

A critical review of the consideration of climate change risks and opportunities in Environmental Impact Assessments (EIAs)

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Mini-dissertation submitted in *partial* fulfillment of the requirements for the degree *Masters in Environmental Management* at the Potchefstroom Campus of the North-West University

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May 2014



ABSTRACT

It is widely acknowledged that the impacts of climate change are likely to be far worse than some people believe possible. Research has shown that our current approach and intervention to combat climate change is hopelessly inadequate. Climate change is a global environmental phenomenon which is not adequately addressed by integrated environmental management and more particularly by environmental impact assessment (EIA). In order to effectively address this challenge, adaptation and mitigation actions at individual, local, national, and international levels are critical. It is argued that EIA is one of the most valuable tools to integrate climate change issues into pre- and post-development decision-making processes. The aim of this research was to critically review the consideration of climate change risks and opportunities in EIAs for housing development in two of Gauteng's metropolitan areas. The results reveal that climate change risks and opportunities are not considered during EIA. It is evident that there are a number of challenges, and the sternest one is the serious lack of a regulatory framework to mandate a compulsory consideration of climate change issues in the process of EIA. On the other hand, there is a lack of awareness and drive by key stakeholders to ensure that the EIA process identifies, considers, and evaluate the risks and opportunities related to climate change.

Key words: climate change, EIA, risks, opportunities.

SAMEVATTING

Dit word algemeen erken dat die impak van klimaatsverandering waarskynlik veel erger is as wat sommige mense glo. Navorsing toon dat ons huidige benadering en ingryping om klimaatsverandering te bekamp, hopeloos ontoereikend is. Klimaatsverandering is 'n globale omgewingsverskynsel wat nie voldoende aangespreek word deur geïntegreerde omgewingsbestuur en meer spesifiek deur die omgewingsimpakstudies nie. Ten einde hierdie uitdaging doeltreffend aan te spreek, is aanpassing en aksies versagting op individuele, plaaslike, nasionale en internasionale vlak van kritieke belang . Daar word aangevoer dat omgewingsimpakstudies die mees waardevolle hulpmiddel is om klimaatsverandering-kwessies in die voor- en na- ontwikkeling besluitnemingsprosesse te integreer. Die resultate van die studie vind dat klimaatsverandering risikos en geleenthede in die algemeen in ag geneem word, alhoewel die invloed hiervan steeds minimaal is. 'n Aantal uitdagings bestaan egter in die verband, waarvan die noemenswaardigste die gebrek aan 'n regulerende raamwerk wat die integrasie van klimaatsveranderingskwessies in omgewingsimpakstudies verpligtend maak. Aan die ander kant is daar ook 'n gebrek aan bewustheid en 'n dryf om te verseker dat omgewingsimpakstudies klimaatsverandering risikos en geleenthede identifiseer, in ag neem en evalueer.

Sleutel woorde: klimaatsverandering, omgewingsimpakstudies, risikos, geleenthede.

DECLARATION

I declare that this research report, apart from the contributions mentioned in the acknowledgements, is my own unaided work. It is being submitted for the degree Master of Environmental Management at the North-West University, Potchefstroom Campus. It has not been submitted before for any degree or examination at any other university.

(Signature of candidate)

08 May 2014

ACKNOWLEDGEMENT

I should like to thank the following people for their assistance, understanding and contributions in making this research dissertation a reality:

- Carli Steenkamp from the North-West University, who tirelessly supervised and provided guidance on this study.
- Officials from the Tshwane and Johannesburg Metropolitan Councils, who provided access to the EIA reports from the two Metropolitan Municipalities.
- Participants who took their valuable time in completing the questionnaires and taking part in interviews, thereby sharing their views on the subject under research.
- My family (wife Shoni, and kids, Rinavho and Unarine) for being the source of inspiration and a pillar of strength through offering me their unwavering support, encouragement and love.

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LIST OF ABBREVIATIONS

BA	- Basic Assessment
CJMM	- City of Johannesburg Metropolitan Municipality
CTMM	- City of Tshwane Metropolitan Municipality
CO ²	- Carbon Dioxide
DEA	- Department of Environmental Affairs (formerly DEAT)
DEAT	- Department of Environmental Affairs and Tourism (now DEA)
ECA	- Environmental Conservation Act
EAP	- Environmental Assessment Practitioner
EIA	- Environmental Impact Assessment
EIR	- Environmental Impact Report
EMPs	- Environmental Management Plan
GCCRS	- Gauteng Climate Change Response Strategy
GDP	- Gross Domestic Products
GHG	- Greenhouse Gas
IDP	- Integrated Development Plan

IPCC	- International Panel on Convention of Climate Change
LTMS	- Long-Term Mitigation Strategy
MTSF	- Medium-Term Strategic Framework
MDG	- Millennium Development Goals
NCCRS	- National Climate Change Response Strategy
NEMA	- National Environmental Management Act
NEPA	- US National Environmental Policy Act
NSFD	- National Strategic Framework Development
SA	- South Africa
SR	- Scoping Report
UNFCCC	- United Nations Framework on Convention of Climate Change
WRI	- World Resources Institute
WMO	- World Meteorological Organisation

PREFACE

The following Table indicates the chapters in this research report and describes them briefly.

Table 1-1: Summary of research chapters and their brief description

Chapters	Overview description
1. Introduction	This chapter sets the scene with a general background to the phenomenon of climate change and deals with the other primary tool in this report, which is environmental impact assessment. It introduces and outlines the key framework of the research through presenting the problem statement and the research questions that it intends to answer. This chapter sets out the main problem that the research seeks to address.
2. Research methods	This section elaborates on the methods used to gather information and the process used to analyse and present the information as research findings. A wide range of tools was used to gather the information, which was presented in various formats to make sense of the existing and emerging trends.
3. Literature review	This chapter reviews recent literature pertaining to climate change and environmental impact assessments. The concept of climate change is elaborated upon through an existing knowledge base from both national and international literature. Consideration of a wide range of literature has helped to contextualise the researcher's initial knowledge base, which gave rise to the questions asked in this research project.
4. Case study and data analysis	Key results from the literature review and the data collected are discussed and presented to answer research questions. This chapter is the core of the report, in which the results and analysis of the consideration of climate change risks and opportunities in EIAs for housing development in Gauteng's two metropolitan areas are presented and interpreted.
5. Conclusions and recommendations	Key lessons and findings from the research results are captured and recommendations are made. Overall conclusions are drawn and recommendations for further research are made.

CHAPTER 1

INTRODUCTION

This chapter sets the research scene and consist of the following introductory sections:

Section 1.1 is the background to the research topic, section 1.2 outlines the research questions, section 1.3 describes the departure point through making a problem statement, and section 1.4 identifies the objective which the research seeks to achieve.

1.1 Background

The IPCC (2000b) emphasised that climate change should be considered to be amongst the most serious threats to global sustainable development, with adverse impacts expected on food and water security, human health, economic and physical infrastructure and natural resources. These impacts will seriously undermine efforts to achieve sustainable development and the Millennium Development Goals (MDGs), particularly in developing countries, which are the most vulnerable and the least well equipped to deal with climate change (EuropeAid, 2009). Conversely, addressing climate change by limiting the emission of GHGs and building resilient communities could significantly contribute to achieving a sustainable society.

The South African government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and acceded to the Kyoto Protocol in July 2002 (DEA, 2011a). South Africa (SA) has also finalized its White Paper on the National Climate Change Response Strategy (NCCRS) in 2004 and approved a white paper on the National Climate Change Response in 2011. These efforts shows commitment towards stabilising global GHG concentrations in the atmosphere and implementing carbon dioxide (CO₂) emission reduction targets in order to meet an internationally agreed global warming limit of a +2°C increase in temperature.

SA is ranked as the 30th largest emitter of GHG globally and one of the largest emitters in Africa (DEAT, 2009a). Currently there are non-binding emission limitation targets, but the SA government has pledged to achieving a 34% reduction of GHG emissions below the business-as-usual trajectory by 2020 and a 42% reduction by 2025 (DEA, 2011b). In order to achieve these targets, SA needs to take drastic and decisive actions in the immediate to

medium-term future. SA's approach to climate change is considered to be primarily needs-driven, customised, developmental, transformational, empowering, participatory, dynamic and evidence-based (DEAT, 2009a). This notion is informed by the fact that SA considers its climate change approach as an on-going response to the perceived changes in the earth's general weather conditions and the increasing temperature of the earth's surface. In the Climate Change Response white paper, SA defines climate change as an on-going trend of changes in the earth's general weather conditions as a result of an average rise in the temperature of the earth's surface often referred to as global warming. The short, broad definition by the UNFCCC (2003) describes climate change as "*the change of the earth's climate due to the harmful effects of human activities*".

In 2005, during the National Climate Change Conference, the SA government acknowledged that climate change was real and that it poses a serious threat to the country's development (DEAT, 2006 & DEAT, 2008). The current white paper, the NCCR, presents the government's vision for an effective climate change response including its intention to transit to a climate-resilient and low-carbon economy. This approach is guided by principles set out in the Constitution of the Republic of South Africa (1996), the Bill of Rights, NEMA, the MDG declaration and the UNFCCC. The SA government, through its white paper entitled the National Climate Change Response (NCCR), acknowledges that mainstreaming climate change considerations into social, economic and environmental policy would play a pivotal role in addressing and achieving its objectives (DEAT, 2004). Given the cross-cutting nature of climate change issues, the SA government further recognises that an effective response strategy requires a national policy to ensure a coordinated, coherent, efficient and effective response.

Although SA has made great strides in the formulation of pledge targets for GHG reduction, legal reform in order to ensure a change in business-as-usual has been lagging behind. For example, the National Environmental Management Act (NEMA), (Act No. 107 of 1998) and its latest Environmental Impact Regulations (2010) are broad and do not make specific provisions for the assessment processes to consider the issue of climate change. Sok *et al* (2011) suggest that EIA is one of the planning, decision-making and management tools for environmental protection through which climate change could be potentially addressed. Du Plessis (2009) attests that EIA is a legislated framework for integrating environmental concerns and sustainability issues during development planning. Sok *et al* (2009) ask what the best way to address climate change through EIA may be. This research's hypothetical answer to the question is that specific climate change-related regulations and guidelines are needed for application throughout each step of the EIA process.

1.2 Research objective and questions

Based on the research title, the objective of this study is to achieve the following:

To establish the extent to which EIAs are being used to consider climate change risks and opportunities within two selected metropolitan municipalities of Gauteng Province.

In order for this research to achieve the above objective, the following research questions were formulated:

1. To what extent does the legal and policy framework for EIAs give guidance on the consideration of climate change issues?
2. How best can climate change issues be considered in the EIA process within a South African context?
3. To what extent do EIAs for housing developments in the Gauteng Province consider climate change risks and opportunities?
4. What are the drivers (opportunities) and barriers (challenges) to improving the consideration of climate change issues in EIAs?

1.3 Problem statement

Gilder and Parramon (2011) allude to the fact that climate change is a global phenomenon which is not adequately addressed by integrated environmental management and more particularly by EIAs in SA from an adaptation and mitigation perspective. It is therefore important that in order to effectively address this challenge; actions on individual, local, national and international levels are required. Sok *et al* (2011) indicate that EIA is the most valuable tool to integrate climate change issues into development assessments. However, it is accepted that there are a number of challenges facing the consideration of climate change in EIAs, one of which is the serious lack of a regulatory framework mandating the compulsory consideration of measures aimed at mitigating the effects of climate change into environmental assessments and to the decisions based on them.

Warburton and Schulze (2006) state that the concern, awareness and interest surrounding climate change phenomena is increasing. Both in the scientific and academic arenas, it has become accepted that climate change is a reality, with the debate now focused on the magnitude and timing of change, the increasing frequency and intensity of extreme events, and the potential impacts of climate change on natural and anthropogenic systems such as the housing development sector in SA. It is for the above reasons that this research topic

was chosen. The rationale for undertaking this research stems from a personal awareness and observation that EIAs are not adequately considering climate change issues. As Gilder and Parramon (2011) state, there is incontrovertible evidence that the current EIA approach does not encompass climate change issues or encompass the broader long-term implications for sustainable development. This is evident since NEMA's EIA Regulations (2010) do not make reference to or specific provisions for the assessment process to consider climate change issues. This is a matter of serious concern particularly since the preceding NEMA EIA draft regulations (2008) had a specific provision on climate change, which was later withdrawn when the same regulations were finalised and promulgated in 2010. SA faces particular challenges with regards to climate change as Benhin (2008) points out that parts of what was already a dry country has become noticeably dryer over the past 30 years. Rising temperatures and changing rainfall patterns, which are attributed to climate change, are having consequences in food production and water supply. Industries and households will have to adapt to these changes by reducing their negative impact on the environment. The Carbon Trust (2008) share the view that businesses and countries do acknowledge that the impact of climate change is global in scope and therefore global solutions must be found, with due considerations of regional and national contexts. Former President Thabo Mbeki (2007) pointed out that "*the South African government understands the urgency of action, and that the costs of doing nothing about climate change far outweigh those of taking concrete steps*". Another political figure and former United Nations Secretary General, Kofi Annan (2001), stated that "*the evidence shows that climate change is occurring and we cannot wait any longer to take action.*"

Climate change, when imposed on existing patterns of human settlement and livelihoods, can bring hardship and social disruption. Reducing the vulnerability of communities and countries to the consequences of climate change needs to be an essential component of both short- and long-term spatial planning and economic and social development strategies. The CERES report (2006) states that given the harrowing statistics and realities that are emerging, developing countries face risks in and opportunities for integrating climate risk immediately into their development paths. Vogel (2011) gives a vivid description of the long-term impacts of climate change on infrastructure and emphasises the need to build infrastructure that can withstand the test of time. Climate change, including climate variability, may bring with it a range of challenges and opportunities for policy makers, urban planners, city managers and civic society. And one such area that is expected to generate particular challenges is the infrastructure sector (Vogel, 2011). Midgley (2013) indicates that disasters relating to climate change cost SA about R3-billion a year, and Africa as a whole bore only 0.6% of economic costs of extreme events. Vogel (2013) warned that Africa, SA

included, needed to prepare itself for more extreme weather events, as between 2000 and 2012 there were 47 disasters of which 37 were linked to environmental factors such as floods, droughts, tropical cyclones and earthquakes. King (2013) stated that infrastructure should not be designed to be fail safe...but to fail safely in the wake of changing climate.

Taviv *et al* (2007) support the notion that SA has made a conscious effort to move towards a green economy as part of the country's long-term plan to grow the economy while mitigating the impacts of climate change. SA is committed to a low carbon growth path over the long term, which is part of the nation's vision to contribute to the global effort to reduce greenhouse gas emissions. The country's green economy growth path addresses economic growth without exposing future generations to environmental risks. Under SA's robust Long-Term Mitigation Strategy (LTMS), it is agreed that emissions would peak between 2020 to 2025, plateau for a decade and then decline in absolute terms from around 2035, as depicted on figure 3-2 (DEAT, 2007a). South Africa is taking concrete actions that will see its carbon emissions 34% lower in 2020 than they would have otherwise been and 43% lower in 2025 (DEAT, 2007b). Of particular concern in SA, the identified national reduction targets are not fully considered in project planning through the EIA process, and therefore the obligation of a 34% reduction by 2020 remains a key challenge if not enforced through project impact assessment.

SA aims to structurally transform its economy from an energy-intensive to a climate-friendly economy as part of a pro-growth, pro-development and pro-jobs strategy (DEAT, 2004). The Medium-Term Strategic Framework (MTSF) guiding government's programme from 2009 to 2014 aims to further explore the concept of "green jobs". Increasing capacity in green technologies and industries that combat the negative impacts of climate change will create new employment opportunities. As reflected in the National Framework for Sustainable Development report, the hi-tech innovations required for green industries will help employment grow over the long term, as new technology spreads throughout the economy and transforms other, larger sectors (SA, 2008).

Golino (2011) argues that the development challenges facing SA are many and varied, and that climate change will have a decided impact on most of them. One of the areas in which climate change presents both a threat and an opportunity is in the housing sector. The rate of urbanisation in SA is high, and the result of increased urbanisation is intensified pressure on land, water and energy systems. This in turn heightens climate emissions and threatens the functionality of infrastructure systems for delivering urban services (Vogel, 2011). The existing stock of low-cost housing is considered inadequate, not only in the quality of the

buildings, but also in the provision of decent shelter that allows for human dignity and learning and earning opportunities. Given the current situation, climate change will make these settlements more vulnerable to its effects and make adaptation and mitigation even more difficult since these settlements were designed and developed without taking the long-term sustainability challenges into account (Golino, 2011). Hence it is important for government to change the nature of low-cost housing developments in view of the climate change and other sustainability challenges.

CHAPTER 2

RESEARCH METHODS

This chapter describes the methodological approach used to gather and present data, thereby creating new understanding and knowledge in order to answer the following research question.

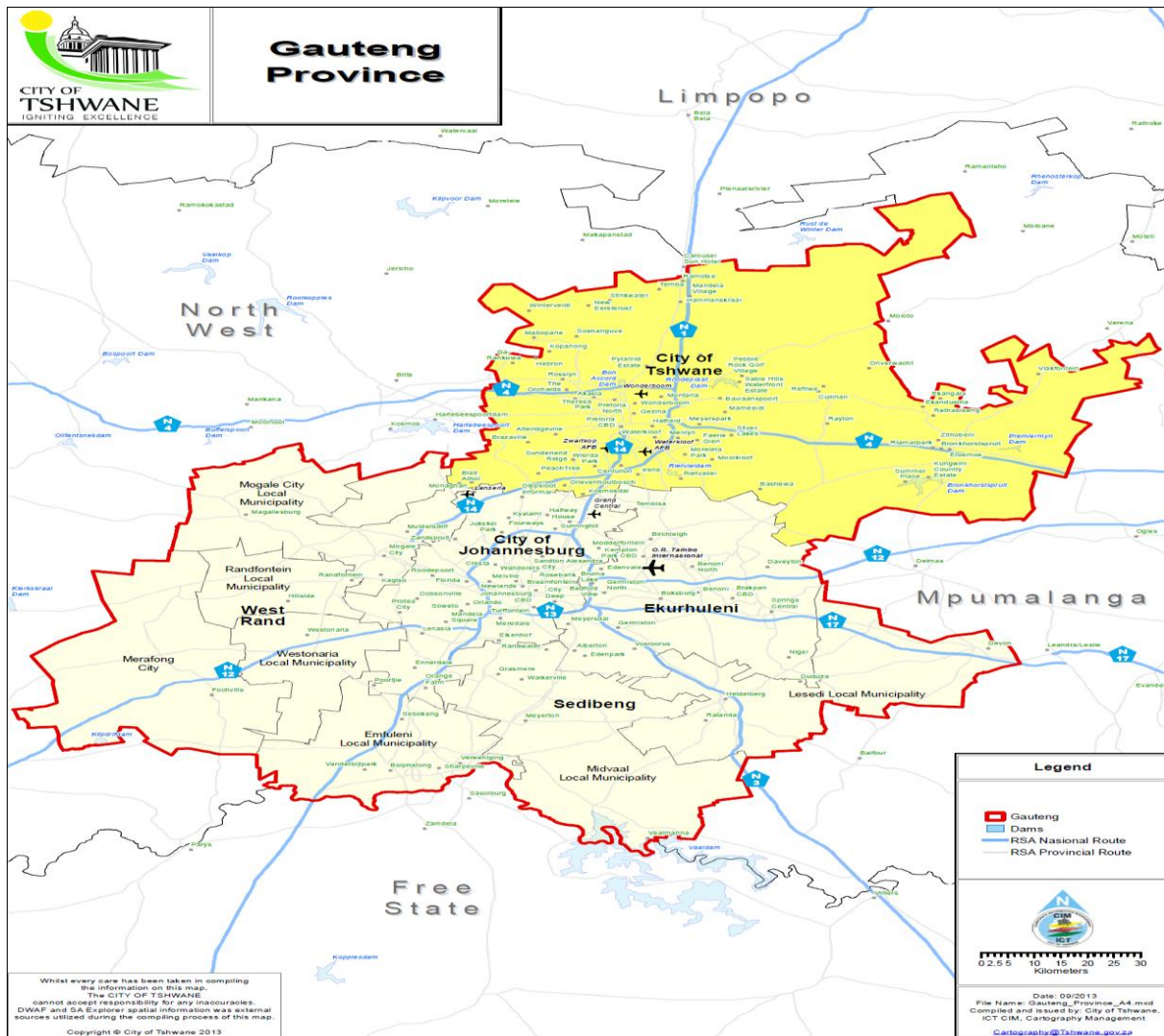
To critically review the consideration climate change risks and opportunities in Environmental Impact Assessments within two selected metropolitan municipalities of Gauteng Province.

Adopted from Goddard and Mellville (2001), a multi-approach research design (combining qualitative, explorative and contextual approaches) was adopted in conducting this research. The key element was the investigation of the existing state of affairs through comparative and correlational survey methods as described by Leedy (1985). The use of various research methodologies enhances the strength of the investigation and allows for more data analysis, as opposed to more focussed methods, as argued by Creswell (2003).

2.1 Study area

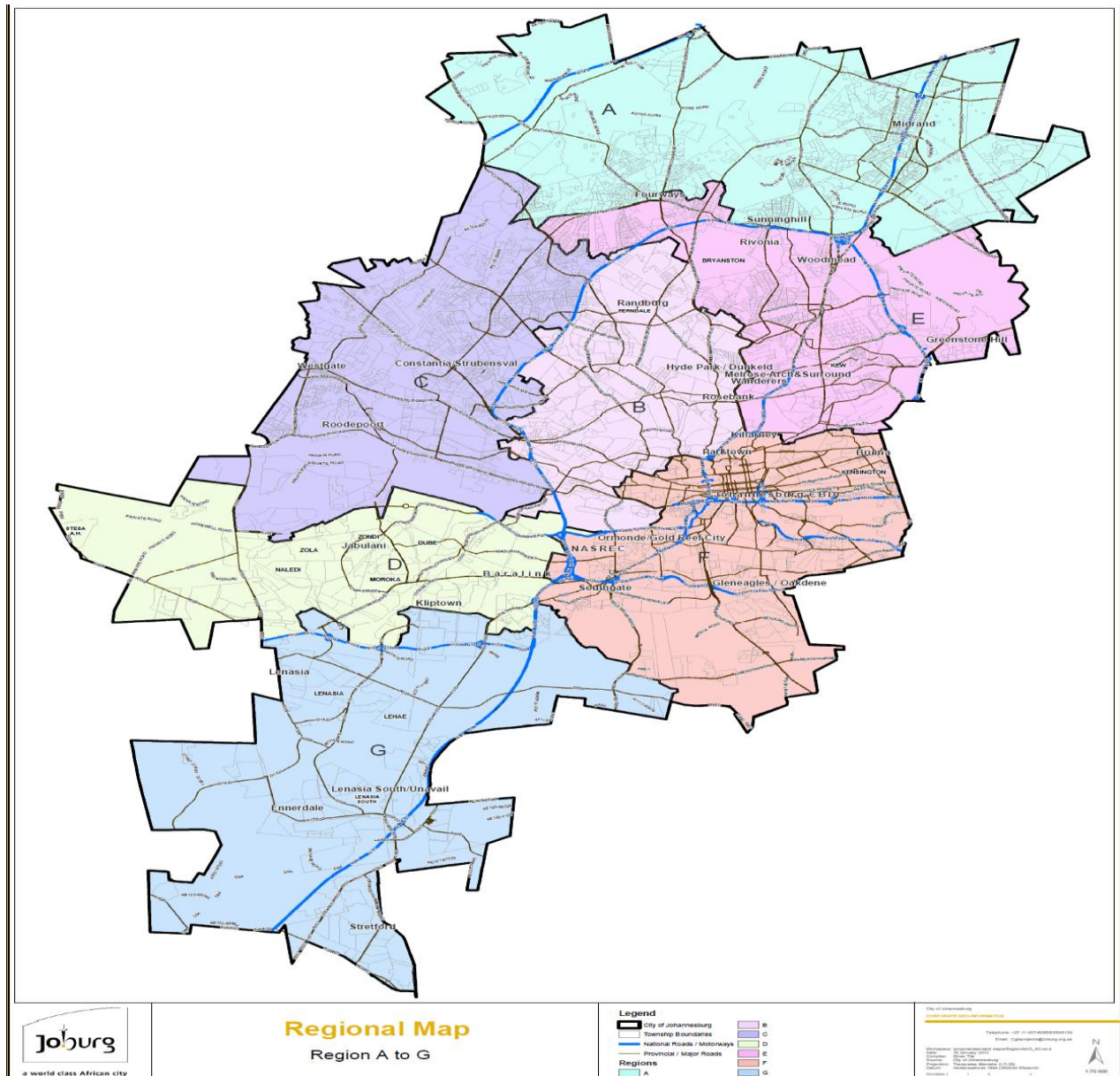
The study location is the Gauteng Province, and the focus areas are the two biggest metropolitan municipalities, namely the City of Tshwane (CTMM) and the City of Johannesburg (CJMM - refer to Figure 1). Gauteng has five local government areas, namely the three populous metropolitan areas of Johannesburg, Tshwane and Ekurhuleni, and two district municipalities, Sedibeng and West Rand Districts (GDARD, 2011). It should be noted that no comparison was done to compare case studies for these two selected municipalities.

Figure 2-1: Map showing CJMM and CTMM within the Gauteng Province (source: CTMM, 2012 – www.tshwane.gov.za)



According to Statistics South Africa in their 2011 Census, the CJMM covers an area of 1 645km² with an estimated population of 4 434 827. Johannesburg is the largest city in South Africa and remains the largest urban complex in the country with highest a urbanisation rate. Johannesburg is the biggest contributor to the Province in terms of its Gross Domestic Product (GDP). There are more than 1 434 856 households (of which 81.4% are formal dwellings) with a population density of 2696 persons per km², and a population growth is 3.18% per annum. The major towns within the CJMM include Alexandra, Diepkloof, Diepsloot, Ennerdale, Johannesburg, Johannesburg South, Lenasia, Meadowlands, Orange Farm, Randburg, Roodepoort, Sandton, Rivonia, Midrand and others (Statistics SA, 2013).

Figure 2-2: Map showing CJMM showing its main seven regions (source: City of Johannesburg Board, 2012 – www.joburg.org.za)



CTMM is the largest municipality in terms of the land mass and includes Tshwane (Pretoria), which is the capital city of South Africa. Tshwane is now the largest metropolitan area in Africa and the third largest in the world after New York and Yokohama/Tokyo. There are more than 911 536 households (of which 80.7% are formal dwellings) with a population density of 464 persons per km², and population growth is 3.10% per annum (Stats SA, 2011). In terms of the GDP, Tshwane is amongst the six largest metropolitan municipalities in South Africa and the second largest in Gauteng. The CTMM covers 6 368km² and houses approximately 2 921 488 residents (The Local Government Handbook, 2013). Tshwane has the second largest number of embassies in the world after Washington DC in the United

States of America. The major towns found within CTMM include Akasia, Bronkhorspruit, Centurion, Cullinan, Ekangala, Ga-Rankuwa, Hammanskraal, Mabopane, Pretoria, Roodeplaas, Soshanguve, Temba, Winterveldt (Statistics SA, 2013).

Figure 2-3: Map showing CTMM and its 105 wards that exist within its regions (source: Demarcation Board, 2013 – www.demarcation.org.za)

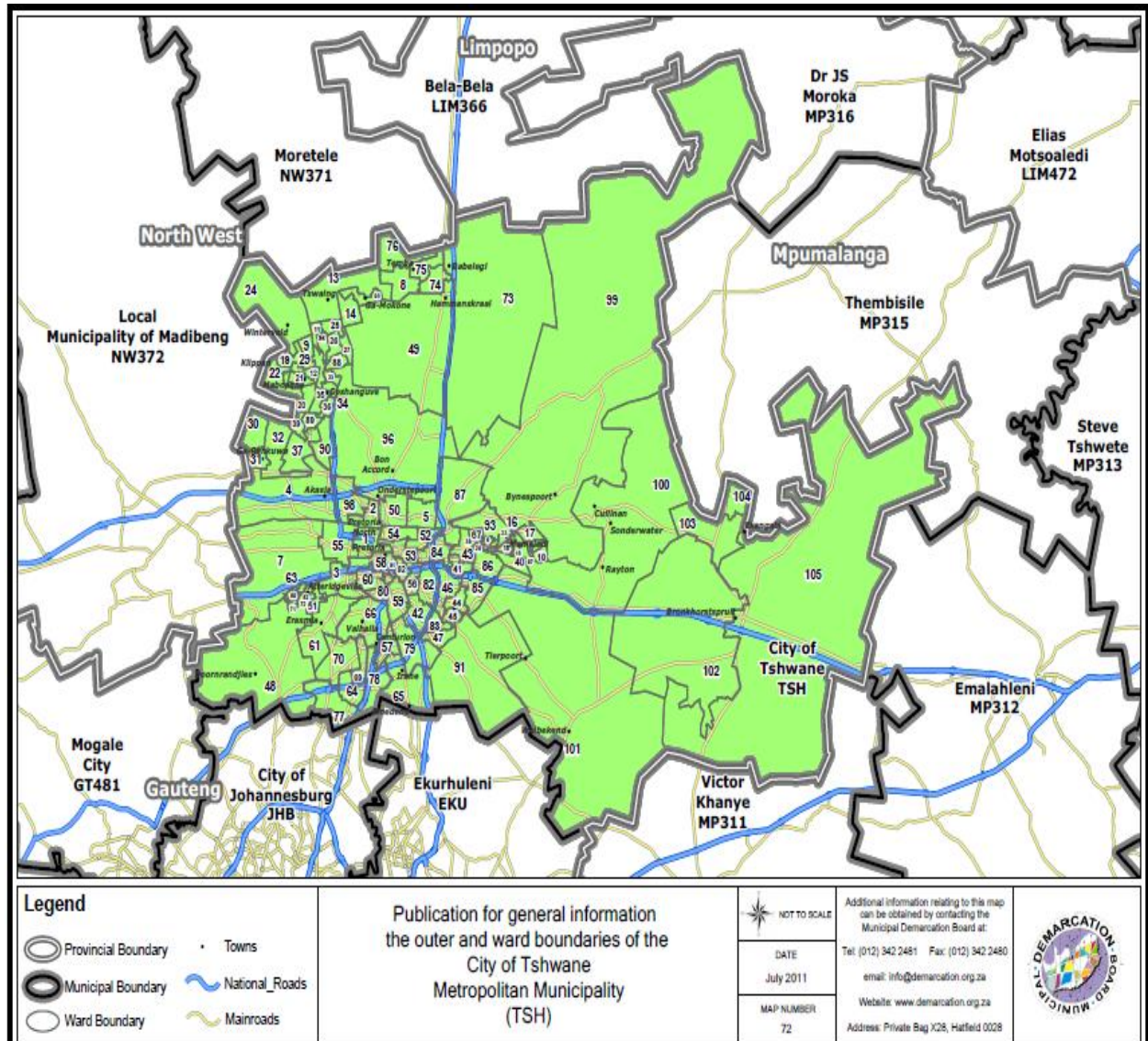


Table 2-1: Summary of the description of the case study municipalities (Source: Stats SA General Household Survey, 2012)

Case No	Municipality	Area size km ² (Province %)	Population million (Province %)	Density (persons/km ²)
1	CJMM	1645 (8.6%)	4 434 827 (35.5%)	2696
2	CTMM	6368 (33.4%)	2 921 488 (23.4%)	464

2.2 Selection of case studies

Case study research is amenable to the use of research strategies that measure the development of the object of study over a period of time using multiple sources of evidence (Woodside, 2010). This particular research project identified twenty case studies relating to EIAs for housing developments, of which ten are from the CJMM and other ten are from the CTMM, and the reports were selected on the basis of the following criteria (Table 2-2):

Table 2-2: Criteria used to determine and select case studies

Criterion No	Criterion requirement	Comments
1	<ul style="list-style-type: none"> The development should be housing-related and within the selected metropolitan areas 	<ul style="list-style-type: none"> Both public and private developments were selected, though no comparison was made between the two (refer to Appendix A).
2	<ul style="list-style-type: none"> The EIA regulation regime should be based on either the 1997, 2006 or 2010 EIA regulations 	<ul style="list-style-type: none"> All EIA reports done under different EIA regulations were considered (refer to Appendix A).
3	<ul style="list-style-type: none"> Access to the relevant reports should be granted by the respective authorities. 	<ul style="list-style-type: none"> Accessibility to the reports from the municipalities was the most determining selection criterion. All case study reports were obtained from the CJMM and CTMM (refer to Appendix A). Due to long internal processes, access to get reports from Provincial and National government departments proved fruitless.
4	<ul style="list-style-type: none"> The reports should be compiled by different environmental consultants. 	<ul style="list-style-type: none"> In order to give variety to and a true reflection of the assessment practice, various reports by different EAPs were considered.
5	<ul style="list-style-type: none"> The reports should be the final reports submitted to the authorities for review. 	<ul style="list-style-type: none"> Only final reports were considered for research sampling in order to ensure that reliable information was analysed.

2.3 Data collection and reviews

Various sources of data were sourced through literature and desktop studies, interviews, questionnaire analysis, and case study document reviews (refer to Table 2-3). However, limitations were also experienced in terms of data collection as noted on Table 2-3. Detailed information is given below on the primary and secondary data collection methods used:

2.3.1 Literature review

Various literature sources were reviewed in order to source the context for the research and in order to fulfil the research objective. This process provided the researcher with information relating to climate change and EIAs around the world and in South Africa in particular. It involved the use of books, journals, and magazines from the North-West University's library and other sources such as newspaper and internet. Government publication materials on climate change and EIAs were used, especially from the Department of Environmental Affairs (DEA) and the Gauteng Department of Agriculture and Rural Development (GDARD). Relevant case studies from other continents and countries were reviewed in order to have a global understanding of the issue beyond SA (refer to table 3-1).

2.3.2 Interviews

One-on-one interviews were conducted with eight government officials (1x National, 2x Provincial, 2x CJMM, 3x CTMM), seven EAPs, and four housing developers. Both structured and semi-structured questions were used during the interviews, which were all conducted between April 2012 and September 2013. Nineteen interviews were completed (refer to Annexure C for designation and roles of the participants). All the participants were asked questions that appear on the questionnaire checklist, and these questions were thoroughly explained to make them clear.

2.3.3 Questionnaires

Questionnaires were developed and administered to members of the public, EAPs, government officials, and housing developers within CJMM and CTMM. The questionnaire had twenty-two questions/lines of enquiry where responses were required (refer to Annexure B). Forty questionnaire forms were distributed but only twenty-two (55%) were completed and returned.

2.3.4 Case study reviews

Twenty case studies for housing development EIA processes were reviewed, ten from each municipality. These consisted of Basic Assessments (BAs), Scoping and Environmental Impact Reports from the two selected municipalities. Other documents reviewed included the Environmental Management Plans (EMPs), Environmental Authorizations (EAs), Specialist reports, Public comments reports, etc. Description of each individual case study is listed under Appendix A.

Table 2-3: Description of data collection methods and sources used

Data collection methodology	Data sources used	Limitations/ constraints of the study
Desktop review	Literature reviews (books, journals, newspaper, internet, and other library materials). Refer to the list of references.	There was a wide variety of international contemporary research on climate change but very limited material in the SA context.
Field interviews	One-on-one interviews with EIA practitioners, developers, and authorities. Refer to Appendix C for the interview schedule	Fear of revealing company information; Unavailability of interviewees during scheduled times; time consuming; lack of supporting evidence/data for the issues raised.
Questionnaire	A structured questionnaire was distributed to various people (authorities, consultants, and developers). Refer to Appendix B for the research questionnaire.	Poor return of questionnaires. Incorrect completion of the questionnaires.
Document Reviews	The following documents were reviewed: EMPs, EAs, Specialist studies, public participation/ comments, BAs, and Scoping reports. Refer to Appendix A	Qualitative reviews are time consuming.

2.4 Data analysis and presentation

As elaborated in Kothari (1985), all the collected data was analysed and used to synthesize and validate the findings from the literature review. Qualitative content analysis was used to extract meaning from the interview and questionnaire responses. The data obtained was analysed using a variety of data analysis techniques. New insights, problems, and information emerged as the result of this analysis.

2.4.1 Evaluation criteria

The following lists of criteria were used to determine the extent of the consideration of climate change in the relevant EIA documents. As per IEMA (2010) the lines of enquiry (the questions) were designed around five critical components of the EIA process where climate change issues could be considered, namely: scoping, public participation, assessment, significance ratings and mitigation. The evaluation criteria used are justified by the debates provided in existing literature, as outlined on Table 2-4. In order to satisfy the research objective, questions were asked with respect to both the CJMM and CTMM case studies on an individual basis, so that the findings of each case study could be understood better. The relevance of these evaluation criteria to the current legal and policy framework is discussed in more detail in Chapter 3.

Table 2-4: List of evaluation questions and justification used

Review criteria (RC)	Phase in the EIA process	Criterion question	Justification
RC1	<ul style="list-style-type: none"> Scoping 	<ul style="list-style-type: none"> Were the impacts (risks and opportunities) associated with climate change considered during scoping? 	<ul style="list-style-type: none"> During scoping, climate change mitigation and adaptation issues and opportunities should be considered alongside one another to maximise their consideration in project design. Gilder et al. (2008) make the recommendation that when considering climate change on the agenda of EIAs, the following should be noted: <ul style="list-style-type: none"> — <i>“EAPs should include climate change in the process, assessments and documentation;</i> — <i>Identify activities that could have a significant impact on climate change or indicate geographical areas that are sensitive; and</i> — <i>Ensure integrated environmental management and other statutory</i>

			<i>requirements/ guidelines regarding climate change are taken into consideration”.</i>
RC2	<ul style="list-style-type: none"> Public participation 	<ul style="list-style-type: none"> Have stakeholders raised the need to consider climate changes in EIAs during the public participation process? 	<ul style="list-style-type: none"> According to Sok <i>et al</i> (2011) local knowledge on climate change issues should be incorporated in the EIA process. IEMA supports and promotes high standards, effective action, best practice and the sharing of experiences on climate change issues during public participation (IEMA, 2013)
RC3	<ul style="list-style-type: none"> Assessment 	<ul style="list-style-type: none"> Was climate variability included in the assessment of the potential impacts? 	<ul style="list-style-type: none"> IEMA (2010) contend that climate change adaptation will act as a major policy driver for the foreseeable future due to the risk and opportunities than requires adequate assessment. When developing the baseline, each receptor’s capacity to resist and/or recover from existing climate variations should be considered. National DEA requires the assessment of cumulative impacts as per NEMA requirements, and as argued by Braklacich (2008) this includes climate change matters.
RC4	<ul style="list-style-type: none"> Significance rating 	<ul style="list-style-type: none"> Are identified climate change-related impacts thoroughly evaluated in terms of their significance? 	<ul style="list-style-type: none"> Based on the identified climate change issues, an evaluation of the significance of these risks and opportunities should be performed. Where the EIA identified the impacts likely to be generated as a consequence of predicted changes in the climate, their significance should also be evaluated (IEMA, 2013). Byer and Yeomans (2007) have explored several methods that may be applied to undertake such evaluation.
RC5	<ul style="list-style-type: none"> Mitigation 	<ul style="list-style-type: none"> Does the EMP include information on the measures that need to be taken to ensure the project’s own resilience to climate change? 	<ul style="list-style-type: none"> EIA mitigation, compensation, enhancement and monitoring related to a project’s predicted in-combination impacts with climate change should be set out in a draft EMP (Personal Communication, 2012a). The draft EMP should be part of the Environmental Specifications and should include information on the measures that need to be considered to ensure the project’s own resilience to climate change is delivered (Personal Communication, 2012b). As stated in the NCCRS (2004), these strategies should aim at reducing the amount of GHGs emissions.

2.4.2 Scoring criteria for consideration of climate change issues

To help with the systematic review and uniform evaluation of the selected case studies, the following scoring system is adopted. This consists of the scoring levels against which a particular criterion is reviewed against.

Table 2-5: Scoring criteria to determine the level of consideration of climate change into EIAs (Source: adapted from Retief, *et al*, 2011).

Scoring level	Definition	Justification and application
A	Considered	Climate change risks and/ or opportunities are completely and clearly referred to and directly addressed.
B	Generally considered	Climate change risks and/ or opportunities are considered to a limited extent and are at times generally referred to and/or indirectly/ somewhat addressed.
C	Not considered	Climate change risks and/ or opportunities are not identified or considered at all.

CHAPTER 3

LITERATURE REVIEW

This chapter reviews contemporary literature pertaining to the research topic, to gain a broad overview of the concepts of climate change and EIA. It further explores the legal and policy framework and the existing literature relating to the consideration of climate change issues (risks and opportunities) in EIA processes. The chapter aims to answer the following research sub-questions:

- To what extent does the legal and policy framework for EIAs require the consideration of climate change issues?
- How best can climate change issues be considered in the EIA process in the South African context?
- What are the drivers (opportunities) and barriers (challenges) to improving the consideration of climate changes issues in EIAs?

3.1 Understanding the climate change concept

To understand the definition of climate change, the International Panel of Climate Change (IPCC) (2001, 2007a) have defined it as the increase in the average temperature of the earth's atmosphere, which will cause changes in local climate patterns and sea-level rise worldwide. As stated earlier in the introductory chapter, the UNFCCC (2006a) attributes climate change directly or indirectly to human activities that have altered the composition of the atmosphere. In 2007 Lehman Brothers commissioned a report that concurs with the fact that this change is in addition to the natural climate variability that has been observed over the comparable time periods. The IPCC further states that the earth's average temperature has increased by about 0.74°C over the last century. The current century's rate of warming has been faster than any global temperature changes estimated for the past 10,000 years (WRI, 2006). A broad consensus of scientists has agreed with "very high confidence" that the recent, rapid warming is caused by human activities and that its impacts are already being seen (WRI, 2006). Human activities such as the burning of fossil fuel and other human activities produce greenhouse gases such as carbon dioxide that trap heat in the earth's atmosphere. It is predicted that the continuation of these activities will result in a 1.8° to 4°C average temperature increase over the next century (IPCC, 2007b).

In 2006 the World Meteorological Organisation (WMO) declared 2005 to have been the warmest year on record since scientific observations of temperature began more than some 140 years ago. Up until 2005, the second warmest year on record had been 1998, when the average global surface temperature was 0.55°C above the annual average for 1961 - 1990 (which is the WMO's standard period to represent present climate), with 2002 the third warmest year on record, when surface temperatures averaged 0.48°C above the same thirty-year mean. Up until 2005, 2001 had been the fourth, 2004 the fifth and 1995 the sixth warmest years on record (UNFCCC, 2006b).

There is increasing evidence that the rapid warming which is occurring is due to human activities having been superimposed on natural variations (IPCC, 1995). Incoming solar radiation heats the earth's land and ocean surface, which then emits long-wave radiation into the atmosphere. Some of this radiation is absorbed by water vapour and greenhouse gases, and is then either reflected and/or partially re-radiated back toward the earth's surface. Thus, atmospheric water vapour (including clouds) and greenhouse gases act like a partial "blanket" for long-wave radiation, thereby warming the atmosphere. This natural process, termed the greenhouse effect, has warmed the atmosphere for centuries, thus making the earth a habitable planet (IPCC, 2000a). Through human activities the concentrations of greenhouse gases in the atmosphere have increased, leading to an enhanced greenhouse effect, through which a larger proportion of long-wave radiation than before is reflected and re-radiated back to the earth. As defined by the IPCC (2001), these greenhouse gases are made up mainly of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

In Africa and South Africa in particular, various researchers predict that climate change will result in increased temperatures and rising sea levels, and will also alter rainfall patterns and seasons. These changes will threaten the availability of water, agricultural production, health, biodiversity, and infrastructure (EThekwini, 2006). The CERES report (2006) indicated that the effect of climate change increases the likelihood of extreme weather events such as droughts, floods and heat waves. Despite these threats, SA plays a significant role in causing climate change as the country is ranked number fourteen in terms of national carbon dioxide emissions worldwide and produces more greenhouse gases than the rest of Sub-Saharan Africa combined (WRI, 2006). As affirmed by the UNFCCC (2006a), the only way to address and effectively respond to climate change phenomenon is through adaptation and mitigation strategies. GDARD (2012) further acknowledged that an effective action plan should focus on climate change responses that make strong contributions to either or both mitigation and adaptation. These two concepts are discussed later in the Chapter.

According to DEAT (2009a), if nothing is done about climate change and we continue, among other things, to burn fossil fuels and chop down our forests at current rates, the following is predicted for South Africa:

- South Africa's coastal regions will warm by around 1-2°C by about 2050 and around 3-4°C by about 2100. The interior regions will warm by around 3-4°C by about 2050 and around 6-7°C by about 2100;
- There will be significant changes in rainfall patterns and this, coupled with increased evaporation, will result in significant changes in respect of water availability, e.g. the western side of the country is likely to experience significant reductions in the flow of streams in the region;
- Our biodiversity will be severely impacted, especially the grasslands, fynbos and Karoo succulents, where a high level of extinction is predicted;
- Small-scale and homestead farmers in dry lands are most vulnerable to climate change and although intensive irrigation agriculture is better off than the latter farmers, irrigated lands remain vulnerable to reductions in available water (Warburton and Schulze, 2006);
- Some predictions suggest that maize production in summer rainfall areas and fruit and cereal production in winter rainfall areas may be badly affected;
- Commercial forestry is vulnerable to an increased frequency of wildfires and changes in available water in south-western regions (Warburton and Schulze, 2006);
- Rangelands are vulnerable to bush encroachment, which reduces grazing lands;
- Alien invasive plant species are likely to spread more and have an ever-increasing negative impact on water resources;
- Because of our already poor health profile, South Africans are specifically vulnerable to new or exacerbated health threats resulting from climate change. For example, some impacts of climate change may already be occurring due to changes in rainfall (droughts and floods) and temperature extremes. Cholera outbreaks have been associated with extreme weather events, especially in poor, high density settlements;
- There will be an increase in the frequency and severity of extreme weather events. The costs of damage caused by extreme weather-related events (flooding, fire, storms and drought) have already been conservatively estimated at being roughly 1 billion rand per year between 2000 and 2009.

3.2 Understanding the EIA concept

According to Cashmore *et al.* (2004), the practice of requiring EIAs originated in the U.S. under the US National Environmental Policy Act (NEPA) of 1969 in an effort to drive and regulate both developmental and sustainability issues. In SA there is a proud history of EIA dating back as far as the mid-1970s, when it was non-mandatory. It became a statutory requirement only in 1997 (CSIR, 2006b). Because of a growing international environmental awareness, together with the considerable progress made with the legislative requirements pertaining to the consideration of the environment in development and decision making over recent years, EIA in SA is becoming a more common and recognized concept. Extensive research has been done on the effectiveness of EIA, with overwhelming focus on procedural criterion according to Cashmore *et al.* (2004). Hence the emphasis here on whether or not it considers and addresses current sustainability challenges such as climate change risks and opportunities.

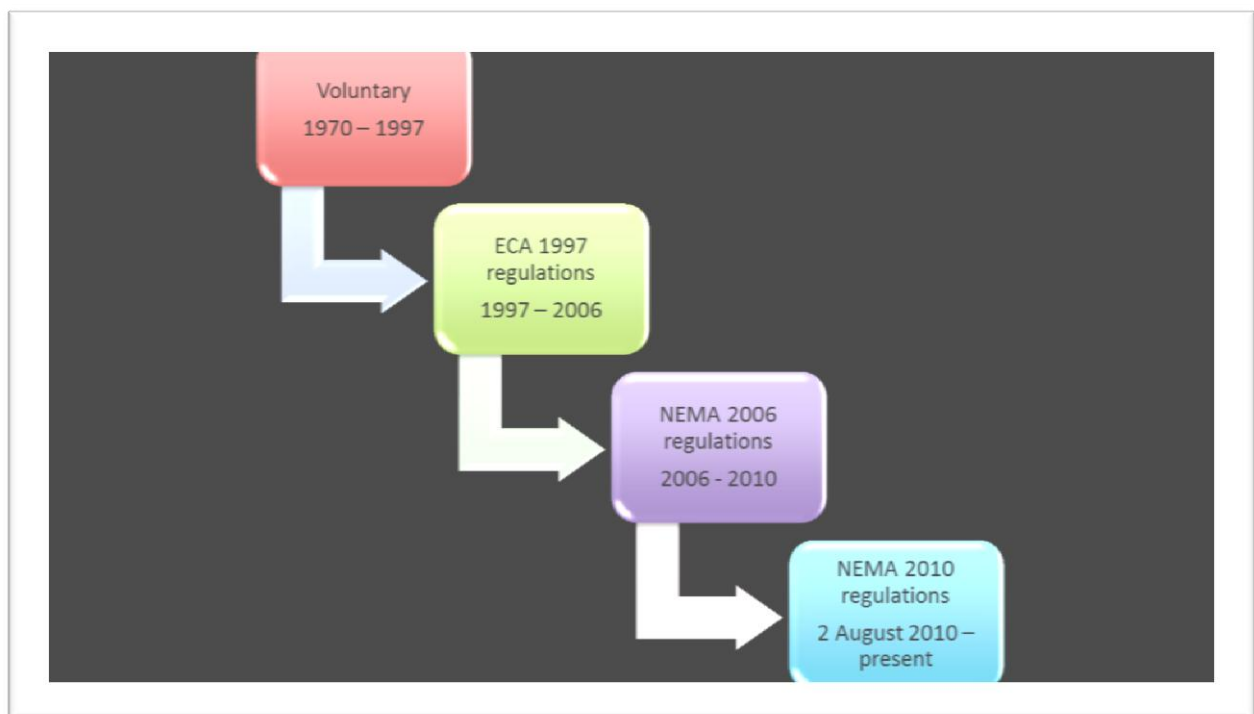
A lot of time, effort, and resources have gone into the establishment of SA environmental legislation, resulting in the birth of an entire industry revolving around certain legislative requirements that need to be met by any proponent before being able to initiate development within the ambit of certain listed activities (Byer & Yeomans, 2007). The rapid growth of what can be referred to as the “*environmental industry*” is so substantial that the global establishment of EIA as a possible result of NEPA is referred to by Cashmore *et al.* (2004) as “*one of the most influential policy innovations of the 20th century*”. In the SA context, the NEMA is the core environmental framework legislation, and helps determine the role of the various spheres of government in relation to environmental governance (DEAT, 2000). The requirement of the performance of EIAs can be seen as a factor that could contribute exponentially towards sustainable development (Sok *et al.*, 2011), and in terms of which various supportive measures have been identified i.e. the South African sustainable development objectives (DEAT, 2006).

As mentioned previously, the practice of environmental assessment in South Africa dates back to the 1970s when it was voluntarily undertaken (refer to Figure 3.1). The Environment Conservation Act (Act 73 of 1989) which was repealed (by NEMA) in 1998 was the first guiding legal framework that governed the EIA process. Caleb (2008) states that prior to its promulgation there was little or no regulation with regards to EIA. This can be partially due to the fact that no formal procedures, methods or listed activities were captured in legislation and that no administrative systems were put in place to deal with EIAs within government

(Duthie, 2001). The promulgation of the 1997 ECA EIA Regulations R1182, R1183 and R1184, was a landmark, as this marked the first step taken towards formal environmental governance as well as integrated environmental management.

Today we see a much more integrated form of environmental governance in the form of the NEMA. Government Notice R543 (2010) defines an environmental impact assessment as “a systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes basic assessment, scoping, and environmental impact reports”. Thus environmental assessment can be defined as the assessment of the impact of any activities on the environment (DEAT, 2009b). Curtis (2005) further emphasises that the EIA process can be broadly defined as the investigations carried out to identify, predict, evaluate and mitigate the biophysical, social, and other relevant impacts of proposed developments prior to major decisions being taken.

Figure 3-1: Schematic illustration of how environmental assessment evolved in South Africa.



In SA, the EIA process is integrative and holistic; addressing social, economic, and environmental or ecological issues concurrently. Such an approach has its own complications and strengths (CSIR, 2006a). The EIA process is very much a planning tool designed to integrate environmental, economic and social factors into the decision-making

process. It follows that if the EIA process is to be effective as a planning tool, it must be introduced in a timely and efficient manner to the decision-making schedule.

Sok *et al* (2011) believe that it is clear that EIA can and should play a role in addressing climate change, as international climate change agreements indicate. For example, recommendations addressing climate change issues during EIA are described in the United Nations 1992 Framework on Climate Change Convention 1, as well as in the 1997 Kyoto Protocol. Both place a requirement on the contracting parties to take into account and minimise the adverse effects of climate change by reducing greenhouse gas (GHG) emissions, and by promoting adaptation responses to climate change effects on EIA projects, the economy, human health and the environment, thereby implying that EIA should play an important role (Bracklacich, 2008). However, the details of exactly how EIA might or should account for climate change, especially at the individual project level, are not specified in these international agreements. In the SA context, the NEMA EIA Regulations (2010) do not provide any direct reference to climate change, which places SA clearly a step behind other countries all over the world, as will be indicated in section 3.3.

3.3 Legal and policy frameworks relating to climate change

In view of the UNFCCC's advisory on taking climate change considerations into policy frameworks, most countries around the world, and the international community as a whole, are now putting formal policies in place.

3.3.1 International Action

International law can be defined as the body of rules and principles which is binding upon states, and that governs their relationship with one another (Owen, 2008). At an international level, governments from around the world have been meeting to discuss the problem of climate change since the early 1990s. These discussions have raised global awareness about climate change, increased the performance of research on its causes, and established some mechanisms that encourage nations to reduce GHG emissions (Agrawala, *et al.* 2008). While international action to promote adaptation activities has been discussed, no system for implementing this has been established (Acclimatise and Synergy, 2008). As international negotiations and policies provide frameworks for action on a national level, some key international agreements and institutions are described below.

a) United Nations Framework Convention on Climate Change

The UNFCCC was established and adopted to address the challenges of climate change by the United Nations in 1992 at the Rio Earth Summit, and since then 189 nations have signed the convention, including South Africa, which signed during 1993 and ratified in 1997. The UNFCCC is the principal legal framework governing the international community's response to climate change, and aims to direct nations to achieve the following (UNFCCC, 2003):

- Acknowledge that climate change is occurring and is influenced by human activity.
- Produce and publish national GHG emissions inventories that assess contributions from industrial and agricultural sectors, transportation, energy production, and forest losses and growth within their borders.
- Promote sustainable development that reduces emissions of GHGs.
- Agree to meet regularly to discuss and cooperate around climate change mitigation, adaptation, technology transfer and research.

b) Intergovernmental Panel on Climate Change (IPCC)

The IPCC is a panel of hundreds of scientists from all over the world created by the United Nations Environmental Programme (UNEP, 2011) and World Meteorological Organization (WMO) in 1988. It was tasked by the UNFCCC to compile and review current studies related to climate change. The IPCC publishes updates on the scientific knowledge regarding climate change causes, future impacts, and mitigation and adaptation measures to inform policy makers. So far four of these have been published: 1990, 1995, 2001, and 2007. The IPCC also publishes special reports to go into further detail on key issues, such as methodologies and best practice for conducting emissions inventories or land-use land-cover change assessments, promoting technology transfer, or measuring the impacts of climate change (IPCC, 2007b).

c) Kyoto Protocol

South Africa is a party to the UNFCCC as well as the Kyoto Protocol to the United Nations Framework Convention on Climate Change. The Kyoto Protocol was drafted by the United Nations in 1997 to provide a "*global action plan*" to implement GHG reduction activities recommended by the UNFCCC. The Protocol is a treaty that contains certain obligations and principles that are binding on South Africa and that govern the international community's

climate change response. South Africa ratified the Kyoto Protocol on 31 July 2002, and it came into effect on 14 February 2005.

Over 168 nations have ratified (officially agreed to implement) the Kyoto Protocol, 35 of which are Annex I industrialized nations that must reduce their emissions. The protocol has entered into force, meaning that member nations are held responsible for their reduction commitments (UNFCCC, 2006b). The United States, which produces over 20% of global anthropogenic GHG releases (WRI, 2006), has not ratified and is not implementing the Kyoto Protocol at a national level. However, several city and state governments, such as the state of California, are proposing legislation to limit the GHG emissions in areas under their jurisdiction. At the 17th Conference of Parties (COP) of the United Nations Framework Convention on Climate Change and the 7th Meeting of Parties to the Kyoto Protocol (CMP7) held in Durban, South Africa in 2011, President Jacob Zuma articulated that a determination must be made on the second commitment period of the Kyoto Protocol. This means that clarity is needed on how to ensure a fair and comparable contribution by non-Kyoto Parties.

The Kyoto Protocol commits developed nations and countries in transition to achieving quantified reductions in greenhouse gas emissions by at least 5% below 1990 levels in the commitment period 2008 – 2012. South Africa entered into acceptance of the Kyoto Protocol in 2002. As a developing country, South Africa is not required to reduce its greenhouse gas emissions. However, its economy is highly dependent on fossil fuels and the country is a significant emitter in terms of emission intensity and emissions per capita. One objective of the Kyoto Protocol is the promotion of sustainable development by implementing policies and measures such as the protection of sinks and reservoirs of greenhouse gases (e.g. the promotion of sustainable forest management practices, afforestation and reforestation), the promotion of sustainable agriculture, the advancement of environmentally sound technologies, and investigations into carbon sequestration technologies (Warburton & Schulze, 2006). As a signatory to the Kyoto Protocol, South Africa has certain obligations which have been incorporated into the NCCRS.

3.3.2 SA legislation and policies

South Africa, like many other developing countries in the world, is concerned about the protection of the environment and associated climate change impacts. Hence, a number of legislation and relevant policies have been and are still being formulated to address key issues relating to sustainable development and climate change, as discussed under table 3-4. As indicated in Table 2-4, the current SA legal and policy framework provides a base

within which key components of the EIA process can be used to consider and address climate change issues. Table 3-4 provides relevant legal framework that could or support the consideration of climate change in EIA process.

Table 3-1: Summary of relevant legal frameworks that may be used to address climate change issues

Legislation/Policy	Applicable provision for climate change consideration	Relevance to EIA considering climate change issues
<p>Constitution of the Republic of South Africa, 1996</p>	<p>Everyone has the constitutional right to an environment that is not harmful to their health or well-being. In terms of section 24 of the constitution, everyone has the right -</p> <p><i>(a) to an environment that is not harmful to their health or well-being; and</i></p> <p><i>(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -</i></p> <p><i>(i) prevent pollution and ecological degradation;</i></p> <p><i>(ii) promote conservation; and</i></p> <p><i>(iii) secure the ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</i></p>	<p>The Constitution is the supreme law of the Republic of South Africa. The Constitution presents an overarching obligation to sustainable environmental management, which requires that local government provide services in a sustainable manner, provide a safe and healthy environment for all communities, promote social and economic development, and ensure transparent governance. Du Plessis (2009) affirms that section 24 of the Constitution establishes an enforceable environmental right that should be pursued by everyone to reconcile the need for development versus the need for environmental protection.</p>
<p>National Environmental Management Act 107 of 1998</p>	<p>NEMA can be seen as the overarching act governing environmental management, as well as environmental assessments in South Africa. The main objective of the NEMA is <i>“to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, to provide for institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; and to provide for matters connected therewith”</i>. NEMA principles are and other key sections are discussed below:</p> <p>Section 2(2) requires that environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably. Section 2(3) further states that development must be socially, environmentally and economically sustainable.</p>	<p>NEMA section 2 identifies and promotes consideration of issues at a macro level, which should also assist when making decisions at a project/programme/policy level.</p>

	<p>Section 23(b) identifies, predicts and evaluates the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimizing negative impacts, maximizing benefits, and promoting compliance with the principles of environmental management set out in section 2.</p>	<p>This allows for consideration of all possible impacts/risks associated with a development or programme.</p>
	<p>Section 2(4)(a) requires the consideration of all relevant factors including the following: (vii) that a risk-averse and cautious approach to sustainable development is adopted, taking into account the limits of current knowledge about the consequences of decisions and actions.</p> <p>Section 2(4)(i) requires that consideration be given to the social, economic and environmental impacts of activities, including disadvantages and benefits, that these be, assessed and evaluated, and that decisions must be appropriate in the light of such consideration and assessment.</p>	<p>A risk-averse and cautious approach should encompass climate change-related phenomena.</p>
	<p>Section 31 has to do with access to environmental information and the protection of whistleblowers. Section 31(1)(a) states that every person is entitled to have access to information held by the State and organs of state which relates to the implementation of this Act and any other law affecting the environment, and to the state of the environment and actual and future threats to the environment, including any emissions to water, air or soil and the production, handling, transportation, treatment, storage and disposal of hazardous waste and substances.</p>	<p>Current and future threats to the environment and to people could refer to floods and natural phenomena like earthquakes, which are partly attributable to climate change.</p>
	<p>Section 28 deals with the duty of care and the remediation of environmental damage. Section 28(1) requires that every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the environment.</p>	<p>Pollution of the environment can emanate from significant emissions of greenhouse gases which in turn affects the air quality and eventual contributed to climate change.</p>

	Section 2(4)(o) states that the environment is held in public trust for the people, that the beneficial use of environmental resources must serve the public interest, and that the environment must be protected as the people's common heritage.	Climate change is one of the biggest environmental threat to the current and future generations, hence should be planned and mitigated during current development planning.
	Section 23(d) requires that adequate and appropriate opportunities be provided for public participation in decisions that may affect the environment. The policy of an organization should reflect its commitment to care about the surrounding environment and the willingness to remedy any damage caused the Section 28 duty of care, and the responsibility of the remediation of environmental damage. The environmental policy should be institutionalised by integrating its standards strategically and operationally by means of an effective environmental management programme/system.	The involvement of all stakeholders is critical in the environmental assessment process, as they might raise issues relating to climate change. A current and future threat to the environment or to people could have to do with floods and natural phenomena like earthquakes, which are partly attributable to climate change.
NEMA EIA Regulations (2010) & its companion Guideline (No. 805 of 2012)	Regulation 26-27 requires the Scoping and EIR (Environmental Impact Report) to identify: <ul style="list-style-type: none"> • <i>“the potential environmental impacts of the proposed activity, including cumulative impacts and</i> • <i>Alternatives to the propose activity that are feasible and reasonable, including advantages and disadvantages that the proposed activity or the alternatives may have on the environment and the community that may be affected; and</i> • <i>Applicable legislation, policies and guidelines”.</i> The EIA report must comply with regulations 31(2) which requires inclusion of the following: <ul style="list-style-type: none"> • <i>“a description and comparative assessment of all alternatives identified;</i> • <i>A description of all environmental issues identified as well as significance of each and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures; and</i> • <i>A draft environmental management programme”.</i> 	The Regulations are very explicit in the sense that they require all potential environmental impacts including cumulative to be identified and assessed. Release of GHG has cumulative effects on regional and global climate change. For example alternative sources of energy should be explored and compared in relation to mitigation and reduction of the GHG emissions. SA has a white policy on climate change response, and the Regulations encourages that relevant policies should be identified as part of the Scoping and EIR.

<p>National Environmental Management: Air Quality Act 39 of 2004</p>	<p>It is acknowledged in the preamble of the Act that the quality of ambient air in many areas of the Republic is not conducive to a healthy environment for the people living in those areas let alone to promoting their social and economic advancement.</p>	<p>Apart from NEMA as the framework legislation, South African's response to climate change is also equally regulated by the National Environmental Management: Air Quality Act (NEMAQA) 39 of 2004, as the sectorial environmental legislation governing air quality and emission of GHG into the atmosphere. This role stems from the fact that climate change is largely driven by and attributed to poor air quality, and the decision that this should be part of the EIA process. An EIA application for an atmospheric licence requires an identification and assessment of the emission sources and how they will be monitored. This piece of legislation gives guidance to and consideration of climate change issues as caused by various emission sources which should be measured and monitored.</p>
<p>National Water Act 36 of 1998</p>	<p>Sustainability and equity are identified in Chapter 1 as central guiding principles in the protection, use, development, conservation, management and control of water resources.</p>	<p>In response to the National Water Act, the then Department of Water Affairs and Forestry (DWAF) developed a National Water Resource Strategy (NWRS) to address the management of water resources to meet the development goals of the country. One of the key objectives of the NWRS is to identify areas of the country where water resources are limited due to climate change, where development is therefore constrained, as well as areas where water resources are available to support development opportunities. The gap in regulation that needs to be addressed is that this sort of information need not be integrated into the EIA process to inform key water management decisions in view of the prospective climate change-related effects (DEAT, 2011b). Climate change will affect the availability of water resources and it is therefore critical to ensure the</p>

		conservation of water.
Minerals and Petroleum Resources Development Act 28 of 2002.	Section 10 of the MPRDA requires consultation with interested and affected parties prior to decision making by a relevant authority. Section 38(1)(b) states that the holder of a permit must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment as contemplated in section 24(7) of the National Environmental Management Act, 1998 (Act No. 107 of 1998). People have the right to have access to environmental information from the government, corporate business or private persons.	The involvement of all stakeholders is critical in the environmental assessment process as they might raise issues relating to climate change.
Disaster Management Act (Act No. 57 of 2002)	This Act focuses on preventing and reducing the risk of disasters, including the impacts of climate change, mitigating their severity, emergency preparedness, rapid and effective response, and post-disaster recovery. Further guidance is provided by the National Disaster Management Framework (2005) and the aftermath of climate change events such as relating to floods in particular is incorporated in municipal plans. Several critical obligations for municipalities, such as the infrastructure management and development, flow from the same Framework.	The City of Ekurhuleni, EThekweni Municipality, the Greater Cape Town Metropolitan and Johannesburg are some of the municipalities in the country that have disaster management plans which are part of the development planning frameworks and address climate change-related disastrous events. These plans are then cascaded into project planning through EIAs within those municipal development frameworks such as the IDPs, SDFs, etc.
Municipal Systems Act (Act No 32 of 2000)	Sections 4 and 74 of the Municipal Systems Act place obligations on local government regarding sustainable development, for a safe and healthy environment and the progressive realisation of the environment right as contained in section 24 of the Constitution. This piece of legislation, in conjunction with the NEMA (section 2) and NEMAQA (section 11), provides clear indication of what is expected of local government structures in climate-change response matters.	The Act describes the core components that must form part of an Integrated Development Plan (IDP) which is adopted by the Council of a municipality after its election, and this is reviewed and amended on an annual basis. The Act requires the IDP to link, integrate and co-ordinate plans for development, the allocation of resources, and the capacity to ensure the implementation of a municipality's development objectives. This is why municipal planning frameworks should be considered during EIA processes. District and local municipalities should accordingly develop their climate change response and mitigation strategies in consultation with one another and in alignment with

		the IDPs, SDFs, etc.
National Climate Change Response White Paper (2011)	<p>The NCCR White Paper is guided by principles set out in the Constitution, the Bill of Rights, the National Environmental Management Act, the Millennium Declaration and the United Nations Framework Convention on Climate Change (DEAT, 2011b). The overall strategic approach for South Africa's climate change response is needs driven and customised; developmental; transformational, empowering and participatory; dynamic and evidence-based; balanced and cost effective; and integrated and aligned (DEA, 2011b).</p> <p>In terms of strategic priorities, the NCCR White Paper sets out South Africa's climate change response strategy to achieve the National Climate Change Response Objective in a manner consistent with the outlined principles and approaches and which is structured around the following strategic priorities: risk reduction and management; mitigation actions with significant outcomes; sectorial responses; policy and regulatory alignment; informed decision making and planning; integrated planning; technology research, development and innovation; facilitated behaviour change; behaviour change through choice; and resource mobilisation. All of these should form part of the assessment during the EIA process to ensure that a holistic approach has been adopted (DEA, 2011b).</p>	<p>Climate change is already a measurable reality and along with other developing countries South Africa is especially vulnerable to its impacts. The White Paper presents the South African Government's vision for an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society (DEAT, 2004). According to the NCCRS, South Africa's response to climate change has two main objectives:</p> <ul style="list-style-type: none"> • To effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity; and • To make a fair contribution to the global effort to stabilise greenhouse gas (GHG) concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe that enables economic, social and environmental development to proceed in a sustainable manner.
The National Climate Change Response Strategy of South Africa (2004)	<p>In the preparations for South Africa's ratification of the UNFCCC in 1997, the urgent need for a national climate change policy was highlighted. The National Committee for Climate Change (NCCC), a non-statutory stakeholder body set up in 1994 to advise the Minister on climate change issues, and chaired by the DEAT, was tasked with developing such a policy. Following the drawing up of a discussion document and holding of stakeholder workshops it was identified that the climate change response strategy needed to:</p>	<p>All of the NCCRS intentions should be explored further at project level in the EIA process, and all key stakeholders (in particular the authority at national level) should remain aware of the need to implement these ideals in their daily planning to ensure the on-going realisation of the environmental right enshrined in the nation's constitution.</p>

	<ul style="list-style-type: none"> • <i>“be an action-orientated response strategy,</i> • <i>promote integration between the programmes of the various government departments involved in order to maximise the benefits to the country as a whole while minimising negative impacts, and</i> • <i>act as a significant factor in boosting sustainable social and economic development, by supporting government objectives such as poverty alleviation and job creation” (DEAT, 2004).</i> 	
Draft Second National Energy Efficiency Strategy Review (29 November 2012)	In its introduction, the National Energy Efficiency Strategy (NEES) acknowledged that improving energy efficiency is globally recognised as the most cost-effective means to sustainably reduce energy usage and mitigate climate change. The National Climate Change Response White Paper sets out a range of measures that government will implement, and many of these involve energy efficiency intervention as per the NEES.	The latest review of the strategy builds on the previous version, reflecting international trends as well as plans for climate change mitigation. Aspirational targets for improvements in energy efficiency are set for the economy as a whole and for various sectors (industry and mining, the commercial and public building sector, the residential sector and the transport sector), in order to guide effectively the transition toward a more energy-efficient economy.
Gauteng Climate Change Response Strategy (2012)	<p>In response to the threats posed by climate change and as mandated by the Gauteng Provincial Department of Agriculture and Rural Development (GDARD) has developed the Gauteng Climate Change Response Strategy (GCCRS, 2012) and Action Plan. The strategy addresses the problem of climate change in two ways:</p> <ul style="list-style-type: none"> • Firstly, Gauteng acknowledges that human activities have contributed a great deal in the release of GHGs into the atmosphere, and that climate change is already evident through the change of weather patterns over the years; and • Secondly, Gauteng acknowledges the need to adapt to the impacts of climate change by means of assessing the vulnerability of the Province to climate change and subsequently to develop mitigation actions. This is in view of the fact that GHGs have long lifetimes in the atmosphere and their accumulated impacts on the local environment require an appropriate response. 	It is clear that the GCCRS calls for a need to reduce the amount of GHGs released into the atmosphere, through mitigation actions at project levels. Gauteng province is the economic hub of South Africa, the economy is based on fossil-fuel energy sources, and it is vulnerable to the impacts of climate variability and change due to increased production or emission of the GHG. Climate change poses a risk of undermining the sustainable development initiatives in South Africa and Gauteng Province and therefore there is a need for consideration of these factors during project planning and impact assessments studies.

3.4 Consideration of climate change into EIAs

EIA was listed in Article 4 of the UNFCCC (2006a) as a feasible tool to be used in response to climate change. Article 4 of the UNFCCC advised all the contracting parties to take any feasible measures and adopt tools such as EIA to achieve mitigation and adaptation. Evidence shows that not many countries have followed the UNFCCC's advice by integrating mitigation and adaptation measures into EIA. In Europe, only the Netherlands and cold countries like Finland, Norway and Denmark had addressed climate change in their EIA systems. Canada, United States and Australia are another three countries to take climate change factors into EIA consideration (European Commission, 2013).

In 1997 the U.S. President's Council on Environmental Quality called for the consideration of climate change factors as part of the NEPA process in many federal actions. Between 2003 and 2007 courts on both the Federal and State levels rendered many decisions to the effect that public projects such as railroads and national highways are required to reduce their GHGs emissions, and required that the reduction of GHGs should be demonstrated in the EIA process. In 2007 the U.S. Senate also provided that any agency involved in implementing a Federal action or project would have to consider, evaluate and report on the impact of changes in GHGs emission and other possible ways in which climate change might affect the action or project (European Commission, 2013).

In Australia, litigation was first filed in 1994 in relation to calls for the inclusion of climate change factors in the EIA process, yet it was not until *Australian Conservation Foundation vs. Latrobe City Council* in 2004 that the court demanded the inclusion of the mitigation of GHG emissions in EIAs having to do with public land development projects. Since 2005 more policy has been framed, more judgments delivered, and public project practices relying on EIAs have been implemented by Australian governments on both the federal and state levels (European Commission, 2013).

According to Wen-Wei and Chen (2012), "*Asian countries have taken action to incorporate climate change into the EIA process*". Thailand was the first country to propose a policy to demand that public projects include mitigation in their EIA proceedings. Bangladesh also proposed a national policy for the coastal region to emphasize adaptation in the EIA process. In 2006, India, a major contributor to world

methane emissions, proposed a National Environmental Policy to demand that public projects consider and evaluate the mitigation of non-carbon GHG emissions while performing EIA. Moreover, India took adaptation into consideration in 2008 in the EIA procedure of a National Project of the Assam Integrated Flood and Riverbank Erosion Management mandated by the Asian Development Bank. Later in the same year India not only addressed adaptation but also added mitigation measures in the EIA procedure of the Sipat Super Thermal Power Project.

In Taiwan, the year 2008 was a watershed. The Taiwan Administrative High Court rendered judgments in cases dealing with Phases Three and Four of Central Taiwan Science Park development projects, demanding that the reduction of GHG emissions be included in the EIA review process. Meanwhile, the EIA Review Committee asked the constructors of the projects to include in the EIA the measures regulated in the Greenhouse Gas Reduction Bill, to provide an estimation of future GHG emissions, and to set the GHG emission standard. Since then, consideration of GHG emissions in EIA proceedings has become part of Taiwan's legal policy regarding mitigation measures aiming at addressing climate change. In 2009 Indonesia passed the Act Regarding Environmental Protection and Management to include adaptation measures in their EIA or SEA process. And in 2005 Bangladesh required the inclusion of adaptation measures in all EIAs relating to coastal management,

Table 3-2: Summary of selected country actions relating to considerations of climate change in EIA and policy frameworks

Country	Year	Description of major milestones/ action taken (selected)
United States	1997	Call for consideration of climate change into EIA.
	2003	Federal and State courts forced many public projects to reduce GHG emissions as part of EIA
	2007	US Senate and Federal Agency to force projects to evaluate the impact of changes in GHG emission during EIA and the effects of climate change on projects.
Australia	1994	First litigation to call for the inclusion of climate change factors into EIAs Case of Australian Conservation Foundation vs. Latrobe City Council.
	2004	Court demanded the inclusion of the issue of GHG emissions in public development projects.
	2005	More policy and judgements on forcing public projects to address climate change matters.

Thailand	2005	Policy proposal for public project to include mitigation in EIA proceedings.
Bangladesh	2005	National Coastal Management Policy for the coastal region to emphasise adaptation during EIAs.
	2009	Inclusion of measures of mitigation in the EIA process in development projects as mandated by the Asian Development Bank.
India	2006	National Environmental Policy to demand public projects to consider and evaluate GHG mitigations during EIA.
	2008	EIA procedure for key projects as mandated by the Asian Development Bank to include climate change adaptation and other mitigation measures.
Taiwan	2008	High Court rendered judgement on key projects to demand the inclusion of the reduction of GHG emissions in EIA reviews. The Greenhouse Gas Bill (and subsequent Policy) took effect and set emission standards for projects
Indonesia	2009	Environmental Protection and Management Act passed which includes adaptation measures in EIA/ SEA processes.
South Korea	2009	The Four River Project included adaptation in the EIA process. Consideration of vulnerable geographical areas during EIA.
	2010	Policy of evaluating GHG emissions by businesses.
Philippines	2010	Streamlined inclusion of climate change factors in the EIA process through the National Framework Strategy on Climate Change
China	2010	Policy for consideration of GHG emissions in the EIA. Voluntary GHG emission reduction commitment under the UNFCCC.
Vietnam	2010	Inclusion of mitigation in the EIA procedure of the Water Management Project in the territory of An Giang Province and Low Mekong River Area cooperated with Laos and China.
Malaysia	2011	Considered adaptation to the future impact of climate change in the EIA of the Landfill project
South Africa	2004	National Climate Change Response Strategy for South Africa
	2008	Draft NEMA EIA Regulations (GN R658) strove to address climate change in the EIA process by providing that, when considering an application for environmental authorisation, “the competent authority must take into account any implications of climate change to the implementation of the activity”. This requirement was later removed when the final (current) NEMA were promulgated in 2010.
	2010	National Climate Change Response Green Paper
	2011	National Climate Change Response White Paper

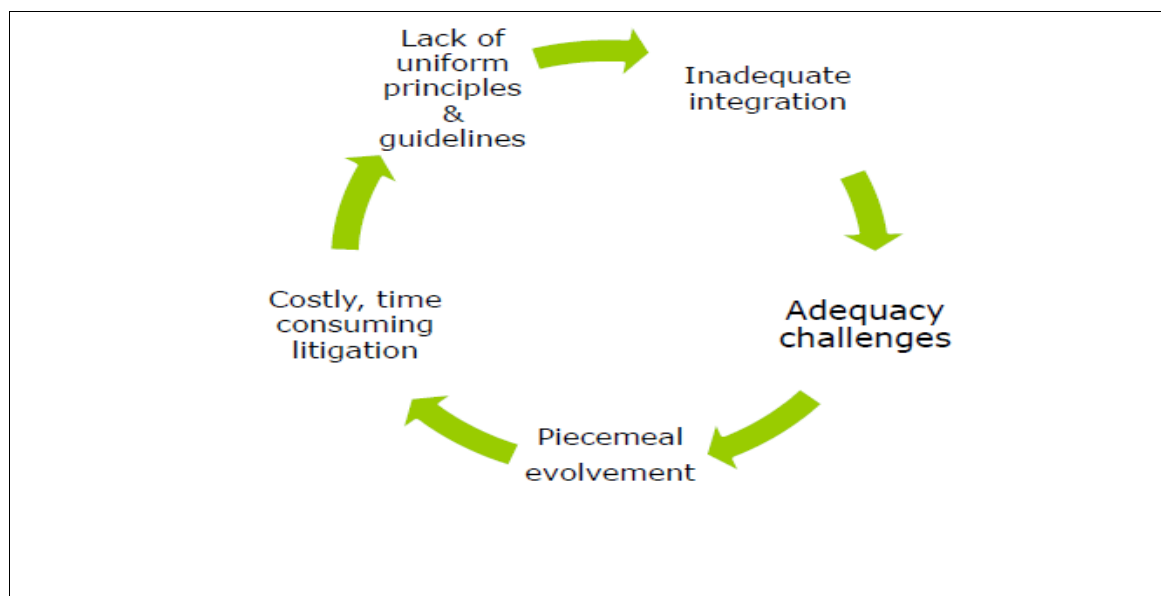
	2012	Draft Second National Energy Efficiency Strategy Review.
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3.5 Climate change risks and opportunities

Marsh (2006) attest that climate change is increasingly recognised as one of the defining issues of the 21st century, drawing all elements of society towards the promotion of a prosperous, low-carbon future. Even in times of economic recession, climate change has not fallen off the radar, with many major economies rather viewing “green” led investment as an engine for economic recovery. SA has become increasingly involved in addressing climate change issues, from the countries’ involvement in international climate negotiations, the modelling of potential mitigation scenarios under the LTMS process (DEAT, 2007b), and the development of a national Climate Change White Paper. A significant amount of work has also been done to consider the direct impacts of climate change on the South African environment, including physical impacts related to higher temperatures, sea-level rise, increased risk of wildfires, and concerns over future availability of water. However, this has not resulted in any policy formulation or implementation in relation to EIAs.

Despite these efforts, less emphasis has been placed on the secondary impacts of climate change, including how industry could be affected by shifts in consumer preferences, how the evolving carbon regulation environment in South Africa might affect industry, and how business and the economy as a whole should respond to these challenges (CAMCO, 2009). In view of the possible risks and opportunities, there are external challenges that hinder the consideration of climate change issues into EIA process, such as those identified by Summers and Lau (2010) as illustrated on Figure 3-2. The main challenges relate to lack of uniform guidelines from the government to influence consideration of risks and opportunities thus resulting in poor consideration; this further result in piecemeal inclusion and evolution of the concept; and also time consuming when dealing with the legality of the matter.

Figure 3-2: Challenges for integrating consideration of climate change into EIAs (source: Summers and Lau, 2010)



With regard to opportunities, GCCRS (2012) developed specific action plan on climate change response with a view of making strong contributions to either mitigation or adaptation, as distinct from “business-as-usual” sustainable development imperatives. Table 3-2 below identifies some of the opportunities that the housing sector can pursue when considering the climate change issues:

Table 3-3: Climate change opportunities for the housing sector (adapted from GCCRS, 2012)

Available strategies	Future strategies
<ul style="list-style-type: none"> • Use of daylight • More efficient appliances • Improved insulation • Passive and active solar design • Alternative refrigeration fluids • Recovery and recycling of fluorinated gases • Efficient lighting 	<ul style="list-style-type: none"> • Integrated design of human settlement/ buildings • Installation of intelligent meters • Solar photovoltaic • Rain water collection

It is acknowledged that simple actions such as improving the thermal efficiency of houses by positioning them correctly; installing insulated ceilings; using thermally efficient building materials; and installing solar water heaters to allow low-income

households access to hot water could go a long way to reduce GHG emissions (GCCRS, 2012).

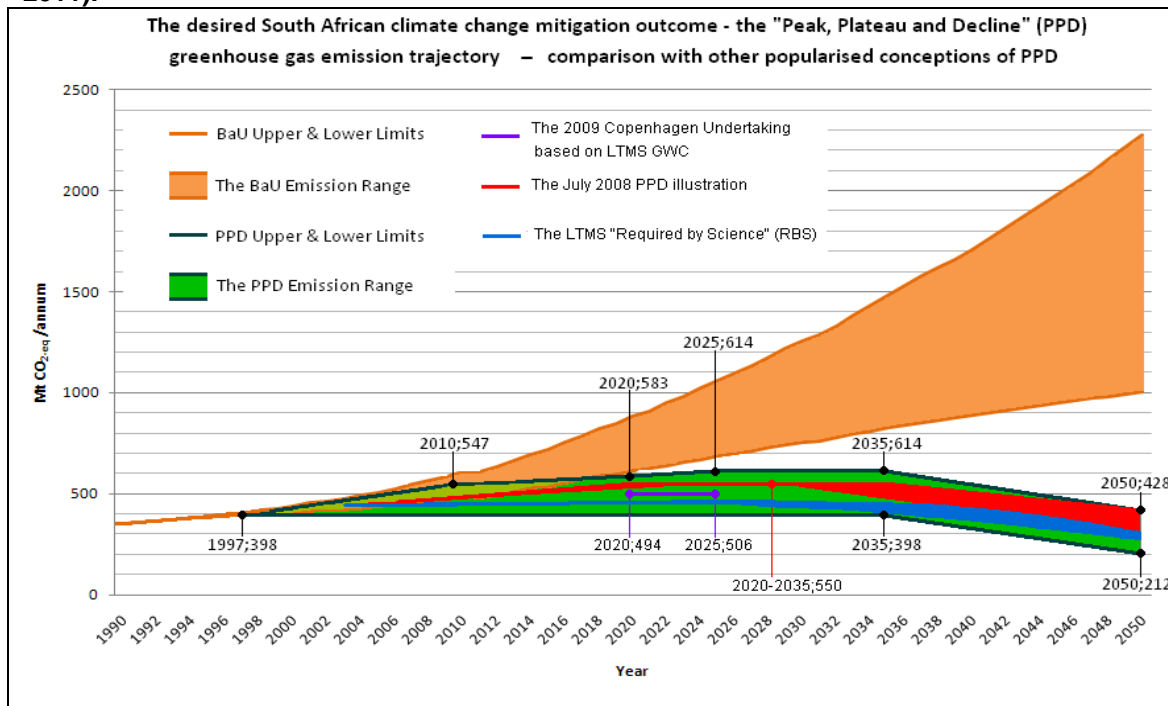
3.6 Climate change mitigation and adaptation

The UNFCCC (2006a) affirms that to effectively respond to climate change the implementation of both adaptation and mitigation strategies is essential.

3.6.1 Mitigation

Mitigation strategies are meant to reduce the amount of GHG in the earth's atmosphere, thereby eliminating the cause of climate change (NCCRS, 2004). It is acknowledged that there are two basic approaches to climate change mitigation: the amount of greenhouse gases emitted from various sources can be reduced, and sinks and reservoirs that remove greenhouse gases can be preserved and enhanced. SA has a desired mitigation outcome known as the "Peak, Plateau and Decline" (PPD) for the greenhouse gas emission trajectory as depicted in figure 3-2. It is evident that emissions would substantially peak between 2020 to 2015, plateau for a decade and then decline in absolute terms around the 2035 to 2050 (DEAT 2007a; DEA 2007). The sectors largely responsible for the release of greenhouse gases in South Africa are the energy, industrial, forestry, agricultural, transport, residential, commercial and waste sectors. According to the SA 2009 National Greenhouse Gas Inventory, most of the greenhouse gas emission (79%) is attributed to the generation of electricity. Hence it is considered to be the major opportunity industry wherein a substantial reduction of GHGs can be achieved (DEAT, 2009b).

Figure 3-3: Schematic illustration of the SA's desired mitigation outcome (source: DEA, 2011).



Tshaka and Jukuda (2011) affirm that the City of Johannesburg, as one of the largest and oldest metropolitan municipalities in South Africa, has made a firm commitment to contribute towards achieving the national imperatives of a future low carbon economy. The city encourages all local governments to engage further in decentralised and city-to-city cooperation in order to advance mitigation actions and encourage international networks – in particular, the international Council for Local Environmental Initiatives (ICLEI) and United Cities and Local Governments (UCLG). Furthermore, actions such as research on climate change, to ensure that the scientific knowledge of this phenomenon is well developed and understood and that appropriate interventions are implemented (GCCRS, 2012). This relevant information is available and should be used during the EIA process.

3.6.2 Adaptation

By definition, as per the IPCC Synthesis Report (2007a), adaptation refers to the implementation of the specific measures to adapt to the changes brought about by climate change, with the objective of reducing vulnerability to climate change and minimising the harm caused by it. The impacts of climate change are diverse and affect different regions of the world differently and thus the need and nature of adaptive practices will vary accordingly. The successful implementation of any adaptation

strategy is dependent on the taking of adaptive measures at every level of government. The IPCC (2007b) identifies a list of sectors that will be adversely affected by the impacts of climate change. These include the health, energy, agriculture, ecosystems, coastal zones, tourism, settlements, industry, and infrastructure sectors. The IPCC (2001) identifies six reasons why we should adapt to climate change, as appear on the Table below:

Table 3-4: The IPCC's six reasons to encourage countries to adapt to climate change (Source: IPCC, 2001)

No	Reasons to encourage adaptation
1	Climate change cannot be totally avoided.
2	Anticipatory and precautionary adaptation is more effective and less costly than forced, last-minute emergency adaptation or retrofitting.
3	Climate change may be more rapid and more pronounced than current estimates suggest. Unexpected events are possible.
4	Immediate benefits can be gained from better adaptation to climate variability and extreme atmospheric events.
5	Immediate benefits can also be gained by removing maladaptive policies and practices.
6	Climate change brings opportunities as well as threats. Future benefits can result from climate change.

The need to adapt to the impacts of climate change has been recognized by the South African national government through the NCCRS (DEAT, 2004), which identifies adjustments that need to be made in sectors ranging from disaster management and healthcare services to agriculture and irrigation and development planning. The National Department of Environmental Affairs (DEA) has a sub-directorate for Global Climate Change that is tasked to build capacity in other national departments to take climate change into account in their activities and planning. The DEA (2011b) has stressed that little direct action has been taken to specifically address climate change at the national level as yet, but there are some existing national projects and policies that can aid the country to adapt to increasing temperatures and water stress. Golino (2011) states that there are adaptation measures that could be effected to the delivery of housing that would significantly improve people's quality of life in terms of adequate shelter. Simultaneously, these adaptations would reduce future carbon emissions resulting from poor people increasing their use of services that are delivered in the current manner.

3.7 Conclusion

It is evident from the literature that climate change is a reality, both globally and regionally. The magnitude of change is still uncertain, as is the timing of the change (ClimAdapt, 2003). However, the severe nature of the impacts which climate change could have on all sectors of South Africa's economy is becoming clear. South Africa is one of many countries worldwide that has taken steps to implement the global call to take sustainable development seriously and to mainstream this concept in all development activities and policies, including those governing IAs. SA has enacted a collection of remarkable environmental legislation. The requirements regarding impact assessment and sustainability has been identified in the legal and policy framework as noted throughout the chapter, EIA is considered one of the tools that can and should be used to address objectives relating to climate change (Summers and Lau, 2003; Wende, 2011; Gilder & Parramon, 2011). The existing challenge in SA is that this potential has not been fully pursued.

As we have observed from the literature (Table 3-1), Asian countries such as Thailand, Bangladesh, India, China, the Philippines and Korea have already formulated the specific policies to consider and address climate change factors and integrated them into the EIA process. Meanwhile, countries like Vietnam, Malaysia, South Korea, the Maldives and Sri Lanka have implemented unconventional public projects or development project as mandated by the project funders (the Asian Development Bank) to include measures of mitigation and adaptation in the EIA process. Across the world the use of EIA as a planning and sustainability development tool is continuing to gain momentum as more and more countries currently practice it world-wide (Caleb, 2008) and realise its potential to address climate change issues.

As discussed earlier in the chapter, NEMA remains SA's environmental framework legislation designed to provide for co-operative and integrated environmental governance through the establishment of a general framework for decision-making on matters affecting the environment. NEMA provides for a set of overarching environmental principles which apply throughout the Republic to the actions of all organs of state that may have an impact on the environment. Sections 2(1)(c) and (e) of NEMA re-iterate that governmental functions affecting the environment and legislation managing and protecting the environment should be interpreted and applied to all actions deemed to have significant environmental impacts. The key driver for climate change consideration is the section 25 of NEMA, which discretely allows the Minister to

introduce legislation or regulations which are necessary to give effect to international environmental instruments to which the Republic is a party such as the UNFCCC and the Kyoto Protocol. Currently EIA Regulations do not prescribe the process, assessment methods or the reporting thereof with regard to climate change issues.

As noted through the literature review, most countries excluding SA have existing legal and policy frameworks that cover and give guidance to the consideration of cumulative climate-change impacts during the EIA process. SA legislative and policy framework does not give specific guidance on the consideration of climate change issue during EIAs. EIAs need to move to the next level of recognizing that the response to climate change is one of the areas that contributes to overall sustainable development and therefore take cognisance of climate change response policies though these do not link to EIA process. In this regard, the SA climate change response requires strong political commitment and administrative action to effect the bold decisions that will be necessary to implement both the mitigation and the adaptation interventions that are within the existing policies (GCCRS, 2012), though separate from the EIA process.

CHAPTER 4

CASE STUDY AND DATA ANALYSIS

This chapter describes the data analysis and results with the aim of answering the following research sub-questions:

- (2) To what extent do EIAs for housing development in Gauteng Province consider climate change risks and opportunities?
- (3) How are the authorities, stakeholders and project proponents influencing the consideration of the climate change issues in EIAs?

4.1 Introduction

It is clear from the previous chapter that EIA should be used as a tool to manage the national response to climate if South Africa is serious about achieving the sustainable development agenda set by the United Nations. This chapter provides the findings arising from the data generated by the review of twenty case studies from the CJMM and the CTMM. The review of the case studies provided a clear indication of the extent to which climate change risks and opportunities were considered during the EIA processes within the Gauteng Province. The chapter will also provide a view of the current role and involvement of the different stakeholders during the EIA process.

4.2 Analysis of case studies

The case studies which were analysed were from the CJMM and the CTMM and the results are discussed below. Each of the case study reports were reviewed and assessed in terms of the set criteria evaluation (Table 2-4).

Table 4-1: Review criteria 1 - the consideration of climate change risks and opportunities during scoping process

Case Study Number	Description of the development project	Justification	Score
CS1	Township development in Monavoni Extension 43	Climate change issues relating to flood-line determination, emissions management, storm-water during excessive rainfall events, power supply and energy efficiency aimed at reducing the emission of GHGs, were all identified during scoping process. Therefore risks and opportunities relevant to climate change were considered during the scoping process.	A
CS2	Township development in Monavoni Extension 49	Risks and opportunities relevant to climate change were considered during the scoping process. For example the reduction of airborne emission was cited as one of the key initiative to be implemented.	A
CS3	Township development in Witkoppies Extension	Risks and opportunities relevant to climate change were considered during the scoping process. Scenarios of extreme weather events were identified and used to determine the effectiveness of the control measure for all identified impacts/opportunities.	A
CS4	Residential Development in Mnandi Extension 4	Climate change impacts were not identified or considered.	C
CS5	Township establishment in Knopjeslaagte portion 20 & 21	The EIA report notes that the proposed development present an action within operations and supply chains where opportunities exist for housing owners to innovate processes, products and services to respond to changing climate and protect their assets. Baseline information about the climate/weather of the areas was generally provided and this was used to inform the prediction of the impacts of abnormal rainfall. Storm water management was also integral to the impact discussion.	B
CS6	Mahube Valley Extension 15 Housing Development	The case study identify rainfall, temperature and humidity to have a major influence on the distribution of disease pathogens and pests, as recorded previously in some informal settlements in Mamelodi. Scenarios of extreme weather events were generally considered and used to determine the effectiveness of the control measure for all identified impacts/opportunities.	A
CS7	Riverbend Extension 1 Township Development	Relevant risks and opportunities were generally identified and considered in the reports, for an example pollution sources such as emission from vehicle and machinery were noted.	B
CS8	Riamapark Extension 126 Development	Climate change impacts were not identified or considered.	C
CS9	Erasmia Housing Development Project	Climate change impacts were not identified or considered.	C

CS10	Township establishment in Orchards Extension 76 & 77	Baseline information about the climate/weather of the areas was provided and this was used to inform the prediction of the impacts of abnormal rainfall. Storm water management was also integral to the impact discussion.	B
CS11	Township establishment in Waterfall Fields	The project was generally able to identify matters that have direct relevance to climate change and the emission of GHG. Impacts were identified and generally considered. The issue of possible higher insurance claims resulting from damage to infrastructure by extreme weather events was well noted since Waterfall Fields area is prone to flooding.	B
CS12	Establishment of Township with mixed developments in Ruimsig Extension 67	Baseline information about the climate/weather of the areas was generally provided and this was used to inform the prediction of the impacts of abnormal rainfall. Storm water management was also integral to the impact discussion.	B
CS13	Aspen Lakes Township development	No mention is made of risks or opportunities associated with climate change.	C
CS14	Mixed Land Use Township Establishment at Lion Park	Baseline information about the climate/weather of the areas was generally provided and this was used to inform the prediction of the impacts of abnormal rainfall. Storm water management was also integral to the impact discussion.	B
CS15	Development of Rabie Ridge Extension 3 Residential Township	No mention is made of risks or opportunities associated with climate change.	C
CS16	Honeydew Manor Extension 16	The project was generally able to identify matters that have direct relevance to climate change and the emission of GHG, therefore impacts were identified and generally considered.	B
CS17	Residential Development in Boksburg	No mention is made of risks or opportunities associated with climate change.	C
CS18	Doornvallei Phase 6 & 7 Housing Developments	No mention is made of risks or opportunities associated with climate change.	C
CS19	Housing development – Equestria Extension 242	The project was generally able to identify matters that have direct relevance to climate change and the emission of GHG. Impacts were identified and generally considered.	B
CS20	Lanseria Extension 53 Development	No mention is made of risks or opportunities associated with climate change.	C
		Overall score	B

Scoring criteria: A = considered; B = generally considered; C = not considered.

From the above Table 4-1, it is evident that there is a general consideration of climate change risks and opportunities during Scoping phase of the EIA process. Climate change related aspects were identified as key material issues hence the overall score is B (generally considered). Four case studies did not consider climate change matters. The next Table 4-2 shows the results of the review of consideration of climate change during public participation process.

Table 4-2: Review criteria 2 - the consideration of climate change risks and opportunities during public participation process

Case Study Number	Description of the development project	Justification	Score
CS1	Township development in Monavoni Extension 43	Stakeholders are aware of the climate change issues and have raised issues regarding the impact of extreme weather/ climatic events on the project during operational phase. One participant raised concern regarding possible damage to infrastructure along the retail product supply chain caused by extreme weather events which will result in lack of services from the Monavoni Settlement area.	A
CS2	Township development in Monavoni Extension 49	No climate change related issues were raised during public participation.	C
CS3	Township development in Witkoppies Extension	No climate change related issues were raised during public participation.	C
CS4	Residential Development in Mnandi Extension 4	No climate change related issues were raised during public participation. However the possible reduced availability of water for small-scale business operations in the Mnandi area, which could result in reduced plant output and/or need to modify equipment, was noted.	C
CS5	Township establishment in Knopjeslaagte portion 20 & 21	No climate change related issues were raised during public participation.	C
CS6	Mahube Valley Extension 15 Housing Development	The authority (City of Tshwane, Environmental Planning & Management Division) requested the inclusion of storm water and flood line determination requirements.	A
CS7	Riverbend Extension 1 Township Development	No climate change related issues were raised during public participation.	C
CS8	Riamapark Extension 126 Development	No climate change related issues were raised during public participation.	C
CS9	Erasmia Housing Development Project	No climate change related issues were raised during public participation.	C
CS10	Township establishment in Orchards Extension 76 & 77	Stakeholders raised issues which were more to do with socio-economics such as job creation, crime, etc. None of the comments were ecological/ environmental.	C
CS11	Township establishment in Waterfall Fields	No climate change related issues were raised during public participation.	C
CS12	Establishment of Township with mixed developments in Ruimsig Extension 67	No climate change related issues were raised during public participation.	C
CS13	Aspen Lakes Township development	No climate change related issues were raised during public participation.	C
CS14	Mixed Land Use Township Establishment at Lion Park	Stakeholders voiced concerns relating to emissions from coal burning from other households. The EIA study noted the following comments from an interested party: promote the use of recycled building materials and materials that have low embodied energy, and promote retrofit existing buildings to make them more energy efficient	B

CS15	Development of Rabie Ridge Extension 3 Residential Township	No climate change related issues were raised during public participation.	C
CS16	Honeydew Manor Extension 16	No climate change related issues were raised during public participation.	C
CS17	Residential Development in Boksburg	No climate change related issues were raised during public participation.	C
CS18	Doornvallei Phase 6 & 7 Housing Developments	No climate change related issues were raised during public participation.	C
CS19	Housing development – Equestria Extension 242	The specialist report on wetland delineation identified the need to preserve the wetland area and recommended that it become a public open space. Comments from Interested and Affected Parties were about the unsuitability of the site and potential flooding and storm water concerns.	B
CS20	Lanseria Extension 53 Development	No climate change related issues were raised during public participation.	C
		Overall score	C

Scoring criteria: A = considered; B = generally considered; C = not considered.

The results from the review of public participation records of the EIA case studies reveal that climate change issues were largely not considered. Hence the overall score of C (not considered) was achieved. Two case studies considered climate change, while the other two case studies generally considered climate change issues, whereas sixteen case studies did not consider any relevant matters during the public participation process. The next Table 4-3 shares the results on consideration of climate change as part of the impact assessment process of the EIA.

Table 4-3: Review of the consideration of climate change risks and opportunities during assessment process.

Case Study Number	Description of the development project	Justification	Score
CS1	Township development in Monavoni Extension 43	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated.	B
CS2	Township development in Monavoni Extension 49	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated. Some of the noted opportunities which were asses include: increased demand for low-water and other sustainable products and services, including energy efficiency products and services, increased demand for cooling equipment systems and services during hot weather, increased demand for resilient materials including building supplies, increased demand for infrastructure and manufacturing systems' retrofit.	A
CS3	Township development in Witkoppies Extension	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated.	A
CS4	Residential Development in Mnandi Extension 4	No consideration of climate variability during the assessment of potential impacts.	C
CS5	Township establishment in Knopjeslaagte portion 20 & 21	Impact evaluation was adequate, as it thoroughly addressed all key and non-key impacts identified.	A
CS6	Mahube Valley Extension 15 Housing Development	Scenarios of extreme weather events were considered and used to determine the effectiveness of the control measure for all identified impacts/opportunities.	A
CS7	Riverbend Exension 1 Township Development	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated.	B
CS8	Riamapark Extension 126 Development	No consideration of climate change during the assessment of potential impacts.	C
CS9	Erasmia Housing Development Project	No consideration of climate change during the assessment of potential impacts.	C
CS10	Township establishment in Orchards Extension 76 & 77	No consideration of climate change during the assessment of potential impacts.	C
CS11	Township establishment in Waterfall Fields	Use of the GDARD template for BA has allowed for thorough evaluation of the identified. Climate variability and impacts were considered and thoroughly evaluated.	B
CS12	Establishment of Township with mixed developments in Ruimsig Extension 67	Use of the GDARD template for BA has allowed for thorough evaluation of the identified impacts. Climate variability and impacts were considered and thoroughly evaluated.	B
CS13	Aspen Lakes Township development	No consideration of climate change during the assessment of potential impacts.	C

CS14	Mixed Land Use Township Establishment at Lion Park	Impact evaluation was adequate, as it thoroughly addressed all key and non-key impacts identified.	A
CS15	Development of Rabie Ridge Extension 3 Residential Township	No consideration of climate change during the assessment of potential impacts.	C
CS16	Honeydew Manor Extension 16	No consideration of climate change during the assessment of potential impacts.	C
CS17	Residential Development in Boksburg		C
CS18	Doornvallei Phase 6 & 7 Housing Developments	No consideration of climate change during the assessment of potential impacts.	C
CS19	Housing development – Equestria Extension 242	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated.	B
CS20	Lanseria Extension 53 Development	No consideration of climate change during the assessment of potential impacts.	C
		Overall score	C

Scoring criteria: A = considered; B = generally considered; C = not considered.

Like during the public participation process, the review of the case studies indicates that climate change risks and opportunities are not part of the impact assessment process. Five case studies considered climate change impacts, another five generally considered the, and the remainder (ten) case studies did not consider climate change issues, hence the overall score is C (not considered). The next Table 4-4 shows the results of the review on consideration of climate change during significance rating process of the EIA.

Table 4-4: Review of the consideration of climate change risks and opportunities during significance rating process.

Case Study Number	Description of the development project	Justification	Score
CS1	Township development in Monavoni Extension 43	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated.	B
CS2	Township development in Monavoni Extension 49	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS3	Township development in Witkoppies Extension	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated.	B
CS4	Residential Development in Mnandi Extension 4	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS5	Township establishment in Knopjeslaagte portion 20 & 21	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated..	B
CS6	Mahube Valley Extension 15 Housing Development	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated.	B
CS7	Riverbend Extension 1 Township Development	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS8	Riamapark Extension 126 Development	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS9	Erasmia Housing Development Project	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS10	Township establishment in Orchards Extension 76 & 77	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS11	Township establishment in Waterfall Fields	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS12	Establishment of Township with mixed developments in Ruimsig Extension 67	Use of the GDARD template for BA has allowed for thorough evaluation of the identified impacts in one of three reports. Climate variability and impacts were considered and thoroughly evaluated.	C
CS13	Aspen Lakes Township development	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS14	Mixed Land Use Township Establishment at Lion Park	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated. Impacts in relation to the use of daylight, more efficient appliances, improved insulation, passive and active solar design were all assessed in terms of short and medium term benefits.	A
CS15	Development of Rabie Ridge Extension 3 Residential Township	Impacts relating to climate change are not identified and therefore not evaluated.	C

CS16	Honeydew Manor Extension 16	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS17	Residential Development in Boksburg	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS18	Doornvallei Phase 6 & 7 Housing Developments	Impacts relating to climate change are not identified and therefore not evaluated.	C
CS19	Housing development – Equestria Extension 242	The impacts are well evaluated in terms of their likelihood and exposure level. The issue of climate variability and other impacts were general considered and evaluated.	B
CS20	Lanseria Extension 53 Development	Impacts relating to climate change are not identified and therefore not evaluated.	C
		Overall score	C

Scoring criteria: A = considered; B = generally considered; C = not considered.

In relation to the assessment process, the rating of impact significance was poor, thus climate change risks and opportunities were not considered. Therefore, the overall score is C, which is constituted by one A score rating, five B score ratings, and fourteen C score ratings. The next Table 4-5 reveals the results on consideration of climate change issues in relation to mitigation measures.

Table 4-5: Review of the consideration of climate change risks and opportunities for mitigation purposes.

Case Study Number	Description of the development project	Review question: Does the EMP include information on the measures that need to be taken to ensure the project's own resilience to climate change?	Score
CS1	Township development in Monavoni Extension 43	The EMP generally considers and includes control measures for the management and monitoring of the identified significant aspects associated with the development proposal. The EIA report proposed that the foundations for successful project and regional (Tshwane) adaptation and mitigation planning should consider four issues: Information for effective planning, Infrastructure for climate-proofing, Insurance for social risk management and poverty reduction, and finally Institutions for disaster risk management including climate related.	B
CS2	Township development in Monavoni Extension 49	The EMP set out all the control and enhancement measures for implementation during the construction and operational phases. The EMP further considers measures on resilience to climate change. The EMPs include control measures for the management and monitoring of the identified significant aspects associated with the development proposal.	B
CS3	Township development in Witkoppies Extension	In the EMP report, the quote from the IPCC Fourth Assessment Report (2007) on climate change was used: "climate change will alter frequencies and intensities of extreme weather events on natural and human systems". The EMP further sets out all the control and enhancement measures for implementation during the construction and operational phases. The EMP further considers measures on resilience to climate change. The EMPs were comprehensive and dealt with all the identified issues.	A
CS4	Residential Development in Mnandi Extension 4	The EMP was not comprehensive and therefore do not identify and address the question of climate change mitigation.	C
CS5	Township establishment in Knopjeslaagte portion 20 & 21	The EMP set out all the control and enhancement measures for implementation during the construction and operational phases. The EMP further considers measures on resilience to climate change. The EMPs were comprehensive and addressed the entire question of how the impacts were going to be managed during construction and post-construction. Overall score B for the consideration of measures.	A
CS6	Mahube Valley Extension 15 Housing Development	The EMP set out all the control and enhancement measures for implementation during the construction and operational phases. The EMP further considers measures on resilience to climate change. The EMPs were comprehensive and dealt with all the identified issues.	A

CS7	Riverbend Extension 1 Township Development	The EMPs include control measures for the management and monitoring of the identified significant aspects associated with the development proposal.	B
CS8	Riamapark Extension 126 Development	The EMPs include control measures for the management and monitoring of the identified significant aspects associated with the development proposal.	B
CS9	Erasmia Housing Development Project	The EMP was not comprehensive and therefore do not identify and address the question of climate change mitigation.	C
CS10	Township establishment in Orchards Extension 76 & 77	The EMP was not comprehensive and therefore do not identify and address the question of climate change mitigation.	C
CS11	Township establishment in Waterfall Fields	Control measures in relation to storm water and low-lying areas were general considered. The EMPs include control measures for the management and monitoring of the identified significant aspects associated with the development proposal.	B
CS12	Establishment of Township with mixed developments in Ruimsig Extension 67	The EMPs include control measures for the management and monitoring of the identified significant aspects associated with the development proposal. The EMP acknowledged that GHGs are emitted when fossil fuel is burned such as coal, oil, petrol, diesel and natural gases. Reduction in the use of these resources is discouraged and alternative energy sources are proposed such as solar energy.	B
CS13	Aspen Lakes Township development	The EMP was not comprehensive and therefore do not identify and address the question of climate change mitigation.	C
CS14	Mixed Land Use Township Establishment at Lion Park	Climate change may exacerbate the problems caused by current poor urban management in and around Lion Park. This included poor storm water drainage systems and urban-induced soil erosion result in flash flooding. The EIA report alluded to the fact that increased storm intensity due to climate change would exacerbate such problems. The EMPs include control measures for the management and monitoring of the identified significant aspects associated with the development proposal.	B
CS15	Development of Rabie Ridge Extension 3 Residential Township	The EMP was not comprehensive and therefore do not identify and address the question of climate change mitigation.	C
CS16	Honeydew Manor Extension 16	The EMPs include control measures for the management and monitoring of the identified significant aspects associated with the development proposal. The EMP recommended the following measures: plant indigenous trees; recycling paper also saves trees; save water; save electricity; use gas for cooking; insulate the house to reduce GHG; and use of public transport.	B
CS17	Residential Development in Boksburg	The EMP was not comprehensive and therefore do not identify and address the	C

		question of climate change mitigation.	
CS18	Doornvallei Phase 6 & 7 Housing Developments	The EMP was not comprehensive and therefore do not identify and address the question of climate change mitigation.	C
CS19	Housing development – Equestria Extension 242	The EMP set out all the control and enhancement measures for implementation during the construction and operational phases. The EMP further considers measures on resilience to climate change and categorically stated that the developer for Equestria should ensure that housing and the built environment are resource efficient and climate resilient.	B
CS20	Lanseria Extension 53 Development	The EMP was not comprehensive and therefore do not identify and address the question of climate change mitigation.	C
		Overall score	B

Scoring criteria: A = considered; B = generally considered; C = not considered.

It is clear that climate change risks and opportunities are generally considered as part of the development of the mitigation strategies, hence the overall score rating of B was achieved (Table 4-5). Three case studies fully considered the issues, whereas nine case studies generally considered, and the remaining eight case studies did not consider any climate change issues.

4.3 Comparative analysis of the results

In the light of the above analysis of the data, conclusion and comparison between different case studies were drawn. This cross-analysis reveals the relationship or lack thereof between case studies. Any emerging new information, trends and knowledge was used to draw conclusions and recommendations in the next chapter.

Table 4-6: Summary of the average review of the consideration of climate change risks and opportunities per individual case study.

Case Study Number	Review Question 1	Review Question 2	Review Question 3	Review Question 4	Review Question 5	Review Results	Average score
CS1	A	A	B	B	B	This EIA study generally identified the risks and opportunities associated with climate change from the onset of the scoping process, through to public participation and included appropriate recommendations.	B
CS2	A	C	A	C	B	In terms of the public participation and evaluation of significance ratings relevant to climate change matters, these were poorly considered.	B
CS3	A	C	A	B	A	Climate change matters were generally considered, but the stakeholders relatively seem unaware of risks and opportunities hence these were not raised.	B
CS4	C	C	C	C	C	This case study EIA report was poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS5	B	C	A	B	A	The concept of climate change adaptation and mitigation are identified throughout the process and well discussed in the EIA report.	B
CS6	A	A	A	B	A	This case study EIA report was extremely well executed with the scoping process identifying all relevant matters applicable to the development. Impacts were thoroughly evaluated and significance rated properly and recommendations measures clearly stipulated. Out of all the reviewed case study, this was superb.	A
CS7	B	C	B	C	B	In terms of the public participation and evaluation of significance ratings relevant to climate change matters, these were poorly considered.	B
CS8	C	C	C	C	B	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C

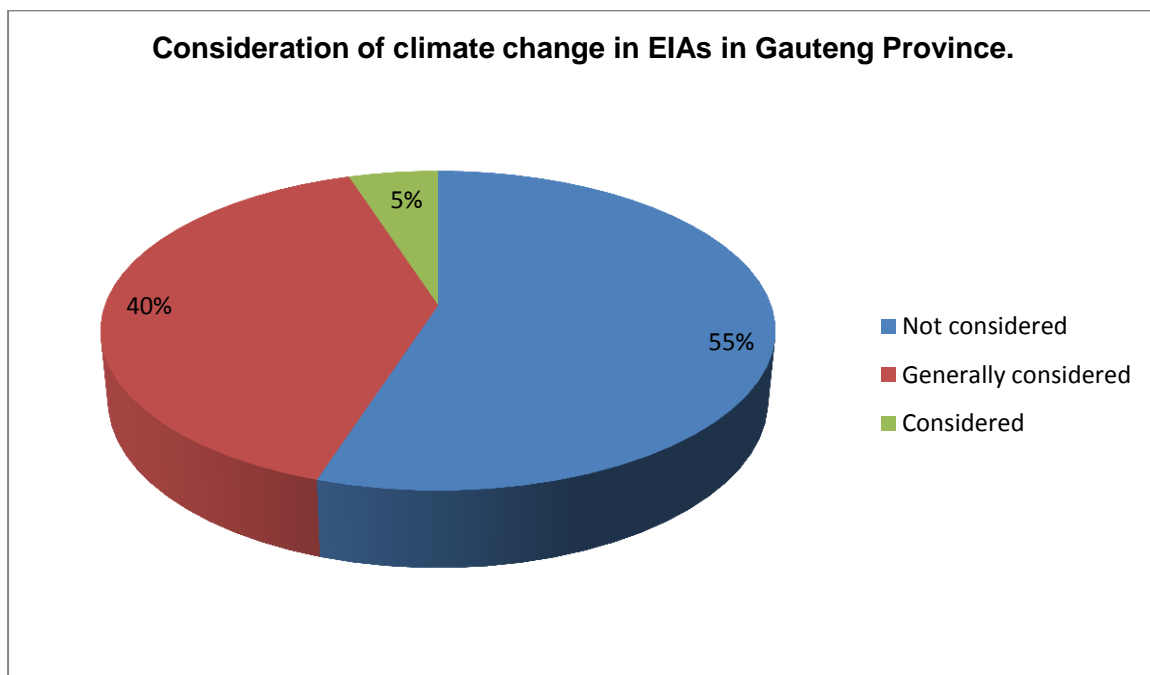
CS9	C	C	C	C	C	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS10	B	C	C	C	C	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS11	B	C	B	C	B	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS12	B	C	B	C	B	Climate change matters were generally considered, but the stakeholders relatively seem unaware of risks and opportunities hence these were not raised.	B
CS13	C	C	C	C	C	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS14	B	B	A	A	B	In terms of the public participation and evaluation of significance ratings relevant to climate change matters, these were poorly considered.	B
CS15	C	C	C	C	C	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS16	B	C	C	C	B	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS17	C	C	C	C	C	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS18	C	C	C	C	C	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
CS19	C	B	B	B	B	Climate change matters were generally considered, but the stakeholders relatively seem unaware of risks and opportunities	B

						hence these were not raised.	
CS20	C	C	C	C	C	This case study EIA report was also poorly documented and is considered sub-standard submission hence no climate change issues were picked during the review.	C
	B	C	C	C	B	Overall score	C

Scoring criteria: A = considered; B = generally considered; C = not considered.

Overall, 55% of the reviewed case studies did not consider climate change risk and opportunities as depicted on figure 5-1. Of the 45% case studies that considered the climate change issues, only 5% was full consideration whereas 40% was general consideration. Therefore the overall score rating for the reviewed twenty case studies is C, meaning majority of the case studies did not consider climate change (refer to Table 4-6).

Figure 5-1: Chart showing the overall results on the extent of to which climate change is considered on selected case studies in Gauteng Province.



To a large degree, climate change risks and opportunities are considered during the scoping process. The scoping process is often dubbed as a situational assessment, because it is where interested and affected parties provide inputs, define their vision, compile a detailed resource inventory, define critical issues, sustainability objectives, criteria and indicators, and also define environmental opportunities and constraints.

During the public participation process, stakeholders (authorities, public, developers, civic organisation, etc.) are not raising questions and comments relating to climate change issues and consultant are not asking relevant questions in order to obtain local knowledge. This is attributed to poor level of understanding on climate change risks and opportunities by the stakeholders. Key stakeholders such as developers and the authorities are also not influencing the consideration of climate change into EIAs mainly due to lack of appropriate knowledge. It is evident from the literature review that the

strongest demand for consideration of climate change comes from organised environmental groups in pro-active countries, which is not the case in Gauteng or in SA in general.

Surprisingly, the identified climate change risks and opportunities are not considered during the assessment and ratings of impact significance. Climate variability is also not considered to determine if the proposed development could withstand different extreme climate events. Mitigation measures relating to climate change impacts are generally considered based on the identified impacts during scoping process. These mitigation measures are generally integrated into the EMP for implementation during construction and operational phases of the development.

4.4 Challenges and opportunities

Climate change risks and opportunities are not fully integrated into the EIA process, regardless of whether it is a BA, Scoping and EIR. During the interviews and the distribution of questionnaires, different stakeholders raised various sentiments (whether real or perceived) in relation to the barriers and drivers for the uptake and improvement of the consideration of climate change issues during the EIA process. The reading of the literature on existing knowledge on the field helped to identify and relate the sentiments shared during the interviews on the barriers against the consideration of climate change issues during EIAs. Specific questions were asked in order to help understand the results obtained from the review of the case studies. The following are the main challenges noted from the analysis of the interview and questionnaire responses:

- Climate change is perceived to be a separate issue from the consideration of the possible environmental impact of a proposed development. The majority of responses from both the questionnaires (88%) and interviews (60%) expressed that *“climate change is currently not considered or addressed through the EIA process”* (Personal Communications, 2012a-c).
- Environmental assessment practitioners are concerned only with the actual impacts on the existing environmental settings e.g. the destruction of vegetation, the loss of local habitat, pollution of soil and water, cultural and heritage issues, socio-economic implications, etc. Responses, from the interviewed authorities in particular, felt that *“EAPs are not thinking outside the regulatory requirements box”* (Personal Communications, 2012b). Approximately 90% of the non-EAPs who were interviewed and responded to questionnaire no.10 (refer to Appendix

B); strongly felt that the reason why EAPs do not consider climate change in their assessment is due to “*lack of a bigger picture and the drive to move towards sustainability assessment*” (Personal Communications, 2012b).

- Climate change is seen as a global and regional issue which is caused on a macro-scale and will have impacts on a macro-scale rather at the development level. In response to questionnaire no. 21-22, 88% of respondents are not concerned about climate change phenomenon and indicate that “*scientists are scaring people for nothing*” and some expressed “*why should I worry about climate change?*” (Personal Communications, 2012a-c).
- Developers and project proponents are concerned about gaining approval for a development to proceed, and issues of sustainability are not on their agendas. Of four developers who were interviewed, all of them are not concerned about “*environmental or climate change issues but the prospects of getting positive approvals to do housing business*” (Personal Communications, 2012c).
- Case officers at municipality, provincial and national authority levels assigned to review EIA applications are mostly junior and inexperienced, and therefore do not ask relevant sustainability and climate change questions during the EIA processes.
- Climate change as a concept is still poorly understood and variably interpreted. This is evident from the responses received from 6 of 8 senior officials from the government authorities, who view climate change as “*extreme climate events such as floods, typhoons, earthquakes, and El Ninos which only occurs in other continents and not in Africa*”.
- Like developers, EAPs more often than not strive to address all the prescribed legislative requirements and focus less on add-on general sustainability matters. Majority of EAPs (60%) feels that EIA cannot address the impacts or maximise any possible opportunities relevant to climate change at project level. One example given that that “*for major projects like power stations, then climate change is relevant at that large scale development*” (Personal Communications, 2012a-c).

In terms of opportunities, the following were identified from the questionnaires and interviews:

- EIA process assists with flood determination and protection. Developers rated the issue of flooding very highly amongst other when they identify location for

housing development. Amongst the suggested mitigation measures, 30% of reviewed EMPs listed key components relating to flood protection; improve drainage system, natural retention of flood waters (flood plain restoration), restriction of building in risky areas (flood-prone and low lying), permeable surfacing, and improving insurance schemes on flood damages.

- There is an increased need for building adaptive capacity through provision of basic services to informal settlements as they are vulnerable to disasters. In order to determine the extent of this requirement, one EMP stated that mapping and modelling impacts and vulnerability should be pursued as part of adaptation measure and operational procedure.
- Improved urban management was also recommended on the EMPs to ensure continuous storm water drainage systems and control of urban-induced soil erosion. Urban land-use planning should consider the potential impacts of climate change.
- Stakeholders (100% of respondents to questionnaire no. 16) who are not from government believe that government authorities/ officials should take a lead in ensuring that climate change issues are considered during the EIA process.
- As identified in one of the EIA report case study, household fittings and furnishing should consider the following measures: use of renewable source of energy e.g. solar panels and external geysers, installation of energy efficiency lights (light emitting diodes), and clean and safe domestic energy appliances. This should be part of the process alternatives that an EIA should explore as per EIA Guideline Series (2012).

4.5 Conclusion

Twenty case studies from the CJMM and CTMM were analysed to determine the level of consideration of climate change risks and opportunities reflected in the EIA reports. The analysis was based on the pre-set criteria as outlined in Table 2.4. The analyses were grouped by the developed five criteria in order to get a true reflection of similarities and differences between case studies. The overall results indicate that climate change risks and opportunities are generally not considered during the EIA process (refer to figure 5-1). From the analysis, it is evident that key weakness areas are in relation to public participation, assessment, and impact significance. Key strength areas which generally consider climate change issues are scoping process and mitigation identification stage. The main drivers and barriers to such consideration were identified

through the distribution of questionnaires and conducting interviews. It became evident that there were notable examples where stakeholders in particular the authorities had actively participated and influenced the consideration of climate change issues during the EIA process.

The analysis further reveal that the main barriers to consideration of climate change issues relate to lack of explicit regulatory requirements on climate change, lack of awareness and understanding by the stakeholders. With regard to opportunities, there is a need to implement mitigation measures relating to flood protection, need for stakeholder capacity building, use of alternative planning tools to address climate change, and the alternatives to GHG reductions. The overall picture is that those involved in deliberating on housing development in Gauteng Province generally do not consider matters relating to climate change. It is also clear that there is a need to create an enabling regulatory framework which automatically triggers consideration of the risks and opportunities of climate change as integral part of the process. Recommendation to improve the consideration of climate change issues in EIA will be discussed in the following chapter.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter provides conclusions derived from the key research findings and recommendations are made for the consideration of future research. The chapter reflects on whether or not the research sub-questions were successfully answered, and also demonstrates that the goal of the research was achieved. That goal was:

To critically review the consideration of climate change risks and opportunities in EIAs within two selected metropolitan municipalities of Gauteng Province.

5.1 Summary of the results

The section below sets out the answers to each of the questions asked throughout the research:

Table 5-1: Summary of results in relation to the research questions

- To what extent does the legal context and policy framework for EIAs give guidance on the consideration of climate change issues?

SA is also party to international treaties on climate change and agreements on the reduction of GHG emissions, all of which should provide ammunition to stakeholders in the EIA process to be more aware of the risks and opportunities relating to climate change. In SA, there are various legal and policy frameworks that deal with a wide array of environmental issues. Principally, the Constitution of the Republic as the supreme law provides an overarching mandatory obligation with regard to sustainable environmental management. In addition there is NEMA, which establishes key enabling principles for the management of the environment and for the performance of EIAs. NEMA provides a number of principles that indirectly encourages the consideration of climate change in EIAs although the its Regulations (2010) do not provide any direct reference to climate change, which places SA a step behind other developing countries. Other key legislation provides mechanisms for the assessment of impacts in relation to sustainable development, of which climate change is construed to be one. In general, NEMA and other sectorial legislation should be used to define the EIA process and the key material issues to be pursued.

In the National Climate Change Response white paper, SA acknowledges that mainstreaming climate change considerations into social, economic and environmental policy would play a pivotal role in addressing and achieving the desired objectives of the government. It is further noted in the literature that due to the cross-cutting nature of the impacts of climate change, an effective response strategy would require the adoption of a national policy which directs that responses to the risks and opportunities of climate change be inscribed into the EIA decision-making process of all key development projects.

Apart from the NEMA and the Constitution, there is other environmental legislation that is key to the performance of EIAs in SA. Section 24 of the Constitution establishes an overarching obligation to engage in sustainable environmental management, the NEMAQA provides for the enforcement of the requirements for the reduction of GHG emissions, and the NWA recognises the need to protect water resources and acknowledges that climate change could exacerbate the national scarcity of water. There are also policies such as the white paper and strategy for responding to climate change, which provides sufficient grounds for EAPs to accept that each individual EIA can play a role in reducing GHG emissions.

- How best can climate change issues be considered in the EIA process within a South African context?

There is a great need to ensure that the current EIA guidelines and regulations are amended to be more specific with regard to climate change, so that inclusion of the consideration of the impacts of climate change is a requirement for certain developments and in certain places. South Africa is one of many countries worldwide that has taken steps to implement the global call to take sustainable development seriously and to mainstream climate change issues into policy. The government has enacted a collection of remarkable environmental legislation which seeks to achieve sustainable development, and the mitigation of the effects of climate change is one of the most important goals of such legislation. Like other countries in the world, SA needs to enact regulations which specifically direct that the issue of climate change be integrated into development EIAs, as is the case in most Asian countries. Though there are various provision in different legislation and EIA regulations that could be used to consider climate change in EIAs, these are not adequately used due to lack of explicit mention that most of the stakeholders are looking for. As noted during the literature review, the sub-processes of the EIA process makes provisions that can be used to address and consider climate change risks and opportunities. These areas include scoping of the potential impacts by including cumulative impacts and other sustainability issues. The

assessment and significance ratings can be used to thoroughly evaluate all the significant environmental impacts including the cumulative impacts. As part of the development of the mitigation control measures, adaptation and mitigation control for climate change would be easy to integrate into the EMPs and other management strategies.

- To what extent do EIAs for housing developments in the Gauteng Province consider climate change risks and opportunities?

EIAs for housing developments within Gauteng province do not consider climate change risks and opportunities. The drive for consideration of climate change requirements within EIA process is very weak at this stage, and this is mainly attributed to lack of explicit regulatory requirements and lack of awareness and understanding by the stakeholders. The results from the selected case studies reveals that at scoping stage, climate change risks and opportunities are generally identified. However, during the public participation process wherein various stakeholders have an opportunity to raise issues, climate change risks and related opportunities are not mentioned or raised for consideration into the EIA process. The identified climate change issues during scoping stage, are not adequately considered during assessment and rating of impact significance. This gap is related to lack of assessment of the cumulative impacts associated with the medium to long-term effects of the development. In the contrary, climate change risks and opportunities are then considered as part of the mitigation strategies. Out of the five key criteria used for review, climate change risks and opportunities are considered on two (scoping and mitigation) and not considered on three areas (public participation assessment, and impact significance). Overall, 55% of the reviewed case studies within Gauteng Province did not consider climate change risks and opportunities.

- What are the drivers (opportunities) and barriers (challenges) to improving the uptake and consideration of climate changes issues?

Climate change is seen as a separate issue from the development to which the EIA process relates. This flawed approach is exacerbated by the fact that EAPs are mostly concerned about the impacts of a development on the existing environmental surroundings, and not worried about cumulative regional and global implications. Hence, climate change is seen as a global and regional issue which is caused and will have impacts on a macro-scale rather at locally. Developers and project proponents are strongly interested in gaining positive approval of the proposed project, and climate change and other sustainability issues are irrelevant to them. The officials responsible for the review and approval of the EIAs lack

experience and understanding of macro-environmental issues such as climate change, and therefore do not direct EAPs or the EIA process to address and integrate such issues. EAPs and the authorities are focussing their attention on making sure that the current EIA regulations are addressed, and nothing more. Generally, the impacts of climate change are poorly understood and variably interpreted and as a result are not considered in the EIA process. There is acknowledgement from the literature (Byer and Yeomans, 2007; Gilder and Parramon, 2011; Sok et al, 2011; Summers and Lau, 2003; and Wende, 2011) and from the response results (88% questionnaire and 60% interview respondents) that lack of regulatory requirements which is explicit on climate change consideration is the main barrier. There are also several areas of opportunities that if explored could see massive drive and consideration of climate change into EIAs; this include changes to EIA regulations, inclusion of mitigation measures relating to extreme climate events, government-led capacity building, and consideration of alternatives on energy use for the housing developments.

5.2 Conclusion

Overall, the results show that climate change risks and opportunities are not adequately considered during EIAs for housing developments in the two selected municipalities in Gauteng Province. Key issues that influence the lack of consideration were identified, as well as the opportunities that should be pursued to ensure that climate change issues are an integral part of the EIA process. It can be concluded that climate change was generally not considered as part of the housing development EIA process within Gauteng Province. It is also clear that there is a need to create an enabling regulatory framework within which the EIA process automatically triggers consideration of the risks and opportunities.

It is an undeniable fact that each development, no matter how small or big scale it may be, contributes to GHG emissions in the atmosphere and ultimately contributes to climate change. Development projects can also be impacted by climate change. It is acknowledged that determining the significance of climate effects of a single project is problematic as the impacts are arguably negligible in global context. The current NEMA framework has particular principles (Section 2) that talks to the desire to reduce GHG so as to reduce negative environmental risks. Chapter 5 of NEMA also provides for an integrated environmental management, thereby ensuring that effects of activities on the environment are adequately considered. It is also clear from the research that there is a need for strong leadership from government and other stakeholders to resolve compelling need for consideration of climate change considerations during EIAs. Thus, the goal incorporating

climate change risks and opportunities within EIAs remains aspirational than operational. Through the research, it has become evident that EIA should be used as a tool to achieve our reduction targets and prevent the negative impacts of climate change.

5.3 Recommendations

It is evident that there are a number of challenges to be overcome for the EIA process to fully consider climate change issues. The following recommendations are made in relation to the identified challenges:

- The NEMA EIA Regulations require specific amendment to incorporate a clause on consideration of climate change. This consideration can be achieved explicitly by making specific provisions in the regulations;
- Urban land-use planning through Spatial Development Frameworks and Integrated Development Plan, should take into account the social-ecological systems and potential impacts of climate change when developing housing objectives;
- Stakeholders, in particular the general public and the authorities, should participate during public consultation processes and demand to know how the development is designed to reduce GHG emissions;
- EAPs should gather local knowledge and information regarding climate change in order to accurately assess the potential impacts and their significance;
- There is also a concomitant need to make substantial and long-term investments in the provision of climate change information, as well as establishing good communication mechanisms between the scientific community and practitioners;
- The finalisation of the establishment of a regulatory body for EAPs would ensure that only qualified and competent personnel undertake EIA work. This should eliminate shoddy reporting and poor environmental assessments;
- Government should exercise its responsibility to ensure the promotion of basic public awareness on emerging global environmental concerns such as climate change. The poor awareness level in SA is attributed to the fact that various government departments (national, provincial and local) are not fulfilling their outreach function;
- Government officials should be capacitated to be competent to review reports with regards to climate change risks and opportunities and other sustainable matters relating to developments; and
- Like in other countries, SA government should consider introducing guidelines on how to address climate change in EIA process.

5.3.1 Recommendations for further research

There is a need for further research to establish conclusively a way forward in terms of using EIA as an appropriate tool to address climate change. The following areas of interest surfaced during the study, and are therefore recommended for further research work:

- What are the other environmental management tools that are or could be used to address climate change issues?
- Could the relevance of climate change be analysed within the spatial, temporal, administrative and technical boundaries of the EIA?
- Investigate constraints to incorporate climate change considerations into land-use zoning planning for settlement and infrastructure development.
- How best to leverage opportunities from urban densification to build climate-resilient urban infrastructure?

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APPENDICES

Appendix A: List of used study cases relating to housing developments within CJMM and CTMM.

No	Description	Report type	Metropolitan Area	Year
1	Township development in Monavoni Extension 43	BA	City of Tshwane	2011
2	Township development in Monavoni Extension 49	BA	City of Tshwane	2009
3	Township development in Witkoppies Extension	Scoping	City of Tshwane	2011
4	Residential Development in Mnandi Extension 4	Scoping	City of Tshwane	2011
5	Township establishment in Knopjeslaagte portion 20 & 21	EIA	City of Tshwane	2010
6	Mahube Valley Extension 15 Housing Development	Scoping	City of Tshwane	2011
7	Riverbend Extension 1 Township Development	BA	City of Tshwane	2012
8	Riamapark Extension 126 Development	BA	City of Tshwane	2011
9	Erasmia Housing Development Project	Scoping	City of Tshwane	2011
10	Township establishment in Orchards Extension 76 & 77	EIA	City of Tshwane	2011
11	Township establishment in Waterfall Fields	EIA	City of Johannesburg	2011
12	Establishment of Township with mixed developments in Ruimsig Extension 67	EIA	City of Johannesburg	2005
13	Aspen Lakes Township development	EIA	City of Johannesburg	2006
14	Mixed Land Use Township Establishment at Lion Park	EIA	City of Johannesburg	2006
15	Development of Rabie Ridge Extension 3 Residential Township	Scoping	City of Johannesburg	2005

16	Honeydew Manor Extension 16	EIA	City of Johannesburg	2005
17	Residential Development in Boksburg	BA	City of Johannesburg	2010
18	Doornvallei Phase 6 & 7 Housing Developments	BA	City of Johannesburg	2010
19	Housing development – Equestria Extension 242	BA	City of Johannesburg	2012
20	Lanseria Extension 53 Development	Scoping	City of Johannesburg	2011

Appendix B: Research questionnaire

Notes:

- The purpose of this questionnaire is to collect data for an academic research purposes.
- No name of respondent or development project will be included in the report.
- All responses shall be treated with strict confidentiality as individual views and not of the organization.
- Provision of respondent's personal details is not compulsory.

Research Area: Climate change risks and opportunities in Environmental Impact Assessments	
Name of respondent	
Company	
Position	
Contact details	
Metropolitan Area	

DISPATCHED QUESTIONS

1. How well do you understand the concept of climate change risks and opportunities?

Excellent Good Fair Poor

2. How familiarised or knowledgeable are you with regard to the EIA process?

Excellent Good Fair Poor

3. How effective do you feel that EIA process considers and integrate climate change issues?

Very effective Effective Somewhat effective Not effective

4. As a role player (stakeholder) in the EIA process, how effective are you in participating for/ proposing the consideration or assessment of climate change issues in housing development?

Very effective Effective Somewhat effective Not effective

5. How important do you think that the issue of climate change affect the development of housing projects?

Very important Important Fairly important Not important

6. Do you view EIA as an appropriate tool to address issues relating to climate change more in particular for housing developments?

Strongly Agree Agree In between Disagree

7. To what extent do you think EIA can potentially address climate change risks and maximise positive opportunities?

Very large degree Large degree Minimal None

8. Apart from the risks and opportunities, what other climate change concerns/ issues do you think should be considered as part of environmental assessments?

9. Do you think housing developers considers climate change issues during planning/ design phase of projects?

Strongly Agree Agree In between Disagree

10. Do you think Environmental Assessment Practitioners considers climate change issues during the EIA process?

Strongly Agree Agree In between Disagree

11. Do you think the general public/ communities are aware of the risks that climate change poses to poorly developed houses?

Strongly Agree Agree In between Disagree

12. Do you think the general public are aware of the climate change related opportunities that can be pursued to improve the sustainability of the housing developments?

Strongly Agree Agree In between Disagree

13. In your opinion, what are the three biggest challenges that hinder the consideration of climate change risks and opportunities during EIA process?

14. In your opinion, what are the three biggest opportunities that can be improving the consideration of climate change risks and opportunities during EIA process?

15. In your view, how strongly does the EIA regulatory framework provide the support for effective analysis of the climate change risk and opportunities?

Strong support Moderate support Very little support Poor/ No support

16. In your opinion, who should take the lead to ensure that climate change issues are considered during the EIA process and during design/ planning phases of the development?

EAPs Stakeholders Developers Authorities

17. Should targets for reduction of Green House Gases be set at a project level?

Strong support Moderate support Very little support Poor/ No support

18. Do you think that making specific provision in the EIA regulations would improve the consideration/ consideration of the climate change in environmental assessment process?

Strongly Agree Agree In between Disagree

19. Have you ever reviewed/ seen an EIA report/s for housing development/s in which climate change issues were adequately addressed?

Yes No

20. Are you aware of the National Climate Change White Paper and other key policies on climate change?

Yes No

21. As an individual, how concerned are you about the possibility of global climate changes and its impacts thereof?

Not concerned Slightly concerned Concerned Very concerned

22. When people talk of climate change, what kind of change do you think they are talking about, please mention three issues?

Appendix C: Interview schedule

No	Group	Designation	Date
1	Environmental Assessment Practitioners	Managing Director	May 2012
2	Environmental Assessment Practitioners	Associate/ Partner	August 2012
3	Environmental Assessment Practitioners	Senior Consultant	April 2012
4	Environmental Assessment Practitioners	Senior Consultant	May 2012
5	Environmental Assessment Practitioners	Senior Consultant	Feb 2012
6	Environmental Assessment Practitioners	Consultant	May 2012
7	Environmental Assessment Practitioners	Trainee/ Junior Consultant	April 2012
8	National Department of Environmental Affairs	Deputy Director – Environmental Impact Directorate	November 2012
9	Gauteng Department of Agriculture & Rural Development	Deputy Director – EIA Section	October 2012
10	Gauteng Department of Agriculture & Rural Development	Assistant Director – EIA Section	October 2012
11	City of Johannesburg	Deputy Director - Environment	May 2012
12	City of Johannesburg	Environmental Compliance Manager – ARP Projects	May 2012
13	City of Tshwane	Deputy Director – EIA Review	August 2012
14	City of Tshwane	Deputy Director – EIA Review	August 2012
15	City of Tshwane	Air Quality Specialist	May 2012
16	Housing Developer	Project Manager - Johannesburg	Feb 2012
17	Housing Developer	Project Manager - Johannesburg	September 2012
18	Housing Developer	Director – Pretoria	October 2012
19	Housing Developer	Development Agent - Pretoria	Feb 2012