand Green Building Council	Established	New Zealand	Asia – Pacific
52.	Nicaragua Green Building Council	Prospective	Nicaragua	Americas
53.	Oman Green Building Council	Prospective	Oman	MENA

54.	Pakistan Green Building Council	Prospective	Pakistan	Asia – Pacific
55.	Palestine Green Building Council	Prospective	Palestine	MENA
56.	Panama Green Building Council	Emerging	Panama	Americas
57.	Paraguay Green Building Council	Prospective	Paraguay	Americas
58.	Peru Green Building Council	Established	Peru	Americas
59.	Philippine Green Building Council	Emerging	Philippines	Asia – Pacific
60.	Polish Green Building Council	Established	Poland	Europe
61.	Qatar Green Building Council	Emerging	Qatar	MENA
62.	Saudi Arabia Green Building Council	Prospective	Saudi Arabia	MENA

63.	Singapore Green Building Council	Established	Singapore	Asia – Pacific
64.	Slovak Green Building Council	Prospective	Slovakia	Europe
65.	Sustentabilidad para Mexico AC	Emerging	Mexico	Americas
66.	Sweden Green Building Council	Established	Sweden	Europe
67.	Swiss Sustainable Building Council	Emerging	Switzerland	Europe
68.	Taiwan Green Building Council	Established	Chinese Tapei	Asia – Pacific
69.	Tanzania Green Building Council	Prospective	Tanzania	Africa
70.	Trinidad & Tobago Green Building Council	Prospective	Trinidad	Americas
71.	Turkish Green Building Council	Established	Turkey	Europe
72.	UK Green Building Council	Established	United Kingdom	Europe

73.	Uruguay Green Building Council	Prospective	Uruguay	Americas
74.	<b>US Green Building Council</b>	<b>Established</b>	<b>USA</b>	<b>Americas</b>



*Above: The Green Building Council Family at the World Green Building Council’s Congress 2013 held in Century City, Cape Town, South Africa (World GBC, 2015)*

The following is the full list of countries that are potential future members of the World Green Building Council: (World GBC, 2015)

**Country**

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1. Bangladesh
2. Benin
3. Botswana
4. Brunei
5. China
6. Denmark
7. Estonia
8. Bosnia
9. Haiti
10. Honduras
11. Iceland
12. Iran
13. Israel
14. Jamaica
15. Kazakhstan
16. Iraq
17. Libya
18. Malta
19. Mongolia
20. Norway

21. Portugal
  22. Romania
  23. Russia
  24. Serbia
  25. Syria
  26. Tunisia
  27. Ukraine
  28. Venezuela
  29. Vietnam
  30. Zambia
  31. Zimbabwe
-

## Appendix B: THE GREEN BUILDING COUNCIL OF SOUTH AFRICA'S GREEN STAR SA CERTIFICATION PROCESS

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### Step 1: Eligibility Ruling

Prior to registration it is important for the project team to establish whether the project is eligible for certification by meeting certain required credits along with other predefined eligibility criteria. It is the responsibility of the project team to check the most current eligibility criteria on the GBCSA website at the time of registration and to ensure that the project is indeed eligible for certification (Green Building Council of South Africa (4), 2015).

Each different rating tool within the GSSA rating system has its own set of eligibility criteria that must be met in order for a development project to be registered for certification (Green Building Council of South Africa (19), 2015).

### Step 2: Project Registration

Registering a project with the Green Building Council of South Africa declares the intent to pursue certification under a specific rating tool. This registration establishes a connection with the GBCSA and gives the project access to essential information and assistance with the submission process (Green Building Council of South Africa (3), 2015).

The certification process, from registration to submission, is undertaken on the Certification Engine, which also includes all the templates, forms and checklists necessary to guide projects through the process (Green Building Council of South Africa (3), 2015).

It is most important to note that registering a project for certification only declares the intent to pursue certification and is not the actual certification. The actual project certification is only awarded by the GBCSA once a project has demonstrated its achievement of a certain rating level (Green Building Council of South Africa (3), 2015).

Step 3: Preparing the Submission

After registration, the project team should start preparing the necessary documentation to satisfy the GSSA credit requirements. A GSSA Accredited Professional, whether part of the internal project team or externally appointed, should take responsibility for the quality of the submission documents (Green Building Council of South Africa (3), 2015).

Each specific rating tool has its own set of categories and credits that need to be met and measured to achieve one of the various levels of Green Star South Africa ratings. The categories group specific key criteria to be assessed and are divided into credits that address initiatives which improve, or have the ability to improve, an urban development project's environmental performance (Green Building Council of South Africa (4), 2015). Assessors will review whether all the necessary requirements of the desired rating as detailed in the tool's Submission Templates and Technical Manual have been met and whether the credit can and should be awarded or not (Green Building Council of South Africa (3), 2015). Once all the credits in each category have been assessed, a percentage score for the category is calculated (Green Building Council of South Africa (4), 2015).

Once the complete submission documentation has been compiled it must be submitted to the Green Building Council of South Africa for assessment (Green Building Council of South Africa (3), 2015).

**Step 4: Round 1 Submission**

From the date of receipt of the Round 1 submission documentation at the Green Building Council of South Africa's offices, the GBCSA will provide the Round 1 assessment results within 7 weeks (Green Building Council of South Africa (3), 2015).

The GBCSA will conduct a pre-assessment quality review of the project submission before commissioning a formal assessment review by the Assessors (Green Building Council of South Africa (3), 2015).

**Step 5: Round 1 Assessment**

An Assessment Panel consisting of two third-party assessors, one acting as an Assessor and the other as a Moderator, will review the project submission and make a recommendation as to the rating of the project to the GBCSA (Green Building Council of South Africa (3), 2015).

The project team may accept the results of the Round 1 assessment as the final rating, or, if they did not achieve their desired or expected rating, they may request to resubmit documentation for credits to be confirmed for a round 2 assessment (Green Building Council of South Africa (3), 2015).

**Step 6: Round 2 Submission**

The project team must provide the Round 2 submission within 90 days of receiving the Round 1 assessment results. Each project only has one opportunity for resubmission and the reasons for doing so may include any of the following (Green Building Council of South Africa (3), 2015):

- Additional or revised documentation to demonstrate the fulfilment of credit criteria;

- New credits not targeted in Round 1; and
- Credit Interpretation Requests to clarify alternative credit compliance.

Step 7: Round 2 Assessment

The Green Building Council of South Africa will issue the Round 2 assessment results within 5 weeks of receiving the Round 2 submission documentation. The Round 2 assessment follows the same procedures as outlined for the round 1 assessment (Green Building Council of South Africa (3), 2015).

Step 8: Certified Rating Awarded

If the assessment(s) validated the project's achievement of the required score, the Green Building Council of South Africa will award the project the Certified Rating and notify the project team (Green Building Council of South Africa (3), 2015).

## Appendix C: GREEN STAR SOUTH AFRICA CERTIFIED PROJECTS

The following is the full list and breakdown of the Green Star South Africa certified projects (Green Building Council of South Africa (22), 2017):

Project Name	Location	Green Star SA Tool	Certification Achieved	Certification Date
Alice Lane Health Club, Virgin Active Classic Collection	Gauteng	Interiors	4 Star	2016
102 Rivonia Road	Gauteng	Office - As Built	4 Star	2016
102 Rivonia Road	Gauteng	Office - Design	4 Star	2014
11 Adderley Street	Western Cape	Existing Building Performance	4 Star	2016
15 Alice Lane	Gauteng	Office	4 Star	2014
19 Dock Road	Western Cape	Existing Building Performance	4 Star	2015
200 on Main	Western Cape	Existing Building Performance	4 Star	2015
24 Peter Place	Gauteng	Existing Building Performance	4 Star	2016
24 Richefond Circle	KwaZulu-Natal	Office - Design	4 Star	2010
24 Richefond Circle	KwaZulu-Natal	Office - As Built	4 Star	2011
25 Rudd Road	Gauteng	Existing Building Performance	4 Star	2016
33 Bree & 30 Waterkant	Western Cape	Existing Building Performance	4 Star	2016
37 Melrose Boulevard	Gauteng	Office	4 Star	2012

4 Stan Road	Gauteng	Office - Design	4 Star	2015
4 Stan Road	Gauteng	Office - As Built	4 Star	2016
44 on Grand Central	Gauteng	Office	4 Star	2011
8 Melville Road	Gauteng	Office	4 Star	2015
90 Grayston Drive	Gauteng	Office - Design	4 Star	2014
90 Grayston Drive	Gauteng	Office - As Built	4 Star	2015
90 Rivonia Road	Gauteng	Office - Design	4 Star	2015
90 Rivonia Road	Gauteng	Office - As Built	4 Star	2016
ABSA Towers West	Gauteng	Office	5 Star	2012
Adams & Adams Building, Lynnwood Bridge	Gauteng	Existing Building Performance	3 Star	2015
AECOM Ridgeview Office	KwaZulu-Natal	Interiors	4 Star	2016
Agrivaal Building	Gauteng	Office	4 Star	2012
Alexander Forbes, 115 West Street	Gauteng	Public and Education Building	4 Star	2012
Alice Lane - Phase II	Gauteng	Office	4 Star	2016
Alice Lane - Phase III	Gauteng	Office	4 Star	2015
Alice Lane Building 1	Gauteng	Office	4 Star	2013
Alice Lane Building 2	Gauteng	Office	4 Star	2013
Allandale Public Transport Facility	Gauteng	Public and Education Building	5 Star	2016
Anslow Park Phase 2	Gauteng	Office	4 Star	2016
Atholl Towers	Gauteng	Office	5 Star	2015
Atrium on 5th	Gauteng	Office - Design	4 Star	2014
Atrium on 5th	Gauteng	Office - As Built	4 Star	2016

Aurecon Century City	Western Cape	Office	5 Star	2011
Aurecon II, Century City	Western Cape	Office	5 Star	2016
Aurecon Tswane	Gauteng	Office	4 Star	2014
Bellmont Office Park	Western Cape	Existing Building Performance	4 Star	2016
Black River Park - Central Building	Western Cape	Existing Building Performance	5 Star	2015
Black River Park - Collingwood Building	Western Cape	Existing Building Performance	6 Star	2015
Black River Park - Gatehouse	Western Cape	Existing Building Performance	6 Star	2015
Black River Park - Park Building (SITA)	Western Cape	Existing Building Performance	4 Star	2015
Black River Park - The Media Building	Western Cape	Existing Building Performance	4 Star	2015
Black River Park - The Old Warehouse	Western Cape	Existing Building Performance	6 Star	2015
Black River Park - The Terraces	Western Cape	Existing Building Performance	5 Star	2015
Black River Park Office Park - North Campus	Western Cape	Existing Building Performance	5 Star	2014
BMW Head Office Refurbishment	Gauteng	Office - Design	4 Star	2014
BMW Head Office Refurbishment	Gauteng	Office - As Built	5 Star	2014
Bridge Park	Western Cape	Office	5 Star	2015
Cape Quarter Lifestyle Village	Western Cape	Existing Building Performance	4 Star	2016
Capital Hill	Gauteng	Office	4 Star	2014
Cavalli Wine and Stud Farm (restaurant and Gallery)	Western Cape	Public and Education Building	4 Star	2016
Cecilia Square	Western Cape	Office	4 Star	2013
Centennial Place	Western Cape	Existing Building Performance	4 Star	2015
Central Park	Gauteng	Existing Building Performance	4 Star	2015
Centurion Square Office Development Phase 1	Gauteng	Office	5 Star	2015

Century City Urban Square	Western Cape	Custom Mix Use	4 Star	2016
Chevron Project Core	Western Cape	Office - Design	5 Star	2013
Chevron Project Core	Western Cape	Office - As Built	4 Star	2016
Chiselhurst	Gauteng	Existing Building Performance	4 Star	2016
Citadel Claremont	Western Cape	Office	4 Star	2016
City of Cape Town Electricity Head Offices	Western Cape	Office - Design	4 Star	2012
City of Cape Town Electricity Head Offices	Western Cape	Office - As Built	5 Star	2016
Convention Towers, Foreshore	Western Cape	Existing Building Performance	4 Star	2016
Council Chambers	Gauteng	Public and Education Building	5 Star	2016
Country Club Estate	Gauteng	Existing Building Performance	4 Star	2016
CTICC East	Western Cape	Public and Education Building	4 Star	2015
Department of Environmental Affairs	Gauteng	Office - Design	6 Star	2013
Ditsela Place	Gauteng	Existing Building Performance	4 Star	2015
DoubleTree by Hilton	Western Cape	Existing Building Performance	5 Star	2016
Eastgate 20	Gauteng	Office - Design	4 Star	2012
Eastgate 20	Gauteng	Office - As Built	4 Star	2015
Emcon Consulting Engineers	Namibia	Existing Building Performance	6 Star	2016
The Estuaries Plaza	Western Cape	Office	4 Star	2015
FNB and Wesbank Fairland Campus	Gauteng	Existing Building Performance	4 Star	2015
FNB Acacia House	KwaZulu-Natal	Office	4 Star	2016
FNB Freedom Plaza	Namibia	Office	4 Star	2014
Fountain Square	Gauteng	Existing Building Performance	4 Star	2016

Fredman Towers	Gauteng	Existing Building Performance	3 Star	2015
Green Building Council SA Office	Western Cape	Interiors	4 Star	2015
Glacier Place	Western Cape	Office	4 Star	2015
Grayston Office Park	Western Cape	Existing Building Performance	4 Star	2015
Grayston Place	Gauteng	Existing Building Performance	4 Star	2016
Greenfield Industrial Park	Western Cape	Custom Industrial	4 Star	2016
Group 5 Head Office	Gauteng	Office - As Built	5 Star	2013
Group 5 Head Office	Gauteng	Office - Design	5 Star	2015
Grove Exchange	Western Cape	Existing Building Performance	3 Star	2016
Growthpoint Ridgeview Office Development	KwaZulu-Natal	Office	5 Star	2015
Grundfos Office Block	Gauteng	Office	5 Star	2014
Honeywell	Gauteng	Existing Building Performance	3 Star	2016
Hotel Verde	Western Cape	Existing Building Performance	6 Star	2015
Hyundai Automotive SA (Pty) Ltd Head Office	Gauteng	Office	4 Star	2013
Ibis House	Western Cape	Office	4 Star	2013
Illovo Edge Phase 3	Gauteng	Office	5 Star	2015
Inanda Green Business Park	Gauteng	Existing Building Performance	4 Star	2016
Kaaimans and bloukrans Tower	Gauteng	Office	5 Star	2014
Karl Bremer Bellville Health Office	Western Cape	Office	5 Star	2015
Khayelitsha Shared Services Office Building	Western Cape	Office	5 Star	2014
Kirstenhof Office Park	Gauteng	Existing Building Performance	5 Star	2015
KPMG Polokwane Office	Limpopo	Office	4 Star	2013

Lakeside Office Park Block 3	Gauteng	Office	4 Star	2013
Lincoln on the Lake	KwaZulu-Natal	Office	4 Star	2011
Lincoln on the Lake	KwaZulu-Natal	Existing Building Performance	4 Star	2015
Lumley House	Gauteng	Existing Building Performance	4 Star	2015
Manenberg Civic Offices	Western Cape	Office	4 Star	2012
Maxwell Office Park	Gauteng	Existing Building Performance	5 Star	2015
Mayfair on the Lake	KwaZulu-Natal	Office - Design	4 Star	2011
Mayfair on the Lake	KwaZulu-Natal	Office - As Built	4 Star	2012
Melrose Arch: 40 on Oak	Gauteng	Multi Unit Residential	4 Star	2011
Menlyn Maine Central Square	Gauteng	Custom Mix Use	4 Star	2016
Menlyn Maine Pegasus	Gauteng	Office	4 Star	2015
Menlyn Reconfiguration Phase 1 New Retail	Gauteng	Retail Centre	4 Star	2016
Merck Building	Gauteng	Existing Building Performance	4 Star	2016
Millenia Park	Western Cape	Office - Design	5 Star	2012
Millenia Park	Western Cape	Office - As Built	5 Star	2013
Monte Circle - Building A	Gauteng	Office	4 Star	2015
Monte Circle - Building B	Gauteng	Office	4 Star	2016
DSTV City	Gauteng	Office	5 Star	2013
MultiChoice City	Gauteng	Office	5 Star	2016
No. 1 Mutual Place	Gauteng	Office	5 Star	2016
Mutual Park	Western Cape	Existing Building Performance	5 Star	2016
N1 Medical Chambers	Western Cape	Existing Building Performance	4 Star	2016

National English Literature Museum	Eastern Cape	Public and Education Building	5 Star	2013
Nedbank Kingsmead	KwaZulu-Natal	Existing Building Performance	3 Star	2015
Nedbank Lakeview	Gauteng	Office - Design	4 Star	2014
Nedbank Lakeview	Gauteng	Office - As Built	4 Star	2015
Nedbank Menlyn Maine Falcon Building	Gauteng	Office - Design	4 Star	2011
Nedbank Menlyn Maine Falcon Building	Gauteng	Office - As Built	5 Star	2013
Nedbank Menlyn Maine Falcon Building	Gauteng	Existing Building Performance	4 Star	2015
Nedbank Newtown	Gauteng	Office	4 Star	2015
Nedbank Phase II	Gauteng	Office - Design	4 Star	2009
Nedbank Phase II	Gauteng	Office - As Built	4 Star	2010
Nedbank Ridgeside	KwaZulu-Natal	Office - As Built	4 Star	2011
Nedbank Ridgeside	KwaZulu-Natal	Office - Design	4 Star	2010
Newtown Nedbank Campus	Gauteng	Office	4 Star	2016
NMMU Business School	Eastern Cape	Public and Education Building	4 Star	2013
NMMU Business School	Eastern Cape	Public and Education Building	4 Star	2015
No. 1 Silo, V&A Waterfront	Western Cape	Office - As Built	6 Star	2014
No. 5 Silo, V&A Waterfront	Western Cape	Office	6 Star	2016
No. 1 Silo, V&A Waterfront	Western Cape	Office - Design	6 Star	2013
No. 2 Silo, V&A Waterfront	Western Cape	Multi Unit Residential	4 Star	2013
Nobelita Office Tower	Rwanda	Office	6 Star	2015
Paramount Place	Western Cape	Existing Building Performance	3 Star	2016
Park Lane	Western Cape	Office	5 Star	2013

Podium at Menlyn	Gauteng	Existing Building Performance	4 Star	2015
Portside	Western Cape	Office - As Built	5 Star	2015
Portside	Western Cape	Office - Design	5 Star	2013
Rewardsco: Ridgeside Office Block C	KwaZulu-Natal	Office - Design	4 Star	2015
Rewardsco: Ridgeside Office Block C	KwaZulu-Natal	Office - As Built	4 Star	2016
Riverpark	Western Cape	Existing Building Performance	3 Star	2016
Riviera Road Office Park	Gauteng	Existing Building Performance	4 Star	2016
Rosebank Tower	Gauteng	Office	4 Star	2016
Rydallviews	KwaZulu-Natal	Office	4 Star	2014
SAGE VIP Menlyn Maine Epilson Building	Gauteng	Office - Design	4 Star	2014
SAGE VIP Menlyn Maine Epilson Building	Gauteng	Office - As Built	4 Star	2012
Sandown Erven 159 - 162	Gauteng	Existing Building Performance	4 Star	2016
SANRAL Corporate Head Office	Gauteng	Office	4 Star	2012
SANRAL Southern Region Office	Eastern Cape	Office	5 Star	2016
SANRAL Western Cape New Office Building	Western Cape	Office	4 Star	2013
SANRAL Western Region Office	Western Cape	Office - As Built	4 Star	2015
Sasol Place	Gauteng	Office	5 Star	2016
Sisonke District Office	KwaZulu-Natal	Office	5 Star	2012
Solid Green offices	Gauteng	Interiors	6 Star	2016
Standard Bank - Kuruman	Northern Cape	Interiors	4 Star	2015
Standard Bank Century City	Western Cape	Interiors	4 Star	2015
Standard Bank Global Leadership Centre	Gauteng	Existing Building Performance	4 Star	2015

Standard Bank - 3 Simmonds Street	Gauteng	Interiors	5 Star	2015
Standard Bank Rosebank	Gauteng	Office - Design	5 Star	2012
Standard Bank Rosebank	Gauteng	Office - As Built	5 Star	2014
Stats SA	Gauteng	Office	4 Star	2015
BMW Supertech Durban	KwaZulu-Natal	Existing Building Performance	4 Star	2015
The Boulevard, Umhlanga Ridge	KwaZulu-Natal	Office	4 Star	2016
The Business Centre and No. 3 Bridgeway	Western Cape	Office - As Built	4 Star	2014
The Business Centre and No. 3 Bridgeway	Western Cape	Office - Design	4 Star	2013
Department of Environmental Affairs Head Office	Gauteng	Office	6 Star	2016
The District	Western Cape	Existing Building Performance	4 Star	2016
The Estuaries	Western Cape	Existing Building Performance	4 Star	2016
The Majestic Offices	Gauteng	Office - Design	4 Star	2014
The Majestic Offices	Gauteng	Office - As Built	4 Star	2015
The Oval	Western Cape	Existing Building Performance	4 Star	2016
The Place	Gauteng	Existing Building Performance	3 Star	2015
The Towers	Western Cape	Existing Building Performance	2 Star	2015
Thebe House	Gauteng	Existing Building Performance	4 Star	2016
Tshedimosetso House	Gauteng	Office	4 Star	2013
Tshwane House	Gauteng	Office	5 Star	2016
UCT New Lecture Theatre	Western Cape	Public and Education Building	4 Star	2015
Upper Grayston Bid F	Gauteng	Office - As Built	6 Star	2015
US AID New Office Building	Gauteng	Office	4 Star	2014

Victoria Wharf Shopping Centre	Western Cape	Existing Building Performance	4 Star	2015
Villa Mall	Gauteng	Retail Centre	4 Star	2010
Vodafone Site Solution Innovation Centre	Gauteng	Office	6 Star	2010
Walker Creek II & III	Gauteng	Office	4 Star	2016
Waterway House	Western Cape	Office	5 Star	2016
Wierda Gables	Gauteng	Existing Building Performance	4 Star	2016
WSP House, Bryanston	Gauteng	Existing Building Performance	3 Star	2014
WWF SA Braamfontein	Gauteng	Office	6 Star	2015
Young Africa Publishing Offices	Western Cape	Interiors	4 Star	2016

## Appendix D: AUSTRALIAN GREEN STAR COMMUNITIES NATIONAL FRAMEWORK CHECKLIST

The following is the full Green Star Communities National Framework Checklist (Green Star (Australia) (1), 2010):

Key Considerations	Response	Actions
<b>ENHANCE LIVEABILITY</b>		
<b>Providing diverse and affordable living</b>		
Is there a diversity of dwellings, buildings and facilities reflecting the socio-economic needs of the community?		
Is there access to local services such as transit, food, health and conveniences?		
<b>Creating healthy, safe and secure communities</b>		
Is community health and safety being promoted through planning and design processes, partnerships and community engagement?		
<b>Fostering inclusiveness and cohesiveness</b>		
Does the project provide diverse and inclusive environments for all ages, abilities, cultures and socio-economic backgrounds?		
Has the community been involved in developing a shared vision for the project?		
Is community cohesion being facilitated by promoting diversity, tolerance and respect?		

Are stakeholders being engaged throughout the life of the project?		
<b>Building community adaptability</b>		
Are considerations being made for building community capacity and the ability for the community to adapt to changing needs?		
Is there a diversity of uses and activities accessible to the community?		
<b>CREATE OPPORTUNITIES FOR ECONOMIC PROSPERITY</b>		
<b>Promoting education and learning</b>		
Does the community have access to a variety of education and learning opportunities?		
<b>Enhancing employment opportunities</b>		
Does the project provide for a diversity of employment opportunities that meet local and regional needs?		
Is the production and procurement of local goods and services encouraged?		
<b>Attracting investment</b>		
Is the necessary infrastructure provided to facilitate community and business connectivity?		
Is ongoing sustainable and ethical investment possible for local businesses?		
Is there a viable business case, inclusive of externalities, to develop green infrastructure systems and the supporting jobs?		

<b>Encouraging innovation</b>		
Are there initiatives in place to encourage business and community innovation?		
Are there new business opportunities available to enhance competitiveness?		
Is investment in sustainable infrastructure being encouraged?		
Has a lifecycle management approach been applied to the project to encourage resource efficiency and reduce lifecycle costs?		
<b>FOSTER ENVIRONMENTAL RESPONSIBILITY</b>		
<b>Enhancing our natural environment</b>		
Has the natural environment and culture heritage of the environment been protected, valued, restored and enhanced?		
Has biodiversity been promoted through the provision of habitats, spaces and environments in community and urban areas?		
Are greenhouse gas emissions, contaminants and other pollutants to land, water and the atmosphere being managed?		
Have the potential risks from climate change and natural disasters been assessed and management strategies developed?		
<b>Reducing our ecological footprint</b>		
Are there efficient systems in place for water and wastewater treatment and reuse?		
Are there efficient systems in place for sustainable energy generation and distribution, demand management and energy efficiency?		

Are there environmentally efficient systems in place for waste management and recycling?		
Is greater resource efficiency (within a lifecycle context) encouraged across these systems?		
Are existing buildings being retrofitted and reused?		
Are sustainable transport systems being used and encouraged?		
Is food security and sustainable food production being promoted?		
Are communities being educated on their individual and collective impacts, by making resource savings and consumption data available?		
<b>EMBRACE DESIGN EXCELLENCE</b>		
<b>Adopting effective planning practices</b>		
Has an integrated planning framework been established, to enable the delivery of a shared design vision, in collaboration with stakeholders?		
Has planning been undertaken for considered density, mixed use and connectivity?		
Are valuable land uses such as good quality agricultural land being protected?		
Have specific design outcomes for the project been identified, and are they clear, measurable and communicated to stakeholders?		

<b>Encouraging integrated design</b>		
Has the context of the project and site been considered in creating a sense of place?		
Has a coherent urban structure been planned and designer for; to encourage connectivity between places and systems, such as transport, communication, social and physical infrastructure systems?		
<b>Maintaining flexible and adaptable approaches</b>		
Are there opportunities available to retrofit and revitalize existing communities, precincts, places and buildings?		
Has flexibility and adaptability been incorporated into the design of the project?		
Can the project adapt to enhance the comfort, health, safety and well-being of people who live and work there, regardless of changing climatic and other environmental and physical conditions?		
<b>Creating desirable places</b>		
Does the area promote a sense of place, community identity and local character?		
Does the project support a connection with nature?		
Does the project provide a high quality integrated and safe public realm that meets the needs of the local community?		
Has a quality built form been provided that includes landscapes responsive to both climate and context?		

Has the conservation and celebration of cultural heritage and archaeological assets across landscapes, places and sites been considered?		
Have vibrant, stimulating and memorable places to live, work and play been created?		
<b>Promoting accessibility</b>		
Have higher densities been located closer to public transport systems and services, to enhance the walkability of the area, promote health and encourage public transport use?		
Has accessibility, diversity and mixed use been encouraged to reflect local values and broader metropolitan needs?		
<b>DEMONSTRATING VISIONARY LEADERSHIP AND STRONG GOVERNANCE</b>		
<b>Establish coordinated and transparent approaches</b>		
Have coordinated approaches among cross-sectoral stakeholder interests been facilitated?		
Has an accountable and transparent decision-making process through inclusion and provision of information been established?		
Have practical, accessible standards of responsibility, resource allocation and programming been established?		
<b>Build a commitment to implementation</b>		
Have practical and enforceable standards of ownership, accountability and delivery been developed?		

Have performance evaluation, feedback and support mechanisms been incorporated to provide opportunities for continual improvement?		
<b>Engaging with stakeholders</b>		
Has a shared vision with stakeholders across the community, industry and government been established?		
Can progress towards this vision – through building community capacity, assessing performance and encouraging leadership – be monitored?		
<b>Fostering sustainable cultures and behaviours</b>		
Are awareness and education opportunities being provided to enable sustainable practices?		
Are sustainable behaviours and systems for monitoring environmental data, sharing information and facilitating continual improvement being encouraged?		
<b>Encouraging and rewarding innovation</b>		
Is open access to information being provided to enhance innovation?		
Are mechanisms established to reward leadership in innovation and excellence?		

## Appendix E: AUSTRALIAN GREEN STAR COMMUNITIES PILOT CERTIFICATION PROCESS

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There are six steps to the Green Star Communities Pilot certification process. These steps are summarised below (Green Star (Australia) (2), 2015):

### **Step 1:** Project Registration

Completion of the online Project Registration Form on the GBCA website, during which the applicant will need to confirm the project meets all eligibility criteria. A Case Manager will be allocated to the project and a project registration number will be awarded.

The registration process will be complete once the GBCA receives both the executed Certification Agreement and payment of the certification fee.

### **Step 2:** Preparing the submission(s)

Once the project is registered the project team will begin to prepare a submission that demonstrates that the project satisfies the Green Star Communities credit requirements and that adheres to the Compliance Requirements as outlined in the Green Star Communities Submission Guideline.

It is recommended that a Green Star Accredited Professional (Communities) is appointed to assist with the submission preparations.

### **Step 3:** Round 1 Assessment

Once the project's submission is completed, the project team must notify the

GBCA via a completed Submission Notification Form at least one week prior to submission, following which a Pre-Assessment Review will be conducted which may identify issues that need to be resolved before the Round 1 Assessment.

A panel of independent assessors will be convened to assess the project submission, where each certified assessor will review the entire submission and they will then meet to discuss the results of their individual reviews. An independent chair facilitates this discussion to ensure the correct assessment process is followed. The results of the Round 1 Assessment will be issued within six weeks of the submission.

If the project's desired outcome is not achieved during the Round 1 Assessment the project team may request to resubmit documentation for credits "to be confirmed" for a Round 2 Assessment.

**Step 4:** Round 2 Assessment

The Round 2 Assessment repeats the Round 1 Assessment process, and results will be made available approximately four weeks from the time of the resubmission. The Round 2 submission must address only those credits that were not awarded in the Round 1 Assessment.

**Step 5:** Certification

The assessment panel will advise the GBCA whether the project has reached a 4, 5 or 6 Star Green Star Communities rating and the certification will be awarded accordingly. The Green Star Communities certification is valid for a period of up to five years.

Certification licenses the project team to use the Green Star Communities trademark for marketing and recognition purposes. The certified project will also

be included on the Australian public register of Green Star Communities certified projects on the GBCA's website and the GBCA will work together with the project team to promote their achievement.

**Step 6:** Recertification

Since a Green Star Communities certification is only valid for up to five years it is necessary for a project to be recertified within five years of every certification to retain the Green Star Communities certification.

The five year time frame is divided as follows: the first three years is the period of project development that is to be assessed and recertified; the final two years is the period during which documentation and submission of the data of the first three years' project development and its compliance with the planning and/or delivery requirements of the relevant credits, is completed.

Where successful recertification is achieved the project will again be licensed to you the Green Star Communities trademark for recognition and promotion.

## Appendix F: LEED – ND SUSTAINABLE NEIGHBOURHOOD DEVELOPMENT CHECKLIST

The following is Leadership in Energy and Environmental Design Neighbourhood Development rating tool’s Sustainable Neighbourhood Development Checklist which summarizes all the credits and prerequisites of the LEED-ND rating tool (U.S. Green Building Council (1), 2015).

DOES THE PROJECT DO THE FOLLOWING?	YES	MAYBE	NO
<b>SMART LOCATION AND LINKAGE (SLL)</b>			
<b>Location</b>			
Is located on a site that is any of the following (only one required for scoring): <ul style="list-style-type: none"> <li>- Infill (75% surrounded by existing development)</li> <li>- Well-connected to adjacent development by an existing street network</li> <li>- Well-served by transit or neighbourhood amenities</li> </ul>			
Is located on a site that is one of the following (pick just one for scoring): <ul style="list-style-type: none"> <li>- Infill and also a previously developed site</li> <li>- Infill but not a previously developed site</li> <li>- Adjacent to existing development, and also a previously developed site</li> <li>- A previously developed site, but not adjacent or infill</li> </ul>			

<p>Is surrounded (within 0.5 mile) by a well-connected existing street network. If possible, estimate the existing number of intersections per square mile nearby (pick just one for scoring):</p> <ul style="list-style-type: none"> <li>- 200 to 250 intersections per square mile</li> <li>- 250 to 300 intersections per square mile</li> <li>- 300 to 350 intersections per square mile</li> <li>- 350 to 400 intersections per square mile</li> <li>- More than 40 intersections per square mile</li> </ul>			
<p>Is located in an economically distressed area while also providing affordable housing.</p>			
<p><b>Ecosystems and open spaces</b></p>			
<p>Does not build on habitat where species are threatened, endangered, or imperilled or creates a habitat conservation plan under the Endangered Species Act.</p>			
<p>Does not build on wetlands or water bodies and leaves buffers of undeveloped land around them of at least 50 to 100 feet.</p>			
<p>Does not build on prime agricultural land, unless the project is infill, transit-served, or makes up for soil loss by creating permanently protected soil easements elsewhere.</p>			
<p>Does not build on floodplains.</p>			
<p>Conserves pre-existing on-site habitat, native plants, wetlands, and water bodies in perpetuity.</p>			
<p>Restores degraded on-site habitat, wetlands, or water bodies, and conserves them in perpetuity.</p>			
<p>Implements a long-term (at least 10 years), fully funded management plan for on-site wetlands, water bodies, and habitat.</p>			
<p>Limits development on steep slopes (greater than 15%), and restores many or all previously developed steep slopes with native or noninvasive plants.</p>			

<b>Contaminated sites</b>			
<p>Does one of the following (pick just one for scoring):</p> <ul style="list-style-type: none"> <li>- Remediates a contaminated site and then locates there.</li> <li>- Remediates a contaminated site in an economically distressed area, and then locates there.</li> </ul>			
<b>Transit-oriented locations</b>			
<p>Is located on a site that is either of the following (pick just one for scoring):</p> <ul style="list-style-type: none"> <li>- Within walking distance (0.25 mile for buses or streetcars and 0.5 mile rail, ferry, and bus rapid transit) of high levels of transit service.</li> <li>- In an area documented to have low vehicle miles travelled.</li> </ul>			
<b>Cycling facilities</b>			
<p>Does both of the following:</p> <ul style="list-style-type: none"> <li>- Is located within 0.25 mile of a bicycle network that is either 5 miles long (minimum) or connects to 10 diverse land uses.</li> <li>- Provides secure and covered bicycle storage (for at least 10% of nonresidential and 30% of residential building occupants), as well as bicycle parking for visitors.</li> </ul>			

<b>Jobs and housing proximity</b>			
<p>Does one of the following (pick just one for scoring):</p> <ul style="list-style-type: none"> <li>- Existing jobs within 0.5 mile walk distance outnumber project’s dwelling units, and the project provides affordable housing.</li> <li>- Existing jobs within 0.5 mile walk distance outnumber project’s dwelling units.</li> <li>- Provides jobs on an infill site within 0.5 mile walk distance of both existing housing and an existing (or new) rail, ferry, tram, or bus rapid transit stop.</li> </ul>			
<b>NEIGHBOURHOOD PATTERN AND DESIGN (NPD)</b>			
<b>Walkable streets</b>			
<p>Includes all of the following at minimum:</p> <ul style="list-style-type: none"> <li>- Public-facing building entries (onto any public space except a parking lot) on 90% of building frontage.</li> <li>- A minimum “building-height-to-street width-ratio” of 1 to 3 (1 foot of building height for every 3 feet of street width) along at least 15% of street length.</li> <li>- Sidewalks along 90% of street length (both sides of street).</li> <li>- Garage doors along no more than 20% of street length.</li> </ul>			

<p>Includes some or all of the following:</p> <ul style="list-style-type: none"> <li>- Minimal distance between the sidewalk and most buildings, with mixed-use and non-residential buildings particularly close to the sidewalk.</li> <li>- Frequent building entries (at least every 75 feet).</li> <li>- Un-shuttered windows along the sidewalk for non-residential buildings.</li> <li>- No blank walls more than 50 feet along sidewalks.</li> <li>- Frequent on-street parking (available along at least 70% of streets).</li> <li>- Sidewalks along 100% of street length (both sides of the street).</li> <li>- Elevated ground-floors for at least half of all dwelling units (at least 24 inches above sidewalk grade).</li> <li>- A minimum “building-height-to-street width-ratio” of 1 to 3 (1 foot of building height for every 3 feet of street width) along 30% of street length.</li> <li>- Low design speeds for most streets (20 mph for residential, 25 mph for non-residential).</li> <li>- Driveway crossings along no more than 10% of sidewalk length.</li> </ul>			
<p>Lines 60% of street length with non-invasive trees (spaced an average of at least every 40 feet from trunk centre to trunk centre).</p>			
<p>Provides noon-time shade along at least 40% of sidewalks.</p>			
<p><b>Compact development</b></p>			
<p>Meets minimum required densities (At least seven dwelling units per acre for residential and 0.50 floor-area ratio for non-residential).</p>			
<p>Exceeds increasing density thresholds (At least 10 dwelling units per acre for residential and 0.75 floor-area ratio for non-residential).</p>			

Neighbourhood connections			
<p>Does either of the following (only one required for scoring):</p> <ul style="list-style-type: none"> <li>- Includes a street or pathway into the project at least every 800 feet, and has at least 140 intersections per square mile within the project (estimate if possible).</li> <li>- Or, only if the project has no internal streets: is surrounded (within 0.25 mile) by an existing street network of at least 90 intersections per square mile (estimate if possible).</li> </ul>			
<p>Does all of the following:</p> <ul style="list-style-type: none"> <li>- Does not include cul-de-sacs.</li> <li>- Includes a street or pathway into the project at least every 400 feet.</li> <li>- Has high intersections per square mile within the project (pick just one of the following for scoring this credit):                             <ul style="list-style-type: none"> <li>300 to 400 intersections per square mile</li> <li>Has more than 400 intersections per square</li> </ul> </li> </ul>			
Mixed uses			
<p>Enables walking access (within ¼ mile) to the following number of existing or new land uses, clustered within neighbourhood centres (pick just one of the following for scoring this credit):</p> <ul style="list-style-type: none"> <li>- 4 to 6 uses</li> <li>- 7 to 10 uses</li> <li>- 11 to 18 uses</li> <li>- More than 19 uses</li> </ul> <p>Uses can include commercial or civic facilities such as restaurants, schools, pharmacies, supermarkets, theatres, parks, libraries, or shops.</p>			

<b>Affordable and diverse housing</b>			
Provides multiple housing types of different sizes, such as large and small apartments, duplexes, townhouses, and/or single-family homes.			
Provides a percentage of new rental and/or for-sale housing at high levels of affordability, available for at least 15 years.			
Provides both high levels of affordability and multiple housing types of different sizes.			
<b>Parking and transportation demand</b>			
<p>Does all of the following:</p> <ul style="list-style-type: none"> <li>- Minimizes total surface parking area (no greater than 20% of development area) and includes no individual surface lot over 2 acres.</li> <li>- Locates any off-street parking at the side or rear of buildings (not along the sidewalk).</li> <li>- Provides bicycle storage for building occupants, bicycle parking for visitors, and spaces for carpool or shared vehicles.</li> </ul>			
Includes shelters, benches, lighting, and information displays at all new and existing transit stops.			

<p>Provides any or all of the following options (for scoring, award 1 point for every 2 options achieved):</p> <ul style="list-style-type: none"> <li>- Subsidized transit passes to half of regular price or cheaper.</li> <li>- Developer-sponsored-transit services – such as a shuttle – to off-site employment centres and/or major transit facilities.</li> <li>- Well-publicized vehicle sharing facilities on-site, or within 0.25 mile walk distance.</li> <li>- For 90% of dwelling units or non-residential space, separates the cost of a parking space from the price of dwelling units or non-residential space.</li> <li>- A comprehensive transportation demand management (TDM) program to reduce trips by 20%.</li> </ul>			
<p><b>Parks and recreation</b></p>			
<p>Enables access (within 0.25 mile walk distance) to public space such as squares, parks, paseos, and plazas.</p>			
<p>Enables access (within 0.5 mile walk distance) to publicly accessible indoor or outdoor recreational facilities (at least 1 acre in size outdoor or 25,000 square feet indoor).</p>			
<p><b>Universal design</b></p>			
<p>Provides either of the following (only one necessary to score a point):</p> <ul style="list-style-type: none"> <li>- For residential projects, universal accessibility for people of diverse abilities in 20% of dwelling units.</li> <li>- For non-residential projects, universal accessibility for people of diverse abilities along 100% of public rights-of-way.</li> </ul>			

<b>Community participation</b>			
<p>Does either of the following (pick just one for scoring):</p> <ul style="list-style-type: none"> <li>- Relies on multiple forms of community input and feedback to guide project concept and design, both before and during development.</li> <li>- Relies on multiple forms of community input and feedback as above, but also conducts a design charrette or obtains an endorsement from a smart growth jury or program.</li> </ul>			
<b>Local food</b>			
<p>Provides both of the following:</p> <ul style="list-style-type: none"> <li>- Permanently set aside gardening space, free local produce shares (from within 150 miles) for residents, or proximity to a farmer’s market (on-site or within 0.5 mile walk distance).</li> <li>- Allows growing of produce, including in yards or on balconies, patios, or rooftops.</li> </ul>			
<b>School access and design</b>			
<p>Achieves both of the following:</p> <ul style="list-style-type: none"> <li>- Is located within walking distance of a school (½ mile for elementary and middle schools; 1 mile for high schools).</li> <li>- New school campuses included in the project are no larger than 5 acres (elementary), 10 acres (middle schools), or 15 acres (high schools).</li> </ul>			

<b>GREEN INFRASTRUCTURE AND BUILDINGS (GIB)</b>			
<b>Construction techniques</b>			
Creates and implements an erosion and sedimentation control plan for construction activities, reducing soil erosion and downstream pollution.			
Does both of the following: <ul style="list-style-type: none"> <li>- Preserves all heritage trees and most other non-invasive trees, especially larger ones.</li> <li>- Preserves a proportion of previously undeveloped land (10% to 20%) on the project site</li> </ul>			
<b>Energy efficiency and conservation</b>			
Ninety percent of building square footage meets minimum energy efficiency requirements. (Minimum 10% improvement over ASHRAE 90.1)			
Ninety percent of building square footage exceeds increasing thresholds for energy efficiency. (Minimum 18% improvement over ASHRAE 90.1 and/or 75 HERS Score)			
Orients 75% of buildings or dense blocks length-wise along east-west axes (within 15 degrees) to maximize passive and active solar access.			
<b>Energy production and distribution</b>			
Generates renewable energy on-site, providing the following percentage of the project’s annual electrical thermal and energy cost (pick just one for scoring): <ul style="list-style-type: none"> <li>- 5%</li> <li>- 12.5%</li> <li>- 20%</li> </ul>			
Provides at least 80% of building heating and cooling through a shared neighbourhood-wide system.			

Provides energy-efficient new neighbourhood infrastructure such as traffic lights, street lights, and water and wastewater pumps (15% minimum improvement over a conventional model).			
<b>Water efficiency and conservation</b>			
Meets minimum requirements for water efficiency in buildings (at least 20% reduction over a baseline).			
Exceeds increased threshold for water efficiency in buildings (at least 40% reduction over baseline).			
Reduces water consumption for outdoor landscaping (at least 50% reduction over baseline).			
<b>Stormwater and wastewater</b>			
Is able to retain and treat all stormwater on-site from the following sizes of rainstorm (pick just one for scoring): <ul style="list-style-type: none"> <li>- 80th percentile rainstorm (more rain than 80% of storms for the past 20-40 years)</li> <li>- 85th percentile rainstorm</li> <li>- 90th percentile rainstorm</li> <li>- 95th percentile rainstorm</li> </ul>			
Treats and reuses wastewater on-site (pick just one of the following for scoring): <ul style="list-style-type: none"> <li>- 25% of wastewater reused</li> <li>- 50% of wastewater reused</li> </ul>			
<b>Green building process</b>			
Uses LEED or a similar green building rating system to certify at least one project building.			

<p>Uses LEED or a similar green building rating system to certify the following percentages of the project’s building square footage (pick just one for scoring):</p> <ul style="list-style-type: none"> <li>- At least 10%</li> <li>- At least 20%</li> <li>- At least 30%</li> <li>- At least 40%</li> <li>- At least 50%</li> </ul>			
<b>Historic and existing building reuse</b>			
Reuses and restores at least 20% of the existing building stock.			
Includes a historic building(s), and rehabilitates if necessary.			
<b>Heat islands</b>			
<p>Uses one of the following strategies—or a combination of the two—to reflect instead of absorb solar heat:</p> <ul style="list-style-type: none"> <li>- Solar-reflective roofs (usually light-coloured) or vegetated roofs.</li> <li>- Shade, open-grid pervious paving, or solar-reflective paving for at least 50% of roads, sidewalks, parking areas, and other “hardscape.”</li> </ul>			
<b>Reuse and recycling</b>			
Uses recycled content in at least 50% of the total mass of public infrastructure materials such as paving, road base, and water/sewer piping.			

<p>Provides at least four of the following five:</p> <ul style="list-style-type: none"> <li>- Recycling services for residents</li> <li>- Hazardous waste disposal services for residents</li> <li>- Composting services for residents</li> <li>- Recycling receptacles on every mixed-use or non-residential block</li> <li>- Recycling or salvaging of at least 50% of construction waste</li> </ul>			
<b>Light pollution</b>			
<p>Provides both of the following:</p> <ul style="list-style-type: none"> <li>- Motion sensors in “shared areas” (publicly or privately owned) to reduce lighting when unoccupied and during daylight hours.</li> <li>- Limits “light trespass” to surrounding areas by directing exterior lighting downward and reducing its brightness, especially in rural areas and residential or mixed use neighbourhoods.</li> </ul>			
<b>INNOVATION AND DESIGN PROCESS (ID)</b>			
<b>Innovation and exemplary performance</b>			
<p>Exhibits exemplary environmental performance in areas not addressed by, or greatly exceeding, the LEED-ND rating system. Write in below (for scoring, add up to five):</p> <ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> </ol>			

Employs a project team member credentialed as a LEED Accredited Professional, in smart growth by the Natural Resources Defence Council and Smart Growth America, or in new urbanism by the Congress for the New Urbanism.			
<b>Regional Priority Credit (RP)</b>			
Addresses geographically-specific environmental, social equity, or public health priorities. Write in below (for scoring, add one point per strategy used up to four, even if the strategy is already addressed in LEED-ND. A complete list of Regional Priority Credits is available from U.S. Green Building Council):  1.  2.  3.  4.			

## Appendix G: LEED – ND CERTIFICATION PROCESS

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The following are the three stages of the Leadership in Energy and Environmental Design – Neighbourhood Development certification process (Welch, Benfield & Raimi, 2015):

**Stage 1:** Conditional Approval of a LEED-ND Plan

Approval at this stage is optional for projects in their initial planning phase, before or at the beginning of the entitlement process, and can give credibility to project designs and be used to garner support during the entitlement process.

**Stage 2:** Pre-Certified LEED-ND Plan

This stage is available to all projects that have been approved and that are fully entitled to be built, but have not yet completed construction. Pre-certification at this stage can help projects secure financing and set clear performance standards.

**Stage 3:** LEED-ND Certified Neighbourhood Development

LEED-ND certification is finalised at this stage and is available for projects that are completed and ready to be occupied.

## Appendix H: GREEN STAR COMMUNITIES AND LEED – ND CERTIFIED PROJECTS

Below is the current list of Green Star Australia Communities certified projects (Green Star (Australia) (3), 2016):

<b>Project Name</b>	<b>Location</b>	<b>Green Star Communities Rating Achieved</b>
Tonsley Park	Tonsley, South Australia	6 Star Green Star
Curtin Master Plan	Bentley, Western Australia	5 Star Green Star
Ginninderry	Holt, Australian Capital Territory	6 Star Green Star
Fairwater	Blacktown, New South Wales, Australia	6 Star Green Star
Aura	Caloundra South, Queensland, Australia	6 Star Green Star
Brisbane Airport	Brisbane, Queensland, Australia	4 Star Green Star
Ecco Ripley	Ipswich, Queensland, Australia	5 Star Green Star
Bowden	Bowden, South Australia	6 Star Green Star
Alkimos	Alkimos, Western Australia	6 Star Green Star
Altrove	Sydney, New South Wales, Australia	5 Star Green Star
Barangaroo South	Millers Point, New South Wales, Australia	6 Star Green Star

Googong Township	Googong, New South Wales, Australia	5 Star Green Star
Willowdale	Campbelltown, New South Wales, Australia	6 Star Green Star
Newport	Newport, Queensland, Australia	5 Star Green Star
Parklands	Southport, Queensland, Australia	6 Star Green Star
Aurora	Wollert, Victoria, Australia	6 Star Green Star
Cloverton	Cities of Hume, Whittlesea, Mitcham, Victoria, Australia	6 Star Green Star
Calleya	City of Cockburn, Western Australia	6 Star Green Star
Australand Communities Project – 1	Logan City, Queensland, Australia	5 Star Green Star
Australand Communities Project – 1	Burwood, Victoria, Australia	6 Star Green Star
Anonymous Project	Location Withheld	6 Star Green Star
Anonymous Project	Location Withheld	5 Star Green Star
Anonymous Project	Location Withheld	6 Star Green Star
Anonymous Project	Location Withheld	6 Star Green Star
Anonymous Project	Location Withheld	6 Star Green Star

Below is the current list of LEED – ND projects certified for as built achievements (U.S. Green Building Council (3), 2016):

<b>Project Name</b>	<b>Location</b>	<b>LEED – ND As Built Rating Achieved</b>
Twinbrook Station	Maryland, USA	Gold
The Hive	California, USA	Certified
Old Colony Public Housing Redevelopment	Massachusetts, USA	Gold
Ilha Pura Empreendimentos Imobiliarios	Rio de Janeiro, Brazil	Certified
Renaissance Place at Grand	Missouri, USA	Certified
Futakotamaawahigashi Area Redevelopment	Japan	Gold
Recinte Modernista Hospital Sant Pau	Barcelona, Spain	Certified
Gold Time Ecological Bay	China	Silver
St. Luke’s Neighbourhood Redevelopment	Ohio, USA	Silver
Westlawn Revitalisation	Wisconsin, USA	Silver
Ever Vail	Colorado, USA	Platinum
Excelsior & Grand	Minnesota, USA	Certified
Lincoln Park Coast Cultural District	New Jersey, USA	Gold
Solea Condominiums	District of Columbia, USA	Gold
Helensview	Oregon, USA	Gold
Crystal City Plan	Virginia, USA	Certified

Jackson Square Redevelopment Initiative	Massachusetts, USA	Silver
Hercules Bayfront	California, USA	Gold
Township 9	California	Silver
Legends Park & University Place	Tennessee, USA	Certified
Preston Meadows	Ontario, Canada	Certified
The Village at Griesbach, Stage 8	Alberta, Canada	Gold
The Gulch	Tennessee, USA	Silver
South Lake Union Urban Centre	Washington, USA	Certified
The Gateway to Nashville	Tennessee, USA	Gold
Newpark Town Centre	Utah, USA	Silver
Ladd Tower	Oregon, USA	Gold
Washington Village	Colorado, USA	Silver
Constitution Square Phase I	District of Columbia, USA	Gold
South Waterfront Central District	Oregon, USA	Gold
Prairie Crossing – Station Village	Illinois, USA	Certified
Willets Point Redevelopment Project	New York, USA	Gold
Depot Walk	California, USA	Certified
Park Avenue Redevelopment – Block 3	Colorado, USA	Gold
Whistler Crossing	Illinois, USA	Certified
Uptown at Falls Park	South Dakota, USA	Gold
Edgewater	Pennsylvania, USA	Certified

Chongqing Tiandi Xincheng Development	China	Gold
Habitat for Humanity East Bay Edes 'B'	California, USA	Certified
Melrose Commons	New York, USA	Silver
The Arbors	Ohio, USA	Certified
Wuhan Tiandi Mixed Use Development	China	Gold
Global Green USA Holy Cross Project	Louisiana, USA	Silver
Town of Normal Uptown Renewal Project	Illinois, USA	Silver
Decker Walk EnvirowHomes	Maryland, USA	Silver
3910 Georgia Commons	District of Columbia, USA	Gold
Faubourg Boisbriand	Quebec, Canada	Gold
Pointe Nord	Quebec, Canada	Gold
Southeast False Creek Neighbourhood	British Columbia, Canada	Platinum
Linked Hybrid	China	Certified
Currie Barracks	Alberta, Canada	Gold
The Yards	District of Columbia, USA	Gold
Beijing Olympic Village	China	Gold
Harbour Point	Connecticut, USA	Gold
Syracuse Art, Life & Technology	New York, USA	Gold
1812 N Moore Street	Virginia, USA	Gold
Garrison Crossing	British Columbia, Canada	Certified
Good	California, USA	Certified

City of Tucson and Gadsden Comp. PPP	Arizona, USA	Gold
Napa Pipe	California, USA	Gold
Hunters view	California, USA	Silver
Hoyt Yards	Oregon, USA	Platinum
Sweetwater	Idaho, USA	Certified
South Chicago LEED ND Initiative	Illinois, USA	Certified
Reston Heights	Virginia, USA	Silver
Flats East Development	Ohio, USA	Certified
Simpson Wisser Fort Shafter	Hawaii, USA	Certified
Miraflores	California, USA	Gold
Dockside Green	British Columbia, Canada	Platinum
Meadow Ranch	Idaho, USA	Certified
Union Park	Nevada, USA	Gold
Silo City	China	Certified
Aspen Club Living	Colorado, USA	Certified
Alliance Town Centre	Texas, USA	Certified
Founder's Square	Virginia, USA	Gold
Mueller	Texas, USA	Silver
MacArthur BART Transit Village	California, USA	Gold
Technopole Angus	Quebec, Canada	Gold
Parkside Mixed-Use Development	District of Columbia, USA	Gold

The Navy yard at Noisette	South Carolina, USA	Certified
The Waterford District	Washington, USA	Silver
Celadon	North Carolina, USA	Certified
Taylor Yard, Parcel C	California, USA	Certified
The Brewery	Wisconsin, USA	Platinum
Jinshan Project	China	Certified
Old Convention Centre Site Redevelopment	District of Columbia, USA	Gold
Metro Green Residential	Connecticut, USA	Gold
Tassafaronga Village	California, USA	Gold
Toronto Waterfront Area 1	Ontario, Canada	Gold
Midtown Crossing at Turner Park	Nebraska, USA	Certified
West Town	Georgia, USA	Certified
Mosaic at Merrifield	Virginia, USA	Silver
Eliot Tower	Oregon, USA	Silver
Metrogate	Ontario, Canada	Silver
Horizon Uptown	Colorado, USA	Certified
The New Stapleton Waterfront	New York, USA	Silver
Quarry Falls	California, USA	Gold
Emeryville Marketplace	California, USA	Platinum
Hawaii Regional Housing PPV Increment 2	Hawaii, USA	Certified
Cornfields/Arroyo Seco Specific plan	California, USA	Certified

East 54	North Carolina, USA	Gold
Strathearn Masterplan	Alberta, Canada	Silver
Barelas Homes	New Mexico, USA	Certified
360 State Street	Connecticut, USA	Platinum
Delaware Addition	California, USA	Certified
Sustainable Fellwood	Georgia, USA	Silver
City Creek Centre	Utah, USA	Silver
Westfield UTC Revitalisation	California, USA	Gold
PHS District Neighbourhood – The Presidio	California, USA	Certified
ND Stage 2 E2E	District of Columbia, USA	Silver
ND Stage 1 Test 2	District of Columbia, USA	Silver

Below is the current list of LEED – ND projects certified for planning achievements (U.S. Green Building Council (3), 2016):

Project Name	Location	LEED – ND Plan Rating Achieved
Kashiwa-no-ha Smart City	Japan	Platinum
The Shipyard/Candlestick Point	California, USA	Gold
Northwest Gardens	Florida, USA	Gold
Foshan Ligan Tiandi Development	China	Gold
Ward Village	Hawaii, USA	Platinum

Beijing CBD Core Zone	Beijing, China	Gold
Taikang Community Shen Garden	Shanghai, China	Silver
Dong Financial City	Shanghai, China	Gold
Dongguan International Trade Centre	Guangdong, China	Gold
UdeM – Campus Outremont	Quebec, Canada	Gold
Brickell City Centre	Florida, USA	Gold
South Sloans Lake	Colorado, USA	Gold
University District	Alberta, Canada	Platinum
Terrapin Row Development	Maryland, USA	Silver
Hitch Village	Georgia, USA	Certified
Lansdowne Park	Ontario, Canada	Silver
Brightwalk	North Carolina, USA	Certified
Rebuild Potrero	California, USA	Gold
BaoNeng City garden	China	Gold
Double Cove	Hong Kong	Gold
Shanghai Knowledge Innovation Community	Shanghai, China	Gold
Ville Verte Mohammed VI	Morocco	Silver
DHA Mariposa Mixed-Use Development	Colorado, USA	Gold
BMX – Parque da Cidade	São Paulo, Brazil	Silver
Futakotamagawahigashi Area Redevelopment	Japan	Gold

Old Colony Public Housing Redevelopment	Massachusetts, USA	Gold
Downtown Doral	Florida, USA	Certified
MFCDC 20/21 Project	Indiana, USA	Silver
Ilha Pura	Rio de Janeiro, Brazil	Certified
North First Campus	California, USA	Certified
55 Laguna Street	California, USA	Gold
Chengdu Daci Mixed Use Complex	China	Gold
Shanghai Taipingqiao Master Plan	China	Gold
Seaport Square	Massachusetts, USA	Gold
Les Bassins Du Nouveau Havre De Montreal	Quebec, Canada	Gold
Oriental Bund Foshan	China	Gold
Grandview Yard	Ohio, USA	Silver
Westlawn Revitalisation	Wisconsin, USA	Silver
9 <sup>th</sup> and Berks Street TOD	Pennsylvania, USA	Platinum
Larimer Neighbourhood	Pennsylvania, USA	Silver
Cafritz Property at Riverdale Park	Maryland, USA	Certified
Jordan Downs	California, USA	Silver
Shanghai Expo UBPA Development	Shanghai, China	Platinum
PJ Sentral Garden City	Malaysia	Gold
Rebecca Street	Ontario, Canada	Certified

Beijing COFCO Hou Shayu Development	Beijing, China	Certified
Miami Design District	Florida, USA	Gold
KL Metropolis	Malaysia	Certified
KLIFD	Malaysia	Gold
Shanghai Rui Hong Xin Cheng	Shanghai, China	Gold
Sunnydale Hope SF	California, USA	Gold
Harper Court	Illinois, USA	Gold
The Village at Market Creek	California, USA	Silver
Gold Time Ecological Bay	China	Silver
Navy Green	New York, USA	Silver
OneCity	Tennessee, USA	Silver

## Appendix I: BASELINE INTERVIEW OUTLINE

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1. What does urban sustainability mean to you as a member of Century City's development/management team?
2. How would you define urban sustainability at the precinct level? What would need to be taken into account? (i.e. environmental issues, social issues, political issues)
3. Do you believe that the incorporation and adoption of sustainable urban development principles, policies and initiatives at a precinct level is important? How do you rate this importance compared to the development of individual/single sustainable buildings?
4. What precinct- or community-level sustainable development policies and initiatives are currently in place within Century City?
5. How many of the current sustainable development policies and initiatives are in place as a result of local authority requirements?
6. What have been the main motivations behind the implementation and adoption of these current sustainable urban development initiatives?
7. Are you aware of any of the international precinct/community/neighbourhood level sustainability rating tools? If yes, have you made use of them as guidelines for any of your precinct level sustainable urban development activities? Are you currently measuring your precinct level development activities against any international rating tools? Which one(s)? And what ratings are achieved?
8. Do you believe that the South African urban development industries are ready for the shift of sustainability's focus from single sustainable buildings in isolation

towards the development of precincts, communities and neighbourhoods as complete sustainable systems?

9. How useful and/or important do you find the existing Green Star South Africa rating tools in terms of the management of buildings and facilities? Do you motivate or require tenants/building owners within Century City to adopt the principles set out in the existing rating tools or to strive for Green Star ratings (specifically the existing building performance/management rating)? Do you believe a precinct level rating tools would be just as useful? Would you similarly encourage/motivate the property owners and various home owners' associations within Century City to participate in the precinct level rating activities?
  
10. Do you believe that the introduction of a South African (Green Star) rating tool for precinct level sustainable urban development will be useful to the South African urban development industries? Specifically with regards to motivation to adopt sustainable urban development initiatives and guidelines as to what achievements are necessary to be classified as a sustainable precinct.

Any further comments/discussions...

## Appendix J: TYPICAL INTERVIEW CONSENT FORM

---

Interviewer:           Melissa Potgieter

Interviewee name: \_\_\_\_\_

Position: \_\_\_\_\_

\_\_\_\_\_

Date of Interview: \_\_\_\_\_

I would hereby like to specifically request your permission to record the interview. Do you consent to the interview being recorded?

YES           NO           Signature:

I would hereby like to confirm whether you will allow me to use your name in my dissertation when reporting on this interview:

YES           NO           Signature:

I would hereby like to confirm whether you allow me to make direct quotations in my dissertation when reporting on this interview:

YES           NO           Signature:

Agreement by interviewer to the above consents: \_\_\_\_\_

## Appendix K: CCPOA AND RABIE PROPERTY GROUP INTERVIEW SIGNED CONSENT FORMS AND TRANSCRIPT

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**INTERVIEW CONSENT FORM**

Interviewer: Melissa Potgieter

Interviewee name: CHRIS BLAKESMAN

Position: CEO  
Country Way Property Owners Association

Date of Interview: 10/4/2016

I would hereby like to specifically request your permission to record the interview. Do you consent to the interview being recorded?

<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Signature:	<div style="border: 1px solid black; padding: 2px;">Signed by candidate</div>
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I would hereby like to confirm whether you will allow me to use your name in my dissertation when reporting on this interview:

<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Signature:	<div style="border: 1px solid black; padding: 2px;">Signed by candidate</div>
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I would hereby like to confirm whether you allow me to make direct quotations in my dissertation when reporting on this interview:

<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Signature:	<div style="border: 1px solid black; padding: 2px;">Signed by candidate</div>
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Agreement by interviewer to the above consents: 

Signed by candidate

INTERVIEW CONSENT FORM

Interviewer: Melissa Potgieter

Interviewee name: COURT ANDERSON.

Position: DIRECTOR.

Date of Interview: 10/03/2016.

I would hereby like to specifically request your permission to record the interview. Do you consent to the interview being recorded?

<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Signature:	<u>Signed by candidate</u>
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I would hereby like to confirm whether you will allow me to use your name in my dissertation when reporting on this interview:

<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Signature:	<u>Signed by candidate</u>
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I would hereby like to confirm whether you allow me to make direct quotations in my dissertation when reporting on this interview:

<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	Signature:	<u>Signed by candidate</u>
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Agreement by interviewer to the above consents: Signed by candidate

Interview Date: 10 March 2016

Interviewer: Melissa Potgieter

Interview Participants: Chris Blackshaw, CEO of the Century City Property Owners' Association (Management of Century City)  
Colin Anderson, Director of Rabie Property Group (Developers of Century City)

Name Coding: CA – Colin Anderson  
CB – Chris Blackshaw  
MP – Melissa Potgieter

INTERVIEW TRANSCRIPT:

MP: Firstly, I would like to thank you both for making the time to have this discussion with me, I appreciate it very much.

CB: It's a pleasure.

CA: Sure.

MP: As per our previous correspondence this is a discussion around urban sustainability at a precinct level for the purpose of my Master's dissertation research. The purpose of my dissertation is to determine whether the South African urban development industries and role players need or will benefit from the introduction and incorporation of a South African precinct level Green Star rating tool. Okay, now to start, what does urban sustainability mean to you? The word sustainability is used a lot in the Century City information and brochures, as well as on the website, so what does it mean to you as the developer/manager of Century City?

CA: It takes more than the buildings, it takes the entire precinct, so what it means is almost an integrated precinct where you've got a bit of everything. You've got retail, you've got commercial, you've got residential, and you've got them together so that a precinct doesn't die at any time of the day. That would be a sustainable precinct, something that doesn't die like some of the other cities have died, relying too heavily on or having no residential. A prime example of that is Johannesburg, where it works beautifully in the daytime with all the business but then at night time it's a dead precinct. Something that lives on 24/7 would be a sustainable precinct.

CB: What you are saying is that there is a business sustainability side to it. That it's a healthy business environment.

CA: 24/7 environment, that it does not just work office hours.

CB: And then their obviously the environment when considering urban sustainability. In your textbooks it would be around minimising the environmental impact of that precinct, or carbon footprint, minimal ecological impact. It would move around minimal impact now which would impede on future generations and everything else. An important point to make is that with urban sustainability there is an environmental sustainability component, but a lot of people do not recognise that there is also a practical, functional, commercial sustainability, and you need both, the two need to marry to create a sustainable urban precinct.

MP: Do you believe that the incorporation and adoption of sustainable urban development principles, policies and initiatives at a precinct level is important? Specifically as opposed to single green buildings viewed in isolation?

CA: Certainly it is. Buildings can't live in isolation. So there is no point having one fantastic building surrounded by a bunch of slums. So I think it is important. The difficulty is that not all developments are controlled by a private entity. We're fortunate in this situation that we own a massive chunk of the property here at Century City and so, what it does, it makes us more conscious of what we do with

every development, because if we mess up this one, we've messed it up for the next one. In an open environment it's not quite the same, everyone does the best for their own development and what happens next is out of their hands.

MP: Do you think that a precinct level rating tool would help with that?

CA: Yes. I'm not sure how you would do it in the open market. Like in the CBD of Cape Town for instance if you've got a precinct then I suppose the City would have to start to comply or put those rules in place for people buying into that precinct. I'm not quite sure how you would manage or control that.

CB: In a way precinct level, looking at sustainability at a precinct level at times could be easier and could help resolve challenges. I mean, Rabie as a developer many of the transport and mobility and those sorts of issues one has been looking at it not at a building level but at a Century City wide level, which means you look at the economies of scale and you can get the necessary finance together to do those things. Some of the challenges we've had here in this sub-precinct, where you have coolers and everything else – there are potential opportunities for collective, whether it's cooling or heating beyond just one building... Communal facilities (MP)... If you can't get your required mass on a particular building and you've got the economies of scale if you work with a number of buildings you could sort out that surplus or deficiency by adding another building to the system. There are opportunities, but it's difficult, as we've found it to be, because then you're dealing with different property owners and jurisdiction and such things.

CA: There's also the financing and the holding costs of those kinds of facilities, if you want dual facilities. Like urban cooling. We've done it in this precinct, which is a smaller sub-precinct of Century City because we control the entire precinct so we've got a central chiller plant, we've got four-five buildings here so it works for all of those buildings. But whether or not we could take that and build an even bigger one, that we could deal with the building next door, that's a lot of capital outlay up front and that's unfortunately not the commercial.

CB: That's the whole question of putting a lot of infrastructure up front and you've got a long period of roll-out of development in a precinct, so it's not just a building which has got your two year turnover, this may be a lengthier period and you're going to have to put that infrastructure cost up front and that places pressure on the financial aspects of any development, particularly if smaller developers are involved. In 2006/2007 we looked at providing a central back-up power facility where each supply line to a building has this back-up and when new buildings are added to the precinct an extra generator is just added onto the back of the back-up power facility, but it is difficult doing it retrospectively, where every building already has its own back-up system. These things should be planned up front for future roll-out.

MP: I've read up a bit on your green initiative that are already happening inside this precinct.

CB: I went through those this morning and it's a bit outdated.

MP: Now that you say it is outdated, what new initiatives have been added?

CB: MyCiti is now here and from April two new feeder routes will be coming through Century City. That's the main sort of change and additional activity. There are additional buildings that have been green certified.

MP: How much of what you do in terms of sustainable activities, like for instance the stormwater management which of course uses the canals, how much of that is because of local authority requirements/City of Cape Town requirements?

CA: I don't think it is as much. I think when it started, it was a solution to a problem. It started off as there is a wetland and how do we get rid of the wetland. Initially it was a solution to a problem, it has now been, there are some regulations that require you to do that (on site stormwater management), but over and above that we've found, especially on the residential side there is added value to having canals. It has

in fact worked out that the stormwater managements aspect of the water and the canals around all of the built sub-precincts was a bonus, it was initiated to solve another problem and for the look and feel of it, with stormwater management being an added bonus.

CB: And the City's regulations which came out in the last four/five/six years, the whole new thing with catchpits and whatever (on site stormwater management and achieving equal pre- and post-development flow off the site) that's what we do here. So Century City's methodology around stormwater management pre-empted the City's formal regulations. Our canals aren't concrete lined, they aren't swimming pools. They are porous with gabion edges, all our stuff is putting water back into the water table, this is how it works anyway, the need for (attenuation and) catchpits is how it works anyway. Those regulations didn't dramatically impact on us as we were already doing it.

CA: I think that the engineers who came up with the concept initially were cleverer than they knew.

CB: The history was that we had the "7 Pannetjies" (historical wetland/salt flats) here and now, from a development position, how do you deal with all that water, especially seasonally, canals was the way of dealing with it and then obviously it's got a major marketing and aesthetic value.

CA: From a residential point of view, if the units overlook water they sell better.

MP: Besides now the added value of the canals, what have been your main motivations for adopting sustainable urban development activities and initiatives?

CA: Well, property is a long term game. So for us to develop a precinct, this is a large precinct that is going to be developed probably over thirty years, so you can't have a short term view on something like that. The developer will ultimately makes its biggest buck when t finishes a development so you've got to look further than

tomorrow. And I think that's sort of been the philosophy. Properties, we buy them and want to hold them and want the values to grow, so again as I said earlier, if that single property would do beautifully but if the surroundings die around it then we've got nothing, we've got a beautiful building in the middle of nothing. So, I think it (sustainability) is just a commercial reality, if you're in it for the long term, you've got to be thinking long term.

CB: And then on top of that, Century City prides itself and strives to be at the cutting edge of everything. So whether it's our fibre connectivity or whether it's our environmental education on Intaka Island or whether it's public transport, accessibility or whatever we pride ourselves of pushing the boundaries. So this again one of the boundaries, we are one of the leaders.

CA: We want it to be a destination where people want to be. And that gives us a competitive edge.

MP: Are you aware of any of the international precinct or community level rating tools?

CA: I've heard of some of them.

MP: Do you use them? Do you try to rate your development against them?

CA: No, we haven't.

MP: If I could just mention some of the things that are measured in these international rating tools:

To enhance liveability, create opportunities for economic prosperity, foster environmental responsibility, embrace design excellence, and demonstrating visionary leadership and strong governance. Those are all things that you would typically be rated on by a precinct level rating tools as well as things like smart location and linkage to externals, which is done very well at Century City, Century City is very well located for that, neighbourhood pattern and design, green

infrastructure and buildings, and then innovation in design, basically are the main categories that have featured so far in international precinct level rating tools, and that are most likely to be adopted by a South African precinct level rating tool. Knowing the above, do you think that the South African industries, as developers and as managers of urban precincts, are ready for a shift from single buildings towards precinct level, for rating?

CB: Before you answer that, I mean all those points that you raised there are comfortably covered by what we are trying to do in Century City, so there is nothing missing out of that.

CA: I think we would pass a precinct level rating with flying colours. The advantage of this is that it wouldn't just be a marketing speak. It wouldn't just be you writing some fancy words in your brochure saying this is what we do. This is a certification that the market then says, this is true, this is real, it's not Chris just giving his little marketing talk. I think there is a massive advantage. It's what happened with the green buildings.

CB: It's got credibility.

CA: People realise that you can't just talk about it, you've actually got to live it and unless you can prove it it's not real. (A rating) It's official, you look at it and you believe it.

CB: So what you're saying, its credibility, and its comparability, that you can compare other prospective areas.

CA: And it is legitimate.

CB: Legitimate in terms of the credibility.

MP: We spoke earlier about precincts that are not necessarily owned or managed by a single entity, do you think a rating tools would help in those cases to give the

developers/managers something to work towards? Every separate developer in a precinct would know what the precinct itself is working towards. Do you think that a rating tools might help in this regard?

CA: I think it would help, but I'm not sure who would drive the process, I mean you would need it to be driven at a municipal level. You would need a separate governing entity, like you've got your CID's, but they haven't got the power, they haven't got the muscle. That's the difficulty with that. You know, with the CID's you can get the guys to pay an extra levy towards additional security and things like that, but now you want to enforce things that they must develop in a certain way, I mean we have our debates which are robust and were Chris feels we need to do certain things and we look at it and we go financially maybe it's not so viable, but at the end of the day, again, we can see the bigger picture of it. Where if I was just fighting for my own life I maybe wouldn't listen as much to Chris (management's sustainable requests or requirements).

CB: As a principal developer, you have got some sway and hold over what happens. And even if a Chevron comes and wants to develop, you say, wait a minute, Chevron's a good one, you want to make this site 100% green buildings and create that green precinct, Chevron are the sort of client one wants/property owner, okay let's do that. How would a council do that? They can't prescribe in their goodies that this piece can only be developed by a certain type of client/property owner. They haven't got that influence.

CA: It would have to become part of the town planning, you would almost have to try and put it up when someone buys a property and gets the zoning or whatever, there would have to be certain rules in place at that level already. Almost like you've got your design guidelines here, but in a bigger precinct. But it is difficult to do that retrospectively in an existing environment, with little pockets around/available for development.

MP: That basically covers all of the questions that I had written down here. Is there anything else on precinct level sustainability that you would like to raise?

CB: Just again to point out the fact that it is not just an environmental sustainability, there is a business case for it as well.

CA: That's why we do it.

CB: That's a critical side which a lot of people miss. And I've, coming from local government, I've started to understand, working with property developers that you've got to marry the two together. Whatever you're doing you've got to look at the business case.

CA: There's got to be a business case for it.

CB: The business case is the commercial reality, and if you can marry the two together then you can do unbelievable things.

CA: And that's where we've seen in the GBC where we built the business case and hence we've been fairly proactive in this whole green building process, because it is a business case and we're a business, we're in business. And it is nice that we can do it (business) and at the same time be environmentally friendly and all those good things, but certainly there has to be a commercial business case for it.

MP: Anything else?

CA: No.

CB: No.

MP: Okay then, I thank you again very much for your time and your input.

CB: Of course, and if you have any further questions or situation you would like to discuss, you have our contact details.

MP: Yes, I do, thank you very much.

## Appendix L: RANDOMLY SELECTED INTERVIEW TRANSCRIPT

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Interview Date: 21 September 2015

Interviewer: Melissa Potgieter

Interview Participant: Anonymous – Representative of Century City’s Operations and Management Team

Name Coding: OMT – Anonymous Interview Participant  
MP – Melissa Potgieter

### INTERVIEW TRANSCRIPT:

MP: Firstly, I would like to thank you for making the time to have this discussion with me, I appreciate it very much.

OMT: Sure, let’s start. I have read through the questionnaire you sent on prepared my answers. Shall we go through them off the questions listed?

MP: Okay. The first question reads: What does sustainable urban development mean to you?

OMT: Firstly I would like to say that as a member of the operations and management team I do not look at Century City from a development point of view but rather from an operational and a building performance point of view. That being said, I believe that operations, management and building or infrastructure performance play a critical role in the sustainability of any urban development.

MP: The second question deals with the importance of the incorporation of sustainable urban development principles, policies and initiatives.

OMT: Yes, any sustainability objectives are very important, and are currently part of our development policy and vision statement.

MP: Great. What precinct- or community level sustainable development policies and/or initiatives have been put in place in your development?

OMT: The policies that we have adopted include the Environmental Heritage system of the site, referring to the “7 Pannetjies” or Blouvillei conservation area now known as Intaka Island, Green Star South Africa new building and existing building principles, and the SANS 10400 standards.

MP: How many of your sustainable development initiatives or policies are as a result of local authority requirements?

OMT: Our sustainable development initiatives and policies are more as a result of releasing the need to be environmentally conscious and responsible and conserving it for future use, by changing the behaviour of staff and tenants by means of implementing waste, water, energy saving initiatives and transport management practices, rather than being driven by local authority.

MP: Okay, the next question follows on that: What has been the main motivation behind the implementation of your current sustainable development initiatives?

OMT: Yes, as said before, the main motivation is to be environmentally responsible and to create an entirely green precinct. To conserve the environment for future generations.

MP: Will the Century City development precinct continue to keep up with the expanding local sustainability standards and continue to pursue Green Star South Africa ratings?

OMT: Yes, the goal is to develop an entirely green precinct by incorporating all applicable standards and ratings in an effort to ensure a sustainable environment. The goal is to achieve as many Green Star ratings as possible for all new developments in Century City.

MP: How do you as an industry professional see South Africa's progress towards sustainability in the urban environment?

OMT: Initial progress has been slow but with the Green Building Council's existing the drive towards sustainable buildings and the implementation of sustainability initiatives has risen significantly. Implementing appropriate systems and streamlining of processes in order to manage and reduce greenhouse gas emissions associated with operational activities within urban development areas still requires a bigger drive. This will definitely become a focus point with the implementation of carbon taxes in 2016. I believe it is imperative that all new development must incorporate sustainability principles in order for them to be effective and sufficient.

MP: Do you believe that the South African urban development market is ready for the shift of focus from sustainable buildings in isolation towards sustainable precinct developments and the implementation of this shift?

OMT: Yes, I do believe so. Relevant legislation is being developed by the government such as SANS 10400XA: 2011 together with SANS 204 standard requirements, which focus on energy efficiency and usage within buildings. This legislation is the first attempt made by local authorities to regulate energy usage and encourage and require minimum levels of energy efficiency within buildings. This came about as a result of the pressure felt by South African electricity suppliers and the electrical grid in the face of growing demand on a supply that is extremely limited. Government seems to

now be focusing on improving the energy efficiency of existing building by retrofitting and ensuring that new buildings are designed to be as energy efficient as possible from the very beginning of their lifecycles. The amended national building regulation now requires buildings to utilise energy as efficiently as possible and to reduce greenhouse gas emissions in accordance with a checklist of requirements. Legislation like this allows for a shift into sustainably developed precincts. Also, the Green Star performance rating tools allows for some application at precinct level, further encouraging sustainable operation and management practices.

MP: Okay, great, we are down to the last question on the list. What do you see as the next step for the South African sustainable urban development industries?

OMT: I believe all urban developments will incorporate sustainable initiatives going forwards especially when you consider the current water and energy crises that our country is facing. Developers will, from a cost efficiency point of view, have no other choice but to implement sustainable initiatives.

MP: Thank you. We have reached the end of my prepared questions. Do you have any additional comments on urban sustainability or sustainability on a precinct level?

OMT: No, not at the moment. I think the questions covered it.

MP: Okay then, thank you again for your time. Your input is much appreciated.

OMT: It's a pleasure. Feel free to drop me an email if you think of anything else.

MP: Will do.